



Grade 7

Skills Practice

TEACHER EDITION

Acknowledgment

Thank you to all the Texas educators and stakeholders who supported the review process and provided feedback. These materials are the result of the work of numerous individuals, and we are deeply grateful for their contributions.

Notice

These learning resources have been built for Texas students, aligned to the Texas Essential Knowledge and Skills, and are made available pursuant to Chapter 31, Subchapter B-1 of the Texas Education Code.

If you have further product questions or to report an error, please email openededucationresources@tea.texas.gov.



Grade 7

Skills Practice Guide

Welcome to the Skills Practice Guide for Secondary Mathematics, Grade 7

.....

Skills Practice Overview	FM-6
Structure and Alignment	FM-7
Best Practices for Implementation of Skills Practice on Learning Individually Days.....	FM-10
Preparing for Learning Individually with Skills Practice	FM-11
You Might Be Wondering	FM-12
Skills Practice Outline	FM-13

Skills Practice Overview

Deliberate practice is essential to build fluency in mathematics. The goal of Skills Practice is to ensure that students receive continual reinforcement that intentionally connects concepts within the TEKS and provides additional opportunity for review. This ongoing practice increases the likelihood that students will remember new information rather than just committing it to rote memory. Students benefit when teachers provide them with timely and descriptive feedback. Teachers should use this resource intentionally.



Skills Practice is used on Learning Individually days, which are scheduled within a topic by the teacher at their discretion. There are suggestions for when to schedule these days in the Topic Overviews. Generally, the Learning Individually days are recommended after every 2-4 days of Learning Together instruction. The goal is to target skills that students still need to practice and develop to achieve proficiency following a lesson, or set of lessons. This allows teachers to provide just-in-time learning and intervention.

Each section of Skills Practice includes Topic Practice, Extension, and Spaced Practice. The Topic Practice problem sets can contain topic aligned and/or interleaved practice sets that correspond to the lesson content. While most problem sets meet the TEKS on grade level, similar to the corresponding lesson, some problem sets incorporate prerequisite skills, while others provide opportunities for extension. For this reason, not all problems need to be assigned to all students. The teacher should intentionally assign specific problem sets to the class, small groups of students, and/or individual students based on data. Activities within the lesson correspond to Skills Practice problem sets and are identified in Skills Practice Alignment notes for teachers at point of use. Use the identified activities to determine how you will gather data and interpret student's mathematical strengths, weaknesses and/or gaps, and common misconceptions. Formative data collection may include the Talk the Talk activity, an exit ticket, student assignment performance, observation of class or small group discussions, and/or one-on-one conversations with students. The provided outline within this Skills Practice Guide will help in strategically selecting which problem sets and problems to assign their students. This allows teachers to personalize learning to meet student needs.

Structure and Alignment

Skills Practice

TOPIC 1 Circles and Ratio

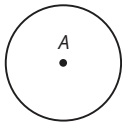
Name _____ Date _____

1 I. Exploring the Ratio of Circle Circumference to Diameter 2

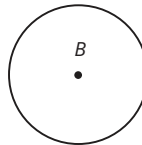
Topic Practice

A. Use a string and a centimeter ruler to measure the radius and circumference of each circle. Calculate the ratio of the circumference of the circle to its diameter.

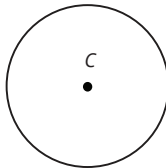
1.



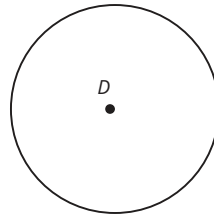
2.



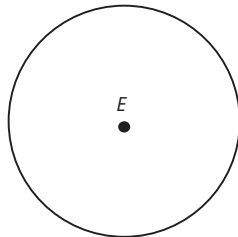
3.



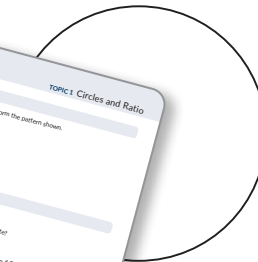
4.



5.

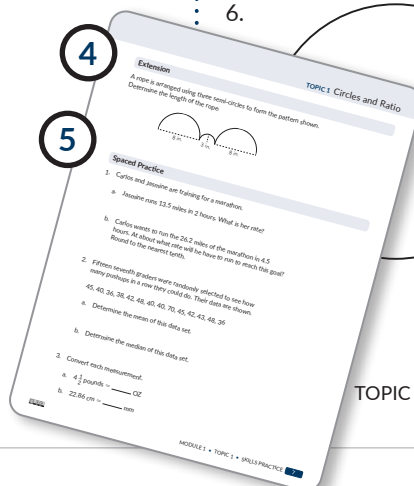


6.



4

5



TOPIC 1 • SKILLS PRACTICE 3

Skills Practice is organized into sections and problem sets.

1 The section number is aligned to the student lesson number of the topic.

2 The section title is named with the title of the corresponding student lesson.

3 Each section consists of one or more problem set(s) that are aligned to the TEKS within the lesson and/or topic. The problem sets are lettered, and directions are provided.

4 Each section includes an Extension for students who have demonstrated proficiency in grade-level content and skills and ready for a challenge.

5 Each section includes Spaced Practice for retrieving and reviewing skills. These problem sets can also be used as a diagnostic tool throughout the course to identify each student's proficiency level with the TEKS to make data-driven instructional decisions.

The TEKS-aligned Skills Practice is organized by topic for each course to align with the student lessons. Key features of the student and teacher's editions of Skills Practice are noted.

The teacher's edition of Skills Practice has the same structure as the student edition of Skills Practice with some additional features.

6 Topic-Aligned

Each problem set is aligned to the TEKS within the lesson and/or topic and is identified in the teacher's edition of Skills Practice. This section is labeled as Topic-Aligned. Topic-Aligned indicates that students are practicing with skills to build proficiency in the aligned TEKS.

7 Answer Key

In each problem set, the answer key is provided in-line with the problems. When answers vary, a sample answer is provided.

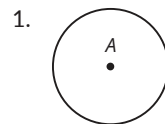
Name _____ Date _____

I. Exploring the Ratio of Circle Circumference to Diameter

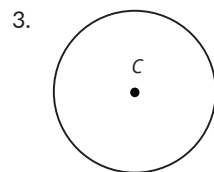
Topic Practice

- A. Use a string and a centimeter ruler to measure the radius and circumference of each circle. Calculate the ratio of the circumference of the circle to its diameter. **TEKS 7.8C (Topic-Aligned)**

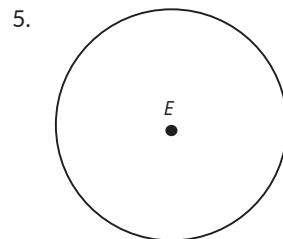
6



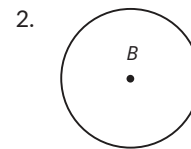
7 Answers will vary. The ratio should be ≈ 3.14 .



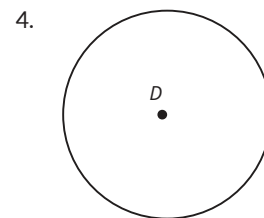
Answers will vary. The ratio should be ≈ 3.14 .



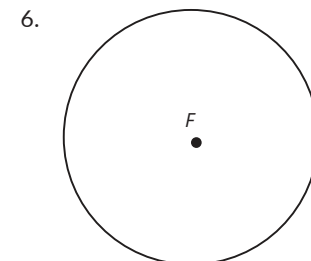
Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



V. Evaluating Algebraic Expressions

Topic Practice

- A. Define a variable and write an algebraic expression for each problem. Evaluate the expression for the given values.

9 **TEKS 7.3A (Interleaved Practice), TEKS 7.3B (Interleaved Practice), Prerequisite for TEKS 7.10A, Prerequisite for TEKS 7.11A** **8**

1. The charge for roller skating is \$3 for the skate rental and \$2 per hour to skate. How much will you pay if you skate for:

h = hours you skate

$$3 + 2h$$

- a. 2 hours?

\$7

- b. 4 hours?

\$11

- c. $3\frac{1}{2}$ hours?

\$10

2. A birthday party at the skating rink costs \$60 to reserve a party area and \$2.50 per guest for skating and skate rental. How much will a party cost if you invite:

g = number of guests invited

$$60 + 2.5g$$

- a. 8 guests?

\$80

- b. 15 guests?

\$97.50

- c. 40 guests?

\$160

3. You have \$20 to spend at the snack bar. All of the snacks at the snack bar cost \$1.25. How much money will you have left if you buy:

s = number of snacks bought

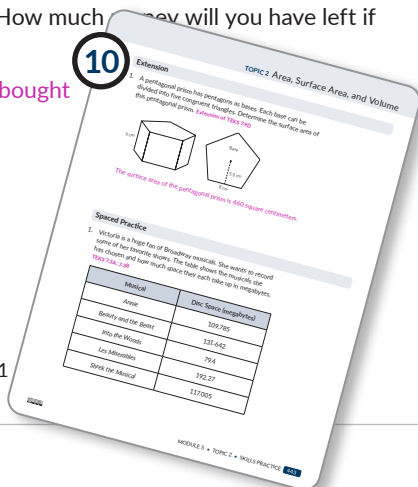
$$20 - 1.25s$$

- a. 2 snacks?

\$17.50

- c. 12 snacks?

\$5



8 Interleaved Practice

You will see TEKS within a Topic Practice section labeled as Interleaved Practice. Interleaved Practice indicates that students are practicing multiple skills together. Interleaved Practice requires students to examine the problem to choose a strategy. Interleaved Practice improves flexibility in applying learned skills by interleaving different types of problems.

9 “Prerequisite for TEKS” is the label for problem sets in which the necessary skills to achieve proficiency are foundational, aligned to the content of the corresponding student lesson, and scaffolded to the skills aligned to the grade-level TEKS. These problem sets should only be assigned when a student needs practice in a prerequisite skill prior to or concurrently with the TEKS it supports.

10 “Extension of TEKS” is the label for problem sets in which there are also skills that extend beyond the grade-level TEKS and are considered optional. These skills are included in Skills Practice because they do align with the extension portion of the corresponding student lesson and provide opportunities for enhanced learning.

Best Practices for Implementation of Skills Practice on Learning Individually Days

- Be intentional about grouping students to work on Skills Practice during Learning Individually days. Student groups need to be productive and not dependent on the teacher to make progress. Consider using small groups in a stations format. The teacher can be positioned at a specific station to facilitate small group instruction, or they can intentionally move around the room to observe student progress and assist small groups as needed.
- Encourage students to show their work and answer questions with complete sentences when appropriate. Complete sentences help students reflect on how they arrived at a solution, make connections between topics, and consider what a solution means both mathematically as well as in context. Having students show their work gives the teacher more information about what a student does and does not know. This can help teachers give specific feedback to students beyond telling them if their answer is correct or incorrect.
- As students work, actively monitor their progress. Provide additional support to those struggling with a problem set. Use questions to help students engage in productive struggle. To help prepare questions ahead of time, consider the Questions to Support Discourse from the Teacher's Implementation Guide for the corresponding lesson.
- Problems within a set are repetitive by design. Students do not necessarily need to complete all problems within a set. Consider assigning half the problems and then have students check their work. The teacher can give feedback and decide whether further practice is needed or whether students can move on to practicing another problem set.
- When all students have shown proficiency of the content for a particular lesson, consider not scheduling a Learning Individually day. When some students have shown mastery of the skills for a particular lesson, or have already completed the Skills Practice assigned to them, consider using those students as leaders of a specific group and/or station to help support their peers. This strategy helps students who need extra support while also developing the capacity of the students who provide assistance.

Preparing for Learning Individually with Skills Practice

Plan for a Learning Individually day just as you would plan for a Learning Together day. Use student data to strategically schedule the Learning Individually days. Keep in mind, the topic pacing guide reflects suggestions for the placement of Learning Individually days. Ultimately, the teacher decides when it makes the most sense to schedule these days based on student need.

Tips for Planning a Learning Individually Day

- Read through the Skills Practice Outline for the specific Topic Skills Practice you are planning.
- Determine which problem sets align with the activities in the corresponding student lesson.
- Using student data, select which problems to assign the class, small groups, and/or individuals so that all students are practicing targeted skills to develop proficiency.
- Begin class with a routine and have a warm-up or other activity to engage students in the learning.
- Set clear expectations for the structure of the Learning Individually day to maximize class time. Set up the classroom environment for stations or small groups, providing space for the teacher or student leaders to circulate around the room to support students.
- Pre-plan student groupings and determine which group(s) of students need the most targeted support.
- After students have been placed in small groups to begin working, determine the teacher's role for supporting students during this time. Some options are:
 - Circulate the room, monitoring small groups and stepping in to provide support as needed.
 - Lead a specific station to provide small group instruction.
- To keep from giving students answers, have questions prepared to help them when they get stuck. To help prepare questions, consider the Questions to Support Discourse from the Teacher's Implementation Guide for the corresponding lesson.
- When there are problem sets that the majority of students were assigned, take time to discuss these problems as a class. Select students to share their work and explain their thinking. Allow time for questions and discussion.
- Identify or create a closing activity, such as an exit ticket or a writing activity to reflect on progress.

You Might Be Wondering...

Can we use the Skills Practice in place of the Learning Together lesson?

No, Skills Practice should not be used in place of the Learning Together lesson. The core instructional resource for learning new concepts and skills is the Learning Together component. Research from books such as *How People Learn: Brain, Mind, Experience, and School: Expanded Edition* demonstrate and explain how learning is enhanced through socially supported interactions (National Research Council, 2000). Skills Practice provides students the opportunity to engage with problems that target each lesson's skills, concepts, and applications for development and proficiency. Individual practice is necessary for students to become fluent and build automaticity in a skill. A balance of these two components provides students with the opportunity to develop a deep conceptual understanding through collaboration with their peers, while demonstrating their understanding individually.

Do my students have to complete all Skills Practice problems?

No, students do not need to complete every problem or set in Skills Practice. The problem sets within a section of Skills Practice scaffold the concepts and skills from the corresponding lesson. While most problem sets meet the TEKS on grade level, similar to the corresponding lesson, some problem sets incorporate prerequisite skills, while others provide opportunities for extension. Student data may indicate students have already demonstrated proficiency of a particular skill. For these reasons, not all sections, problem sets, or individual problems need to be assigned to all students. The teacher should use student data to strategically assign specific problem sets to the class, small groups, and/or individual students.

Skills Practice Outline

1 Thinking Proportionally

TOPIC 1: Circles and Ratio

Section	Problem Set	TEKS
I. Exploring the Ratio of Circle Circumference to Diameter	A. Students use string and a ruler to measure the radius and circumference of circles, then calculate the ratio of the circumference to its diameter.	7.8C (Topic-Aligned)
	B. Students calculate circumference and write a ratio using the circumference to represent the value of π .	7.5B (Interleaved Practice) 7.9B (Interleaved Practice)
	C. Students complete a table by determining the radius, diameter, circumference, and ratio of circumference to diameter given the radius or diameter for different circles.	7.5B (Topic-Aligned)
	D. Students determine the circumference for problem situations.	7.9B (Topic-Aligned)
	Extension	(E) 7.9B
	Spaced Practice	(P)7.4A, (P)7.4E, (P)7.12C
II. Area of Circles	A. Students calculate the area of circles given a radius or diameter.	7.9B (Topic-Aligned)
	B. Students determine the circumference or area of circles for problem situations.	7.9B (Interleaved Practice)
	C. Students determine which size quesadillas offer the best buy based on given information. Given the diameters of different quesadillas, number of pieces per quesadilla, and the cost per quesadilla, students calculate the unit rate of cost per square inch of quesadilla.	7.4B (Topic-Aligned)
	Extension	(E)7.9B, (E)7.9C
	Spaced Practice	7.4B, 7.9B
III. Solving Area and Circumference Problems	A. Students answer questions about circumference, area, or parts of a circle for different problem situations.	7.9B (Interleaved Practice)
	B. Students determine the area of composite figures containing rectangles, squares, triangles, circles, and semi-circles.	7.9C (Topic-Aligned)
	Extension	(E) 7.9B , (E) 7.9C
	Spaced Practice	7.4B, 7.9B , (P) 7.9C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 2: Circles and Ratio

Section	Problem Set	TEKS
I. Unit Rate Representations	A. Students write unit rates for problem situations involving recipes and mixes. Then, students compare unit rates to answer questions.	7.4B (Interleaved Practice)
	B. Students complete partially completed tables following a proportional relationship. Then, they determine the unit rate for the relationship.	7.4B (Interleaved Practice)
	Extension	(E)7.4B
	Spaced Practice	7.9B, 7.9C
II. Solving Problems with Ratios of Fractions	A. Students determine the ratio of baby weight to adult weight for different animals, given a table of values where quantities may be given as mixed numbers or decimals. Then, they order the ratios from least to greatest.	7.4D (Topic-Aligned)
	B. Students rewrite given rates in problem situations as unit rates.	7.4B (Topic-Aligned)
	C. Students use unit rates to convert between measurement systems.	7.4E (Topic-Aligned)
	D. Students answer questions for problem situations by comparing unit rates. The unit rates they determine may involve fractions or decimals as the two quantities being compared.	7.4B (Interleaved Practice)
	E. Students solve real-world problems by setting up and solving a proportion.	7.4D (Topic-Aligned)
	Extension	(E)7.4E
	Spaced Practice	7.4A, 7.4B, 7.9B
III. Solving Proportions Using Means and Extremes	A. Students solve real-world problems by setting up and solving a proportion.	7.4D (Topic-Aligned)
	B. Students solve proportions written in fractional or colon form by using the means and extremes method.	7.4D (Topic-Aligned)
	C. Students use proportions to convert between measurement systems.	7.4E (Interleaved Practice)
	Extension	(E) 7.4D
	Spaced Practice	7.4B, 7.5B

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 3: Proportionality		
Section	Problem Set	TEKS
I. Proportional Relationships	A. Students determine whether the relationship between two data sets given in a table is proportional or not.	7.4C (Topic-Aligned)
	B. Students complete tables of values and identify graphs for given problem situations. Then, they determine whether the situation is linear or nonlinear and whether the situation is proportional or not proportional.	7.4A (Topic-Aligned)
	C. Students determine whether given relationships in words, tables, or graphs represent direct variations.	7.4C (Topic-Aligned)
	Extension	(E) 7.4D
	Spaced Practice	7.4B, 7.4D
II. Constant of Proportionality	A. Students determine the constant of proportionality for given problem situations and answer questions using the constant of proportionality.	7.4C (Interleaved Practice) 7.4D (Topic-Aligned)
	B. Students determine the constant of proportionality for given problem situations, then write a proportion using the constant of proportionality and rewrite the proportion as an equation in the form $y = kx$.	7.4A (Topic-Aligned) 7.4C (Topic-Aligned)
	C. Students use the equation for the constant of proportionality, $k = \frac{y}{x}$, to determine unknown values.	7.4C (Topic-Aligned)
	Extension	(E) 7.4D , 8.5E
	Spaced Practice	7.4A, 7.4B, 7.4D
III. Identifying the Constant of Proportionality in Graphs	A. Students determine whether given graphs represent proportional relationships. If so, they identify the constant of proportionality from the graph.	7.4C (Topic-Aligned)
	B. Students determine the constant of proportionality for given graphs and interpret its meaning in the context of the problem situation.	7.4A (Topic-Aligned) 7.4C (Topic-Aligned)
	C. Students determine the constant of proportionality using given tables of values. They use the tables to create a graph and write equations in the form $y = kx$.	7.4A (Topic-Aligned) 7.4C (Topic-Aligned)
	D. Students use multiple representations for proportional relationships to answer questions.	7.4A (Topic-Aligned) 7.4D (Topic-Aligned)
	Extension	(E) 7.4D
	Spaced Practice	(P)7.3A, 7.4B, 7.4C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

IV. Constant of Proportionality in Multiple Representations	A. Students graph proportional relationships given a problem situation and a table. Then, they write an equation that represent the proportional relationship in the form $y = kx$.	7.4A (Interleaved Practice) 7.4C (Interleaved Practice)
	Extension	(E) 7.4D , (E) 7.5C
	Spaced Practice	7.4C, 7.4D , 7.9B

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

2 Applying Proportionality

TOPIC 1: Proportional Relationships

Section	Problem Set	TEKS
I. Introducing Proportions to Solve Percent Problems	A. Students use strip diagrams and ratio tables to model real-world scenarios and answer questions about the problem situation.	7.4D (Topic-Aligned)
	B. Students write and solve a proportion to answer real-world problems.	7.4D (Topic-Aligned)
	C. Students solve real-world percent problems involving sales, rebates, and coupons.	7.4D (Topic-Aligned) 7.13F (Topic-Aligned)
	Extension	(E)7.13F
	Spaced Practice	6.7A , 7.4A, 7.4C
II. Calculating Tips, Commissions, and Simple Interest	A. Students answer percent questions using both a percent equation and a proportion.	7.4D (Topic-Aligned)
	B. Students write and solve equations in the form $y = kx$ to answer questions involving tip and commission.	7.4D (Topic-Aligned)
	C. Students calculate simple interest given the principal, interest rate, and time.	7.13E (Interleaved Practice) 7.13F (Interleaved Practice)
	Extension	(E) 7.4D , (E)7.13A
	Spaced Practice	7.4A , 7.4C, 7.4D
III. Sales Tax, Income Tax, and Fees	A. Students answer real-world percent problems involving sales tax.	7.4D (Topic-Aligned) 7.13A (Interleaved Practice)
	B. Students answer percent problems involving income tax.	7.4D (Topic-Aligned) 7.13A (Topic-Aligned)
	C. Students use a table of tax brackets and rates to solve problems involving federal income tax.	7.4D (Topic-Aligned) 7.13A (Topic-Aligned)
	Extension	(E)7.13A
	Spaced Practice	7.4B, 7.4C, 7.4D

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

IV. Percent Increase and Percent Decrease	A. Students determine percent increase and percent decrease for real-world problems.	7.4D (Topic-Aligned)
	B. Students solve real-world problems involving percent increase and decrease.	7.4D (Topic-Aligned)
	Extension	(E) 7.4D
	Spaced Practice	7.4C, 7.13A
V. Scale and Scale Drawings	A. Students solve real-world problems involving scale and scale models.	7.5C (Topic-Aligned)
	B. Students identify congruent corresponding angles and write ratios of proportional sides for pairs of similar triangles.	7.5A (Topic-Aligned)
	C. Students write and solve proportions to determine the lengths of unknown sides for pairs of similar triangles.	7.5A (Interleaved Practice) 7.5C (Interleaved Practice)
	D. Students solve problems involving scale and scale drawings.	7.5C (Topic-Aligned)
	Extension	(E) 7.5C
	Spaced Practice	7.4D , 7.4E

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 2: Financial Literacy: Interest and Budgets		
Section	Problem Set	TEKS
I. Simple and Compound Interest	A. Students determine the total value of an investment given the principal, interest rate, and time.	7.13E (Topic-Aligned)
	B. Students determine the simple interest rate given the principal, time, and simple interest earned.	7.13E (Topic-Aligned)
	C. Students calculate the compound interest earnings to determine the total value of an investment.	7.13E (Topic-Aligned)
	D. Students complete a table of values and answer questions to compare investing in a simple interest account and a compound interest account.	7.13E (Topic-Aligned)
	Extension	(E)7.13E
	Spaced Practice	7.8C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

II. Net Worth Statements	A. Students identify whether given items are liabilities or assets and explain their reasoning.	7.13C (Topic-Aligned)
	B. Students create net worth statements for given account information and determine the person's net worth.	7.13C (Interleaved Practice)
	Extension	(E)7.13C
	Spaced Practice	7.4D
III. Personal Budgets	A. Students answer questions given a circle graph representing a family budget.	7.4D (Topic-Aligned) 7.13B (Topic-Aligned) 7.13D (Interleaved Practice)
	B. Students determine the percent that given expenses represent of a family's total expenses.	7.4D (Topic-Aligned) 7.13B (Topic-Aligned) 7.13C (Interleaved Practice)
	C. Students create circle graphs to represent family budgets and expenses.	7.13B (Interleaved Practice) 7.13D (Topic-Aligned)
	Extension	(E) 7.4D , (E)7.13E
	Spaced Practice	7.4D

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

3 Reasoning Algebraically

TOPIC 1: Operating with Rational Numbers

Section	Problem Set	TEKS
I. Adding and Subtracting Rational Numbers	A. Students sketch a Venn diagram to show all the sets and subsets of numbers they know. Then, they use the diagram to answer true/false questions about the rational number system.	7.2A (Topic-Aligned)
	B. Students determine solutions to real-world problems involving operations with rational numbers.	7.3A (Interleaved Practice)
	C. Students estimate, then calculate, sums and differences of rational numbers.	7.3A (Interleaved Practice)
	Extension	(E)7.3A
	Spaced Practice	7.3A, 7.4B, 7.4C, 7.4D
II. Quotients of Integers	A. Students solve real-world problems requiring all four operations with rational numbers.	7.3A (Interleaved Practice) 7.3B (Interleaved Practice)
	B. Students calculate quotients of rational numbers.	7.3A (Topic-Aligned)
	Extension	(E)7.3A
	Spaced Practice	7.3A, 7.3B , 7.4D

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

III. Simplifying Expressions to Solve Problems	A. Students solve real-world problems involving operations with rational numbers.	7.3A (Interleaved Practice) 7.3B (Interleaved Practice)
	B. Students evaluate expressions with rational numbers for given values.	7.3A (Topic-Aligned) 7.3B (Topic-Aligned)
	Extension	(E) 7.11A
	Spaced Practice	7.3A
IV. Using Number Properties to Interpret Expressions with Signed Numbers	A. Students identify the number property used in a given equation.	(P) 7.3B
	B. Students use the commutative, associative, or distributive property to rewrite a numeric expression in simplest terms.	7.3A (Topic-Aligned) 7.3B (Topic-Aligned)
	Extension	(E) 7.3B , 8.10A, 8.10C
	Spaced Practice	7.3B , 7.4B, 7.4D
V. Evaluating Algebraic Expressions	A. Students define a variable and write an algebraic expression to represent a given problem situation. Then, they evaluate the algebraic expression for given values.	7.3A (Interleaved Practice) 7.3B (Interleaved Practice) (P)7.10A (P) 7.11A
	B. Students evaluate algebraic expressions for given values.	7.3A (Interleaved Practice) 7.3B (Interleaved Practice) (P)7.10A (P) 7.11A
	C. Students complete a table of values for algebraic expressions using given input values.	7.3A (Interleaved Practice) 7.3B (Interleaved Practice) (P)7.10A (P) 7.11A
	Extension	(E)7.3A
	Spaced Practice	7.3A, 7.4C
VI. Rewriting Expressions Using the Distributive Property	A. Students complete an area model for expressions involving the distributive property. Then, they rewrite the expressions in simplest terms.	7.3A (Interleaved Practice)
	B. Students evaluate algebraic expressions that involve the distributive property for given values.	7.3A (Topic-Aligned) 7.3B (Topic-Aligned) (P)7.10A (P) 7.11A
	C. Students rewrite algebraic expressions by factoring out the greatest common factor.	7.3A (Interleaved Practice)
	Extension	(E) 7.3B
	Spaced Practice	7.3A, 7.4C, 7.7A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 2: Two-Step Equations and Inequalities

Section	Problem Set	TEKS
I. Modeling Equations as Equal Expressions	A. Students write and solve two-step addition equations to solve real-world problems.	7.10A (Topic-Aligned) 7.11A (Topic-Aligned)
	B. Students write and solve two-step subtraction equations to solve real-world problems.	7.10A (Topic-Aligned) 7.11A (Topic-Aligned)
	C. Students write and solve two-step addition and subtraction equations to solve real-world problems.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	Extension	(E) 7.11A
	Spaced Practice	7.3A, 7.3B, 7.4D
II. Solving Equations Using Algebra Tiles	A. Students analyze, and write equations to represent, pan balances.	7.11A (Interleaved Practice)
	B. Students write equations to represent diagrams of algebra tiles.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	C. Students model and solve equations using algebra tiles.	7.11A (Interleaved Practice)
	Extension	(E) 7.11A
	Spaced Practice	7.4D , 7.13B
III. Solving Equations on a Double Number Line	A. Students solve two-step equations using double number lines.	7.10B (Topic-Aligned) 7.11A (Interleaved Practice)
	B. Students solve more two-step equations using double number lines.	7.10B (Topic-Aligned) 7.11A (Interleaved Practice)
	Extension	A.8A , (E) 7.11A
	Spaced Practice	7.3A, 7.3B , 7.10A, 7.11A
IV. Using Inverse Operations to Solve Equations	A. Students determine whether given values make an equation true.	7.11B (Interleaved Practice)
	B. Students solve one- and two-step equations and graph their solution on a number line.	7.10B (Interleaved Practice) 7.11A (Interleaved Practice)
	C. Students write and solve equations related to real-world situations. Then, they verify their solutions.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice) 7.11B (Interleaved Practice)
	D. Students write real-world situations that can be modeled by given equations.	7.10C (Topic-Aligned)
	Extension	(E) 7.11A
	Spaced Practice	7.3A, 7.3B , 7.10B, 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

V. Using Inverse Operations to Solve Inequalities	A. Student create equivalent algebraic inequalities and algebra tile models and determine their solution.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	B. Students determine whether possible given solutions make an inequality true.	7.11B (Topic-Aligned)
	C. Students solve one- and two-step inequalities and graph their solution on a number line.	7.10B (Interleaved Practice) 7.11A (Interleaved Practice)
	D. Students write and solve inequalities to solve real-world problems. Then, they explain the solution set in terms of the situation.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	E. Students write real-world situations that can be modeled by given inequalities.	7.10C (Topic- Aligned)
	Extension	(E)7.10B, (E) 7.11A
	Spaced Practice	7.3A, 7.3B , 7.10B, 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 3: Multiple Representations of Equations		
Section	Problem Set	TEKS
I. Representing Equations with Tables and Graphs	A. Students identify independent and dependent quantities for given scenarios.	7.7A (Interleaved Practice)
	B. Students write and solve equations related to real-world problem situations.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	C. Students complete a table of values, create a graph, and write an algebraic equation to represent problem situations. Then, they answer questions using the representations.	7.7A (Topic-Aligned) 7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	Extension	(E) 7.7A
	Spaced Practice	7.3A, 7.10A, 7.11A , 7.11B
II. Building Inequalities and Equations to Solve Problems	A. Students determine the unit rate of change and write an equation to represent a given table of values.	7.4A (Interleaved Practice) 7.7A (Interleaved Practice)
	B. Students analyze graphs to estimate solution sets for given scenarios. Then, they write and solve an inequality that represents the problem situation.	7.10A (Interleaved Practice) 7.11A (Interleaved Practice)
	Extension	(E) 7.7A
	Spaced Practice	7.3A, 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

III. Using Multiple Representations to Solve Problems	A. Students analyze and create tables, graphs, and equations to represent real-world problem situations. They identify the independent and dependent variables, and determine the rate of change.	7.4A (Interleaved Practice) 7.7A (Topic-Aligned)
	B. Students write a problem situation that can be represented by a given table, graph, or equation.	7.4A (Topic-Aligned) 7.7A (Interleaved Practice) 7.10C (Interleaved Practice)
	Extension	A.3D, (E)7.10A
	Spaced Practice	7.4A, 7.4D, 7.10B, 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

4 Analyzing Populations and Probabilities

TOPIC 1: Introduction to Probability

Section	Problem Set	TEKS
I. Defining and Representing Probability	A. Students determine various probabilities related to randomly selecting a card from a deck.	7.6E (Interleaved Practice)
	B. Students determine various probabilities related to spinning and spinner. They determine the complement of each even and describe the relationship between each probability and its complement.	7.6E (Topic-Aligned)
	C. Students determine whether events are impossible, just as likely as unlikely, or certain to occur.	(P)7.6E
	Extension	(E)7.6E
	Spaced Practice	7.4A, 7.4D, 7.7A, 7.11A
II. Probability Models	A. Students construct a probability model for given situations. Then, they determine whether the model is a uniform or non-uniform probability model.	7.6I (Interleaved Practice)
	B. Students use a given probability model to answer questions.	7.6I (Topic-Aligned)
	C. Students create a probability model for a given situation and use the model to determine the probability of specific outcomes.	7.6I (Topic-Aligned)
	Extension	(E)7.6C, (E)7.6D
	Spaced Practice	7.3A, 7.3B , 7.6A, 7.6E, 7.7A , 7.10A, 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

III. Determining Experimental Probabilities of Simple Events	A. Students determine experimental probability for various situations given tally tables.	7.6I (Topic-Aligned)
	B. Students predict the probability of a specific outcome given spinners of various shapes and different sized sections.	7.6H (Topic-Aligned)
	C. Students are given probabilities of landing on specific colors of a spinner. They use the given probabilities and proportions to predict the frequency of landing on specific colors for different numbers of spins.	7.6D (Topic-Aligned)
	D. Students determine the percent error for certain situations given the experimental data.	7.6C (Topic-Aligned) 7.6D (Interleaved Practice) 7.6I (Interleaved Practice)
	Extension	(E) 7.6I
	Spaced Practice	7.3A, 7.6E, 7.6I , 7.7A , 7.10A, 7.11A
IV. Simulating Simple Experiments	A. Students conduct a described experiment, record results in a table, and use the data to determine experimental probability.	7.6B (Interleaved Practice) 7.6C (Interleaved Practice) 7.6I (Interleaved Practice)
	B. Students describe a simulation to model a given situation and then describe one trial.	7.6B (Topic-Aligned)
	Extension	(E)7.6C, (E)7.6D
	Spaced Practice	7.3A, 7.6C, 7.6D, 7.10A, 7.11A , 7.13C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 2: Compound Probability		
Section	Problem Set	TEKS
I. Using Arrays to Organize Outcomes	A. Students determine the sample space for an experiment, conduct the experiment, record their results, and calculate experimental probability as a fraction, decimal, and percent.	7.6A (Interleaved Practice) 7.6C (Interleaved Practice) 7.6I (Interleaved Practice)
	B. Students create an array to show the possible outcomes for an experiment. Then, they use the array to determine theoretical probability.	7.6A (Interleaved Practice) 7.6D (Interleaved Practice) 7.6I (Interleaved Practice)
	C. Students use a proportion to predict the number of times they would get a specific outcome given the theoretical probability and the number of times they spin the spinner.	7.6D (Interleaved Practice)
	Extension	(E)7.6D
	Spaced Practice	6.7D , 7.3A, 7.3B , 7.6B, 7.6C, 7.6I

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

II. Using Tree Diagrams	A. Students describe and conduct simulations for experiments. They construct tree diagrams and probability models, and calculate experimental and theoretical probabilities.	7.6A (Topic-Aligned) 7.6C (Interleaved Practice) 7.6D (Interleaved Practice)
	B. Students complete and analyze tree diagrams and probability models for compound events.	7.6A (Topic-Aligned) 7.6D (Topic-Aligned)
	Extension	(E)7.6D, (E) 7.6I
	Spaced Practice	7.4A , 7.4C, 7.6D, 7.6I
III. Determining Compound Probability	A. Students list all possible outcomes for compound events. Then, they determine the probability of compound events.	7.6A (Interleaved Practice) 7.6D (Topic-Aligned)
	B. Students determine compound probabilities for various situations.	7.6A (Interleaved Practice) 7.6D (Topic-Aligned)
	Extension	(E)7.6A, (E)7.6D, (E) 7.6I
	Spaced Practice	7.3A, 7.6A, 7.6D, 7.6I , 7.13D
IV. Simulating Probability of Compound Events	A. Students describe a simulation for a compound event. They describe one trial, conduct the simulation, record results, determine experimental probability from the simulation results, and make a prediction.	7.6B (Interleaved Practice) 7.6C (Topic-Aligned) 7.6D (Topic-Aligned)
	B. Students use given data to predict the likelihood of an event. Then, they use a random number table to conduct a simulation, record results, and answer questions about the simulation.	7.6B (Interleaved Practice) 7.6C (Topic-Aligned) 7.6D (Topic-Aligned)
	Extension	(E)7.6B
	Spaced Practice	7.6B, 7.6D, 7.6I , 7.11A

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 3: Drawing Inferences		
Section	Problem Set	TEKS
I. Collecting Random Samples	A. Students determine whether survey results are a parameter or a statistic.	(P)7.6F
	B. Students determine whether data collected in a survey represent a census or a sample.	(P)7.6F (P)7.12B
	C. Students determine whether given samples are random and explain their reasoning.	7.6F (Interleaved Practice) 7.12B (Interleaved Practice)
	D. Students use a random number table to select students at random from a class list.	7.6B (Interleaved Practice) 7.6F (Interleaved Practice) 7.12B (Interleaved Practice)
	Extension	(E)7.6F, (E)7.12B
	Spaced Practice	7.6A, 7.6B, 7.6C, 7.6D, 7.6I , 7.11A
II. Using Random Samples to Draw Inferences	A. Students describe the distribution of comparative dot plots and determine the mean for the data sets.	7.6F (Interleaved Practice) 7.12B (Interleaved Practice)
	B. Students use data from a sample class survey and a random number generator tool to determine the mean of different samples.	7.6B (Interleaved Practice) 7.6F (Topic-Aligned) 7.12B (Topic-Aligned)
	C. Students create a comparative dot plot for two data sets, describe the distribution, and determine the mean of each data set. Then, students make predictions using proportions.	7.6D (Interleaved Practice) 7.6F (Interleaved Practice) 7.12A (Interleaved Practice) 7.12B (Interleaved Practice)
	Extension	(E)7.12B
	Spaced Practice	7.3A, 7.3B , 7.6A, 7.6D, 7.6F, 7.6I , 7.12B
III. Bar Graphs	A. Students create bar graphs, double bar graphs, stacked bar graphs, and circle graphs based on given information. Then, they answer questions based on the graphs.	7.6G (Interleaved Practice) 7.12C (Interleaved Practice)
	B. Students analyze bar graphs, double bar graphs, stacked bar graphs, and circle graphs to answer questions about the data.	7.6G (Topic-Aligned)
	Extension	(E) 7.6G
	Spaced Practice	7.6D, 7.6I

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

IV. Comparing Two Populations	A. Students create a comparative dot plot given two data sets. Then, students describe the distribution, determine measures of center, and draw conclusions about the data.	7.6G (Interleaved Practice) 7.12A (Topic-Aligned)
	B. Students create a double stem-and-leaf plot for two data sets, describe the distribution, and determine the five-number summary for each data set. Then, they make comparisons and draw conclusions about the data.	7.6G (Topic-Aligned) 7.12A (Topic-Aligned)
	Extension	(E)7.12A
	Spaced Practice	7.3A, 7.6D, 7.6E, 7.6I , 7.12B
V. Using Random Samples from Two Populations to Draw Conclusions	A. Students analyze comparative dot plots to describe the distribution, determine the mean, compare shape and spread, determine measures of center, and draw conclusions about the data.	7.6F (Interleaved Practice) 7.12A (Topic-Aligned) 7.12C (Topic-Aligned)
	B. Students use five-number summaries to construct comparative box plots for two given data sets.	7.6F (Interleaved Practice) 7.12A (Interleaved Practice)
	C. Students analyze comparative box plots to describe the distribution, determine the median, compare shape and spread, determine measures of center, and draw conclusions about the data.	7.6F (Interleaved Practice) 7.12A (Topic-Aligned) 7.12C (Topic-Aligned)
	D. Students compare box plots and describe the variation.	7.6F (Interleaved Practice) 7.12A (Topic-Aligned)
	Extension	(E)7.12A
	Spaced Practice	7.3A, 7.3B, 7.6D, 7.6I , 7.13F

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

5 Constructing and Measuring

TOPIC 1: Angle Relationships

Section	Problem Set	TEKS
I. Solving Equations Using the Triangle Sum Theorem	A. Students determine the unknown measures in a triangle based on the Triangle Sum theorem.	7.11C (Topic-Aligned)
	B. Students write and solve an equation to determine an unknown angle measure of an isosceles triangle.	7.11C (Topic-Aligned)
	Extension	(E)7.11C
	Spaced Practice	7.2A, 7.6I , 7.11C, 7.12B

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

II. Relationships Between 90° and 180° Angles	A. Students use a diagram to answer questions involving relationships between 90° and 180° angles.	7.11C (Interleaved Practice)
	B. Students complete sketches given a description involving relationships between 90° and 180° angles.	7.11C (Interleaved Practice)
	C. Students determine the unknown angle measure for complementary or supplementary angles.	7.11C (Topic-Aligned)
	Extension	(E)7.11C
	Spaced Practice	7.6A, 7.6D
III. Special Angle Relationships	A. Students use a given diagram to answer questions about special angle relationships.	7.11C (Interleaved Practice)
	B. Students complete sketches given a description of special angle relationships.	7.11C (Interleaved Practice)
	C. Students determine unknown angle measures based on given information about angle relationships.	7.11C (Topic-Aligned)
	D. Students determine the value of x in given diagrams involving angle relationships.	7.11C (Topic-Aligned)
	Extension	(E)7.11C
	Spaced Practice	7.5A, 7.5C , 7.13E

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

TOPIC 2: Area, Surface Area, and Volume		
Section	Problem Set	TEKS
I. Composite Figures	A. Students calculate the area of shaded regions in composite figures.	7.9C (Topic-Aligned)
	B. Students calculate the area of composite figures containing triangles, squares, rectangles, parallelograms, and trapezoids.	7.9C (Interleaved Practice)
	Extension	(E) 7.9C
	Spaced Practice	7.6G , 7.6H , 7.9D, 7.10C
II. Total Surface Area of Prisms and Pyramids	A. Students sketch nets for a given prism or pyramid.	7.9D (Topic-Aligned)
	B. Students complete a table with characteristics of different prisms and pyramids.	7.9D (Topic-Aligned)
	C. Students determine the total surface area of a given figure using its net.	7.9D (Topic-Aligned)
	D. Students determine the total surface area of given prisms and pyramids based on diagrams of the figures.	7.9D (Topic-Aligned)
	E. Students determine the total surface area of two solid figures and answer questions comparing the two figures.	7.9D (Interleaved Practice)
	Extension	(E)7.9D
	Spaced Practice	7.3A, 7.3B , 7.12A , 7.12C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

III. Volume of Prisms and Pyramids	A. Students compare the base area and the volume of prisms and pyramids with the same shape and size base and same height.	7.8A (Topic-Aligned) 7.8B (Topic-Aligned)
	B. Students compare the base area and volume of rectangular and triangular prisms with bases of the same size and shape but with different heights.	7.8A (Topic-Aligned) 7.8B (Topic-Aligned)
	C. Students determine the volume of rectangular and triangular prisms and pyramids when given diagrams with dimensions labeled.	7.9A (Topic-Aligned)
	D. Students determine the volume of rectangular and triangular prisms and pyramids to solve real-world problems.	7.9A (Interleaved Practice)
	Extension	(E)7.8A
	Spaced Practice	7.11A
IV. Volume and Surface Area Problems with Prisms and Pyramids	A. Students determine the lateral area and total surface area of given figure using its net.	7.9D (Topic-Aligned)
	B. Students determine the lateral surface area of given prisms and pyramids using their nets.	7.9D (Topic-Aligned)
	C. Students determine the total surface area of given prisms and pyramids using their nets.	7.9D (Topic-Aligned)
	D. Students determine the surface area, volume, or lateral area of prisms and pyramids in real-world problems. Then, they explain how they determined which value to calculate on the given information.	7.9A (Interleaved Practice) 7.9D (Interleaved Practice)
	Extension	(E)7.9D, 8.7B
	Spaced Practice	7.9A , 7.11C

Bold TEKS = Readiness Standard (P) = Prerequisite for TEKS (E) = Extension of TEKS

Thinking Proportionally

TOPIC 1: Circles and Ratio

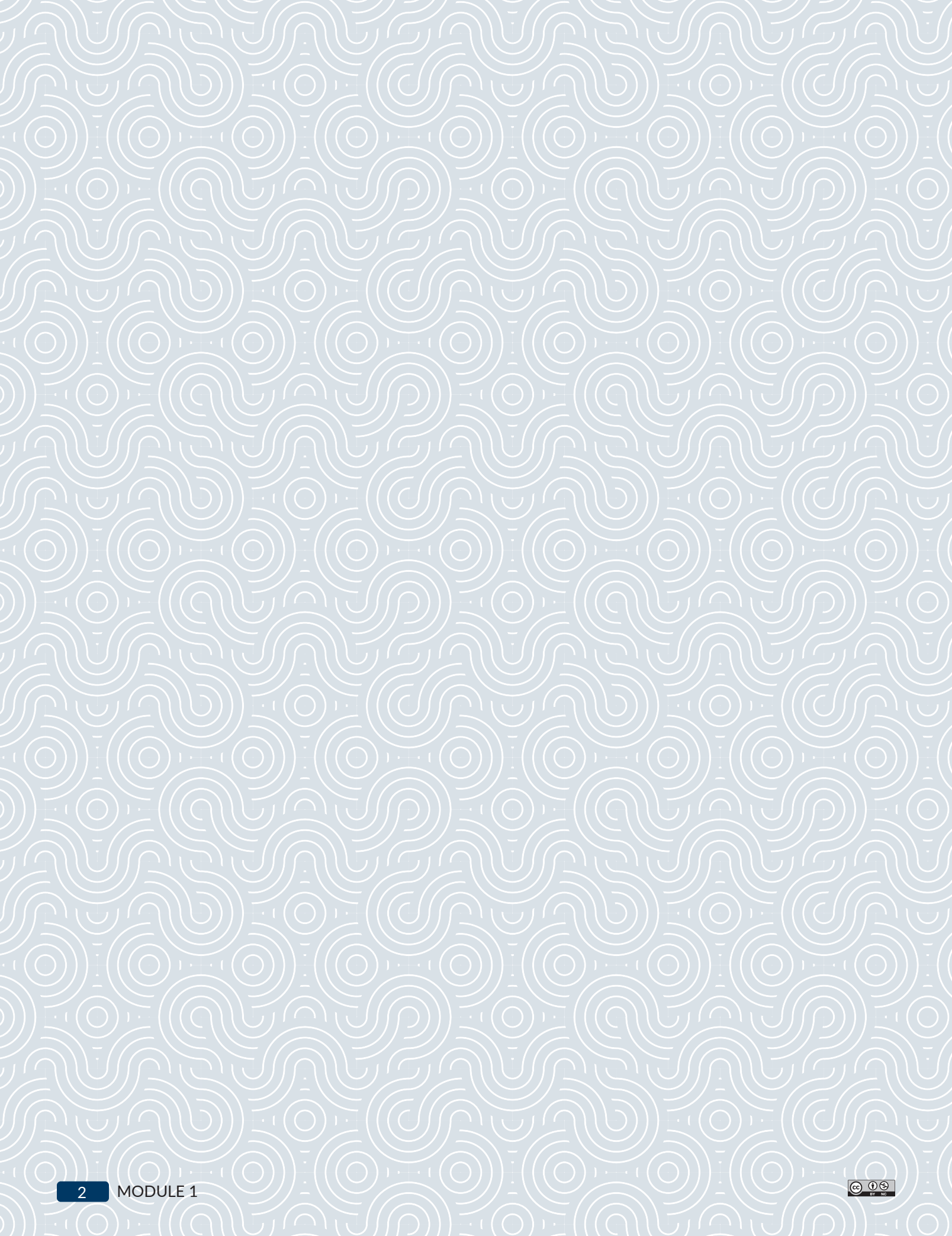
I. Exploring the Ratio of Circle Circumference to Diameter.....	3
II. Area of Circles	8
III. Solving Area and Circumference Problems	12

TOPIC 2: Fractional Rates

I. Unit Rate Representations	21
II. Solving Problems with Ratios of Fractions	26
III. Solving Proportions Using Means and Extremes	32

TOPIC 3: Proportionality

I. Proportional Relationships	37
II. Constant of Proportionality	48
III. Identifying the Constant of Proportionality in Graphs	57
IV. Constant of Proportionality in Multiple Representations	69

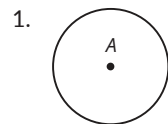


Name _____ Date _____

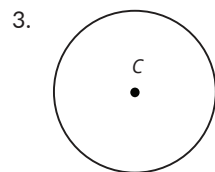
I. Exploring the Ratio of Circle Circumference to Diameter

Topic Practice

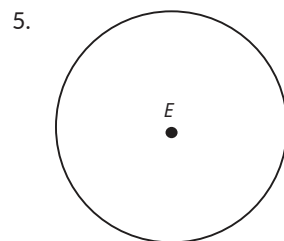
- A. Use a string and a centimeter ruler to measure the radius and circumference of each circle. Calculate the ratio of the circumference of the circle to its diameter. **TEKS 7.8C (Topic-Aligned)**



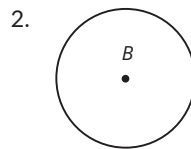
Answers will vary. The ratio should be ≈ 3.14 .



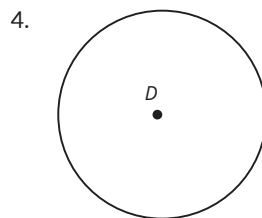
Answers will vary. The ratio should be ≈ 3.14 .



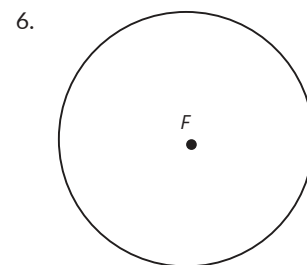
Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



Answers will vary. The ratio should be ≈ 3.14 .



Notes

TOPIC 1 Circles and Ratio

B. For each question, write a ratio that represents the value of π . For Questions 1 – 4, determine the circumference of the circle. Use 3.14 for π . TEKS 7.5B (Interleaved Practice), TEKS 7.9B (Interleaved Practice)

1. The circumference of a circle is C, and the diameter of the circle is 24.

$$\frac{C}{24}$$

Circumference: 75.36 units

2. The circumference of a circle is C, and the diameter of the circle is 9.2.

$$\frac{C}{9.2}$$

Circumference: 28.89 units

3. The circumference of a circle is C, and the radius of the circle is 7.

$$\frac{C}{14}$$

Circumference: 43.96 units

4. The circumference of a circle is C, and the radius of the circle is 1.2.

$$\frac{C}{2.4}$$

Circumference: 3.77 units

5. The circumference of a circular wall around a fountain is 5.65 meters, and the diameter of the wall is 1.8 meters.

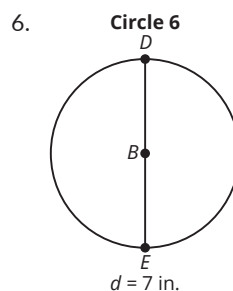
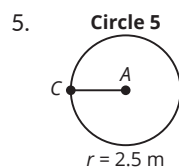
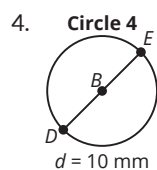
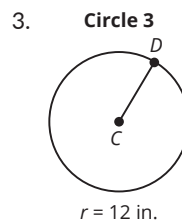
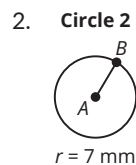
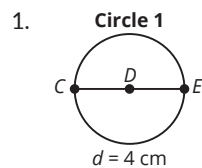
$$\frac{5.65}{1.8}$$

6. The circumference of a circle on a gym floor is 37.10 feet. The radius of the circle on the floor is 5.91 feet.

$$\frac{37.10}{11.82}$$

Notes

- C. Use the given information to complete the table. Use 3.14 for π .
Then verify that π is the ratio of the circumference to the diameter
for each circle. **TEKS 7.5B (Topic-Aligned)**



	Circle	Circumference	Radius	Diameter	$\pi = \text{Circumference} / \text{Diameter}$
1.	Circle 1	12.56 cm	2 cm	4 cm	$\pi = \frac{12.56}{4} = 3.14$
2.	Circle 2	43.96 mm	7 mm	14 mm	$\pi = \frac{43.96}{14} = 3.14$
3.	Circle 3	75.36 in.	12 in.	24 in.	$\pi = \frac{75.36}{24} = 3.14$
4.	Circle 4	31.4 mm	5 mm	10 mm	$\pi = \frac{31.4}{10} = 3.14$
5.	Circle 5	15.7 m	2.5 m	5 m	$\pi = \frac{15.7}{5} = 3.14$
6.	Circle 6	21.98 in.	3.5 in.	7 in.	$\pi = \frac{21.98}{7} = 3.14$



TOPIC 1 Circles and Ratio

Notes

D. Determine the circumference for each problem situation. Use 3.14 for π and round to the nearest hundredth, when necessary. **TEKS 7.9B (Topic-Aligned)**

1. Emily bought a new circular dining room table with a radius of 2 feet. She wants to decorate the outer edge of the table with wooden beads. What is the distance around the outer edge of the table?

$$C \approx (2)(3.14)(2) \approx 12.56$$

The distance around the outer edge of the table is about 12.56 feet.

3. Logan runs laps at the local high school. It is a circular track with a diameter of 44 feet. How far does he run after completing one lap?

$$C \approx (2)(3.14)(22) \approx 138.16$$

Logan runs about 138.16 feet after completing one lap.

5. A circus sets up a miniature train for children to ride. The circular track has a radius of 6 feet. How far will the train travel after one rotation on the track?

$$C \approx (2)(3.14)(6) \approx 37.68$$

The train travels approximately 37.68 feet after completing one rotation.

2. Sarah buys a circular mirror. She wants to decorate the mirror by gluing ribbon along the outer edge of the mirror. How long is the ribbon when the mirror has a 15 inch radius?

$$C \approx (2)(3.14)(15) \approx 94.2$$

The ribbon is about 94.2 inches long.

4. Avery is designing a platform for a local theater company. He plans to paint a red circle in the center of the platform, and he plans to outline the circle with black paint. When the circle has a diameter of 8 meters, how long is the black outline?

$$C \approx (3.14)(8) \approx 25.12$$

The distance around the outer edge of the table is about 25.12 meters.

6. Camilla takes her dog to the park on a 3-foot leash. Camilla stands in one spot and lets her dog run around her to play. What is the length of the boundary for the area where Camilla's dog can run around in?

$$C \approx (2)(3.14)(3) \approx 18.84$$

The length of the boundary is about 18.84 feet.

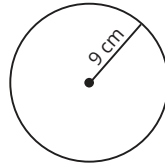
Notes

II. Area of Circles

Topic Practice

A. Calculate the area of each circle. Use 3.14 for π and round to the nearest hundredth, when necessary. TEKS 7.9B (Topic-Aligned)

1.



$$A \approx 3.14(9)^2$$

$$A \approx 3.14(81)$$

$$A \approx 254.34 \text{ cm}^2$$

3.



$$A \approx 3.14(11)^2$$

$$A \approx 3.14(121)$$

$$A \approx 379.94 \text{ in.}^2$$

5. A circle has a radius of 150 millimeters.

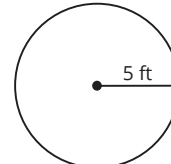
$$A \approx 3.14(150)^2$$

$$A \approx 3.14(22,500)$$

$$A \approx 70,650$$

The circle has an area of approximately 70,650 square millimeters.

2.

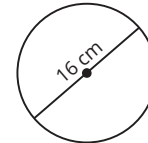


$$A \approx 3.14(5)^2$$

$$A \approx 3.14(25)$$

$$A \approx 78.5 \text{ ft}^2$$

4.



$$A \approx 3.14(8)^2$$

$$A \approx 3.14(64)$$

$$A \approx 200.96 \text{ cm}^2$$

6. A circle has a diameter of 60 feet.

$$A \approx 3.14(30)^2$$

$$A \approx 3.14(900)$$

$$A \approx 2826$$

The circle has an area of approximately 2826 square feet.

B. Determine the circumference or area for each problem situation. Use 3.14 for π and round your answer to the nearest hundredth, when necessary. **TEKS 7.9B (Interleaved Practice)**

1. Luna is buying a round backyard pool. The distance around the edge of the pool is 38 feet. Determine the area that the pool will cover.
The pool will cover about 114.93 square feet.
 2. Nahimana is digging a round flower garden in her backyard. She has 19 feet of rubber edging to place around the garden. What is the area of the new garden?
The new garden has an area of about 28.83 square feet.
 3. Isaiah is spreading mulch in a circle on top of an area where he has planted some seeds. He has enough mulch to cover an area that is 28.26 square feet. How much rubber edging does Isaiah need to encircle the mulch that will cover the seeds?
Isaiah needs 18.84 feet of rubber edging.
 4. Lucas is adding mulch to an existing round flower bed. The length of the rubber edging around the flower bed is 25.12 feet. What is the area that Lucas needs to cover with mulch?
The area that Lucas needs to cover with mulch is 50.24 square feet.
 5. Mason is decorating for a birthday party. He would like to add a paper streamer around the edge of a round table. The table covers an area of 12.56 square feet. What is the minimum length of the paper streamer Mason needs?
Mason needs at least 12.56 feet of the paper streamer.
 6. Sebastian is adding a mosaic pattern to the top of a small round table. The distance around the edge of the table top is 4.71 feet. What is the area that Sebastian needs to cover with the mosaic pattern?
The area that Sebastian needs to cover with the mosaic pattern is 1.77 square feet.

Notes



TOPIC 1 Circles and Ratio

Notes

C. Fiesta's Restaurant offers the following sizes of quesadillas. **TEKS 7.4B (Topic-Aligned)**

	Kids	Small	Medium	Large
Diameter	6 in.	8 in.	10 in.	12 in.
Pieces	4	6	8	10
Cost	\$3	\$5	\$6.25	\$7.50

Kayla is trying to determine which size offers the best buy. Determine the unit rate for each size of quesadillas. Use 3.14 for π and round to the nearest hundredth, when necessary.

1. Kids

$$A = (3.14)(3)^2 = 28.26 \text{ square inches}$$

$$3 \div 28.26 \approx \$0.11 \text{ per square inch}$$

2. Small

$$A = (3.14)(4)^2 = 50.24 \text{ square inches}$$

$$5 \div 50.24 \approx \$0.10 \text{ per square inch}$$

3. Medium

$$A = (3.14)(5)^2 = 78.5 \text{ square inches}$$

$$6.25 \div 78.5 \approx \$0.08 \text{ per square inch}$$

4. Large

$$A = (3.14)(6)^2 = 113.04 \text{ square inches}$$

$$7.50 \div 113.04 \approx \$0.07 \text{ per square inch}$$

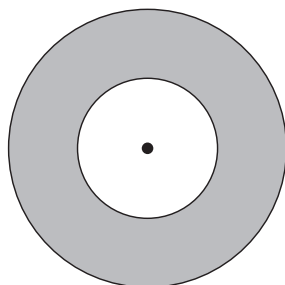
5. Which size quesadillas is the best buy? Explain your reasoning.

The Large size quesadilla is the best buy at \$0.07 per square inch.

6. What is the difference in cost between the unit rate of the most expensive size and the least expensive size?

The most expensive size costs \$0.11 per square inch and the least expensive size costs \$0.07 per square inch, so the difference is \$0.04 per square inch.

The radius of the small circle is 0.5 millimeter. The area of the large circle is 28.26 square millimeters. Calculate the area of the shaded region. **Extension of TEKS 7.9B and TEKS 7.9C**



The approximate area of the annulus is 27.475 sq mm.

Determine the circumference of each circle, given its radius or diameter. Use 3.14 for π and round to the nearest tenth. **TEKS 7.9B**

1. Radius: 4.5 cm
28.3 cm
2. Diameter: 12 ft
37.7 ft

Determine each unit rate. Round your answer to the nearest thousandth if necessary. **TEKS 7.4B**

- 75 square feet of tile for \$126
\$1.68 per square foot of tile or approximately 0.6 square foot of tile per dollar
- 420 miles in 6.5 hours
Approximately 64.615 miles per hour or approximately 0.015 hour per mile



Notes

III. Solving Area and Circumference Problems

Topic Practice

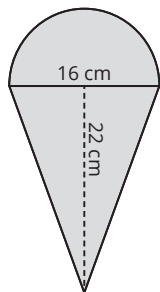
A. Solve each problem. Let $\pi = 3.14$. Round your answer to the nearest hundredth, when necessary. **TEKS 7.9B (Interleaved Practice)**

1. You need to replace the cover for a light in your bathroom. The light cover is a circle. The circumference of the light cover is 43.96 inches. What are the radius and diameter of the light cover? What is the area of the light cover?
 $r = 7 \text{ in.}, d = 14 \text{ in.}, A = 153.86 \text{ in.}^2$
2. You order a pizza for dinner. The circumference of the pizza is 31.4 inches. What are the radius and diameter of the pizza? What is the area of the pizza?
 $r = 5 \text{ in.}, d = 10 \text{ in.}, A = 78.5 \text{ in.}^2$
3. You are responsible for setting the table for dinner. Each place setting has a circular dinner plate. The circumference of the dinner plate is 37.68 inches. What are the radius and diameter of the dinner plate? What is the area of the dinner plate?
 $r = 6 \text{ in.}, d = 12 \text{ in.}, A = 113.04 \text{ in.}^2$
4. You collect coins. One of your favorite coins is a silver-colored coin showing a man's portrait. The radius of the coin is 12 millimeters. What is the diameter of the coin? What is the circumference of the coin? What is the area of the coin?
 $d = 24 \text{ mm}, C = 75.36 \text{ mm}$
 $A = 452.16 \text{ mm}^2$
5. You buy a new wheel for your bicycle. The diameter of the bicycle wheel is 22 inches. What is the radius of the bicycle wheel? What is the circumference of the bicycle wheel? What is the area of the bicycle wheel?
 $r = 11 \text{ in.}, C = 69.08 \text{ in.}$
 $A = 379.94 \text{ in.}^2$
6. Your friend orders a new cover for his round swimming pool. The area of the pool cover is 200.96 square feet. What are the radius and diameter of the pool cover? What is the circumference of the pool cover?
 $r = 8 \text{ ft}, d = 16 \text{ ft}, C = 50.24 \text{ ft}$

- B. Determine the area of each shaded region. Let $\pi = 3.14$. Round your answer to the nearest hundredth, when necessary.

TEKS 7.9C (Topic-Aligned)

1. A figure is composed of a triangle and a semicircle.



Area of the triangle:

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(16)(22) = 8(22) = 176$$

Area of the semicircle:

$$A = \frac{1}{2}\pi r^2$$

$$A = \frac{1}{2}\pi(8)^2 = \frac{1}{2}\pi(64) = 32\pi \approx 100.48$$

Area of the figure = Area of the triangle + Area of the semicircle

$$\approx 176 + 100.48$$

$$\approx 276.48$$

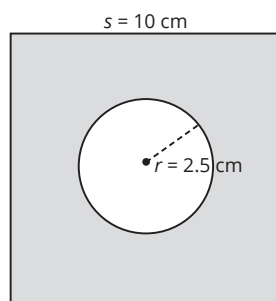
The area of the figure is approximately 276.48 square centimeters.

Notes

TOPIC 1 Circles and Ratio

Notes

2.



Area of the square:

$$A = s^2$$

$$A = (10)^2$$

$$A = 100$$

Area of the circle:

$$A = \pi r^2$$

$$A \approx (3.14)(2.5)^2$$

$$A \approx 19.63$$

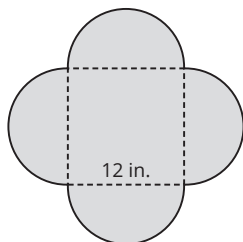
Area of the shaded region = Area of the square – Area of the circle

$$\approx 100 - 19.63$$

$$\approx 80.37$$

The area of the shaded region is approximately 80.37 square centimeters.

3. A figure is composed of a square and four semicircles.



Area of the square:

$$A = s^2$$

$$A = (12)^2 = 144$$

Area of one semicircle:

$$A = \frac{1}{2}\pi r^2$$

$$A = \frac{1}{2}\pi(6)^2 = \frac{1}{2}\pi(36) = 18\pi \approx 56.52$$

Area of the figure = Area of the square + Area of the semicircles

$$\approx 144 + 4(56.52)$$

$$\approx 144 + 226.08$$

$$\approx 370.08$$

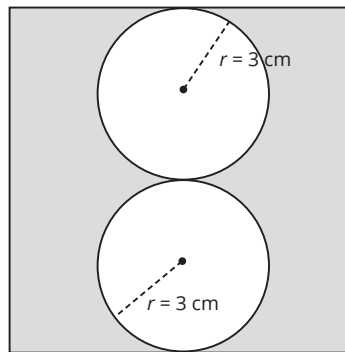
The area of the figure is approximately 370.08 square inches.

Notes

TOPIC 1 Circles and Ratio

Notes

4.



Area of the square:

$$s = 3 \cdot 4$$

$$s = 12$$

$$A = s^2$$

$$A = (12)^2$$

$$A = 144$$

$$\text{Area of both circles} \approx 2 \cdot 28.26$$

$$\approx 56.52$$

$$\text{Area of the shaded region} = \text{Area of the square} - \text{Area of the circles}$$

$$\approx 144 - 56.52$$

$$\approx 87.48$$

The area of the shaded region is approximately 87.48 square centimeters.

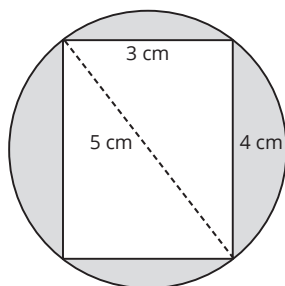
Area of one circle:

$$A \approx \pi r^2$$

$$A \approx (3.14)(3)^2$$

$$A \approx 28.26$$

5.



Area of the rectangle:

$$A = bh$$

$$A = (4)(3)$$

$$A = 12$$

Area of the circle:

$$r = \frac{d}{2}$$

$$r = \frac{5}{2}$$

$$r = 2.5$$

$$A = \pi r^2$$

$$A \approx (3.14)(2.5)^2$$

$$A \approx 19.63$$

Area of the shaded region = Area of the circle – Area of the rectangle

$$\approx 19.63 - 12$$

$$\approx 7.63$$

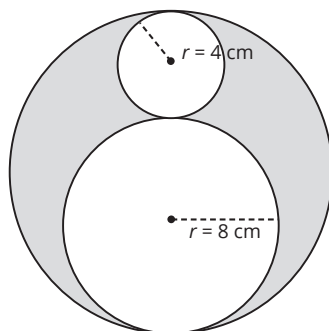
The area of the shaded region is approximately 7.63 square centimeters.

Notes

TOPIC 1 Circles and Ratio

Notes

6.



Area of the large circle:

$$d = 24$$

$$r = \frac{d}{2}$$

$$r = \frac{24}{2}$$

$$r = 12$$

$$A = \pi r^2$$

$$A \approx (3.14)(12)^2$$

$$A \approx 452.16$$

Area of the medium circle:

$$A = \pi r^2$$

$$A \approx (3.14)(8)^2$$

$$A \approx 200.96$$

Area of the small circle:

$$A = \pi r^2$$

$$A \approx (3.14)(4)^2$$

$$A \approx 50.24$$

Area of the shaded region = Area of the large circle – Area of the smaller circles

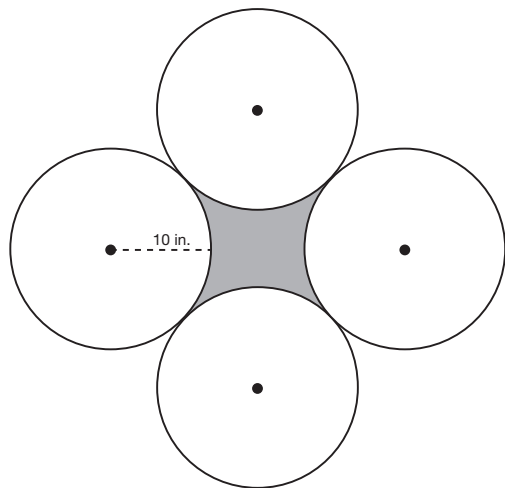
$$\approx 452.16 - (200.96 + 50.24)$$

$$\approx 200.96$$

The area of the shaded region is approximately 200.96 square centimeters.

Extension

1. Determine the area of the shaded region. All circles have the same radius of 10 inches. Use 3.14 for π . **Extension of TEKS 7.9B and TEKS 7.9C**



86 sq in.

Spaced Practice

Solve each problem. Round your answer to the nearest tenth, when necessary. Use 3.14 for π .

- Adriana is adding mulch to an existing round flower bed. The length of the rubber edging around the flower bed is 25.12 feet. What is the area that Adriana needs to cover with mulch? **TEKS 7.9B**

Approximately 50.2 ft²

2. Angelina is adding a mosaic pattern to the top of a small round table. The distance around the edge of the table top is 6.28 feet. What is the area that Angelina needs to cover with the mosaic pattern? **TEKS 7.9B**

Approximately 3.1 ft²



Notes

Notes

TOPIC 1 Circles and Ratio

Determine each area.

3. Area of a triangle with a base length of 4 in. and a height of 9 in. **Prerequisite for TEKS 7.9C**
18 sq in.

4. Area of a parallelogram with a base length of 2.9 ft and a height of 5.5 ft. **Prerequisite for TEKS 7.9C**
15.95 ft²

5. Area of a trapezoid with a top base length of 6 cm, a bottom base length of 12 cm, and a height of 5 cm. **Prerequisite for TEKS 7.9C**
45 cm²

Write a unit rate for each ratio.

6. $\frac{28 \text{ cm}}{4 \text{ square feet}}$ **TEKS 7.4B**
 $\frac{7 \text{ cm}}{1 \text{ square foot}}$

7. $\frac{5.15 \text{ yd}}{5 \text{ square feet}}$ **TEKS 7.4B**
 $\frac{1.03 \text{ yd}}{1 \text{ sq ft}}$



Name _____ Date _____

I. Unit Rate Representations

Topic Practice

A. Write a unit rate for each recipe or mix. Compare the unit rates to answer each question. **TEKS 7.4B (Interleaved Practice)**

1. Angelina and Gabriel are each making trail mix. Angelina's recipe calls for 3 parts raisins to 2 parts almonds. Gabriel's recipe calls for 4 parts raisins to 3 parts almonds. Which recipe has a higher concentration of almonds?

Angelina's recipe:

2 parts almonds : 3 parts raisins

The unit rate is $\frac{2}{3}$ parts almonds per 1 part raisins.

Gabriel's recipe:

3 parts almonds : 4 parts raisins

The unit rate is $\frac{3}{4}$ parts almonds per 1 part raisins.

$\frac{3}{4} > \frac{2}{3}$, so Gabriel's recipe has a higher concentration of almonds.

2. Nahimana and Jasmine are each making pineapple punch. Nahimana's recipe calls for 5 parts pineapple juice to 3 parts orange sherbet. Jasmine's recipe calls for 8 parts pineapple juice to 6 parts orange sherbet. Which recipe will have a stronger orange flavor?

Nahimana's recipe:

3 parts orange sherbet : 5 parts pineapple juice

The unit rate is $\frac{3}{5}$ parts orange sherbet per 1 part pineapple juice.

Jasmine's recipe:

6 parts orange sherbet : 8 parts pineapple juice

The unit rate is $\frac{3}{4}$ parts orange sherbet per 1 part pineapple juice.

$\frac{3}{4} > \frac{3}{5}$, so Jasmine's recipe has a stronger orange flavor.



TOPIC 2 Fractional Rates

Notes

3. Isaiah and Avery are each making Hawaiian snack mix. Isaiah's recipe calls for 5 parts dried pineapple to 2 parts macadamia nuts. Avery's recipe calls for 3 parts dried pineapple to 1 part macadamia nuts. Which recipe has a higher concentration of macadamia nuts?

Isaiah's recipe:

2 parts macadamia nuts : 5 parts dried pineapple

The unit rate is $\frac{2}{5}$ parts macadamia nuts per 1 part dried pineapple.

Avery's recipe:

1 part macadamia nuts : 3 parts dried pineapple

The unit rate is $\frac{1}{3}$ parts macadamia nuts per 1 part dried pineapple.

$\frac{2}{5} > \frac{1}{3}$, so Isaiah's recipe has a higher concentration of macadamia nuts.

4. Adriana and Mei are each making lemonade. Adriana's recipe calls for 4 parts lemon juice to 2 parts sugar syrup. Mei's recipe calls for 5 parts lemon juice to 3 parts sugar syrup. Which recipe has a stronger lemon flavor?

Adriana's recipe:

4 parts lemon juice : 2 parts sugar syrup

The unit rate is 2 parts lemon juice to 1 part sugar syrup.

Mei's recipe:

5 parts lemon juice : 3 parts sugar syrup

The unit rate is $1\frac{2}{3}$ parts lemon juice to 1 part sugar syrup

$2 > 1\frac{2}{3}$, so Adriana's recipe has a stronger lemon flavor.

Notes

5. Sarah and Camilla are each making snack mix. Sarah's recipe calls for 8 parts pretzels to 3 parts peanuts. Camilla's recipe calls for 6 parts pretzels to 2 parts peanuts. Which recipe has a higher concentration of peanuts?

Sarah's recipe:

3 parts peanuts : 8 parts pretzels

The unit rate is $\frac{3}{8}$ parts peanuts to 1 part pretzels.

Camilla's recipe:

2 parts peanuts : 6 parts pretzels

The unit rate is $\frac{1}{3}$ parts peanuts to 1 part pretzels.

$\frac{3}{8} > \frac{1}{3}$, so Sarah's recipe has a higher concentration of peanuts.

6. Mason and Lucas are each making a wildflower seed mix to plant in their gardens. Mason's mix calls for 8 parts poppy seeds to 5 parts daisy seeds. Lucas's mix calls for 10 parts poppy seeds to 8 parts daisy seeds. Which mix will produce a higher concentration of poppy flowers?

Mason's mix:

8 parts poppy seeds : 5 parts daisy seeds

The unit rate is $1\frac{3}{5}$ parts poppy seeds to 1 part daisy seeds.

Lucas's mix:

10 parts poppy seeds : 8 parts daisy seeds

The unit rate is $1\frac{1}{4}$ parts poppy seeds to 1 part daisy seeds.

$1\frac{3}{5} > 1\frac{1}{4}$, so Mason's mix has a higher concentration of poppy flowers.

B. Complete each table. Use the table to determine the unit rate.

TEKS 7.4B (Interleaved Practice)

1. Sebastian can read 12 pages of his book in 3 minutes.

Minutes	1	3	6	12
pages	4	12	24	48

Sebastian can read 4 pages per minute.

2. Carlos is delivering newspapers. In 2 hours he delivers 60 newspapers.

Newspapers	30	60	90	105
Hours	1	2	3	3.5

Carlos can deliver 30 newspapers per hour.



Notes

TOPIC 2 Fractional Rates

3. Valentina's new printer can print 10 photos in 5 minutes.

Photos	2	10	25	50
Minutes	1	5	12.5	25

Valentina can print 2 photos per minute.

4. Kayla is mixing blue paint and white paint to create a shade of light blue paint. She creates the shade she likes by mixing 12 ounces of blue paint with 8 ounces of white paint.

Blue paint (oz)	1.5	12	18	27
White paint (oz)	1	8	12	18

The light blue paint has 1.5 oz of blue paint per oz of white paint.

5. Luna is making fruit salad. The recipe calls for 3 cups of sliced peaches to 2 cups of halved grapes.

Peaches (c)	1.5	3	4.5	6
Grapes (c)	1	2	3	4

The recipe has 1.5 cups of peaches per cup of grapes.

6. Avery is stuffing envelopes. She stuffs 50 envelopes in 30 minutes.

Envelopes	25	50	100	200
Hours	0.25	0.5	1	2

Avery can stuff 100 envelopes per hour.

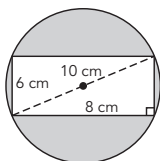
Extension

A line is graphed through points at (4, 5) and (8, 10). What is the ordered pair of the unit rate? **Extension of TEKS 7.4B**

(1, 1.25)

Spaced Practice

Use the circle shown to answer each question. Use 3.14 for π . Round to the nearest tenth.



1. Calculate the exact area of the circle. **TEKS 7.9B**
 25π sq cm
2. Calculate the circumference of the circle. **TEKS 7.9B**
31.4 cm
3. Determine the total area of the shaded regions. **TEKS 7.9C**
30.5 sq cm

Use 3.14 for π . Round to the nearest hundredth.

4. Gabriel's dog is on a leash that is 6 feet long. What is the approximate circular area of Gabriel's dog's play area? **TEKS 7.9B**
113.04 sq ft

Notes

Notes

II. Solving Problems with Ratios of Fractions

Topic Practice

- A. The table shows the weights of four different animals as adults and babies. **TEKS 7.4D (Topic-Aligned)**

Animal	Adult Weight (pounds)	Baby Weight (pounds)
Tiger	650	$2\frac{1}{2}$
Giraffe	3000	110
Polar Bear	750	1.3
Elephant	8000	200
Panda	190	0.2

Determine the ratio of baby weight to adult weight for each animal. Round to the nearest thousandth, when necessary.

1. Tiger
 $\frac{2\frac{1}{2}}{650} = 0.004$

3. Polar Bear
 $\frac{1.3}{750} = 0.002$

5. Panda
 $\frac{0.2}{190} = 0.001$

2. Giraffe
 $\frac{110}{3000} = 0.037$

4. Elephant
 $\frac{200}{8000} = 0.025$

6. Compare the ratios of baby weight to adult weight. List the animals in order from the least to the greatest ratio.
 Panda, polar bear, tiger, elephant, giraffe

B. Rewrite each given rate as a unit rate. TEKS 7.4B (Topic-Aligned)

1. A cell phone company mistakenly advertises that their data plan costs 50 cents for every 10 kilobytes of data. $\frac{5 \text{ cents}}{1 \text{ kilobyte}}$	2. A store advertises that 12-ounce sodas are 99 cents each. $\frac{8.25 \text{ cents}}{1 \text{ ounce}}$
3. A carnival game advertises 50 cents to toss 4 rings. $\frac{12.5 \text{ cents}}{1 \text{ ring}}$	4. At a yard sale, Mason sees a sign that advertises 85 cents for 5 books. $\frac{17 \text{ cents}}{1 \text{ book}}$
5. An office supply store is having a back-to-school sale and advertises in the local paper that pencils are 88 cents for 11. $\frac{8 \text{ cents}}{1 \text{ pencil}}$	6. A restaurant advertises that wings are 75 cents for 2 on Monday nights. $\frac{37.5 \text{ cents}}{1 \text{ wing}}$
7. A fast-food restaurant has a sign that says "5 chicken nuggets for 95 cents." $\frac{19 \text{ cents}}{1 \text{ nugget}}$	8. A recycling center claims to give 96 cents for every 12 aluminum cans turned in. $\frac{8 \text{ cents}}{1 \text{ can}}$

Notes



TOPIC 2 Fractional Rates

Notes

C. Convert each rate. TEKS 7.4E (Topic-Aligned)

- Convert the rate 5 feet per 3 seconds to yards per hour.

$$\begin{aligned}\frac{5 \text{ ft}}{3 \text{ sec}} \cdot \frac{3600 \text{ sec}}{1 \text{ hr}} &= \frac{18,000 \text{ ft}}{3 \text{ hr}} \\ &= \frac{6000 \text{ ft}}{1 \text{ hr}} \\ \frac{6000 \text{ ft}}{1 \text{ hr}} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} &= \frac{6000 \text{ yd}}{3 \text{ hr}} \\ &= \frac{2000 \text{ yd}}{1 \text{ hr}}\end{aligned}$$

The rate 5 feet per 3 seconds is equivalent to 2000 yards per hour.

- Convert the rate of 10 yards per 5 minutes to feet per hour.

$$\begin{aligned}\frac{10 \text{ yd}}{5 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} &= \frac{600 \text{ yd}}{5 \text{ hr}} \\ &= \frac{120 \text{ yd}}{1 \text{ hr}} \\ \frac{120 \text{ yd}}{1 \text{ hr}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} &= \frac{360 \text{ ft}}{1 \text{ hr}}\end{aligned}$$

The rate 10 yards per 5 minutes is equivalent to 360 feet per hour.

- Convert the rate of 12 pints per 15 minutes to quarts per hour.

$$\begin{aligned}\frac{12 \text{ pt}}{15 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} &= \frac{720 \text{ pt}}{15 \text{ hr}} \\ &= \frac{48 \text{ pt}}{1 \text{ hr}} \\ \frac{48 \text{ pt}}{1 \text{ hr}} \cdot \frac{1 \text{ qt}}{2 \text{ pt}} &= \frac{48 \text{ qt}}{2 \text{ hr}} \\ &= \frac{24 \text{ qt}}{1 \text{ hr}}\end{aligned}$$

The rate 12 pints per 15 minutes is equivalent to 24 quarts per hour.

- Convert the rate 1000 fluid ounces per 2 hours to cups per minute.

$$\begin{aligned}\frac{1000 \text{ fl oz}}{2 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} &= \frac{1000 \text{ fl oz}}{120 \text{ min}} \\ &= \frac{25 \text{ fl oz}}{3 \text{ min}} \\ \frac{25 \text{ fl oz}}{3 \text{ min}} \cdot \frac{1 \text{ c}}{8 \text{ fl oz}} &= \frac{25 \text{ c}}{24 \text{ min}} \\ &\approx \frac{1.04 \text{ c}}{1 \text{ min}}\end{aligned}$$

The rate 1000 fluid ounces per 2 hours is equivalent to approximately 1.04 cups per minute.

- Convert the rate of 48 feet per hour to inches per minute.

$$\begin{aligned}\frac{48 \text{ ft}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} &= \frac{48 \text{ ft}}{60 \text{ min}} \\ &= \frac{4 \text{ ft}}{5 \text{ min}} \\ \frac{4 \text{ ft}}{5 \text{ min}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} &= \frac{48 \text{ in.}}{5 \text{ min}} \\ &= \frac{9.6 \text{ in.}}{1 \text{ min}}\end{aligned}$$

The rate 48 feet per hour is equivalent to 9.6 inches per minute.

- Convert the rate of 48 ounces per 2 hours to pounds per day.

$$\begin{aligned}\frac{48 \text{ oz}}{2 \text{ hr}} \cdot \frac{24 \text{ hr}}{1 \text{ day}} &= \frac{1152 \text{ oz}}{2 \text{ days}} \\ &= \frac{576 \text{ oz}}{1 \text{ day}} \\ \frac{576 \text{ oz}}{1 \text{ day}} \cdot \frac{1 \text{ lb}}{16 \text{ oz}} &= \frac{576 \text{ lb}}{16 \text{ days}} \\ &= \frac{36 \text{ lb}}{1 \text{ day}}\end{aligned}$$

The rate 48 ounces per 2 hours is equivalent to 36 pounds per day.



D. Answer each question by comparing unit rates. TEKS 7.4B (Interleaved Practice)

1. Nahimana can type 40 words in half a minute. Sebastian can type 100 words in one and a half minutes. Which student can type at a greater rate of words per minute?

Nahimana: 80 words per minute;
Sebastian: $66\frac{2}{3}$ words per minute;
Nahimana types faster.

3. Sarah's home computer downloads a 7 megabyte program in $\frac{5}{6}$ minute. Parker's home computer takes $1\frac{1}{4}$ minutes to download a 9 megabyte program. Whose computer downloads at a greater rate of megabytes per minute?

Sarah's computer: $8\frac{2}{5}$ megabytes per minute; Parker's computer: $7\frac{1}{5}$ megabytes per minute; Sarah's computer downloads faster.

5. Mei drove 45 miles and used $3\frac{3}{4}$ gallons of gas. Luna drove 85 miles and used $5\frac{2}{3}$ gallons of gas. Which driver used fewer gallons of gas per mile?

Mei: $\frac{1}{12}$ gallon per mile;
Luna: $\frac{1}{15}$ gallon per mile;
Luna used fewer gallons of gas per mile.

2. Adriana takes $\frac{5}{12}$ hour to complete 50 math problems. Carlos is able to complete 48 math problems in $\frac{2}{5}$ hour. Which student can complete math problems at a greater rate of problems per hour?

Adriana: 120 problems per hour;
Carlos: 120 problems per hour;
Each student completes problems at the same rate.

4. Isaiah travels for $1\frac{1}{3}$ hours to visit a friend who lives $4\frac{1}{2}$ miles away. Diego travels $4\frac{1}{4}$ miles to visit a friend. It takes him $1\frac{1}{5}$ hours to get there. Who travels at a greater rate of miles per hour?

Isaiah: $3\frac{3}{8}$ miles per hour;
Diego: $3\frac{13}{24}$ miles per hour;
Diego travels faster.

6. Lucas baked $5\frac{1}{2}$ batches of cookies in one and one half hours. Jasmine baked $3\frac{1}{3}$ batches of cookies in $\frac{11}{12}$ hour. Which baker made cookies at a greater rate of batches per hour?

Lucas: $3\frac{2}{3}$ batches per hour;
Jasmine: $3\frac{7}{11}$ batches per hour;
Lucas made cookies at a greater rate of
batches per hour.

Notes

TOPIC 2 Fractional Rates

Notes

E. Solve each problem by setting up and solving a proportion. TEKS 7.4D (Topic-Aligned)

1. The human body is often drawn using specific ratios. The average height of an adult is drawn using 7 head lengths (the height of the head is $\frac{1}{7}$ the total height). When a person in a painting is 63 centimeters tall, how tall is the person's head?
9 centimeters
2. The Appalachian Trail is a 2,155-mile hiking trail in the Eastern United States. You plan to hike the section of the trail that is in New Jersey at a rate of 9 miles per day. When the hike will take you 8 days, what is the length of the trail in New Jersey?
72 miles
3. The average person breathes 35 pounds of air per day. At this rate, how many pounds of air will the average person breathe in seven days?
245 pounds
4. You are on a hockey team. Your time on the ice is 12 minutes per game. A season is twenty games. How many minutes do you play during the season?
240 minutes
5. In an hour, a jogger burns about 4 calories per pound of body weight. How many calories will a jogger who weighs 151 pounds burn in an hour?
604 calories
6. In the old British money system, 5 shillings was equal in value to 1 crown. Emily had 45 shillings. What was the value in crowns?
9 crowns

Extension

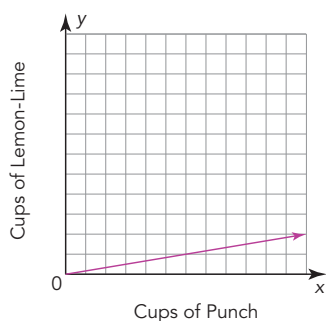
A scale model of a train is constructed at the ratio 1 : 87.1. If the scale model of a locomotive is 10.4712 inches long, how long is the actual locomotive in feet? **Extension of TEKS 7.4E**

Approximately 76 feet long

Spaced Practice

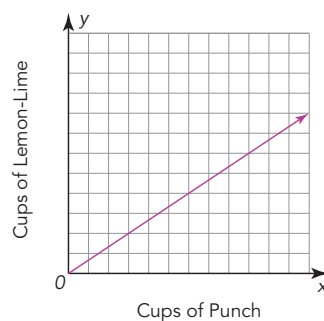
Determine each unit rate and graph each rate on the coordinate plane.

1. $\frac{3}{4}$ cup of punch to $\frac{1}{8}$ cup of lemon-lime
TEKS 7.4A, 7.4B



$\frac{1}{6}$ cup of lemon-lime per cup of punch

2. 1 cup of lemon-lime : $1\frac{1}{2}$ cups of punch
TEKS 7.4A, 7.4B



$\frac{2}{3}$ cup of lemon-lime per cup of punch

Answer each question. Use 3.14 for π . Round to the nearest hundredth.

3. The diameter of a circle is 4 cm. Determine the area of the circle. **TEKS 7.9B**
12.56 sq cm

4. The radius of a circle is 3 ft. Determine the circumference of the circle. **TEKS 7.9B**
18.84 ft

Notes



Notes

III. Solving Proportions Using Means and Extremes

Topic Practice

A. Solve each problem by setting up and solving a proportion. **TEKS 7.4D (Topic-Aligned)**

1. A football team won ten games out of sixteen of their games during the 2009 regular season. At this rate, how many games do they need to play to win 50 games?
80 games
2. The 18 wind turbines on a hill are enough to meet the electrical needs of all 6 houses on a city street. How many wind turbines are needed to meet the electrical needs of 26 houses?
78 wind turbines
3. Between 1990 and 2000, the population of New York City increased at a rate of 32 people every four hours. By how many people would the population have increased in 63 hours?
504 people
4. A local survey determined that 4 out of every 10 Internet users have downloaded music at some point. At this rate, out of 60 Internet users, how many have downloaded music?
24 users
5. The string that produces the lowest tone on a piano vibrates 87 times in 3 seconds. How many times would this string vibrate in 12 seconds?
348 times
6. A 10-ounce package of animal cookies costs \$2. What should a 35-ounce package cost, assuming the same cost per ounce?
\$7.00

Notes

B. Solve for each variable using the means and extremes method.

Round to the nearest hundredth, when necessary. TEKS 7.4D (Topic-Aligned)

1. $\frac{4}{28} = \frac{x}{35}$

$(28)(x) = (4)(35)$

$\frac{28x}{28} = \frac{140}{28}$

$x = 5$

2. $12 : 6 = 60 : x$

$(6)(60) = (12)(x)$

$\frac{360}{12} = \frac{12x}{12}$

$30 = x$

3. $560 : 80 = x : 300$

$(80)(x) = (560)(300)$

$\frac{80x}{80} = \frac{168,000}{80}$

$x = 2100$

4. $\frac{41}{282} = \frac{7}{x}$

$(282)(7) = (41)(x)$

$\frac{1974}{41} = \frac{41x}{41}$

$48.15 \approx x$

5. $\frac{39}{9} = \frac{x}{2}$

$(9)(x) = (39)(2)$

$\frac{9x}{9} = \frac{78}{9}$

$x \approx 8.67$

6. $74 : 31 = 2 : x$

$(31)(2) = (74)(x)$

$\frac{62}{74} = \frac{74x}{74}$

$0.84 \approx x$

7. $\frac{x}{3} = \frac{1351}{7}$

$(3)(1351) = (x)(7)$

$\frac{4053}{7} = \frac{7x}{7}$

$579 = x$

8. $26 : x = 117 : 9$

$(x)(117) = (26)(9)$

$\frac{117x}{117} = \frac{234}{117}$

$x = 2$



TOPIC 2 Fractional Rates

Notes

C. Use the given information to answer each question. TEKS 7.4E (Interleaved Practice)

1. Camilla drove 175 miles to visit her grandparents. How many kilometers did she travel?

$$\frac{175 \text{ mi}}{x \text{ km}} = \frac{1 \text{ mi}}{1.61 \text{ km}}$$

$$(175)(1.61) = (x)(1)$$

$$281.75 = x$$

$$175 \text{ mi} = 281.75 \text{ km}$$

Camilla traveled 281.75 kilometers.

3. Valentina is making dinner for her family. The recipe she is using calls for 0.5 kilogram of ground chicken. How many pounds of ground chicken does she need?

$$\frac{0.5 \text{ kg}}{x \text{ lb}} = \frac{1 \text{ kg}}{2.2 \text{ lb}}$$

$$(0.5)(2.2) = (x)(1)$$

$$1.1 = x$$

$$0.5 \text{ kg} = 1.1 \text{ lb}$$

Valentina needs 1.1 pounds of ground chicken.

5. Isaiah is going to compete in a 5000-meter race. How long is the race in yards?

$$\frac{5000 \text{ m}}{x \text{ yd}} = \frac{1 \text{ m}}{1.09 \text{ yd}}$$

$$(5000)(1.09) = (x)(1)$$

$$5450 = x$$

$$5000 \text{ m} = 5450 \text{ yd}$$

The race is 5450 yards.

2. Parker weighs 165 pounds. What is his mass in kilograms?

$$\frac{165 \text{ lb}}{x \text{ kg}} = \frac{1 \text{ lb}}{0.45 \text{ kg}}$$

$$(165)(0.45) = (x)(1)$$

$$74.25 = x$$

$$165 \text{ lb} = 74.25 \text{ kg}$$

Parker has a mass of 74.25 kilograms.

4. Diego needs to refill his lawn mower gas tank. The tank holds 4.2 liters of gas. How many gallons of gas does the tank hold?

$$\frac{4.2 \text{ L}}{x \text{ gal}} = \frac{1 \text{ L}}{0.26 \text{ gal}}$$

$$(4.2)(0.26) = (x)(1)$$

$$1.092 = x$$

$$4.2 \text{ L} = 1.092 \text{ gal}$$

The tank holds 1.092 gallons of gas.

6. Kayla's favorite basketball player is 2.1 meters tall. How tall is Kayla's favorite basketball player in feet?

$$\frac{2.1 \text{ m}}{x \text{ ft}} = \frac{1 \text{ m}}{3.28 \text{ ft}}$$

$$(2.1)(3.28) = (x)(1)$$

$$6.888 = x$$

$$2.1 \text{ m} = 6.888 \text{ ft}$$

Kayla's favorite basketball player is 6.888 feet tall.



Extension

The word *four* has 4 letters, so the number-to-letter-count ratio for 4 is 1 : 1, or just 1. Are there any other numbers between 1 and 20 that have equal number-to-letter-count ratios? What are they? **Extension of TEKS 7.4D**

$\frac{1}{3}, \frac{2}{3}, \frac{3}{5}, 1, \frac{5}{4}, 2, \frac{7}{5}, \frac{8}{5}, \frac{9}{4}, \frac{10}{3}, \frac{11}{6}, 2, \frac{13}{8}, \frac{7}{4}, \frac{15}{7}, \frac{16}{7}, \frac{17}{9}, \frac{9}{4}, \frac{19}{8}, \frac{10}{3}$

There are no numbers with a 1 : 1 ratio. However, 6 and 12 have equal ratios (2), 9 and 18 have equal ratios ($\frac{9}{4}$), and 10 and 20 have equal ratios ($\frac{10}{3}$).

Spaced Practice

- The table shows the gallons filled in a pool over time. **TEKS 7.4B**

- Complete the table.

Number of Hours	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{5}{8}$
Gallons Filled	125	250	500	625

- Determine a unit rate for this situation.
1000 gallons per hour

- Pi is the ratio of what two measures of a circle? **TEKS 7.5B**

Pi is the ratio of the circumference of a circle to its diameter.

- Which is a better deal—a 16-inch diameter pizza for \$12.99 or an 8-inch diameter pizza for \$6? **TEKS 7.4B**

The 16-inch pizza is the better buy.

Notes



Notes

Handwriting practice lines on the left margin.



Name _____ Date _____

I. Proportional Relationships

Topic Practice

- A. Determine whether the relationship between the two data sets in each is proportional. **TEKS 7.4C (Topic-Aligned)**

1.

Data Set One	Data Set Two
5	3
30	18

The relationship is proportional
because $\frac{5}{3} = \frac{30}{18}$.

$$5(18) = (3)30$$

$$90 = 90$$

3.

Data Set One	Data Set Two
18	45
28	70

The relationship is proportional
because $\frac{18}{45} = \frac{28}{70}$.

$$18(70) = (45)28$$

$$1260 = 1260$$

2.

Data Set One	Data Set Two
25	35
45	50

The relationship is not proportional
because $\frac{25}{35} \neq \frac{45}{50}$.

$$25(50) \neq (35)45$$

$$1250 \neq 1575$$

4.

Data Set One	Data Set Two
279	45
434	70

The relationship is proportional
because $\frac{279}{45} = \frac{434}{70}$.

$$279(70) = (45)434$$

$$19,530 = 19,530$$



TOPIC 3 Proportionality

Notes

5.

Data Set One	Data Set Two
7	18
11	26

The relationship is not proportional
because $\frac{7}{18} \neq \frac{11}{26}$.

$$7(26) \neq (18)11$$

$$182 \neq 198$$

7.

Data Set One	Data Set Two
8	6
44	33

The relationship is proportional
because $\frac{8}{6} = \frac{44}{33}$.

$$8(33) = (6)44$$

$$264 = 264$$

6.

Data Set One	Data Set Two
33	4
110	13

The relationship is not proportional
because $\frac{33}{4} \neq \frac{110}{13}$.

$$33(13) \neq (4)110$$

$$429 \neq 440$$

8.

Data Set One	Data Set Two
15	108
20	144

The relationship is proportional
because $\frac{15}{108} = \frac{20}{144}$.

$$15(144) = (108)20$$

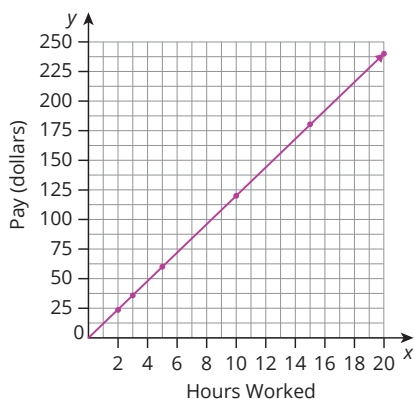
$$2160 = 2160$$

B. For each problem situation: TEKS 7.4A (Topic-Aligned)

- Complete the table of values.
- Complete the graph or identify the graph that matches the scenario in the table.
- Determine whether the situation is linear or non-linear.
- Determine whether the situation is proportional or not proportional.

1. Luna makes \$12 per hour at her job.

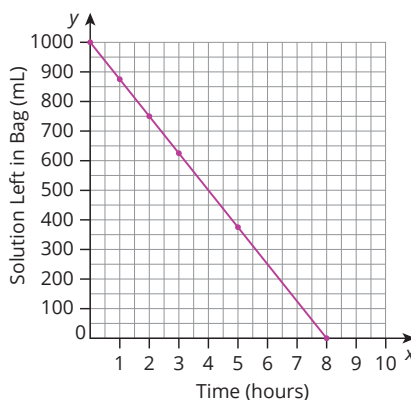
Hours Worked	Pay (dollars)
2	24
3	36
5	60
10	120
15	180
20	240



The problem situation is linear and proportional.

2. A patient receives an intravenous saline solution from a 1000-milliliter IV fluid bag. The solution is dispensed at a rate of 125 mL per hour.

Time (hours)	Solution Left in Bag (ml)
0	1000
1	875
2	750
3	625
5	375
8	0



The problem situation is linear and not proportional.

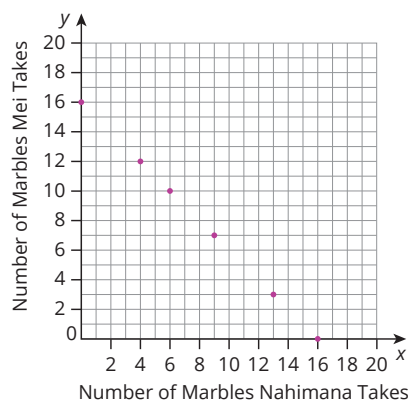


TOPIC 3 Proportionality

Notes

3. Nahimana and Mei must decide how to divide 16 marbles between themselves.

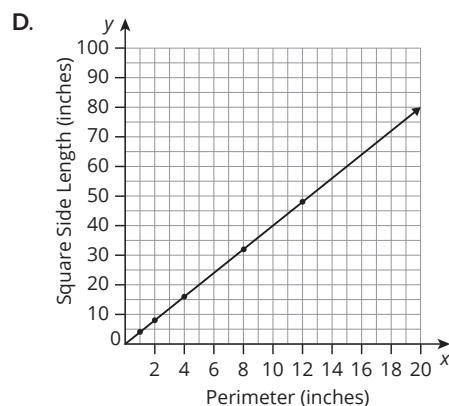
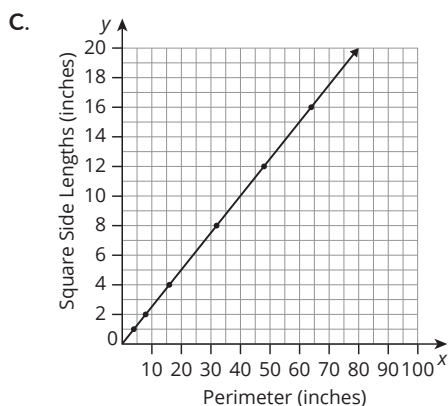
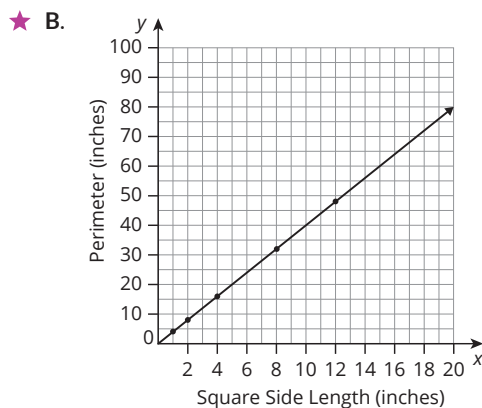
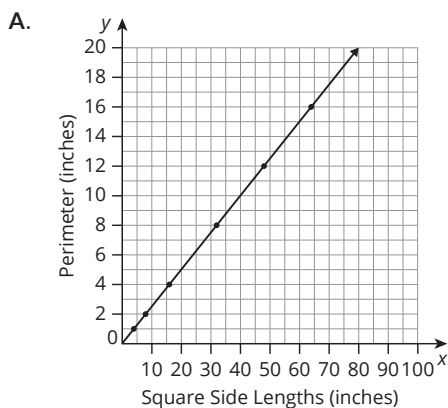
Number of Marbles Nahimana Takes	Number of Marbles Mei Takes
0	16
4	12
6	10
9	7
13	3
16	0



The problem situation is non-linear and not proportional.

4. The perimeter of a square is 4 times the length of one side.

Square Side Length (inches)	Perimeter (inches)
1	4
2	8
4	16
8	32
12	48
16	64



The problem situation is linear and proportional.



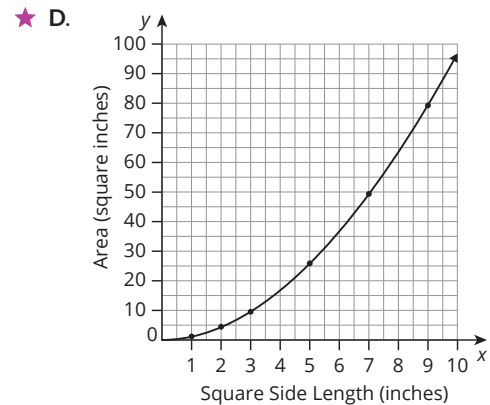
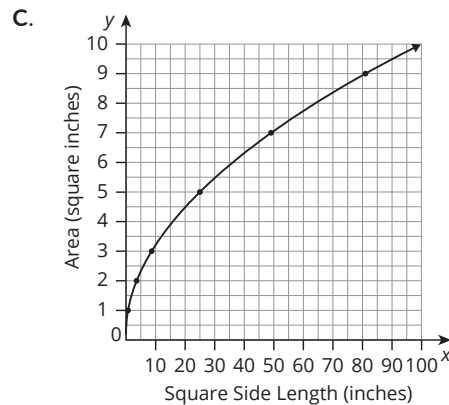
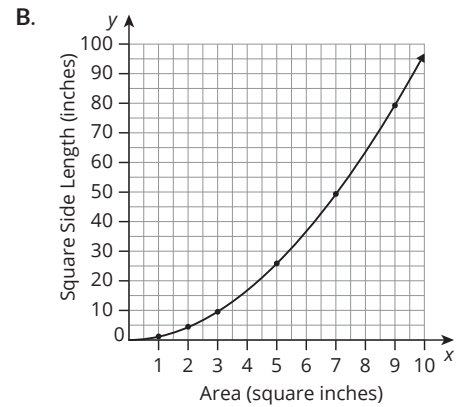
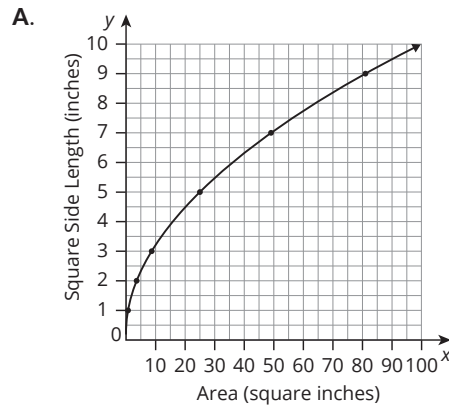
Notes

TOPIC 3 Proportionality

Notes

5. The area of a square is calculated by squaring the length of one side.

Square Side Length (inches)	Area (square inches)
1	1
2	4
3	9
5	25
7	49
9	81

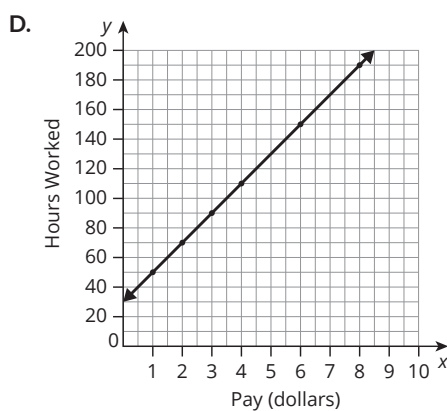
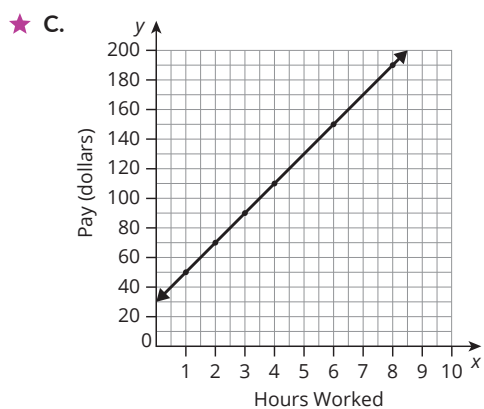
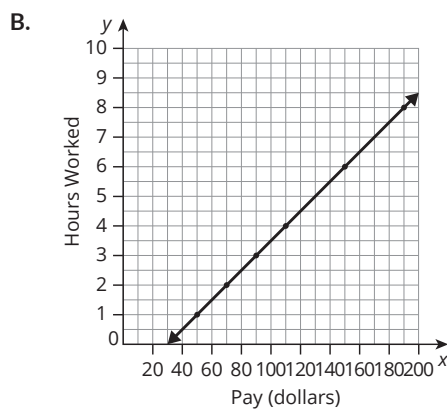
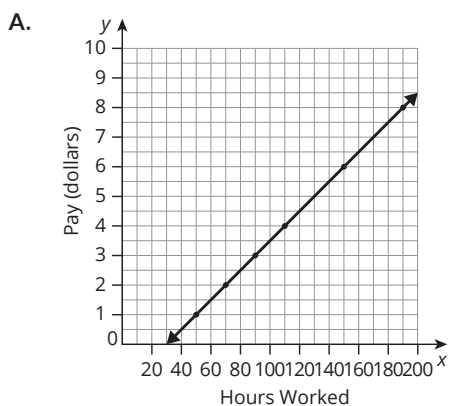


The problem situation is non-linear and not proportional.

Notes

6. When Mason, a nurse at a local hospital, works on Saturdays, he is paid a \$30 bonus plus \$20 per hour worked.

Hours Worked	Pay (dollars)
1	50
2	70
3	90
4	110
6	150
8	190



The problem situation is linear and not proportional.

TOPIC 3 Proportionality

Notes

C. Determine whether the relationship represents a proportional relationship. Explain your reasoning. TEKS 7.4C (Topic-Aligned)

1. The table shows the relationship between the number of hours that a plumber works on a job and the amount the plumber charges for the job.

Number of Hours	Amount Charged (dollars)
3	\$220
5	\$340
6	\$400

I set up the ratio $\frac{\text{amount charged}}{\text{number of hours}}$ for each pair of values.

$$\frac{220}{3} = 73\frac{1}{3} \quad \frac{340}{5} = 68 \quad \frac{400}{6} = 66\frac{2}{3}$$

The ratios are not constant, so the relationship between the number of hours and the amount charged is not a proportional relationship.

2. The cost to print a yearbook is \$0.45 per page.

The cost per page remains constant, so the relationship between the cost and the number of pages is a proportional relationship.

3. The table shows the relationship between the size of a painting and the cost of the painting.

Size (square centimeters)	Cost (dollars)
240	\$7.20
610	\$18.30
900	\$27.00

I set up the ratio $\frac{\text{cost}}{\text{size}}$ for each pair of values.

$$\frac{7.20}{240} = 0.03 \quad \frac{18.30}{610} = 0.03 \quad \frac{27.00}{900} = 0.03$$

The ratios are constant, so the relationship between the size of a painting and the cost of the painting is a proportional relationship.

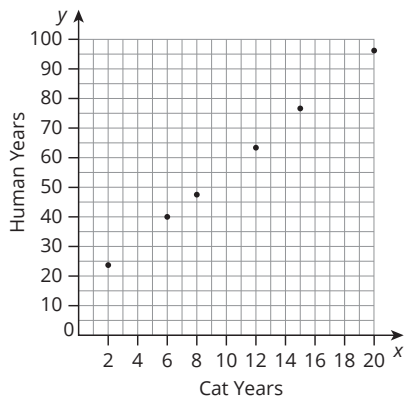
4. Sebastian bought $\frac{1}{2}$ pound of raisins for \$1.07, while Sarah bought $1\frac{1}{2}$ pounds of raisins for \$3.21.

I set up the ratio $\frac{\text{cost}}{\text{pounds}}$ for each pair of values.

$$\frac{1.07}{0.5} = 2.14 \quad \frac{3.21}{1.5} = 2.14$$

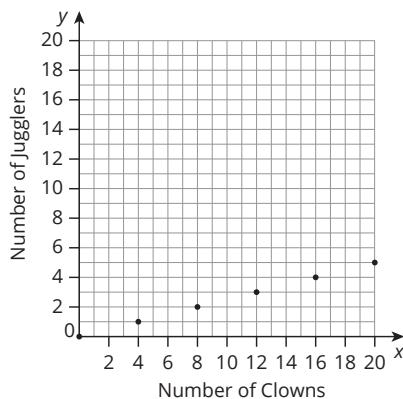
The ratios are constant, so the relationship between the cost and the number of pounds of raisins is a proportional relationship.

5. The graph shows the relationship between the age of a cat and its corresponding age in “human years”.



The points form a straight line, but the line does not go through the origin. Therefore, the relationship is not a proportional relationship.

6. The graph shows the relationship between the number of clowns and number of jugglers needed for a performance.



The points form a straight line, the points go through (0, 0), and any two points on the graph have a ratio $\frac{1}{4}$. Therefore, the relationship is a proportional relationship.

Notes

TOPIC 3 Proportionality

Extension

Another way to classify varying quantities is as an inverse variation, or inversely proportional. The tables represent inverse variations. Study the tables of values and make a conjecture about the relationship between the quantities that illustrate inverse variation. **Extension of TEKS 7.4D**

Number of Hours	Number of People
2	6
3	4
$\frac{1}{12}$	144

Width of Rectangle	Length of Rectangle
2	18
12	3
0.5	72

The product of corresponding values in an inversely proportional relationship is constant.

Spaced Practice

Use proportions to solve each question.

1. In a town, 3 out of 5 citizens who are eligible to vote did so in the fall election. **TEKS 7.4D**
 - a. Determine the number of citizens that voted in the fall election if 400 citizens were eligible.
240
 - b. Determine the number of citizens that were eligible to vote in the fall election if 180 actually voted.
300

Notes

2. The student council at a local middle school determines that 3 out of 4 students prefer that all school assemblies be held on Friday afternoon. **TEKS 7.4D**
 - a. When 200 students are surveyed, how many will prefer that school assemblies be held on Friday afternoon?
150
 - b. When 747 students prefer the school assemblies be held on Friday afternoon, how many students were surveyed?
996

Write a unit rate to represent the relationship between the given quantities. Round to the nearest hundredth, when necessary. **TEKS 7.4B**

3. 2.5 liters $\approx$ 0.66 gallon
3.79 liters per gallon
4. 430.6 centimeters $\approx$ 169.5 inches
2.54 centimeters per inch



Notes

TOPIC 3 Proportionality

II. Constant of Proportionality

Topic Practice

A. Answer each question. **TEKS 7.4C (Interleaved Practice), 7.4D (Topic-Aligned)**

1. Camilla learned in her science class that every 2 minutes she spends in the shower, she uses 17 gallons of water. This rate is constant.
 - a. When Camilla showers for 4 minutes, how many gallons of water will she use?
34 gallons
 - b. When Camilla's sister used 119 gallons of water during her shower, how long was her sister's shower?
14 minutes
 - c. Identify the constant of proportionality for the time in minutes to the number of gallons.
 $\frac{2}{17}$
 - d. Identify the constant of proportionality for the number of gallons used to the time in minutes.
 $\frac{17}{2}$
2. A television time slot has 4 minutes of commercials for every 11 minutes of programming. This rate is constant.
 - a. When a television program is 88 minutes long, how many minutes of commercials should a viewer expect?
32 minutes
 - b. When there are 16 minutes of commercials, how long is the television program?
44 minutes
 - c. Identify the constant of proportionality for the minutes of commercials to the minutes of programming.
 $\frac{4}{11}$
 - d. Identify the constant of proportionality for the minutes of programming to the minutes of commercials.
 $\frac{11}{4}$



3. Each week, a store orders 8 boxes of socks for every 3 cases of shoes. This rate is constant.

a. When the store orders 96 boxes of socks one week, how many cases of shoes would it order?
36 cases of shoes

b. This week, the store ordered 27 cases of shoes. How many boxes of socks did the store order?
72 boxes of socks

c. Identify the constant of proportionality for the boxes of socks to the cases of shoes.
 $\frac{8}{3}$

d. Identify the constant of proportionality for the cases of shoes to the boxes of socks.
 $\frac{3}{8}$

4. In a survey that Gabriel conducted of the students in his school, he determined that 3 out of 8 students chose basketball as their favorite sport.

a. How many students choose basketball as their favorite sport if Gabriel surveys 240 students?
90 students

b. When 225 students chose basketball as their favorite sport, how many students did Gabriel survey?
600 students

c. Identify the constant of proportionality for the students who chose basketball to the students surveyed.
 $\frac{3}{8}$

d. Identify the constant of proportionality for the students surveyed to the students who chose basketball.
 $\frac{8}{3}$

Notes

Notes

TOPIC 3 Proportionality

5. Logan is weighing pennies for a science experiment. When he weighs 2 pennies, the weight is 5 grams.
- How many pennies are on the scale when the weight measures 40 grams?
 16 pennies
 - How much would 12 pennies weigh?
 30 grams
 - Identify the constant of proportionality for number of pennies to total weight.
 $\frac{2}{5}$
 - Identify the constant of proportionality for total weight to number of pennies.
 $\frac{5}{2}$
6. The school's cross country track team is participating in a 3-day walk-a-thon to raise money for their favorite charity. They are asking each donor to pledge \$18 for every 6 miles they walk.
- How much money will the team raise when it walks 150 miles during the walk-a-thon?
 $\$450$
 - How many miles does the team need to walk when they want to raise \$615?
 205
 - Identify the constant of proportionality for miles walked to money raised.
 $\frac{6}{18}$ or $\frac{1}{3}$
 - Identify the constant of proportionality for money raised to miles walked.
 $\frac{18}{6}$ or 3

B. Answer each question. TEKS 7.4A (Topic-Aligned), 7.4C (Topic-Aligned)

1. During your morning workout, you run for 20 seconds for every 3 seconds you sprint.
 - a. Determine the constant of proportionality for the ratio between the number of seconds you run and the number of seconds you sprint.
$$\frac{20}{3}$$
 - b. Write a proportion that shows the relationship between the number of seconds you run, the number of seconds you sprint, and the constant of proportionality.
$$\frac{r}{s} = \frac{20}{3}$$
 - c. Rewrite the proportion as an equation to represent the number of seconds you run in terms of the number of seconds you sprint.
$$r = \frac{20}{3}s$$
 2. Parker had pictures taken for his football team. The pictures come in different sizes. The ratio of each picture is a height of 7 inches by a width of 6 inches.
 - a. Determine the constant of proportionality for the ratio between the height of each picture, in inches, and the width of each picture, in inches.
$$\frac{7}{6}$$
 - b. Write a proportion that shows the relationship between the height of each picture, the width of each picture, and the constant of proportionality.
$$\frac{h}{w} = \frac{7}{6}$$
 - c. Rewrite the proportion as an equation to represent the height of each picture in terms of the width of each picture.
$$h = \frac{7}{6}w$$

Notes



Notes

TOPIC 3 Proportionality

3. Avery played tennis for two hours. His activity watch showed that he burned 17 calories every 5 minutes.
- a. Determine the constant of proportionality for the ratio between the number of calories burned and the time Francis played tennis, in minutes.
 $\frac{17}{5}$
- b. Write a proportion that shows the relationship between the number of calories burned, the time Francis played tennis, and the constant of proportionality.
 $\frac{c}{m} = \frac{17}{5}$
- c. Rewrite the proportion that shows the relationship between the number of calories burned in terms of the number of minutes Francis played tennis.
 $c = \frac{17}{5}m$
4. Your class is going on a field trip to an art museum. For every 6 students going to the museum, there is 1 adult chaperone.
- a. Determine the constant of proportionality for the ratio between the number of students who visit the museum and the number of adults who visit the museum.
 $\frac{6}{1}$
- b. Write a proportion that shows the relationship between the number of students, the number of adults, and the constant of proportionality.
 $\frac{s}{a} = \frac{6}{1}$
- c. Rewrite the proportion as an equation to represent the number of students in terms of the number of adults.
 $s = 6a$

5. Valentina is decorating mirrors from a craft kit he received. He can decorate 10 mirrors every 3 hours.

- a. Determine the constant of proportionality for the ratio between the number of mirrors he decorates and the time it takes, in hours.

$$\frac{10}{3}$$

- b. Write a proportion that shows the relationship between the number of mirrors he decorates and the time it takes, and the constant of proportionality

$$\frac{m}{h} = \frac{10}{3}$$

- c. Rewrite the proportion as an equation to represent the number of mirrors he decorates in terms of the time, in minutes.

$$m = \frac{10}{3}h$$

6. Sarah is a landscaper. She knows that for every 25 pounds of topsoil he orders, she can cover an area of 13 square feet.

- a. Determine the constant of proportionality for the ratio between the number of pounds of topsoil and the area it covers, in square feet.

$$\frac{25}{13}$$

- b. Write a proportion that shows the relationship between the number of pounds of topsoil the area it covers, and the constant of proportionality.

$$\frac{p}{a} = \frac{25}{13}$$

- c. Rewrite the proportion as an equation to represent the number of pounds of topsoil in terms of the area, in square feet.

$$p = \frac{25}{13}a$$

Notes



TOPIC 3 Proportionality

Notes

C. Use the equation for the constant of proportionality, $\frac{y}{x} = k$, to determine each unknown value. TEKS 7.4C (Topic-Aligned)

1. $k = \frac{3}{2}$ and $y = 15$

$$\frac{y}{x} = k$$

$$\frac{15}{x} = \frac{3}{2}$$

$$3x = 15(2)$$

$$3x = 30$$

$$x = 10$$

2. $k = \frac{1}{4}$ and $y = 5$

$$\frac{y}{x} = k$$

$$\frac{5}{x} = \frac{1}{4}$$

$$1x = 5(4)$$

$$x = 20$$

3. $k = \frac{7}{3}$ and $x = 21$

$$\frac{y}{x} = k$$

$$\frac{y}{21} = \frac{7}{3}$$

$$3y = 21(7)$$

$$3y = 147$$

$$y = 49$$

4. $k = 6$ and $y = 2$

$$\frac{y}{x} = k$$

$$\frac{2}{x} = \frac{6}{1}$$

$$6x = 2$$

$$x = \frac{1}{3}$$

5. $k = 0.18$ and $y = 450$

$$\frac{y}{x} = k$$

$$\frac{450}{x} = \frac{18}{100}$$

$$18x = 450(100)$$

$$18x = 45,000$$

$$x = 2500$$

6. $k = \frac{5}{6}$ and $x = 126$

$$\frac{y}{x} = k$$

$$\frac{y}{126} = \frac{5}{6}$$

$$6y = 126(5)$$

$$6y = 630$$

$$y = 105$$

Extension

When a is inversely proportional to b , then the product of a and b is constant. Use this information to solve this problem.

When x is inversely proportional to y and is directly proportional to z , and when y and z are both 3 when $x = 5$, what is the value of $z - y$ when $x = 8$?

Extension of TEKS 7.4D; 8.5E

$$z - y = \frac{117}{40} = 2.925$$

Spaced Practice

1. Sketch a graph that represents a linear, non-proportional relationship. Label your quantities. **TEKS 7.4A**
Answers will vary.
Students should sketch the graph of a straight, non-vertical line that does not pass through the origin.
2. Sketch a graph that represents a relationship that is proportional. Label your quantities. **TEKS 7.4A**
Answers will vary.
Students should sketch a graph of a straight line that passes through the origin.

Notes



Notes

TOPIC 3 Proportionality

3. Carlos will be staying a month in one of the cities listed in the table. He wants to determine the average cost of public transportation for each city. He finds the following information.

City	Cost for Unlimited Public Transportation
New York City	\$51.50 for 14 days
Miami	\$100 for 1 month
Los Angeles	\$17 for 1 week
Chicago	\$14 for 3 days

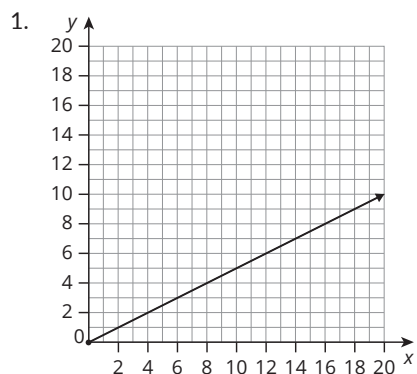
- a. Calculate the unit rate, or per day cost, for unlimited transportation in each city. **TEKS 7.4B**
(Let 1 week = 7 days and 1 month = 30 days.)
All unit rates are rounded to the nearest hundredth, or cent.
New York City: \$3.68 per day
Miami: \$3.33 per day
Los Angeles: \$2.43 per day
Chicago: \$4.67 per day
- b. When Carlos stays in the city for a month, how much does he spend on transportation in each city? **TEKS 7.4D**
All computations are based on the rounded unit rates.
New York City: \$110.40 per month
Miami: \$99.90 per month
Los Angeles: \$72.90 per month
Chicago: \$140.10 per month



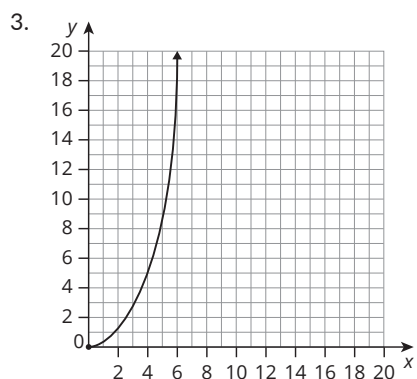
III. Identifying the Constant of Proportionality in Graphs

Topic Practice

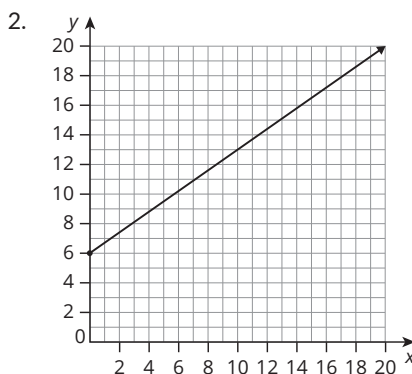
- A. Determine whether each graph represents a proportional relationship. When a proportional relationship occurs identify the constant of proportionality. **TEKS 7.4C (Topic-Aligned)**



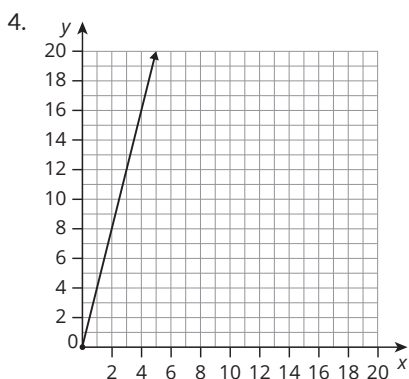
The graph represents a proportional relationship. The constant of proportionality is $\frac{1}{2}$.



The graph does not represent a proportional relationship.



The graph does not represent a proportional relationship.

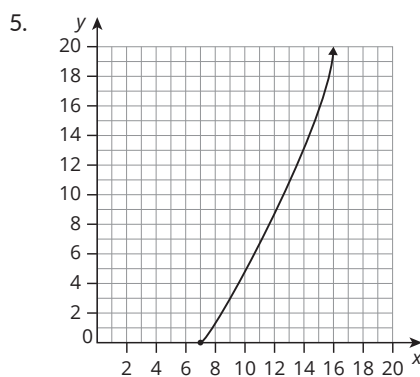


The graph represents a proportional relationship. The constant of proportionality is 4.

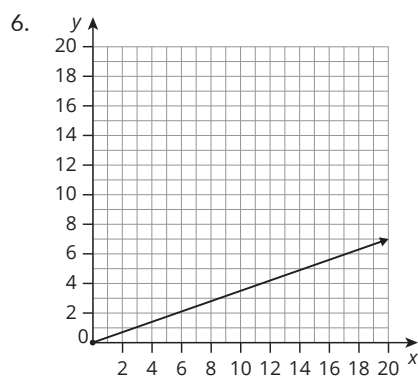
Notes

TOPIC 3 Proportionality

Notes



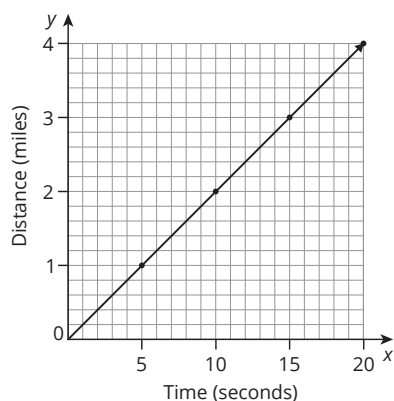
The graph does not represent a proportional relationship.



The graph represents a proportional relationship. The constant of proportionality is $\frac{1}{3}$.

B. Determine the constant of proportionality k and interpret it in the context of each problem. TEKS 7.4A (Topic-Aligned), 7.4C (Topic-Aligned)

1. The graph shows the relationship between the distance in miles between you and a storm, and the number of seconds between when you see lightning and when you hear thunder.

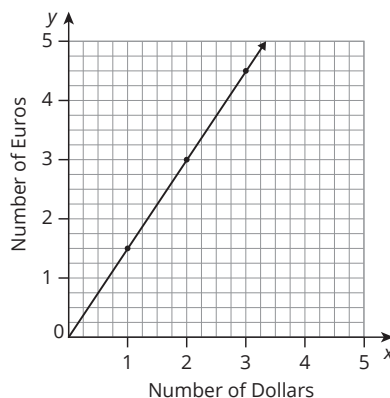


I chose a point on the graph and expressed the ratio formed by $\frac{y}{x}$.

$$k = \frac{3}{15} \text{ or } \frac{1}{5} \text{ or } 0.2$$

The constant of proportionality means the distance between you and the storm increases by 1 mile for every 5 seconds between the lightning and the thunder. Or, the distance increases by 0.2 miles for every second counted.

2. The graph shows the relationship between the number of Euros Lucas received and the number of dollars Lucas exchanged during his trip to Spain.



I chose a point on the graph and expressed the ratio formed by $\frac{y}{x}$.

$$k = \frac{4.5}{3} \text{ or } 1.5$$

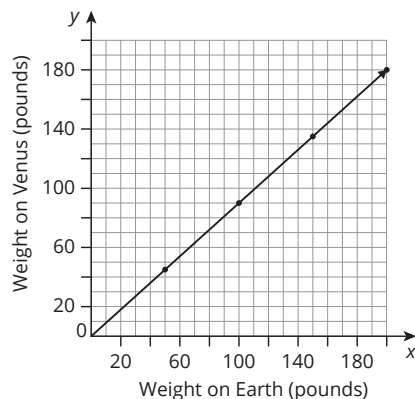
The constant of proportionality means that the number of Euros that Lucas received increased by 1.5 for every dollar that he exchanged. Or, at the time, \$1 was worth 1.5 Euros.

Notes

TOPIC 3 Proportionality

Notes

3. The graph shows the relationship between the weight of an object on Earth and the weight of the same object on Venus.

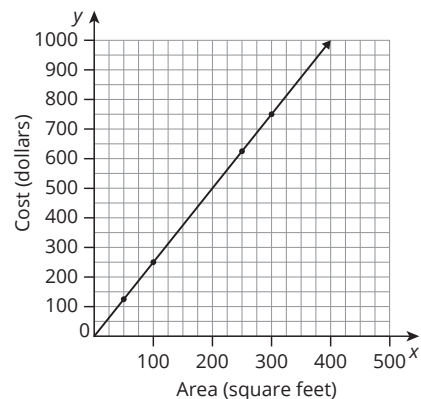


I chose a point on the graph and expressed the ratio formed by $\frac{y}{x}$.

$$k = \frac{90}{100} \text{ or } \frac{9}{10}$$

The constant of proportionality means that for every 10 pounds on Earth, the same object weighs 9 pounds on Venus. Or, the weight of an object on Venus is $\frac{9}{10}$ its weight on Earth.

4. The graph shows the relationship between the area of a room in square feet and the cost of covering the floor with new tile.



I chose a point on the graph and expressed the ratio formed by $\frac{y}{x}$.

$$k = \frac{750}{300} \text{ or } \frac{5}{2}$$

The constant of proportionality means that the cost of covering the floor with new tile increases by \$5 for every 2 square feet in floor area. Or, the cost per square foot is \$2.50.

TOPIC 3 Proportionality

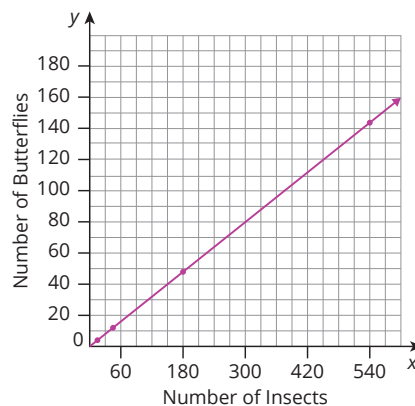
Notes

C. For each problem situation, create a graph using the table of values and write an equation in the form $y = kx$. **TEKS 7.4A (Topic-Aligned), 7.4C (Topic-Aligned)**

1. Jasmine spent many days at the city park last summer. She noticed that 4 out of every 15 flying insects she saw at the park were butterflies.

Number of Insects	Number of Butterflies
15	4
45	12
180	48
540	144

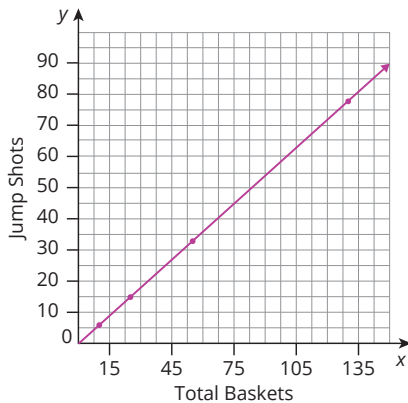
$$y = \frac{4}{15}x$$



2. Your cousin plays shooting guard for his community basketball team. When he plays in a game, 3 out of every 5 baskets he scores for his team are jump-shots.

Total Baskets	Jump Shots
10	6
25	15
55	33
130	78

$$y = \frac{3}{5}x$$



- Luna looked at her household budget for the past several months and determined that 1 out of every 8 dollars she spent on groceries were spent on whole fruits and vegetables.

Amount Spent on Groceries	Amount Spent on Whole Fruits and Vegetables
Dollars	Dollars
88	11
224	28
232	29
248	31

$$y = \frac{1}{8}x$$



Notes

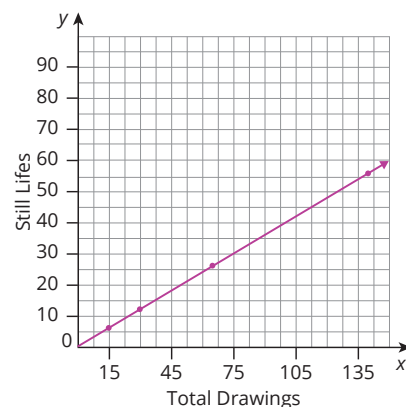
TOPIC 3 Proportionality

Notes

4. Mason keeps all of his line drawings in portfolio folders. He notices as he sorts through the drawings that, in each folder, 2 out of every 5 drawings are still lifes.

Total Drawings	Still Lifes
15	6
30	12
65	26
140	56

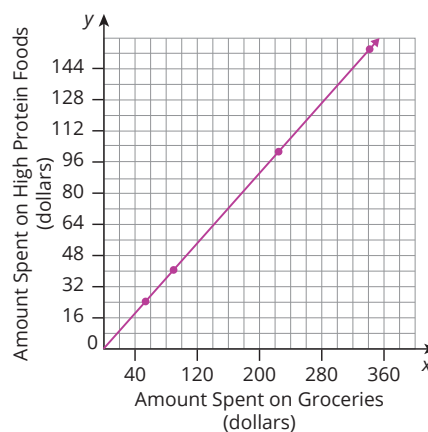
$$y = \frac{2}{5}x$$



5. Isaiah looked at his household budget for the past several months and determined that 4 out of every 9 dollars he spent on groceries were spent on high protein foods.

Amount Spent on Groceries	Amount Spent on High Protein Foods
Dollars	Dollars
54	24
90	40
225	100
342	152

$$y = \frac{4}{9}x$$



Total Yards Lost	Yards Lost Due to Slippery Conditions
12	4
15	5
45	15
75	25

The graph shows a linear relationship between the total yards lost and the yards lost due to slippery conditions. The data points are as follows:

Total Yards Lost (yards)	Yards Lost Due to Slippery Conditions (yards)
0	0
10	4
40	16
70	24
100	32

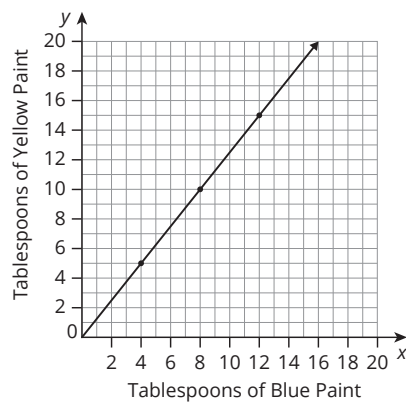
- Seven 8th-graders are needed.



TOPIC 3 Proportionality

Notes

2. The graph shows the relationship between the number of blue and the number of yellow tablespoons of paint an artist needs to make a shade of green. How many tablespoons of yellow paint does the artist need to mix with 44 tablespoons of blue paint?



I set up the ratio $\frac{\text{yellow tbsp (y)}}{\text{blue tbsp (b)}}$ for a pair of values, $\frac{10}{8} = \frac{5}{4}$ so $y = \frac{5}{4}b$.

$$y = \frac{5}{4}b$$

$$y = \frac{5}{4}(44)$$

$$y = 55$$

The artist needs 55 tablespoons of yellow paint.

3. The equation $r = \frac{2}{7}p$ shows the relationship between the number of rocks, r , and plants, p , in a garden design. How many rocks does a homeowner following this design need when he has 35 plants?

$$r = \frac{2}{7}p$$

$$r = \frac{2}{7}(35)$$

$$r = 10$$

The homeowner needs 10 rocks.

4. Mei redeemed 4000 gift points for a \$20 gift card and 10,000 gift points for a \$50 gift card. How many gift points does she need to get a \$75 gift card?

I set up the ratio $\frac{\text{dollars } (d)}{\text{points } (p)}$ for a pair of values, $\frac{50}{10,000} = 0.005$, so $d = 0.005p$.

$$d = 0.005p$$

$$75 = 0.005p$$

$$\frac{75}{0.005} = p$$

$$15,000 = p$$

Mei needs 15,000 gift points.

5. The table shows the relationship between the height of a custom-built fence to enclose a given area and the cost of the fence. What would be the cost of a fence that is 8 feet high?

Height (feet)	Cost (dollars)
3	\$225
5	\$375
6	\$450

I set up the ratio $\frac{\text{cost } (c)}{\text{height } (h)}$ for a pair of values, $\frac{225}{3} = 75$, so $c = 75h$.

$$c = 75h$$

$$c = 75(8)$$

$$c = 600$$

The fence would cost \$600.

6. The equation $a = 1.2p$ shows the relationship between the number of apples, a , and the number of pears, p , in a fruit basket. How many pears are in a basket when there are 12 apples?

$$a = 1.2p$$

$$12 = 1.2p$$

$$\frac{12}{1.2} = p$$

$$10 = p$$

There are 10 pears in the basket.

Notes



Notes

TOPIC 3 Proportionality

Extension

At any given time of the day, the length of your shadow is proportional to your height. Suppose a person who is 81 inches tall casts a shadow that is 94.5 inches long. Another person in the same place casts a shadow that is 84 inches long. How tall is the second person? **Extension of TEKS 7.4D**

The second person is 72 inches, or 6 feet, tall.

Spaced Practice

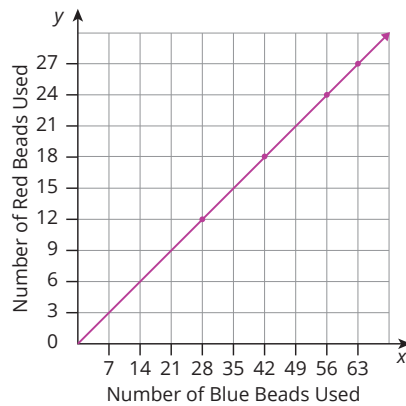
1. Use the equation for the constant of proportionality, $k = \frac{y}{x}$, to determine each unknown value. **TEKS 7.4C**
 - a. $k = \frac{3}{2}$ and $y = 15$
 $x = 10$
 - b. $k = \frac{1}{4}$ and $y = 5$
 $x = 20$
2. Determine a unit rate for each scenario. **TEKS 7.4B**
 - a. $\frac{3}{4}$ of an inch of rain fell in $\frac{1}{2}$ hour.
 $1\frac{1}{2}$ inches of rain per hour
 - b. Heather charges a half-dollar for each eighth of a pizza.
 $\$4$ per pizza
3. Simplify each expression. **Prerequisite for 7.3A**
 - a. $8 - 4(5) + 2^4$
 4
 - b. $10 \div (1 + 4) - 3^2$
 -7

TOPIC 3 Proportionality

Notes

3. Lucas is making necklaces out of glass beads. For every 3 red beads he uses, he uses 7 blue beads. The table displays the possible number of blue beads used and the number of red beads used.

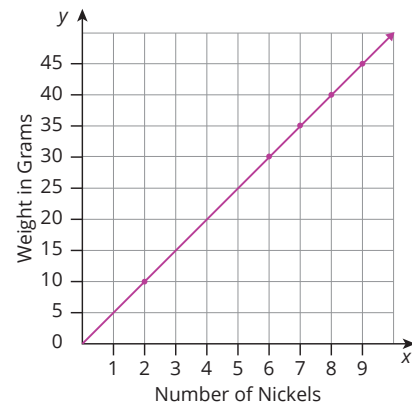
Number of Blue Beads Used	Number of Red Beads Used
b	r
28	12
42	18
56	24
63	27



$$r = \frac{3}{7}b$$

4. Adriana is weighing money on a scale. She determines that 1 nickel weighs 5 grams. The table displays the possible number of nickels weighed and their weight in grams.

Number of Nickels	Weight in Grams
n	g
2	10
6	30
7	35
9	45



$$g = 5n$$

TOPIC 3 Proportionality

Notes

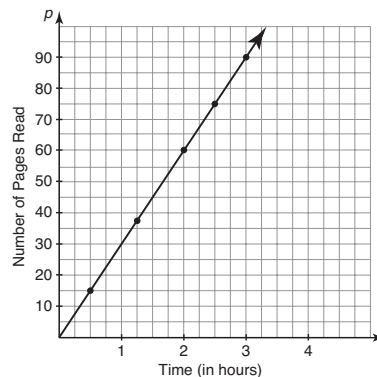
Extension

A map of the United States is drawn such that 1 inch is equal to 600 miles. What is the approximate distance, on the map, between New York and Los Angeles? **Extension of TEKS 7.4D and TEKS 7.5C**

The straight-line distance between New York and Los Angeles is approximately 2448 miles. So, the map distance would be approximately 4 inches.

Spaced Practice

1. Suppose the number of pages (p) that Sarah can read is directly proportional to the amount of time (t) in hours she spends reading. Determine the constant of proportionality and describe its meaning. **TEKS 7.4C**



The constant of proportionality is $\frac{30}{1}$, or 30. This means that Tony can read 30 pages in 1 hour.

2. In the first quarter (3 months), a store sold 32 limited-edition action figures. Suppose this quarter's sales represent a typical sales pattern. How many action figures should they expect to sell in a year? **TEKS 7.4D**

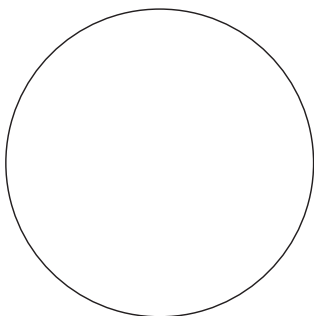
The store should expect to sell 128 action figures in a year.

3. A recipe calls for $3\frac{1}{2}$ cups of flour and $\frac{3}{4}$ cup of sugar. Suppose you want to make the recipe with 6 cups of flour. How much sugar will you need? **TEKS 7.4D**

You will need $1\frac{2}{7}$ cups of sugar.

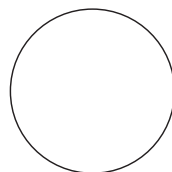
4. Determine the area of each circle. **TEKS 7.9B**

- a. Circle A with a diameter of 6 in.



28.26 square inches

- b. Circle B with a circumference of 25.12 cm



50.24 square centimeters

Notes



Notes

Handwriting practice lines on the left side of the page.



Applying Proportionality

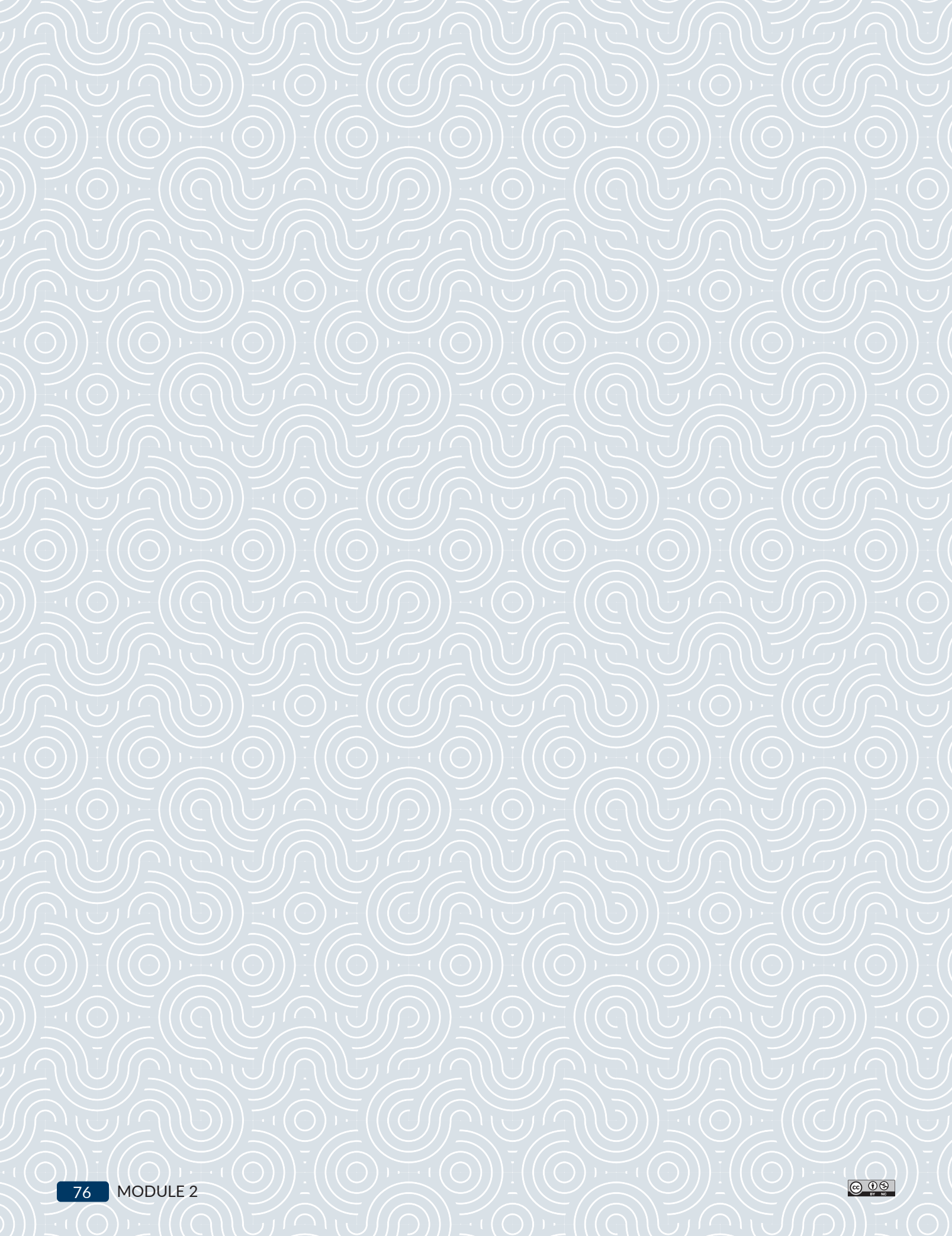
.....

TOPIC 1: Proportional Relationships

I. Introducing Proportions to Solve Percent Problems	77
II. Calculating Tips, Commissions, and Simple Interest.	87
III. Sales Tax, Income Tax, and Fees	96
IV. Percent Increase and Percent Decrease.	103
V. Scale and Scale Drawings.....	109

TOPIC 2: Financial Literacy: Interest and Budgets

I. Scale and Scale Drawings.....	125
II. Net Worth Statements	132
III. Personal Budgets.....	140



Name _____ Date _____

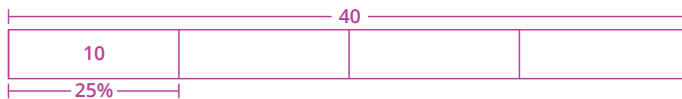
I. Introducing Proportions to Solve Percent Problems

Topic Practice

A. Model each scenario. For Questions 1–3, use a strip diagram. For Questions 4–6, use a ratio table. Then use your model to answer the question. Explain your thinking. **TEKS 7.4D (Topic-Aligned)**

1. A shirt costs \$40. When it was on sale for 25% off, what was the discount?

Sample strip diagram:



The shirt was \$10 off.

Sample explanation:

Each rectangle of the strip diagram represents \$10, and 1 rectangle represents 25% of the total.

2. A jacket is on sale for 20% off, which is \$15 off. What is the original price of the jacket?

Sample strip diagram:



The jacket was originally \$75.

Sample explanation:

Each rectangle of the strip diagram represents \$15, and there are a total of 5 bars in the whole.

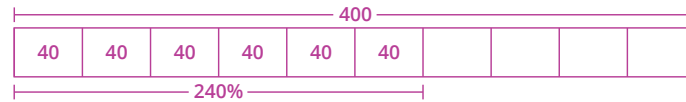


TOPIC 1 Proportional Relationships

Notes

3. A sofa originally costs \$400. During a sale, it costs \$240. What percent does a customer save with the sale?

Sample strip diagram:



The customer saved 40% on the sofa.

Sample explanation:

Each rectangle of the strip represents \$40, or 10% of the total, and the customer saved \$160.

4. A shirt costs \$40. When it was on sale for 15% off, what was the discount?

Sample ratio table:

	$\div 10$	$\div 2$	
Percent (%)	100	10	5
Total (dollars)	40	4	2
	$\div 10$	$\div 2$	

The shirt was \$6 off.

Sample explanation:

I used a ratio table to determine that 10% of \$40 is \$4 and 5% of \$40 is \$2. Then, $\$4 + \$2 = \$6$, which means 15% of \$40 is \$6.

5. A dress is on sale for 30% off, which is \$36 off. What is the original price of the dress?

Sample ratio table:

	$\div 3$	$\cdot 10$	
Percent (%)	30	10	100
Total (dollars)	36	12	120
	$\div 3$	$\cdot 10$	

The dress was originally \$120.

Sample explanation:

I used a ratio table to determine that since 10% is one-third of 30%, \$12 is one-third of the discount of \$36. Then, $10 \cdot 10\% = 100\%$, so $10 \cdot \$12 = \$120$.

6. A chair originally costs \$360. During a sale, it costs \$288. What percent does a customer save with the sale?

Sample ratio table:

	$\div 10$	$\cdot 2$	
Percent (%)	100	10	20
Total (dollars)	360	36	72
	$\div 10$	$\cdot 2$	

The customer saved 20% on the sofa.

Sample explanation:

The customer saved \$72 on the chair during the sale. I used a ratio table to determine that 10% of \$360 is \$36 and 20% of \$360 is \$72.

Notes

Notes

TOPIC 1 Proportional Relationships

B. Set up and solve a proportion to solve each problem.

TEKS 7.4D (Topic-Aligned)

1. Mr. Sanchez works as the art teacher at a summer day camp. Six hundred campers participate in the camp every day. Yesterday, Mr. Sanchez helped 6 campers on an art project. What percent of the campers did Mr. Sanchez help yesterday?
1%
2. Malik is saving up to purchase a small flat screen television for his bedroom. He has saved \$80, which is 64% of the total cost of the television. How much does the television cost?
\$125
3. Luis saved \$75 over the summer from his part-time job. He withdrew 40% of the money to buy new clothes. He kept the rest of the money in his bank account. How much money did Luis spend on new clothes?
\$30
4. Huyen raises animals and trains them to appear in Hollywood movies. Currently, 23 of her penguins are appearing in a film about global freezing. That is 92% of the penguins Huyen has raised. How many penguins has she raised?
25 penguins
5. Mr. Rodriguez teaches dance at the middle school. His classes are 90 minutes long, and he spends 94% of class time teaching strength and conditioning. How many minutes do Mr. Rodriguez's students spend on strength and conditioning in each class?
84.6 minutes
6. Angel plays quarterback for a neighborhood football team. During his team's first game, he executed 60 plays, 42 of which were successful. What percent of Angel's plays were successful?
70%



C. Solve each problem. **TEKS 7.4D (Topic-Aligned), TEKS 7.13F (Topic-Aligned)**

1. William purchases a guitar for \$78.44. He has a coupon for 20% off the price. How much does William pay for the guitar after using the coupon?

William pays \$62.75 for the guitar after using the coupon.

$$0.8(78.44) = 62.75$$

2. Madison is purchasing ink cartridges for his computer. Each ink cartridge costs \$35.99 and comes with a \$10 rebate. How much will Madison pay for one ink cartridge after the rebate?

Madison will pay \$25.99 after the rebate.

$$35.99 - 10.00 = 25.99$$

3. Koda purchased an antique chair for \$15. He later sold the chair for \$27 to an antique dealer. What was the percent markup of the chair?

80%

4. Amir purchases comic books at garage sales and marks them up 75% before reselling them to comic book dealers. If Amir purchases a comic book at a garage sale for \$4, how much will he charge the comic book dealer for it?

\$7

5. If a store marks up the price of an item by 45% and sells it to customers for \$58, what was the original price the store paid for the item?

\$40

Notes



Notes

TOPIC 1 Proportional Relationships

6. Jacob's favorite store is having a sale. All clothing is 40% off, and Jacob has a coupon for another \$10 off his purchase. He buys a sweater for \$65.99. How much does Jacob pay for the sweater after the discounts?

Jacob pays \$29.59 for the sweater after the discounts.

$$0.6(65.99) = 39.59$$

$$39.59 - 10 = 29.59$$

7. Maria needs to buy new shoes for the soccer season. The local sporting goods store is having a sale, and all shoes are 30% off. Maria will also receive 10% off her purchase with her student ID. The list price of Maria's shoes are \$75.00. How much will Maria pay for the shoes after the discounts?

Maria will pay \$47.25 for the shoes after the discounts.

$$0.7(75) = 52.50$$

$$0.9(52.50) = 47.25$$

8. Gabriela is purchasing a new bedspread. The list price of the bedspread is \$139.99. She has a coupon for 15% off the item and another for \$20 off the item. She can only use one coupon. Which should she use to get the best deal on the bedspread?

Gabriela should use the 15% off coupon to get the best deal on the bedspread.

$$0.85(139.99) = 118.99$$

$$139.99 - 20 = 119.99$$

Notes

9. Destiny needs to buy new chairs for her dining room. She has found some she likes at two different stores. The chairs at Store A have a list price of \$149.99, and she has a coupon for 35% off. The chairs at Store B have a list price of \$132.95 and include a \$25 rebate. Which chairs should she buy if she wants to pay the least amount for them?

Destiny should buy the chairs at Store A as they will cost less after the discounts.

$$0.65(149.99) = 97.49$$

$$132.95 - 25 = 107.95$$

10. Two stores are having sales on the couch that Jacob wants to buy. Store A sells the couch for \$859 but is having a sale for 25% off that price. Store B sells the couch for \$975 and is having a sale for $\frac{1}{3}$ off. Where should Jacob buy the couch to get the best deal?

Jacob should buy the couch at Store A because the sale price is \$644.25 and at Store B, the sale price is \$650.

11. Fernando is buying holiday socks to give as gifts. The table shows the prices and advertised sales for the same type of holiday socks at three different stores.

Store	Price per Pair	Advertised Sale
H	\$4.50	Buy 1 pair get 1 pair half off.
J	\$5.95	Buy 2 pairs get one pair free.
K	\$4.25	Buy 6 pairs get 15% off the total price.

Based on the advertised sales, at which store will Fernando get the lowest price on 6 pairs of socks?

Fernando should buy the socks at Store H. Six pairs of socks at Store H cost \$20.25, they cost \$23.80 at Store J, and they cost about \$21.68 at Store K.



Notes

TOPIC 1 Proportional Relationships

Extension

While Olivia is shopping with her friend Jacob, they notice a sign in the front of the store.

BACK-TO-SCHOOL SALE!

- 20% off all purchases
- \$10.00 student discount

They also notice that the two cashiers are applying the discounts differently.

The cashier on their left is taking 20% off the total bill and then subtracting \$10.00. The cashier on their right is subtracting \$10.00 first and then taking 20% off the total.

To get a better deal, should Olivia and Jacob go to the cashier on the left or the right? Or does it not matter? Show all your work and explain your reasoning. **Extension of TEKS 7.13F**

Olivia and Jacob should go to the cashier on their left for the better sale price. The order in which I apply the percentage and the discount does matter. When I take the percentage first, I am taking a percentage of a higher number, leading to a greater amount off the price. For example, on a \$100 purchase, the cashier on the left would charge \$70 and the cashier on the right would charge \$72.

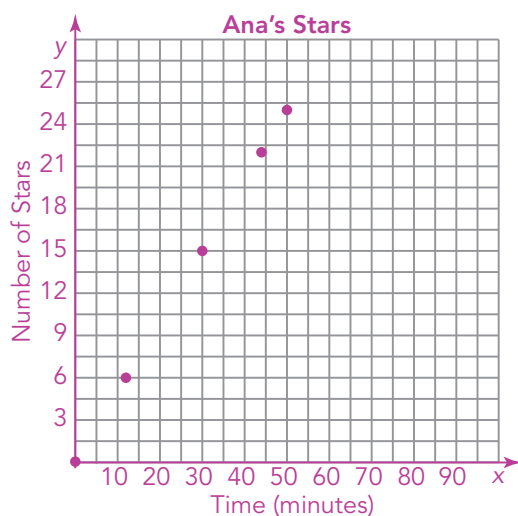
Spaced Practice

1. Ana is cutting out stars to decorate the gym for the school dance. The number of stars (s) she can cut out is directly proportional to the time (t) in minutes she spends cutting out the stars. **TEKS 6.7A**
 - a. Write an equation to show the relationship between s and t .
 $s = kt$

Time (t) (in minutes)	Number of Stars (s)	$\frac{s}{t} = k$
0	0	
12	6	$\frac{6}{12} = \frac{1}{2}$
30	15	$\frac{15}{30} = \frac{1}{2}$
44	22	$\frac{22}{44} = \frac{1}{2}$
50	25	$\frac{25}{50} = \frac{1}{2}$

- $$s = \frac{1}{2}t$$

- TEKS 7.4A**



Notes

TOPIC 1 Proportional Relationships

- e. Did the graph turn out as you expected? Explain. **TEKS 7.4A**
Yes. Because s is proportional to t , I expected the points to be on a line that passes through the origin $(0, 0)$.

- f. Explain how to determine the constant of proportionality using the graph. **TEKS 7.4C**
Answers will vary.

2. Determine whether there is a proportional relationship between the two quantities. Explain your reasoning. **TEKS 7.4C**

a.

A	B
35	92
23	80

A and B are not proportional. The ratios of the values of A to B are not equal.

b.

C	D
20	8
12.5	5

C and D are proportional. The ratios of the values of C to D are equal.

II. Calculating Tips, Commission, and Simple Interest

Topic Practice

A. Answer each question by solving both a percent equation and a proportion in the table shown. **TEKS 7.4D (Topic-Aligned)**

1. You want to buy a sweater that is 25% off. If the original price of the sweater is \$38, how much will your discount be?

Use a Percent Equation	Use a Proportion
$(0.25)(38) = d$ $9.50 = d$	$\frac{25}{100} = \frac{d}{38}$ $100d = (25)(38)$ $\frac{100d}{100} = \frac{950}{100}$ $d = 9.50$

The discount will be \$9.50.

2. If you ate a 315-calorie meal and 95 calories are from fat, about what percent of the meal is fat?

Use a Percent Equation	Use a Proportion
$f(315) = 95$ $\frac{315f}{315} = \frac{95}{315}$ $f \approx 0.30$	$\frac{f}{100} = \frac{95}{315}$ $(100)(95) = (f)(315)$ $\frac{9500}{315} = \frac{315f}{315}$ $30 \approx f$

About 30% of the meal is fat.

Notes

TOPIC 1 Proportional Relationships

Notes

3. You want to leave a tip for a meal that costs \$17.95. If all you have is \$3.00, what percentage tip will you be able to leave?

Use a Percent Equation	Use a Proportion
$t(17.95) = 3.00$ $\frac{17.95t}{17.95} = \frac{3.00}{17.95}$ $t \approx 0.17$	$\frac{t}{100} = \frac{3.00}{17.95}$ $(100)(3.00) = (t)(17.95)$ $\frac{300.00}{17.95} = \frac{17.95t}{17.95}$ $17 \approx t$

The tip will be about 17%.

4. If the 480 children's books represent 15% of the books in the library, how many total books are in the library?

Use a Percent Equation	Use a Proportion
$0.15b = 480$ $\frac{0.15b}{0.15} = \frac{480}{0.15}$ $b = 3200$	$\frac{15}{100} = \frac{480}{b}$ $(100)(480) = (15)(b)$ $\frac{48,000}{15} = \frac{15b}{15}$ $3200 = b$

There are 3200 total books in the library.

5. A town's population is 760 in one year and 798 the next year. By what percent did the population grow?

Use a Percent Equation	Use a Proportion
$798 - 760 = 38$ $(p)(760) = 38$ $\frac{760p}{760} = \frac{38}{760}$ $p = 0.05$	$798 - 760 = 38$ $\frac{p}{100} = \frac{38}{760}$ $(100)(38) = (p)(760)$ $\frac{3800}{760} = \frac{760p}{760}$ $5 = p$

The population grew by 5%.

TOPIC 1 Proportional Relationships

6. Abby gets a \$50 allowance each month (4 weeks). She spends \$5 per week and saves the rest. What percentage of her allowance does she save?

Use a Percent Equation	Use a Proportion
$50 - 20 = 30$ $(a)(50) = 30$ $\frac{50a}{50} = \frac{30}{50}$ $a = 0.6$	$50 - 20 = 30$ $\frac{a}{100} = \frac{30}{50}$ $(100)(30) = (a)(50)$ $\frac{3000}{50} = \frac{50a}{50}$ $60 = a$

Abby saves 60% of her allowance.

7. A solution is 45% saline. If 27 mL of saline was added to make the solution, what is the total amount of the solution?

Use a Percent Equation	Use a Proportion
$(0.45)(s) = 27$ $\frac{0.45s}{0.45} = \frac{27}{0.45}$ $s = 60$	$\frac{45}{100} = \frac{27}{s}$ $(100)(27) = (45)(s)$ $\frac{2700}{45} = \frac{45s}{45}$ $60 = s$

There is 60 mL of total solution.

Notes



TOPIC 1 Proportional Relationships

Notes

8. Luis read 166 pages of a 415-page novel. What percentage of the book does he have left to read?

Use a Percent Equation	Use a Proportion
$(p)(415) = 166$ $\frac{415p}{415} = \frac{166}{415}$ $p = 0.4$	$\frac{p}{100} = \frac{166}{415}$ $(100)(166) = (p)(415)$ $\frac{16,600}{415} = \frac{415p}{415}$ $40 = p$

Luis has already read 40% of the novel, so he has 60% of the novel left to read.

- B. Write an equation in the form of $y = kx$, where y represents the tip or commission amount, k represents the tip or commission percent, and x represents the bill amount. Use your equation to solve the problem. **TEKS 7.4D (Topic-Aligned)**

1. You want to leave a tip for a meal that costs \$18.75. If all you have is \$3.00, what percentage tip will you be able to leave?

$$3 = k(18.75)$$

$$k = 0.16$$

I can leave a 16% tip.

3. Gabriela wants to leave an 18% tip for her meal. If her meal costs \$26, what should she leave for a tip?

$$y = 0.18(26)$$

$$y = 4.68$$

Gabriela should leave \$4.68 for a tip.

2. Malik earns a 15 percent commission on each piece of artwork that he sells. If a customer purchases a painting for \$68.00, how much commission does Daniel receive?

$$y = 0.15(68.00)$$

$$y = 10.20$$

Malik receives \$10.20 in commission.

4. Destiny always tips her hair stylist 20 percent of whatever her services cost. On her most recent trip to her hair stylist, Destiny tipped the stylist \$33. How much did Destiny's services cost?

$$33 = 0.20x$$

$$x = 165$$

Destiny's services cost \$165.



TOPIC 1 Proportional Relationships

5. Maria works at a shoe store and earns a commission for her sales. A customer purchases \$260 in shoes, and Maria receives \$31.20 in commission. What percent commission does Maria earn?

$$31.20 = k(260)$$

$$k = 0.12$$

Maria earns a 12% commission on her sales.

6. The Chens ate out at a restaurant, and their bill was \$57.55. If the Chens tipped 20%, how much did they leave for a tip? How much did they pay for their meal, including the tip?

$$y = 0.2(57.55)$$

$$y = 11.51$$

The Chens left a \$11.51 tip and paid a total of \$69.06 for their meal.

C. Solve each problem. TEKS 7.13E (Interleaved Practice), TEKS 7.13F (Interleaved Practice)

1. Determine the simple interest if the principal is \$225, the interest rate is 6%, and the time is 2 years.

$$I = P \cdot r \cdot t$$

$$= 225 \cdot 0.06 \cdot 2$$

$$= 27$$

The simple interest is \$27.

3. Determine the simple interest if the principal is \$300, the interest rate is 7%, and the time is 5 years.

$$I = P \cdot r \cdot t$$

$$= 300 \cdot 0.07 \cdot 5$$

$$= 105$$

The simple interest is \$105.

2. Determine the simple interest if the principal is \$1500, the interest rate is 4%, and the time is 3 years.

$$I = P \cdot r \cdot t$$

$$= 1500 \cdot 0.04 \cdot 3$$

$$= 180$$

The simple interest is \$180.

4. Determine the simple interest if the principal is \$600, the interest rate is 5%, and the time is 4 years.

$$I = P \cdot r \cdot t$$

$$= 600 \cdot 0.05 \cdot 4$$

$$= 120$$

The simple interest is \$120.

Notes



TOPIC 1 Proportional Relationships

Notes

5. Michael is purchasing a new baseball bat. He has two coupons for the local sporting goods store, but he can only use one of the coupons. One coupon is for 15% off the list price of any bat. The other is for \$35 off. The list price of the bat Michael wants is \$395. Which coupon should Michael use to get the best deal?

$$0.85(325) = 276.25$$

$$325 - 35 = 290$$

Michael should use the 15% off coupon.

7. Huyen earned \$235 babysitting. She decides to deposit the money into a bank account that earns 3% interest. If she leaves the money in the account for 2 years, how much interest will she earn?

$$I = P \cdot r \cdot t$$

$$= 235 \cdot 0.03 \cdot 2$$

$$= 14.1$$

Huyen will earn \$14.10 in interest.

6. Fernando needs a new oven for his home. The hardware store is having a sale on the oven he wants for 30% off the list price. The list price of the oven at the hardware store is \$985. Fernando also has a coupon for the appliance store for \$250 off. The list price of the oven at the appliance store is \$938. Should Fernando purchase the oven at the hardware store or at the appliance store?

$$0.7(985) = 689.50$$

$$938 - 250 = 688$$

Fernando should purchase the oven at the appliance store.

8. Javier earned \$800 cutting grass this summer. He decides to deposit the money into a bank account that earns 4% interest. If he leaves the money in the account for 2 years, what is the total amount that Javier will have in the account?

$$I = P \cdot r \cdot t$$

$$= 800 \cdot 0.04 \cdot 2$$

$$= 64$$

$$\text{total amount} = \text{principal} + \text{interest}$$

$$= 800 + 64$$

$$= 864$$

After 2 years, Javier will have \$864 in the account.

TOPIC 1 Proportional Relationships

9. Javier is looking to buy some new sneakers. He has two pairs that he would like to buy at the shoe store. The store is having a buy one, get one half off deal. So, Javier will pay full price for one pair of sneakers, and the second pair will be 50% off. Javier also has a coupon for 20% off each pair of sneakers. He cannot use the coupon if he takes the buy one, get one half off deal. Each pair of sneakers Javier wants is \$74.99. Should Javier use the coupon or take the deal?

$$74.99 + 0.5(74.99) = 112.49$$

$$0.8(74.99) + 0.8(74.99) = 119.98$$

Javier should take the deal.

10. Fernando needs a new oven for his home. The hardware store is having a sale on the oven he wants for 30% off the list price. The list price of the oven at the hardware store is \$985. Fernando also has a coupon for the appliance store for \$250 off. The list price of the oven at the appliance store is \$938. Should Fernando purchase the oven at the hardware store or at the appliance store?

$$0.7(985) = 689.50$$

$$938 - 250 = 688$$

Fernando should purchase the oven at the appliance store.

Extension

Ana goes to dinner at a restaurant in Oklahoma where the combined sales and local tax on meals is 9%. She leaves a tip that is 175% of the amount of sales tax. When her total bill—including tax and tip—is \$45, what was the cost of her meal and what tip as a percent did she leave?

Extension of TEKS 7.13A and TEKS 7.4D

Ana's meal was \$36.07, and she left a 15.75% tip.

Spaced Practice

1. Hannah has started a home business making and selling all-natural goat milk soaps. **TEKS 7.4D**
- a. When the cost of the materials for a basic bar of soap is \$2.50 and Hannah sells each bar of soap for \$4.50, what is the markup percent?

Hannah marks up the soaps by 80%.

Notes



TOPIC 1 Proportional Relationships

Notes

- b. Hannah sells intricately shaped holiday soaps for \$9 each. After each holiday, she marks the related soaps down to \$6.75. What percent discount should she advertise on her social media site?

Hannah should advertise a 25% off sale for her holiday soaps.

2. Alexander is selling homemade granola to raise money to support having a pet iguana. He makes a batch of granola and then divides it into 14 individual bags for sale. The total cost of the ingredients is \$35. **TEKS 7.4D**

- a. Alexander sells each bag at a markup of 50%. How much does each bag cost? How much money does Alexander make?

Alexander charges \$3.75 per bag for a total of \$52.50. He makes \$17.50 per batch.

- b. When Alexander has not sold all of the granola after 3 days, he sells the remaining bags for 60% of the cost. What is the sale price of the individual bags of granola?

The individual bags cost \$2.25.

3. Jacob works in a men's clothing store. The amount of money (m) he makes is directly proportional to the number of hours (h) he works.

- a. Complete the table to show the amount of money Jacob earns for different amounts of time that he works. **TEKS 7.4A**

Time (hours)	Money Earned (dollars)
3	37.50
4.5	56.25
6	75.00
7.5	93.75

TOPIC 1 Proportional Relationships

- b. Determine the constant of proportionality. **TEKS 7.4C**

The constant of proportionality is $k = \frac{37.50}{3}$, or 12.50. This tells me that Jameer earns \$12.50 per hour.

- c. Write an equation to show the relationship between m and h .

TEKS 7.4A

$$m = 12.50h$$

- d. How many hours does Jacob have to work to make \$100?

TEKS 7.4D

Jacob has to work 8 hours to make \$100.

- e. How much money does Jacob earn when he works 40 hours?

TEKS 7.4D

Jacob earns \$500 when he works 40 hours.

Notes



TOPIC 1 Proportional Relationships

Notes

III. Sales Tax, Income Tax, and Fees

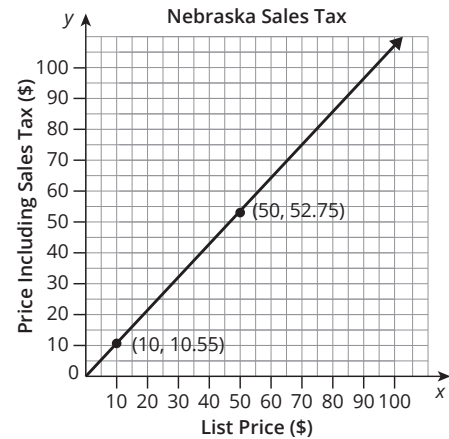
Topic Practice

A. Answer each question using the data provided.

TEKS 7.4D (Topic-Aligned), TEKS 7.13A (Interleaved Practice)

Arizona Sales Tax	
List Price (\$)	Price Including Sales Tax (\$)
5.00	5.33
8.50	9.06
10.25	10.93
13.00	13.86

Nevada Sales Tax
$y = 1.0685x$, where x is the list price in dollars and y is the price including sales tax, in dollars.



1. What is the sales tax percentage in Arizona? Show your work.

The sales tax percentage is 6.6%.

$$\frac{5.33}{5.00} = 1.066$$

2. In Nebraska, what is the cost, including sales tax, of an item with a list price of \$50?

The item costs \$52.75.

$$1.055(50) = 52.75$$

TOPIC 1 Proportional Relationships

3. Which state has the highest sales tax?
Show your work.

Nevada has the highest sales tax.

Arizona: $\frac{5.33}{5} = 1.066 : 6.6\%$
sales tax

Nebraska: $\frac{10.55}{10} = 1.055 : 5.5\%$
sales tax

Nevada: 6.85% sales tax

5. Olivia lives in Arizona and is purchasing a new laptop. The list price for the laptop is \$400. Olivia has \$420 in cash to pay for the laptop. Can she afford the laptop?

No. Olivia cannot purchase the laptop. The price with tax for the laptop is \$426.40, and she only has \$420.

$$1.066(400) = 426.40$$

7. Amir bought a souvenir while on vacation. The item cost \$22, but the total bill was \$23.43. What percent was the sales tax?

6.5%

9. Koda paid \$3.30 in sales tax on an item that cost \$60. What percent sales tax did he pay?

5.5%

4. Madison lives in Nevada and is purchasing two new movies. The list price of each movie is \$13. What will be the total price of the movies including sales tax?

The price of the movies, after tax, is \$27.78.

$$2(13) = 26$$

$$1.0685(26) = 27.78$$

6. Abby purchases a new refrigerator for her kitchen. The list price is \$1500. What is the price, including sales tax, if Abby lives in Nebraska?

The price of the refrigerator including sales tax is \$1582.50.

$$1.055(1500) = 1582.50$$

8. Huyen buys a sweatshirt for \$30. The sales tax in her state is 7%. What is the total amount Karen will pay for the sweatshirt, including sales tax?

\$32.10

Notes



Notes

TOPIC 1 Proportional Relationships

B. Use the given information from various states to answer each question.

TEKS 7.4D (Topic-Aligned), TEKS 7.13A (Topic-Aligned)

1. Income: \$95,500

State Income Tax Rate: 6.5%

What is the state income tax paid?

The income tax paid is \$6207.50.

$$0.065(95,500) = 6207.50$$

3. Income: \$47,500

State Income Tax Rate: 6.5%

What is the income remaining?

The amount remaining is \$44,412.50.

$$0.935(47,500) = 44,412.50$$

5. State Income Tax Rate: 5%

Amount Paid: \$2500

What is the income?

The income is \$50,000.

$$\frac{5}{100} = \frac{2500}{x}$$

$$x = (100)(500)$$

$$x = 50,000$$

2. Income: \$118,000

State Income Tax Rate: 3.4%

What is the income tax paid?

The state income tax paid is \$4012.

$$0.034(118,000) = 4012$$

4. Income: \$95,750

State Income Tax Rate: 4.5%

What is the income remaining?

The amount remaining is \$91,441.25.

$$0.955(95,750) = 91,441.25$$

6. State Income Tax Rate: 4.5%

Amount Paid: \$1350

What is the income?

The income is \$30,000.

$$\frac{4.5}{100} = \frac{1350}{x}$$

$$x = (100)(300)$$

$$x = 30,000$$

TOPIC 1 Proportional Relationships

- C. Use the table of tax brackets and rates for 2023 to answer each question. Use a calculator to help with your calculations.

TEKS 7.4D (Topic-Aligned), TEKS 7.13A (Topic-Aligned)

Federal income tax is not a flat rate. The 2023 tax brackets and rates are listed in the table.

Tax Rate	For Single Filers	For Married Individuals Filing Joint Returns	For Heads of Households
10%	\$0 to \$11,000	\$0 to \$22,000	\$0 to \$15,700
12%	\$11,000 to \$44,725	\$22,000 to \$89,450	\$15,700 to \$59,850
22%	\$44,725 to \$95,375	\$89,450 to \$190,750	\$59,850 to \$95,350
24%	\$95,375 to \$182,100	\$190,750 to \$364,200	\$95,350 to \$182,100
32%	\$182,100 to \$231,250	\$364,200 to \$462,500	\$182,100 to \$231,250
35%	\$231,250 to \$578,125	\$462,500 to \$693,750	\$231,250 to \$578,100
37%	\$578,125 or more	\$693,750 or more	\$578,100 or more

Notes



Notes

TOPIC 1 Proportional Relationships

For federal income tax, you pay one rate on part of your income and a higher rate on income above a set amount based on how you file your taxes.

1. Determine the federal income tax for a single filer with an income of \$24,000.
\$2,860
2. Determine the federal income tax for married individuals filing joint returns with a combined income of \$96,000.
\$11,735
3. Determine the federal income tax for a head of household with an income of \$75,000.
\$10,201
4. Determine the federal income tax for a single filer with an income of \$100,000.
\$17,400
5. Determine the federal income tax for married individuals filing joint returns with a combined income of \$80,000.
\$9,160
6. Determine the federal income tax for a head of household with an income of \$40,000.
\$4,486

Extension

In 2015, a person working in the United States paid 10% federal income tax for income up to \$9225. Income between \$9226 and \$37,450 was taxed at 15%. Suppose William earns \$9225. How much of his earnings does William take home after taxes? If he were to get a raise and William's entire check was taxed at 15%, how much more would he need to earn to take home more than his current take-home pay? **Extension of TEKS 7.13A**

When William earns \$9225, his take-home pay after taxes is \$8302.50. So, his take-home pay, T , after 15% taxes should be greater than \$8302.50; $0.85T > 8302.5$. William's pay needs to be greater than \$9767.65.

Spaced Practice

1. Determine each total cost, including a 20% tip, for the following bill amounts. **TEKS 7.4D**
 - a. \$45.80
\$54.96
 - b. \$103.65
\$124.38

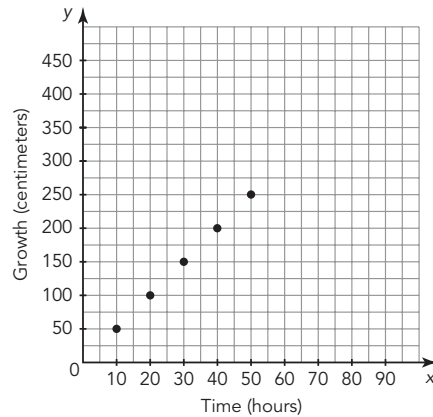
Notes



TOPIC 1 Proportional Relationships

Notes

2. The graph shows how many centimeters a bamboo plant can grow and the number of hours that the plant has been growing. Determine the constant of proportionality and explain what it means. **TEKS 7.4C**



The constant of proportionality is 5. The bamboo plant grows 5 centimeters in 1 hour.

3. In the middle school and high school jazz bands, the number of 7th-graders is proportional to the total members. Write a constant of proportionality for this situation and explain what it means.

TEKS 7.4C

Jazz Band	Number of 7th-Graders	Total Members
Middle School	6	15
High School	8	20

$\frac{2}{5}$ of the total members are 7th graders, or there are 2.5 times as many total members as 7th graders.

4. Write each as a unit rate. **TEKS 7.4B**

a. \$180 in 5 hours

\$36 per hour

b. \$1 in tax for \$20 spent

\$0.05 tax per dollar spent

IV. Percent Increase and Percent Decrease

Topic Practice

A. Determine each percent increase or percent decrease.

TEKS 7.4D (Topic-Aligned)

1. The local animal shelter had 12 dogs at the beginning of the week. Since then, the number of dogs at the shelter has decreased by 9. What is the percent change in the number of dogs at the animal shelter this week?

75% decrease

2. Hannah has a collection of necklaces. Last month, she had 40 necklaces. She now has 76 necklaces. What is the percent change in the number of necklaces in Hannah's collection from last month to now?

90% increase

Notes



TOPIC 1 Proportional Relationships

Notes

3. Last month, Gabriela had 72 dollars in a checking account. The current balance is 126 dollars. What is the percent change in the account balance from last month to this month?
75% increase
5. Last season, your favorite basketball team won 20 games. So far this season, your favorite basketball team has won 31 games. What is the percent change in the number of games that your favorite team won from last season to this season?
55% increase
7. The Italian restaurant near your house sold 60 plain pizzas last week. They sold 39 fewer plain pizzas this week than last week. What is the percent change in the number of plain pizzas sold from last week to this week?
65% decrease
4. Last month, you conducted a survey for the student newspaper. Of the students that you surveyed, 20 thought that the student council president was doing a good job. You conduct the same survey this month. After surveying the same students, you find that 11 think that the student council president is doing a good job. What is the percent change in the number of students who think that the student council president is doing a good job from last month to this month?
45% decrease
6. Maria collects baseball cards and is trying to complete a special edition set of cards. Last month, she collected 25 cards. This month, she collected 19 cards. What is the percent change in the number of cards collected from last month to this month?
24% decrease
8. At the beginning of the month, Ana's Used Car Dealership had 80 cars on the lot. Today, there are 100 cars on the lot. What is the percent change in the number of cars on the lot this month?
25% increase



TOPIC 1 Proportional Relationships

9. Last month, you joined an online strategy game. When you joined, there were 25 members. This month, there are 47 members. What is the percent change in the number of members from last month to this month?
88% increase
10. At a local toy store, their most popular toy sold is a scooter. Last summer, the toy store sold 20 scooters. This summer, the store sold 27 scooters. What is the percent change in the number of scooters sold from last summer to this summer?
35% increase
11. The peach tree in Angel's backyard produced 56 pounds of peaches in one summer. The next summer, it produced 14 pounds less than the previous year. What is the percent change in the number of pounds of peaches produced from one summer to the next?
25% decrease
12. In summer, you want to put the wind chill factor to work for you. You know that using ceiling fans can make you feel 23 degrees cooler in a house that is 92 degrees, so you turn on your ceiling fans. What is the percent change in the temperature after the ceiling fans are turned on?
25% decrease

B. Answer each question. TEKS 7.4D (Topic-Aligned)

1. Mr. Jackson opened a new general store in the downtown area. On the day of the grand opening, he had 10 customers. The next day, he had 80% more customers than on the grand opening day. How many customers did Mr. Jackson have on the second day?
18 customers
2. Luis creates pottery. He brought 40 pieces to a show at the fall festival. When he went to the spring carnival, he brought 15% more pieces than he brought to the fall festival. How many pieces of pottery did Luis bring to the spring carnival?
46 pottery pieces

Notes



TOPIC 1 Proportional Relationships

Notes

3. A recital hall is located on the campus of The University of Texas at Austin. One day before a piano recital was to take place, 30 tickets had been sold. Happily for the concert organizers an additional 80% of the 30 seats that were previously sold were sold on the actual day of the concert. The result was a sellout. How many seats does the recital hall have?
54 seats
4. Malik is scaling down a photograph that has an area of 8 square inches. He plans to reduce its area by 25%. What will be the area in square inches of the reduced photograph?
6 square inches
5. The heart of a black bear beats about 50 times per minute during normal sleep in the fall. When the animal hibernates in winter, its heart rate decreases by 84%. How many times per minute does a black bear's heart beat during hibernation?
8 beats per minute
6. Your aunt is a web designer. When she tones a photo for a website, she works with it in an image quality of 25 dots per inch (dpi). When she uploads it to the website, she reduces the quality by 60%. What is the dpi your aunt uses for a photo that she uploads to a website?
10 dpi
7. Your sister works as a tutor in the evenings. Last school year, she charged \$25 per hour for her services. After taking some certification classes over the summer, she increased her hourly charge by 40%. How much does your sister now charge per hour for her tutoring services?
\$35
8. Your MP3 player has 40 gigabytes of music on it. During the next sync, you add 10% more music to it and it is full. How many gigabytes does the MP3 player hold now?
44 gigabytes



TOPIC 1 Proportional Relationships

9. The local take-out pizza place sold 50 pepperoni pizzas last month. They sold 6% more pepperoni pizzas this month than last month. How many pepperoni pizzas did they sell this month?
53 pizzas
 10. Last season, your favorite hockey team won 20 games. So far this season, the team has won 90% more games than last season. How many games has your favorite team won so far this season?
38 games
 11. Abby has a collection of sports cards. Last month, she had 50 sports cards. Since last month, her collection has decreased by 46%. How many sports cards does Abby have now?
27 sports cards
 12. Each morning, Ana makes 20 cinnamon bagels for her customers. Because of a recent increase in the popularity of cinnamon bagels, she has increased the number she bakes each morning by 80%. How many cinnamon bagels does Ana now bake each day?
36 cinnamon bagels

Extension

Can you write a percent decrease as a negative ratio? Provide an example of a percent decrease written as a negative ratio and describe what it means in context. **Extension of TEKS 7.4D**

Sample answer:

If, for example, a price is reduced from \$499 to \$299, the percent decrease can be written as $\frac{299 - 499}{499} = -0.40$, so this is a decrease of about 40%.

Notes

Notes

TOPIC 1 Proportional Relationships

Spaced Practice

1. A T-shirt that costs \$14 without tax costs \$14.98 with tax. What is the sales tax percent? **TEKS 7.13A**

7%

2. A car that costs \$14,000 without tax costs \$14,700 with tax. What is the sales tax percent? **TEKS 7.13A**

5%

3. Identify the constant of proportionality in each situation. **TEKS 7.4C**

- a. The temperature rises 4 degrees each hour for 10 hours.

$$k = 4$$

- b. Two thirds of the floats in the parade have flowers.

$$k = \frac{2}{3}$$



Topic Practice

TEKS 7.5C (Topic-Aligned)

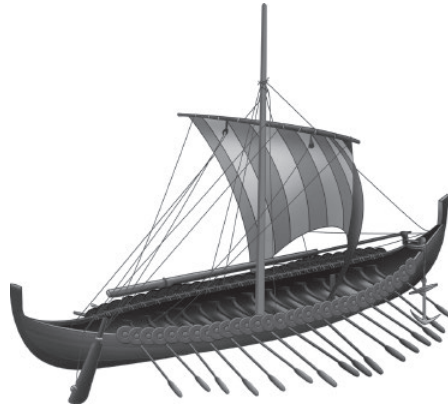
A black and white photograph of a Tyrannosaurus Rex model. The dinosaur is shown in profile, facing left, with its mouth wide open, revealing sharp teeth. It has a large head, a small body, and a long tail. The model is standing on a dark, rectangular base that resembles a rock. The background is plain white.

- The window in the model is $9 \cdot \frac{1}{60} = 0.15$ foot tall.

TOPIC 1 Proportional Relationships

Notes

The model of the historic Gokstad Viking ship has a scale factor of $\frac{1}{64}$.



5. If the ship model is 15 inches long, how long is the actual ship in feet?

The actual ship is $15 \cdot 64 = 960$ inches, or $960 \div 12 = 80$ feet long.

6. If the mast on the actual ship is 32 feet tall, how tall is the mast on the model in inches?

The mast on the model is

$$32 \cdot \frac{1}{64} = 0.50 \text{ foot, or} \\ 0.50 \cdot 12 = 6 \text{ inches tall.}$$

7. A scale model of a skyscraper was built at a scale of 1 : 250 and is 1.4 meters tall. What is the height of the original skyscraper?

$$\frac{1}{250} = \frac{1.4}{x} \\ (1)(x) = (250)(1.4) \\ x = 350$$

The height of the original skyscraper is 350 meters.

8. Luis created a scale model of a bank check to present to a charity. The model was created at a scale of 8 : 1 and is 4 feet long. What is the length of the original check?

$$\frac{8}{1} = \frac{4}{x} \\ (8)(x) = (1)(4) \\ 8x = 4 \\ x = 0.5$$

The length of the original bank check is 0.5 foot, or 6 inches.

TOPIC 1 Proportional Relationships

9. The height of the U.S. Capitol Building is 287 feet. The height of a scale model of the building is 2.87 feet. What is the scale of the model?

$$\frac{2.87}{287} = \frac{287}{28,700}$$

$$= \frac{1}{100}$$

The model is built at a scale of 1 : 100.

11. Koda made a scale model of the Washington Monument. The monument has an actual height of 555 feet. Koda's model used a scale in which 1 inch represents 150 feet. What is the height in inches of Koda's model?

$$\frac{1}{150} = \frac{x}{555}$$

$$(150)(x) = (1)(555)$$

$$x = 3.7$$

The height of Koda's model is 3.7 inches.

10. The length of a pencil is 7 inches. Shawna created a scale model of the pencil for art class. The model is 35 inches long. What is the scale of the model?

$$\frac{35}{7} = \frac{5}{1}$$

The model is built at a scale of 5 : 1.

12. A car has a height of 4.8 feet and a length of 16.2 feet. On a scale model of the car the height is 2 inches. What is the length of the car on the scale model in inches?

$$\frac{4.8}{16.2} = \frac{2}{x}$$

$$(4.8)(x) = (16.2)(2)$$

$$x = 6.75$$

The length of the car is 6.75 inches.

Notes



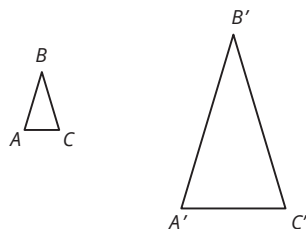
TOPIC 1 Proportional Relationships

Notes

- B. Identify the congruent corresponding angles and write ratios to identify the proportional sides of each triangle.

TEKS 7.5A (Topic-Aligned)

1. $\triangle ABC \sim \triangle A'B'C'$



Congruent
Corresponding Angles:

$$\angle A \cong \angle A'$$

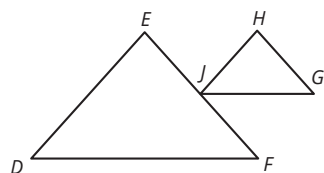
$$\angle B \cong \angle B'$$

$$\angle C \cong \angle C'$$

Proportional Sides:

$$\frac{AB}{A'B'} = \frac{BC}{B'C'} = \frac{CA}{C'A'}$$

2. $\triangle DEF \sim \triangle GHJ$



Congruent
Corresponding Angles:

$$\angle D \cong \angle G$$

$$\angle E \cong \angle H$$

$$\angle F \cong \angle J$$

Proportional Sides:

$$\frac{DE}{GH} = \frac{EF}{HJ} = \frac{FD}{JG}$$

TOPIC 1 Proportional Relationships

Notes

6. $\triangle KLM \sim \triangle RST$

Congruent

Corresponding Angles:

$$\angle K \cong \angle R$$

$$\angle L \cong \angle S$$

$$\angle M \cong \angle T$$

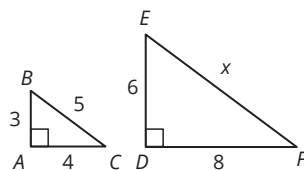
Proportional Sides:

$$\frac{KL}{RS} = \frac{LM}{ST} = \frac{MK}{TR}$$

- C. For each pair of similar triangles, write and solve a proportion to determine the length of the missing side, x .

TEKS 7.5A (Interleaved Practice), TEKS 7.5C (Interleaved Practice)

1. $\triangle ABC$ is similar to $\triangle DEF$.



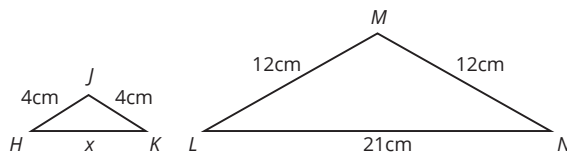
Sample answer:

$$\frac{3}{6} = \frac{5}{x}$$

$$(6)(5) = (3)(x)$$

$$x = 10$$

2. $\triangle HJK$ is similar to $\triangle LMN$.



Sample answer:

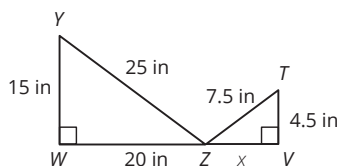
$$\frac{x}{21} = \frac{4}{12}$$

$$(21)(4) = (x)(12)$$

$$x = 7$$

TOPIC 1 Proportional Relationships

3. $\triangle WYZ$ is similar to $\triangle VTZ$.



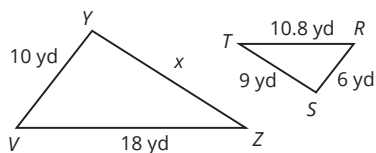
Sample answer:

$$\frac{20}{25} = \frac{x}{7.5}$$

$$(25)(x) = (20)(7.5)$$

$$x = 6$$

5. $\triangle VYZ$ is similar to $\triangle RST$.



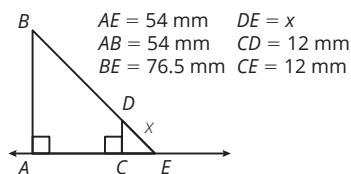
Sample answer:

$$\frac{6}{10} = \frac{9}{x}$$

$$(10)(9) = (6)(x)$$

$$x = 15$$

4. $\triangle ABE$ is similar to $\triangle CDE$.



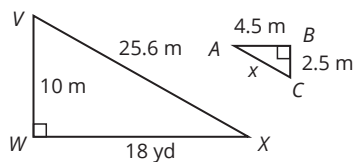
Sample answer:

$$\frac{76.5}{x} = \frac{54}{12}$$

$$(x)(54) = (76.5)(12)$$

$$x = 17$$

6. $\triangle VWZ$ is similar to $\triangle CBA$.



Sample answer:

$$\frac{25.6}{18} = \frac{x}{4.5}$$

$$(18)(x) = (25.6)(4.5)$$

$$x = 6.4$$

Notes

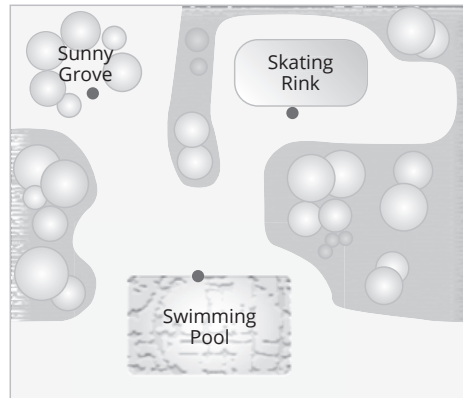


TOPIC 1 Proportional Relationships

Notes

D. Solve each problem. TEKS 7.5C (Topic-Aligned)

1. Gabriela is helping to organize Family Fun Day at the local park. Gabriela is responsible for organizing the relay race. On a map of the park, she plans the first leg of the relay race to start at Sunny Grove and end at the swimming pool. The second leg of the relay race will run from the swimming pool to the skating rink.



On the map:

- The distance between Sunny Grove and the swimming pool is 3.5 inches.
- The distance between the swimming pool and the skating rink is 3.2 inches.
- On the map scale, 1 in. represents 400 ft.

What is the length of the actual race?

2680 ft

2. Huyen enjoys planning vacations almost as much as going on them. This year, she is spending her vacation in the city. Looking at a map, she plans to start at her hotel. From there, she will go to the fine arts museum and then to the sculpture garden. She will walk between each location.



On the map:

- The distance between the hotel and the fine arts museum is 1.1 inches.
- The distance between the fine arts museum and the sculpture garden is 1.3 inches.
- On the map scale, 1 in. represents 3 km.

What is the distance that Huyen walked from the hotel to the sculpture garden?

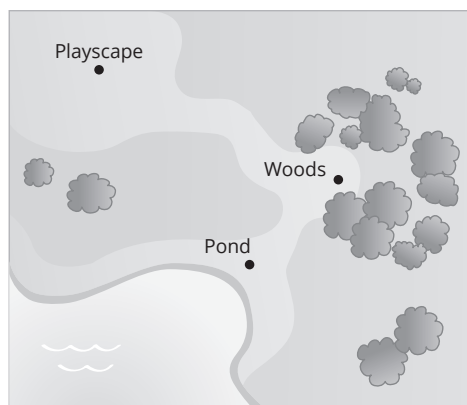
7.2 km

Notes

TOPIC 1 Proportional Relationships

Notes

3. You have been looking forward to the music festival all year. The festival is held at the local park. Using a map of the music festival, you plan to start at the pond, where Mozart is being played. Then, you will walk to a spot in the woods, where Beethoven is being played. Finally, you'll continue to the playscape, where Bach is being played.



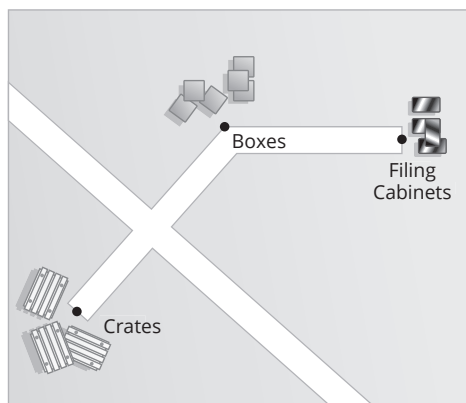
On the map:

- The distance between the pond and the woods is 1.4 inches.
- The distance between the woods and the playscape is 3.1 inches.
- On the map scale, 1 in. represents 40 yd.

What is the distance you walk from the pond to the playscape?

180 yd

4. William is looking at a map of his warehouse to track down shipment #452A7. He begins in the crate section. When he does not find it there, he looks among the boxes. Finally, he searches in the filing cabinets.



On the map:

- The distance between the crates and the boxes is 2 centimeters.
- The distance between the boxes and the filing cabinets is 1.6 centimeters.
- On the map scale, 1 cm represents 80 m.

What is the distance William walks from the crates to the filing cabinets?

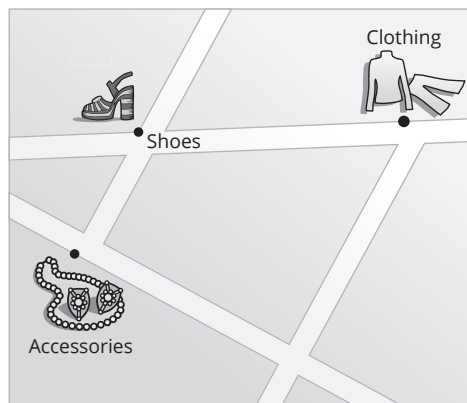
288 m

Notes

Notes

TOPIC 1 Proportional Relationships

5. You look at a map of a department store to see how far the following three departments are from the other: Accessories, Shoes, and Clothing.



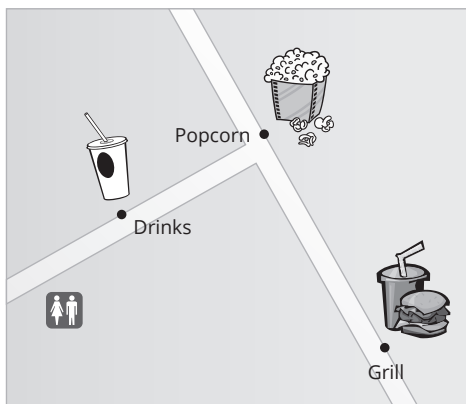
On the map:

- The distance between Accessories and Shoes is 0.5 inches.
- The distance between Shoes and Clothing is 1.2 inches.
- On the map scale, 1 in. represents 50 ft.

What is the actual distance between the shoes and the clothing departments?

60 ft

6. You and your friends are at the high school football stadium watching the game. You volunteer to get snacks for yourself and your friends. You check out the map for concession stands. There are three different concession stands. One is for drinks, one is for popcorn, and one is for the grill.



On the map:

- The distance between the drinks and the popcorn is 2 inches.
- The distance between the popcorn and the grill is 3 inches.
- On the map scale, 1 in. represents 60 ft.

What is the actual distance between the drinks and the popcorn concession stands?

120 ft

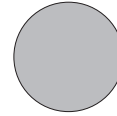
Notes

Notes

TOPIC 1 Proportional Relationships

Extension

You may have seen the star Betelgeuse (BEETLE juice) in the night sky. It is a red giant star, which has a radius of 821.3 million kilometers. By comparison, our Sun has a radius of 0.5 million kilometers. **Extension of TEKS 7.5C**



Suppose the circle shown represents our Sun. How big would the model of Betelgeuse be when you drew it to scale?

The diameter of Betelgeuse, at the same scale, would be 3285.2 cm, or 1293.4 in., or approximately 108 feet across.

Spaced Practice

1. Determine each percent increase or decrease. **TEKS 7.4D**

a. Original: \$340 New: \$34
90% decrease

b. Original: 75 New: 225
300% increase

2. Solve each proportion. **TEKS 7.4D**

a. $\frac{4}{x} = 9$
 $x = \frac{4}{9}$

b. $\frac{7.5}{26} = \frac{75}{p}$
 $p = 260$

TOPIC 1 Proportional Relationships

3. Convert each measure to the unit indicate. Round each measure to the nearest tenth. **TEKS 7.4E**

a. 120 pounds to kilograms

54.4

b. 10 kilometers to miles

6.2

c. 5 gallons to liters

18.9

Notes



Notes

Handwriting practice lines consisting of 18 horizontal white lines on a grey background with a circular pattern.



Name _____ Date _____

I. Simple and Compound Interest

Topic Practice

A. Determine the total value of each investment given the principal, simple interest, and time. **TEKS 7.13E (Topic-Aligned)**

1. Principal: \$200 Simple Interest Rate: 3% Time: 5 years The total value is \$230. $I = Prt$ $I = (200)(0.03)(5)$ $I = 30$ $200 + 30 = 230$	2. Principal: \$1800 Simple Interest Rate: 2.5% Time: 20 years The total value is \$2700. $I = Prt$ $I = (1800)(0.025)(20)$ $I = 900$ $1800 + 900 = 2700$
3. Principal: \$650 Simple Interest Rate: 5% Time: 12 years The total value is \$1040. $I = Prt$ $I = (650)(0.05)(12)$ $I = 390$ $650 + 390 = 1040$	4. Principal: \$2000 Simple Interest Rate: 4% Time: 10 years The total value is \$2080. $I = Prt$ $I = (2000)(0.04)(10)$ $I = 80$ $2000 + 80 = 2080$



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

5. Principal: \$4050
Simple Interest Rate: 2%
Time: 30 years
The total value is \$6480.
 $I = Prt$
 $I = (4050)(0.02)(30)$
 $I = 2430$
 $4050 + 2430 = 6480$

6. Principal: \$7000
Simple Interest Rate: 5%
Time: 20 years
The total value is \$14,000.
 $I = Prt$
 $I = (7000)(0.05)(20)$
 $I = 7000$
 $7000 + 7000 = 14,000$

B. Determine the simple interest rate for each given principal, time, and simple interest earned. TEKS 7.13E (Topic-Aligned)

1. Principal: \$500
Time: 20 years
Simple Interest: \$250
The interest rate is 2.5%.
 $I = Prt$
 $250 = (500)(r)(20)$
 $250 = 10,000r$
 $r = 0.025$
3. Principal: \$1200
Time: 15 years
Simple Interest: \$720
The interest rate is 4%.
 $I = Prt$
 $720 = (1200)(r)(15)$
 $720 = 18,000r$
 $r = 0.04$

2. Principal: \$850
Time: 10 years
Simple Interest: \$255
The interest rate is 3%.
 $I = Prt$
 $255 = (850)(r)(10)$
 $255 = 8500r$
 $r = 0.03$
4. Principal: \$2000
Time: 5 years
Simple Interest: \$441
The interest rate is 4.41%.
 $I = Prt$
 $441 = (2000)(r)(5)$
 $441 = 10,000r$
 $r = 0.0441$

TOPIC 2 Financial Literacy: Interest and Budgets

5. Principal: \$2000

Time: 20 years

Simple Interest: \$2000

The interest rate is 5%.

$$I = Prt$$

$$2000 = (2000)(r)(20)$$

$$2000 = 40,000r$$

$$r = 0.05$$

6. Principal: \$5250

Time: 10 years

Simple Interest: \$2100

The interest rate is 4%.

$$I = Prt$$

$$2100 = (5250)(r)(10)$$

$$2100 = 52,500r$$

$$r = 0.04$$

- C. Calculate the compound interest earnings to determine the total value of each investment. Use a calculator to complete questions 3–6. **TEKS 7.13E (Topic-Aligned)**

1. Principal: \$5000

Compound Interest Rate: 4%

Time: 1 year

The total value is \$5200.00.

$$A = P(1 + r)^t$$

$$A = 5000(1 + 0.04)^1$$

$$A = 5000(1.04)$$

$$A = 5200.00$$

3. Principal: \$1400

Compound Interest Rate: 2.5%

Time: 12 years

The total value is \$1882.84.

$$A = P(1 + r)^t$$

$$A = 1400(1 + 0.025)^{12}$$

$$A = 1400(1.025)^{12}$$

$$A = 1882.84$$

2. Principal: \$850

Compound Interest Rate: 5%

Time: 2 years

The total value is \$937.13.

$$A = P(1 + r)^t$$

$$A = 850(1 + 0.05)^2$$

$$A = 850(1.05)^2$$

$$A = 937.13$$

4. Principal: \$2830

Compound Interest Rate: 3%

Time: 15 years

The total value is \$4409.05.

$$A = P(1 + r)^t$$

$$A = 2830(1 + 0.03)^{15}$$

$$A = 2830(1.03)^{15}$$

$$A = 4409.05$$

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

5. Principal: \$3500

Compound Interest Rate: 2.25%

Time: 20 years

The total value is \$5461.78.

$$A = P(1 + r)^t$$

$$A = 3500(1 + 0.0225)^{20}$$

$$A = 3500(1.0225)^{20}$$

$$A = 5461.78$$

6. Principal: \$6000

Compound Interest Rate: 4%

Time: 5 years

The total value is \$7299.92.

$$A = P(1 + r)^t$$

$$A = 6000(1 + 0.04)^5$$

$$A = 6000(1.04)^5$$

$$A = 7299.92$$

- D. The table shown represents the total value over time of a \$5000 investment earning money in accounts with a 3% interest rate.

TEKS 7.13E (Topic-Aligned)

Number of Years Invested	Total Value in a Simple Interest Account (\$)	Total Value in a Compound Interest Account (\$)
1	$(5000)(0.03)(1) = 150$ $5000 + 150 = 5150$	$(5000)(1 + 0.03)^1 = 5150$
2	$(5000)(0.03)(2) = 300$ $5000 + 300 = 5300$	$(5000)(1 + 0.03)^2 = 5304.50$
3	$(5000)(0.03)(3) = 450$ $5000 + 450 = 5450$	$(5000)(1 + 0.03)^3 = 5463.64$
4	$(5000)(0.03)(4) = 600$ $5000 + 600 = 5600$	$(5000)(1 + 0.03)^4 = 5627.54$
5	$(5000)(0.03)(5) = 750$ $5000 + 750 = 5750$	$(5000)(1 + 0.03)^5 = 5796.37$
10	$(5000)(0.03)(10) = 1500$ $5000 + 1500 = 6500$	$(5000)(1 + 0.03)^{10} = 6719.58$
20	$(5000)(0.03)(20) = 3000$ $5000 + 3000 = 8000$	$(5000)(1 + 0.03)^{20} = 9030.56$
30	$(5000)(0.03)(30) = 4500$ $5000 + 4500 = 9500$	$(5000)(1 + 0.03)^{30} = 12,136.31$

TOPIC 2 Financial Literacy: Interest and Budgets

1. Use a calculator to complete the last four rows of the table.

See table above.

3. How much more money does the compound interest account earn in year 10?

The compound interest earns \$219.58 more in year 10.

5. Look at your table to estimate how long it would take to double the investment if the account earns compound interest.

It would take about 25 years to double the investment with compound interest.

2. How much more money does the compound interest account earn in year 5?

The compound interest earns \$46.37 more in year 5.

4. How long will it take to double the investment if the account earns simple interest?

$$10,000 = (5000)(0.03)(t)$$

$$t = 66.67$$

It would take about 67 years to double the investment with simple interest.

6. Your friend Angel wants to invest money for the next ten years in order to save for college. Which type of account would you suggest that Angel use? Explain your reasoning.

I would tell Angel to invest using a compound interest account because he will make money at a much faster rate than he would using simple interest.

Notes



Notes

TOPIC 2 Financial Literacy: Interest and Budgets

Extension

Determine how much more money is made in a compound interest account than a simple interest account for the given principal, rate, and time. **Extension of TEKS 7.13E**

Principal: \$12,250

Rate: 2.25%

Time: 15 years

Simple Interest Account:

$$I = Prt$$

$$I = (12,250)(0.0225)(15)$$

$$I = 4134.38$$

Compound Interest Account:

$$A = P(1 + r)^t$$

$$A = 12,250(1 + 0.0225)^{15}$$

$$A = 17,103.53$$

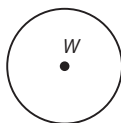
The amount of money made (interest) in the compound interest account is $\$17,103.53 - \$12,250 = \$4853.53$.

$$\text{Difference: } 4853.53 - 4134.38 = 719.15$$

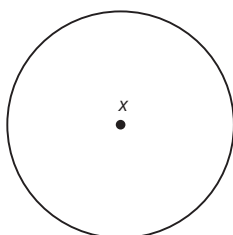
The compound interest account earns \$719.15 more than the simple interest account over 15 years.

Use a string and a centimeter ruler to measure the radius and circumference of each circle. Calculate the ratio of the circumference of the circle to its diameter. **TEKS 7.8C**

1.



2.



3. What is the formula for the circumference of a circle with radius a ?

$$C = 2\pi a$$

4. What is the formula for the area of a circle with radius b ?

$$A = \pi b^2$$



Notes

II. Net Worth Statements

Topic Practice

A. Identify each item as a liability or asset. Explain your reasoning.

TEKS 7.13C (Topic-Aligned)

1. The mortgage on your house This is a liability because I must repay your mortgage.	2. Money in your savings account This is an asset because I own that money.
3. A car that is paid off This is an asset because I own the car.	4. A loan used to pay for college This is a liability because I must repay that loan.
5. Money put away for retirement This is an asset because I own that money.	6. A credit card with unpaid charges on it This is a liability because I must repay the charges.

TOPIC 2 Financial Literacy: Interest and Budgets

B. Analyze each set of accounts. Create a net worth statement, then determine each person's net worth. TEKS 7.13C (Interleaved Practice)

1. Luis's accounts:

- School loans: \$15,000
- Savings account: \$4000
- Car: \$17,600
- 401(k) account: \$45,000
- Credit card: \$4300

Assets		Liabilities	
Type	Amount	Type	Amount
Car	\$17,600	School loans	\$15,000
401(k)	\$45,000	Credit card	\$4300
Savings account	\$4000		
Total:	\$66,600	Total:	19,300

Net worth: $66,600 - 19,300 = 47,300$

Luis's net worth is \$47,300.

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

2. Malik's accounts:

- Business loan: \$200,000
- 403(b): \$65,780
- Vehicle loan: \$65,900
- Certificate of deposit: \$30,000
- Home: \$230,000
- Investments: \$35,000

Assets		Liabilities	
Type	Amount	Type	Amount
403(b)	\$65,780	Business loan	\$200,000
CD	\$30,000	Vehicle loan	\$65,900
Home	\$230,000		
Investments	\$35,000		
Total:	\$360,780	Total:	\$265,900

Net worth: $360,780 - 265,900 = 94,880$

Malik's net worth is \$94,880.

3. Huyen's accounts:

- Video game collection: \$800
- School loans: \$8130
- Car: \$10,540
- Medical bills: \$1675
- Credit cards: \$1535

Assets		Liabilities	
Type	Amount	Type	Amount
Video game collection	\$800	School loans	\$8130
Car	\$10,540	Medical bills	\$1675
		Credit cards	\$1535
Total:	\$11,340	Total:	\$11,340

Net worth: $11,340 - 11,340 = 0$

Huyen's net worth is \$0.

Notes

TOPIC 2 Financial Literacy: Interest and Budgets

Notes

4. Olivia's accounts:

- Mortgage: \$125,000
- Home value: \$160,000
- Car loan: \$15,980
- Bank accounts: \$9800
- 403(b) account: \$11,750
- Home equity loan: \$6450

Assets		Liabilities	
Type	Amount	Type	Amount
Home value	\$160,000	Mortgage	\$125,000
Bank accounts	\$9800	Car loan	\$15,980
403(b) account	\$11,750	Home equity loan	\$6450
Total:	\$181,550	Total:	\$147,430

Net worth: $181,550 - 147,430 = 34,120$

Olivia's net worth is \$34,120.

5. Alexander's accounts:

- Checking account: \$2245.16
- Medical bills: \$567.50
- Home: \$180,000
- Mortgage: \$135,000
- Coin collection: \$1400
- Certificate of deposit: \$10,000
- Car loan: \$26,500

Assets		Liabilities	
Type	Amount	Type	Amount
Checking account	\$2245.16	Medical bills	\$567.50
Coin collection	\$1400	Mortgage	\$135,000
Certificate of Deposit	\$10,000	Car loan	\$26,500
Home	\$180,000		
Total:	\$193,645.16	Total:	\$162,067.50

Net worth: $193,645.16 - 162,067.50 = 31,577.66$

Alexander's net worth is \$31,577.66.

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

6. Luis's accounts:
- Investments: \$3675
 - 403(b): \$22,050
 - Credit cards: \$4523.18
 - Bank accounts: \$10,467.29
 - Car loan: \$16,900

Assets		Liabilities	
Type	Amount	Type	Amount
Investments	\$3675.00	Credit cards	\$4523.18
403(b)	\$22,050.00	Car loan	\$16,900
Bank accounts	\$10,467.29		
Total:	\$36,192.29	Total:	\$21,423.18

Net worth: $36,192.29 - 21,423.18 = 14,769.11$

Luis's net worth is \$14,769.11.

Extension

In 2019, the net worth of the average American was \$102,700. Create a list of realistic assets and liabilities that leads to this net worth. Include at least four assets and four liabilities and be sure to show your work. **Extension of TEKS 7.13C**

Answers will vary.

Spaced Practice

Write and solve a proportion to answer each question.

1. What is 78% of 50? **TEKS 7.4D**

$$\frac{78}{100} = \frac{x}{50}$$

$$x = 39$$

2. What is 54% of 450? **TEKS 7.4D**

$$\frac{54}{100} = \frac{x}{450}$$

$$x = 243$$

3. The number 110 is what percent of 500? **TEKS 7.4D**

$$\frac{110}{500} = \frac{x}{100}$$

$$x = 22\%$$

4. The number 21 is what percent of 75? **TEKS 7.4D**

$$\frac{21}{75} = \frac{x}{100}$$

$$x = 28\%$$

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

5. The number 88 is 44% of what number? **TEKS 7.4D**

$$\frac{88}{x} = \frac{44}{100}$$
$$x = 200$$

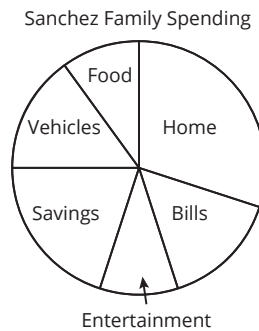
6. The number 57 is 76% of what number? **TEKS 7.4D**

$$\frac{57}{x} = \frac{76}{100}$$
$$x = 75$$

III. Personal Budgets

Topic Practice

- A. The circle graph represents how the Sanchez family spent and saved its \$98,000 in earnings this year. Use the graph to answer each question. Explain your reasoning. **TEKS 7.4D (Topic-Aligned), TEKS 7.13B (Topic-Aligned), TEKS 7.13D (Interleaved Practice)**



1. Suppose the Sanchez family is a family of four. Use a family budget estimator to determine the minimum household budget needed for a family of four to meet its basic needs in your region of the state.

Answers will vary.

TOPIC 2 Financial Literacy: Interest and Budgets

2. Which category did the Sanchez family spend the most on?

The Sanchez family spent the most on their home.

I know this is correct because it is the greatest section of the circle graph.

4. Estimate the percent of earnings and the amount of money the Sanchez family spent on their vehicles this past year.

Answers will vary.

I estimated that the Sanchez family spent about 15% of their earnings on vehicles.

$$(98,000)(0.15) = 14,700$$

The Sanchez family spent \$14,700 on their vehicles this year.

6. How much more did the Sanchez family spend on their home than on entertainment this year?

Answers will vary.

I estimated that the Sanchez family spent about 30% of their earnings on their home and about 10% of their earnings on entertainment. That means they spent 20% more on their home than on entertainment.

$$(98,000)(0.2) = 19,600$$

They spent \$19,600 more on their home than on entertainment.

3. Which categories did the Sanchez family spend the least on?

The Sanchez family spent the least on entertainment and food. I know this is correct because these are the smallest sections of the circle graph.

5. Estimate the percent of earnings and the amount of money the Sanchez family put into their savings this past year.

Answers will vary.

I estimated that the Sanchez family put about 20% of their earnings in savings.

$$(98,000)(0.2) = 19,600$$

The Sanchez family put \$19,600 into their savings this year.

7. The Sanchez family's gross income for the year is \$108,600 before taxes. Estimate the percent of the family's gross income that is taken out in taxes.

$$\begin{aligned} \frac{x}{100} &= \frac{98,000}{108,600} \\ x &= \frac{(98,000)(100)}{108,600} \\ x &= \frac{9,800,000}{108,600} \\ x &\approx 90 \end{aligned}$$

That means they took home about 90% of their income, so about 10% was taken out in taxes.

8. Determine the average hourly wage necessary to earn enough money to support a family of four in your region of the state.

Answers will vary.

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

B. For each expense, determine the percent of the total expenses for each category. TEKS 7.4D (Topic-Aligned), TEKS 7.13B (Topic-Aligned), 7.13C (Interleaved Practice)

1. The Jackson family's expenses:

- Household: \$700
- Living: \$280
- Savings: \$420

Total expenses: $600 + 350 + 450 = 1400$

Household: $\frac{700}{1400} = 0.5 = 50\%$

Living: $\frac{280}{1400} = 0.2 = 20\%$

Savings: $\frac{420}{1400} = 0.3 = 30\%$

2. The Rodriguez family's expenses:

- Household: \$800
- Living: \$400
- Savings: \$400

Total expenses: $800 + 400 + 400 = 1600$

Household: $\frac{800}{1600} = 0.50 = 50\%$

Living: $\frac{400}{1600} = 0.25 = 25\%$

Savings: $\frac{400}{1600} = 25 = 25\%$

3. The Chen family's expenses:

- Mortgage: \$1500
- Utilities: \$400
- Credit cards: \$250
- Savings: \$350

Total expenses: $1500 + 400 + 250 + 350 = 2500$

Mortgage: $\frac{1500}{2500} = 0.60 = 60\%$

Utilities: $\frac{400}{2500} = 0.16 = 16\%$

Credit cards: $\frac{250}{2500} = 0.1 = 10\%$

Savings: $\frac{350}{2500} = 0.14 = 14\%$

4. The Jackson family's expenses:

- Mortgage: \$1900
- Utilities: \$600
- Car loan: \$800
- Savings: \$700

Total expenses: $1900 + 600 + 800 + 700 = 4000$

Mortgage: $\frac{1900}{4000} = 0.475 = 47.5\%$

Utilities: $\frac{600}{4000} = 0.15 = 15\%$

Car loan: $\frac{800}{4000} = 0.2 = 20\%$

Savings: $\frac{700}{4000} = 0.175 = 17.5\%$

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

5. The Rodriguez family's expenses:

- Mortgage: \$1500
- Utilities: \$300
- School loans: \$480
- Miscellaneous: \$120

Total expenses: $1500 + 300 + 480 + 120 = 2400$

Mortgage: $\frac{1500}{2400} = 0.625 = 62.5\%$

Utilities: $\frac{300}{2400} = 0.125 = 12.5\%$

School loans: $\frac{480}{2400} = 0.2 = 20\%$

Miscellaneous: $\frac{120}{2400} = 0.05 = 5\%$

6. The Sanchez family's expenses:

- Mortgage: \$4000
- Utilities: \$800
- Vacation: \$1280
- Credit cards: \$200
- Savings: \$120

Total expenses: $4000 + 800 + 1280 + 200 + 120 = 6400$

Mortgage: $\frac{4000}{6400} = 0.625 = 62.5\%$

Utilities: $\frac{800}{6400} = 0.125 = 12.5\%$

Vacation: $\frac{1280}{6400} = 0.2 = 20\%$

Credit cards: $\frac{200}{6400} = 0.03125 = 3.125\%$

Savings: $\frac{120}{6400} = 0.01875 = 1.875\%$

Notes

- Total expenses: $2250 + 1125 + 450 + 450 + 225 = 4500$

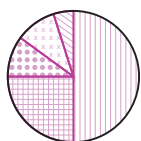
Mortgage: $\frac{2250}{4500} = 0.5 = 50\%$

Vehicle loans: $\frac{1125}{4500} = 0.25 = 25\%$

Utilities: $\frac{450}{4500} = 0.1 = 10\%$

Credit cards: $\frac{450}{4500} = 0.1 = 10\%$

Savings: $\frac{225}{4500} = 0.05 = 5\%$



- Mortgage
- Vehicle Loans
- Utilities
- Credit cards
- Savings

TOPIC 2 Financial Literacy: Interest and Budgets

Notes

2. Create a circle graph to present the Sanchez family's expenses:

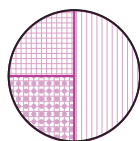
- Household expenses: \$3100
- Living expenses: \$1550
- Savings: \$1550

Total expenses: $3100 + 1550 + 1550 = 6200$

Household expenses: $\frac{3100}{6200} = 0.5 = 50\%$

Living expenses: $\frac{1550}{6200} = 0.25 = 25\%$

Savings: $\frac{1550}{6200} = 0.25 = 25\%$



- Household expenses
- Living expenses
- Savings

TOPIC 2 Financial Literacy: Interest and Budgets

3. Create a circle graph to present the Rodriguez family's expenses:

- Rent: \$5100
- Utilities: \$2125
- Car loan: \$850
- Entertainment: \$425

Total expenses: $5100 + 2125 + 850 + 425 = 8500$

Rent: $\frac{5100}{8500} = 0.6 = 60\%$

Utilities: $\frac{2125}{8500} = 0.25 = 25\%$

Car loan: $\frac{850}{8500} = 0.1 = 10\%$

Entertainment: $\frac{425}{8500} = 0.05 = 5\%$



□ Rent
▤ Utilities
▧ Car Loan
▩ Entertainment

Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

4. Create a circle graph to present the Chen family's expenses:

- Vacation: \$2500
- Car loan: \$500
- Retirement savings: \$5000
- Food: \$500
- Entertainment: \$1000
- Miscellaneous: \$500

Total expenses:

$$2500 + 500 + 5000 + 500 + 1000 + 500 = 10,000$$

$$\text{Vacation: } \frac{2500}{10,000} = 0.25 = 25\%$$

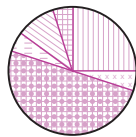
$$\text{Car loan: } \frac{500}{10,000} = 0.05 = 5\%$$

$$\text{Retirement savings: } \frac{5000}{10,000} = 0.5 = 50\%$$

$$\text{Food: } \frac{500}{10,000} = 0.05 = 5\%$$

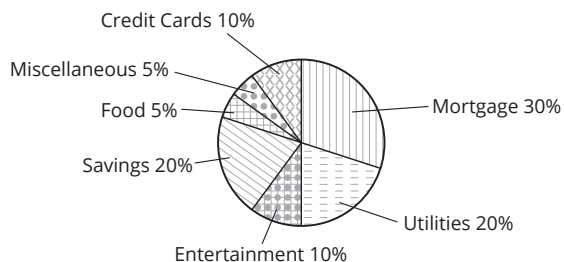
$$\text{Entertainment: } \frac{1000}{10,000} = 0.1 = 10\%$$

$$\text{Miscellaneous: } \frac{500}{10,000} = 0.05 = 5\%$$



- Vacation
- Car Loan
- Retirement Savings
- Food
- Entertainment
- Miscellaneous

5. The Jackson family spends \$25,000 quarterly. The pie chart represents the family's expenses.



- a. Determine the amount the Jackson family spends on food quarterly.

$$25,000 \cdot 0.05 = 1250$$

The Jackson family spends \$1250 on food quarterly.

- b. Assume that 20% of the Jackson family's gross income is taken out in federal income tax. How much money must they make before taxes in order to maintain the family's current budget?

$$25,000 \cdot 1.20 = 30,000$$

The Jackson family must have \$30,000 of quarterly income to maintain their current budget.

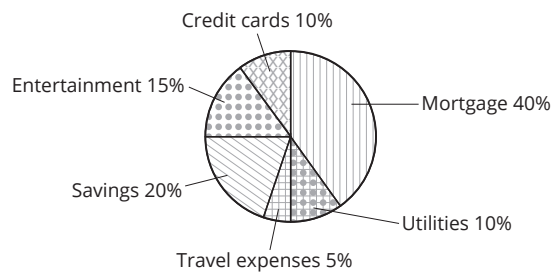
Notes



TOPIC 2 Financial Literacy: Interest and Budgets

Notes

6. The Sanchez family spends \$30,000 quarterly. The pie chart represents the family's expenses.



- a. Determine the amount the Sanchez family spends on travel expenses and entertainment quarterly.

$$30,000 \cdot 0.05 = 1500$$

$$30,000 \cdot 0.15 = 4500$$

$$1500 + 4500 = 6000$$

The Sanchez family spends \$6000 on travel expenses and entertainment quarterly.

- b. Assume that 25% of the Sanchez family's gross income is taken out in federal income tax. How much money must they make before taxes in order to maintain the family's current budget?

$$30,000 \cdot 1.25 = 37,500$$

The Jackson family must have \$37,500 of quarterly income to maintain their current budget.

TOPIC 2 Financial Literacy: Interest and Budgets

Extension

According to the Texas Quarterly Housing Report (2019), the statewide median price for a single-family home is \$177,100. Research the average interest rate for a 30-year fixed-rate mortgage in your area. Use that information to calculate the total interest that someone would pay over the life of the loan. **Extension of TEKS 7.4D, Extension of TEKS 7.13E**

Answers will vary.

Spaced Practice

Set up and solve a proportion to solve each problem.

1. Mr. Jackson works as the art teacher at a summer day camp. Six hundred campers participate in the camp every day. Yesterday, Mr. Jackson helped 6 campers on an art project. What percent of the campers did Mr. Jackson help yesterday? **TEKS 7.4D**

1%

2. Jacob is saving up to purchase a small flat screen television for his bedroom. He has saved \$80, which is 64% of the total cost of the television. How much does the television cost? **TEKS 7.4D**

\$125

Notes



Notes

TOPIC 2 Financial Literacy: Interest and Budgets

3. Madison saved \$150 over the summer from his part-time job. He withdrew 20% of the money to buy new clothes. He kept the rest of the money in his bank account. How much money did Madison spend on new clothes? **TEKS 7.4D**

\$30

4. Destiny harvests tomatoes from 18 plants. That is 75% of the tomato plants she planted. How many tomato plants did Destiny plant? **TEKS 7.4D**

24 tomato plants

Reasoning Algebraically

TOPIC 1: Operating with Rational Numbers

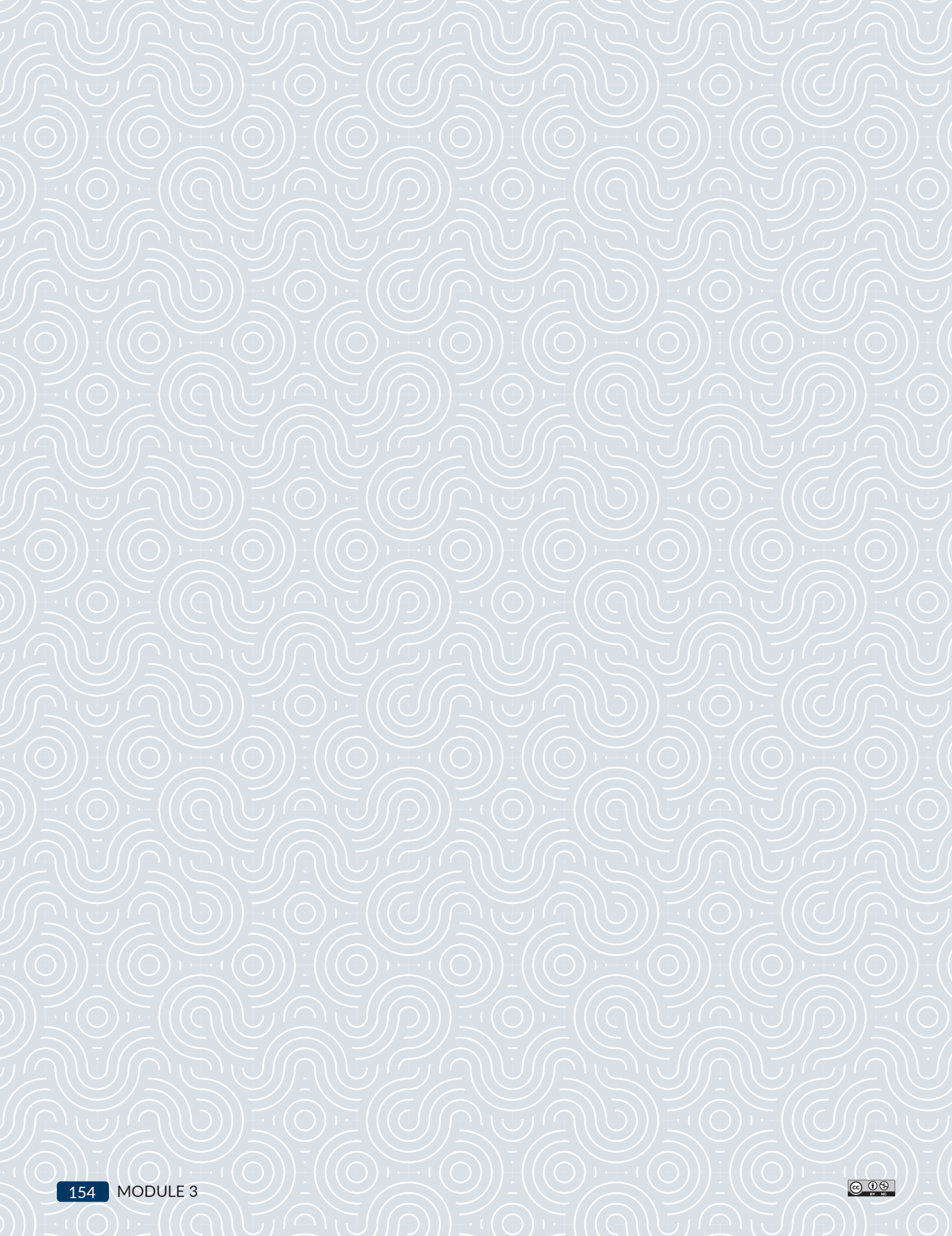
I. Adding and Subtracting Rational Numbers	155
II. Quotients of Integers	160
III. Simplifying Expressions to Solve Problems	165
IV. Using Number Properties to Interpret Expressions with Signed Numbers	171
V. Evaluating Algebraic Expressions	174
VI. Rewriting Expressions Using the Distributive Property	181

TOPIC 2: Two-Step Equations and Inequalities

I. Modeling Equations as Equal Expressions	187
II. Solving Equations Using Algebra Tiles	193
III. Solving Equations on a Double Number Line	200
IV. Using Inverse Operations to Solve Equations	204
V. Using Inverse Operations to Solve Inequalities	213

TOPIC 3: Multiple Representations of Equations

I. Representing Equations with Tables and Graphs	221
II. Building Inequalities and Equations to Solve Problems	234
III. Using Multiple Representations to Solve Problems	250



Name _____ Date _____

I. Adding and Subtracting Rational Numbers

Topic Practice

- A. Sketch a Venn diagram to show all of the sets and subsets of numbers that you know. Use your Venn diagram to decide whether each statement is true or false. Explain your reasoning.

TEKS 7.2A (Topic-Aligned)

Answers will vary. Check students' Venn Diagrams.

1. All integers are included in the set of natural numbers. False. 0 is an integer but is not included in the set of natural numbers.	2. All whole numbers are included in the set of integers. True. The set of integers includes all whole numbers and their opposites.
3. All rational numbers are included in the set of whole numbers. False, whole numbers only include 0 and positive integers. Rational numbers include negative integers as well as positive and negative numbers that can be written in the form $\frac{a}{b}$ with b not being equal to 0.	4. $\frac{2}{9}$ is included in the set of integers. False. $\frac{2}{9}$ is not a whole number, therefore not included in the set of integers, but is included in the set of rational numbers.



Notes

TOPIC 1 Operating with Rational Numbers

5. -3 is included in the set of rational numbers.

True. -3 is an integer and the set of all integers is included in the set of rational numbers.

6. $\frac{3}{5}$ is included in the set of rational numbers.

True. $\frac{3}{5}$ is a number written in the form $\frac{a}{b}$ with b not being equal to 0, which is the definition of a rational number.

B. Determine each solution. TEKS 7.3A (Interleaved Practice)

1. The temperature in Chattanooga, Tennessee, is -3°C . The temperature in Mario's hometown is 18 degrees colder than that. What is the temperature in Mario's hometown?

-2°C

2. Kaya owes \$22.50 on her lunch account balance. She pays \$15 toward her balance. What is the status of her lunch account balance now?

$-\$7.50$

3. A roller coaster rises up to 50.6 feet above the ground before dropping 100.7 feet into an underground cavern. Describe the height of the roller coaster at the bottom of the cavern.

-50.1 feet

4. To qualify to compete in the high jump finals, athletes must jump a certain height in the semi-finals. Andrew jumped $1\frac{5}{8}$ inches below the qualifying height, but his friend Alejandro made it to $2\frac{1}{4}$ inches over the qualifying height. How much lower was Andrew's semi-final jump compared with Alejandro's?

$3\frac{7}{8}$ inches



TOPIC 1 Operating with Rational Numbers

5. A drilling crew dug to a height of $-32\frac{3}{4}$ feet during their first day of drilling. On the second day, the crew dug down $19\frac{2}{3}$ feet more than on the first day. What is the total distance that the drilling crew dug at the end of the second day?

$$-52\frac{5}{12} \text{ feet}$$

6. The freezing point of helium is -458 degrees Fahrenheit. If you increase that temperature by 569.7 degrees Fahrenheit, you reach the freezing point of phosphorus. What is the freezing point of phosphorus?

$$111.7^{\circ}\text{F}$$

- C. Estimate each sum or difference. Then, calculate the actual sum or difference. TEKS 7.3A (Interleaved Practice)

1. $-13.5 + 5.35$

$$-8.15$$

2. $-\frac{3}{4} + \frac{2}{3}$

$$-\frac{1}{12}$$

3. $2.89 + (-3.237)$

$$-0.347$$

4. $5\frac{3}{4} + (-2\frac{1}{3})$

$$3\frac{5}{12}$$

5. $-\frac{3}{8} + \frac{5}{6}$

$$\frac{11}{24}$$

6. $-3.76 - (-2.9)$

$$-0.86$$

Notes



Notes

TOPIC 1 Operating with Rational Numbers

$$7. \frac{2}{3} - \frac{3}{8}$$

$$\frac{7}{24}$$

$$9. \frac{5}{8} - \frac{3}{4}$$

$$-1\frac{3}{8}$$

$$11. 0.23 - (-0.36)$$

$$0.59$$

$$8. -2\frac{2}{7} + 1\frac{1}{3}$$

$$-\frac{20}{21}$$

$$10. 42.71 + (-12.1)$$

$$30.61$$

$$12. 1\frac{5}{6} + \left(\frac{-1}{4}\right)$$

$$1\frac{7}{12}$$

Extension

Determine each solution. Let $-3 = x$, $-5 = y$, and $-4 = k$. **Extension of TEKS 7.3A**

$$1. |x - y - y - k + y + x|$$

$$3$$

$$3. -k - y + x - y$$

$$11$$

$$2. k - y - k + x + k$$

$$-2$$

Spaced Practice

- Determine each difference. Then, write a sentence that describes the movement on the number line that you could use to solve the problem. **TEKS 7.3A**

a. $7 - (-6)$

13; move to 7 and then move right 6 units

⋮

b. $-5 - 13$

-18; move to -5 and then move left 13 units

- Samantha is riding her bicycle across the state of Texas to raise money for her favorite charity. The distance in miles that she can travel varies directly with the length of time in hours she spends riding. Assume that her constant of proportionality is 18. What does the constant of proportionality represent in this problem? **TEKS 7.4C**

The constant of proportionality represents how fast Samantha can ride in miles per hour.

- The constant of proportionality between the number of children on a field trip and the number of teachers on the trip is $\frac{14}{3}$. There are 70 children on a field trip. How many teachers are on the trip? **TEKS 7.4D**

There are 15 teachers on the trip.

- Determine two unit rates for each given rate. **TEKS 7.4B**

- a. 12 students ate 4.5 pizzas.

$2\frac{2}{3}$ students per pizza and 0.375 pizzas per student

- b. Trung painted $\frac{1}{3}$ of the wall in $\frac{1}{4}$ hour.

$1\frac{1}{3}$ walls per hour and $\frac{3}{4}$ hours per wall

Notes



Notes

TOPIC 1 Operating with Rational Numbers

II. Quotients of Integers

Topic Practice

A. Solve each problem. TEKS 7.3A (Interleaved Practice), TEKS 7.3B (Interleaved Practice)

1. A small submarine is at an elevation of $-45\frac{1}{2}$ feet compared to sea level. What is its elevation after it ascends 9.75 feet?

$$-45\frac{1}{2} + 9.75 = -35.75 \text{ or } -35\frac{3}{4}$$

The elevation of the submarine is $-35\frac{3}{4}$ feet.

2. Eduardo is downloading songs on his electronic device. His device has $22\frac{1}{2}$ minutes of available space. How many $4\frac{2}{5}$ -minute songs can Eduardo download?

$$22\frac{1}{2} \div 4\frac{2}{5} = 5\frac{5}{44}$$

Eduardo can download 5 songs.

3. The temperature changed -2.3°F per hour for $7\frac{3}{4}$ hours. By how many degrees did the temperature change during that time period?

$$-2.3 \cdot 7\frac{3}{4} = -17\frac{33}{40} \text{ or } -17.825$$

$$-17\frac{33}{40}^{\circ}\text{F}$$

4. Paola rides her bike to and from work $3\frac{1}{8}$ miles each way. How many days will it take her to ride 100 miles?

$$2 \cdot 3\frac{1}{8} = 6\frac{1}{4}$$

$$100 \div 6\frac{1}{4} = 16$$

It will take Paola 16 days to ride 100 miles.



TOPIC 1 Operating with Rational Numbers

5. The art club purchased 144 plain white t-shirts for \$8.30 each. After painting the T-shirts, they sold $\frac{3}{4}$ of the T-shirts for \$15.45 each. How much money did the art club make from the fundraiser?

$$144(-8.30) = -1195.20$$

$$144 \cdot \frac{3}{4} = 108$$

$$108 \cdot 15.45 = 1668.60$$

$$1668.60 + (-1195.20) = 473.40$$

The art club made \$473.40.

6. The water in a bucket evaporated $\frac{5}{8}$ inch every hour. At 8:00 AM the water level in the bucket was $8\frac{3}{4}$ inches. What was the water level in the bucket at 11:30 AM?

$$3\frac{1}{2} \cdot \left(-\frac{5}{8}\right) = -2\frac{3}{16}$$

$$8\frac{3}{4} + \left(-2\frac{3}{16}\right) = 6\frac{9}{16}$$

The water level in the bucket at 11:30 AM was $6\frac{9}{16}$ inches.

B. Calculate each quotient. TEKS 7.3A (Topic-Aligned)

1. $6\frac{2}{3} \div -\frac{2}{3} =$

$$6\frac{2}{3} \div -\frac{2}{3} = -10$$

$$6\frac{2}{3} \div -\frac{2}{3} =$$

$$\frac{20}{3} \div -\frac{2}{3} =$$

$$\frac{20}{3} \cdot -\frac{3}{2} = -10$$

2. $-12\frac{3}{4} \div -2\frac{1}{4} =$

$$-12\frac{3}{4} \div -2\frac{1}{4} = 5\frac{2}{3}$$

$$-12\frac{3}{4} \div -2\frac{1}{4} =$$

$$-\frac{51}{14} \div -\frac{9}{4} =$$

$$-\frac{51}{14} \cdot -\frac{4}{9} =$$

$$\frac{17}{3} = 5\frac{2}{3}$$

Notes



TOPIC 1 Operating with Rational Numbers

Notes

$$3. \quad -144.15 \div 15.5 =$$

$$-144.15 \div 15.5 = -9.30$$

$$5. \quad -79.54 \div -9.7 =$$

$$-79.54 \div -9.7 = 8.20$$

$$7. \quad 33.33 \div -6.06 =$$

$$33.33 \div -6.06 = -5.50$$

$$4. \quad -12\frac{2}{5} \div 15\frac{1}{2} =$$

$$-12\frac{2}{5} \div 15\frac{1}{2} = -\frac{4}{5}$$

$$-12\frac{2}{5} \div 15\frac{1}{2} =$$

$$-\frac{62}{5} \div \frac{31}{2} =$$

$$-\frac{62}{5} \cdot \frac{2}{31} = -\frac{4}{5}$$

$$6. \quad 7\frac{1}{2} \div -\frac{5}{6} =$$

$$7\frac{1}{2} \div -\frac{5}{6} = -9$$

$$7\frac{1}{2} \div -\frac{5}{6} =$$

$$\frac{15}{2} \div -\frac{5}{6} =$$

$$\frac{15}{2} \cdot -\frac{6}{5} = -9$$

$$8. \quad -16\frac{1}{2} \div -24\frac{3}{4} =$$

$$-16\frac{1}{2} \div -24\frac{3}{4} = \frac{2}{3}$$

$$-16\frac{1}{2} \div -24\frac{3}{4} =$$

$$-\frac{33}{2} \div -\frac{99}{4} =$$

$$-\frac{33}{2} \cdot -\frac{4}{99} = \frac{2}{3}$$

TOPIC 1 Operating with Rational Numbers

9. $(-33.28 \div -5.2) \div -1.6 =$

$$(-33.28 \div -5.2) \div -1.6 = -4$$

$$(-33.28 \div -5.2) \div -1.6 =$$

$$(6.4) \div -1.6 = -4$$

10. $(-14\frac{7}{8} \div 1\frac{3}{4}) \div -\frac{1}{2} =$

$$(-14\frac{7}{8} \div 1\frac{3}{4}) \div -\frac{1}{2} = 17$$

$$(-14\frac{7}{8} \div 1\frac{3}{4}) \div -\frac{1}{2} =$$

$$(-\frac{119}{8} \div \frac{7}{4}) \div -\frac{1}{2} =$$

$$(-\frac{119}{8} \cdot \frac{4}{7}) \div -\frac{1}{2} =$$

$$(-\frac{17}{2}) \div -\frac{1}{2} =$$

$$-\frac{17}{2} \cdot -\frac{2}{1} = 17$$

Extension

Use what you know about multiplying signed numbers to evaluate each expression. **Extension of TEKS 7.3A**

1. $(-\frac{1}{2})^2$

$$\frac{1}{4}$$

2. $-(\frac{1}{2})^2$

$$-\frac{1}{4}$$

3. $(-\frac{1}{2})^3$

$$-\frac{1}{8}$$

4. $-(\frac{1}{2})^3$

$$-\frac{1}{8}$$

What do you notice?

When the negative is included in the base, raising to an even power results in a positive, and raising to an odd power results in a negative. If the negative is in front, not being raised to the power, the answer is the opposite of that computed for the power.

Notes



Notes

TOPIC 1 Operating with Rational Numbers

Spaced Practice

Represent each scenario as a multiplication or division problem. Then, solve the problem. **TEKS 7.3B**

1. The temperature changed -2° per hour for 5 hours. How many degrees did the temperature drop during that time period.
 -10°
2. Paola missed 8 questions on her science final, which changed her final score by -32 points. If each question is weighted equally, how many points did she lose for each question?
 -4 points

Determine each product. **TEKS 7.3A**

3. $2\frac{1}{2} \cdot \left(-3\frac{3}{4}\right)$
 $-9\frac{3}{8}$

4. $-5\frac{1}{3} \cdot \left(-2\frac{1}{2}\right)$
 $13\frac{1}{3}$

Determine an 18% gratuity for each restaurant bill. **TEKS 7.4D**

5. \$29.50
\$5.31

6. \$56.70
\$10.21

III. Simplifying Expressions to Solve Problems

Topic Practice

- A. Solve each problem. TEKS 7.3A (Interleaved Practice),
TEKS 7.3B (Interleaved Practice)

1. Elena is baking cookies. She has $6\frac{7}{8}$ cups of sugar. Each batch of cookies requires $\frac{3}{4}$ cup of sugar. How many full batches of cookies can Elena make? How much sugar will she have left over?

$$\begin{aligned} 6\frac{7}{8} \div \frac{3}{4} &= \frac{55}{8} \cdot \frac{4}{3} \\ &= \frac{55}{6} \\ &= 9\frac{1}{6} \end{aligned}$$

Elena can make 9 full batches.

$$\frac{1}{6} \left(\frac{3}{4} \right) = \frac{1}{8}$$

Elena will have $\frac{1}{8}$ cup of sugar left over.

2. A construction company is building concrete pillars at the entrance of an auditorium. Each pillar requires 5.75 cubic yards of concrete. How many cubic yards will be required to construct 9 pillars?

$$5.75 \cdot 9 = 51.75$$

The construction company will need 51.75 cubic yards of concrete to construct 9 pillars.

Notes



TOPIC 1 Operating with Rational Numbers

Notes

3. Eduardo needs to cut a 15-foot steel pipe into $2\frac{1}{3}$ -foot pieces. How many $2\frac{1}{3}$ -foot pieces can he cut from the pipe?

$$\begin{aligned} 15 \div 2\frac{1}{3} &= \frac{15}{1} \div \frac{7}{3} \\ &= \frac{15}{1} \cdot \frac{3}{7} \\ &= \frac{45}{7} \\ &= 6\frac{3}{7} \end{aligned}$$

Eduardo can cut 6 pieces from the pipe.

4. Chris is sowing a large field with alfalfa. Each acre requires 12.4 pounds of alfalfa seed. How many pounds of alfalfa will Chris use if she sows 7 acres?

$$12.4 \cdot 7 = 86.8$$

Chris will use 86.8 pounds of alfalfa to seed the field.

5. A veterinarian is providing care to cattle. One bottle of medicine is 8 fluid ounces. How many $\frac{2}{3}$ -fluid-ounce doses can the veterinarian get out of one bottle of medicine? How many fluid ounces of medicine will be left in the bottle after she draws the maximum number of doses out?

$$\begin{aligned} 8 \div \frac{2}{3} &= \frac{8}{1} \cdot \frac{3}{2} \\ &= \frac{24}{2} \\ &= 12 \end{aligned}$$

The veterinarian can get 12 doses from one bottle. There will be no medicine left in the bottle.

TOPIC 1 Operating with Rational Numbers

6. A nightlight uses $8\frac{1}{3}$ watts of power every hour. How many watts will the nightlight use every $6\frac{1}{2}$ hours?

$$\begin{aligned} 8\frac{1}{3} \cdot 6\frac{1}{2} &= \frac{25}{3} \cdot \frac{13}{2} \\ &= \frac{325}{6} \\ &= 54\frac{1}{6} \end{aligned}$$

The nightlight will use $54\frac{1}{6}$ watts of power every $6\frac{1}{2}$ hours.

7. Jorge feeds 21.9 fluid ounces of milk to 6 kittens. If each kitten drinks an equal amount, how many fluid ounces of milk does each kitten drink?

$$21.9 \div 6 = 3.65$$

Each kitten drinks 3.65 fluid ounces of milk.

8. Eight divers recover 18.24 ounces of gold from a sunken ship. How many ounces of gold will each diver get if they divide the gold equally?

$$18.24 \div 8 = 2.28$$

Each diver will get 2.28 ounces of gold.

9. Mariana's truck uses $2\frac{2}{3}$ gallons of gas every hour on a long-distance trip. How many gallons does the truck use in $8\frac{1}{2}$ hours?

$$\begin{aligned} 2\frac{2}{3} \cdot 8\frac{1}{2} &= \frac{8}{3} \cdot \frac{17}{2} \\ &= \frac{136}{6} \\ &= 22\frac{2}{3} \end{aligned}$$

The truck will use $22\frac{2}{3}$ gallons of gas in $8\frac{1}{2}$ hours.

Notes



TOPIC 1 Operating with Rational Numbers

Notes

10. Jaylen is cutting $5\frac{1}{2}$ -foot strips of ribbon from a 60-foot roll. How many full strips can he cut from the roll? Once he cuts the maximum number of full strips from the roll, how many feet of ribbon will be left over?

$$\begin{aligned} 60 \div 5\frac{1}{2} &= \frac{60}{1} \div \frac{11}{2} \\ &= \frac{60}{1} \cdot \frac{2}{11} \\ &= \frac{120}{11} \\ &= 10\frac{10}{11} \end{aligned}$$

Jaylen can cut 10 full strips from the roll.

$$\begin{aligned} \frac{10}{11} \cdot 5\frac{1}{2} &= \frac{10}{11} \cdot \frac{11}{2} \\ &= \frac{10}{2} \\ &= 5 \end{aligned}$$

There will be 5 feet of ribbon left over.

B. Evaluate each expression for the given value. TEKS 7.3A (Topic-Aligned), TEKS 7.3B (Topic-Aligned)

1. Evaluate $\frac{5}{6}x$ for $x = -8$.

$$\begin{aligned} \frac{5}{6}(-8) &= \frac{5}{6} \cdot \frac{-8}{1} \\ &= \frac{-20}{3} \\ &= -6\frac{2}{3} \end{aligned}$$

3. Evaluate $t \div 0.25$ for $t = 9.75$.

$$9.75 \div 0.25 = 39$$

2. Evaluate $9\frac{1}{3} - m$ for $m = -1\frac{2}{3}$.

$$\begin{aligned} 9\frac{1}{3} - (-1\frac{2}{3}) &= 9\frac{1}{3} + 1\frac{2}{3} \\ &= 10\frac{3}{3} \\ &= 11 \end{aligned}$$

4. Evaluate $\frac{2}{5}k - 3.5$ for $k = 15$.

$$\begin{aligned} \frac{2}{5}(15) - 3.5 &= 6 - 3.5 \\ &= 2.5 \end{aligned}$$

TOPIC 1 Operating with Rational Numbers

5. Evaluate $-3.25 - 2\frac{3}{4}z$ for $z = -4$.

$$\begin{aligned} -3.25 - 2\frac{3}{4}(-4) &= -3.25 - \frac{11}{4}\left(\frac{-4}{1}\right) \\ &= -3.25 + 11 \\ &= 7.75 \end{aligned}$$

7. Evaluate $12.36 \div v$ for $v = -0.6$.

$$12 \div (-0.6) = -20.6$$

9. Evaluate $x \div \left(-1\frac{1}{5}\right)$ for $x = 6\frac{3}{4}$.

$$\begin{aligned} 6\frac{3}{4} \div \left(-1\frac{1}{5}\right) &= \frac{27}{4} \div \left(-\frac{6}{5}\right) \\ &= \frac{27}{4} \cdot \left(-\frac{5}{6}\right) \\ &= -\frac{45}{8} \\ &= -5\frac{5}{8} \end{aligned}$$

6. Evaluate $\frac{3}{4}\left(x - 1\frac{1}{5}\right)$ for $x = 2$.

$$\begin{aligned} \frac{3}{4}\left(2 - 1\frac{1}{5}\right) &= \frac{3}{4}\left(\frac{10}{5} - \frac{6}{5}\right) \\ &= \frac{3}{4}\left(\frac{4}{5}\right) \\ &= \frac{3}{5} \end{aligned}$$

8. Evaluate $\left(-3\frac{1}{2}\right)n - 2\frac{2}{3}$ for $n = -3$.

$$\begin{aligned} \left(-3\frac{1}{2}\right)(-3) - 2\frac{2}{3} &= \left(-\frac{7}{2}\right)\left(-\frac{3}{1}\right) - 2\frac{2}{3} \\ &= \frac{21}{2} - 2\frac{2}{3} \\ &= \frac{21}{2} - \frac{8}{3} \\ &= \frac{63}{6} - \frac{16}{6} \\ &= \frac{47}{6} \\ &= 7\frac{5}{6} \end{aligned}$$

10. Evaluate $2.25\left(7\frac{5}{6} - m\right)$ for $m = 4\frac{2}{3}$.

$$\begin{aligned} 2.25\left(7\frac{5}{6} - 4\frac{2}{3}\right) &= 2.25\left(3\frac{1}{6}\right) \\ &= 2.25\left(\frac{19}{6}\right) \\ &= 7.125 \end{aligned}$$

Notes



Notes

TOPIC 1 Operating with Rational Numbers

Extension

Solve each equation. **Extension of TEKS 7.11A**

1. $\frac{4}{5}(p + 1) = 1$

$$p = \frac{1}{4}$$

2. $\frac{g}{8} - 5 = 1\frac{1}{2}$

$$g = 52$$

Spaced Practice

Determine each product. **TEKS 7.3A**

1. $-4\frac{1}{5} \cdot (-2.65)$

$$11.13$$

2. $3\frac{1}{5}(-4\frac{3}{8})$

$$-14$$

Determine each absolute value. Show your work. **TEKS 7.3A**

3. $|-5 - (-7)|$

$$2$$

4. $|- \frac{3}{8} + \frac{1}{6}|$

$$\frac{5}{54}$$

Determine each quotient. **TEKS 7.3A**

5. $\frac{3}{4} \div \frac{4}{3}$

$$\frac{9}{16}$$

6. $\frac{1}{8} \div \frac{1}{5}$

$$\frac{5}{8}$$

IV. Using Number Properties to Interpret Expressions with Signed Numbers

Topic Practice

A. For each equation, identify the number property used.

Prerequisite for TEKS 7.3B

1. $3\frac{1}{5} + 6 = 6 + 3\frac{1}{5}$

commutative

2. $(3.4)(3.35)3 = 3.4(3.35)(3)$

associative

3. $-(-5\frac{1}{4} + 8\frac{1}{3}) = -1(-5\frac{1}{4}) + -1(8\frac{1}{3})$

distributive

4. $-4\frac{1}{8} + (-6\frac{1}{3} + 8) = (-4\frac{1}{8} + -6\frac{1}{3}) + 8$

associative

5. $\frac{(4.6 + 8.1)}{4} = \frac{(4.6)}{4} + \frac{(8.1)}{4}$

distributive

6. $(-3.64)(-2.48) = (-2.48)(-3.64)$

commutative

B. Use the commutative, associative, or distributive property to simplify each expression. TEKS 7.3A (Topic-Aligned), TEKS 7.3B (Topic-Aligned)

1. $-10(-0.32 - 0.2)$

5.2

2. $18\frac{3}{4} + 9 - 3 + 1\frac{1}{4}$

26

3. $-8.17 + (8.17 + 6.54)$

6.54

4. $-3(3\frac{2}{3}) + -3(-1\frac{1}{3})$

-7

Notes



Notes

TOPIC 1 Operating with Rational Numbers

$$5. \left(-5\frac{2}{5} + 2\frac{1}{2}\right) + \left(-4\frac{1}{2}\right)$$

$$-7\frac{2}{5}$$

$$7. \frac{5}{12} \cdot \left(-\frac{8}{9}\right) \cdot \left(-\frac{12}{5}\right)$$

$$\frac{8}{9}$$

$$9. 94.45 - (4.45 + 9.87)$$

$$80.13$$

$$11. (18 - 9.9) + 12.9$$

$$21$$

$$6. (-4.2)(8.6) + (-4.2)(-4.6)$$

$$-16.8$$

$$8. -48.23 - 8 + 20 + 2.23$$

$$-34$$

$$10. -2\left(\frac{7}{2} - \frac{1}{4}\right)$$

$$-6\frac{1}{2}$$

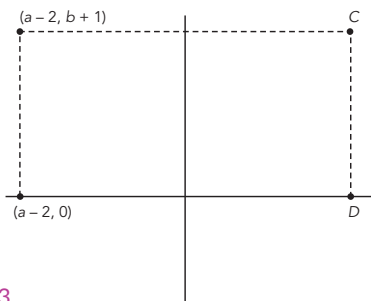
$$12. -\frac{5}{8} \cdot 7 \cdot 16$$

$$-70$$

Extension

The rectangle shown is formed by a reflection of points C and D across the y-axis of the coordinate plane. Point C has the coordinates (4, 4). Determine a and b and then calculate the perimeter of the rectangle.

TEKS 8.10A, 8.10C; Extension of TEKS 7.3B



$$a = -2, b = 3$$

$$\text{Perimeter} = 24 \text{ units}$$

Spaced Practice

- Jamal and Matthew recorded how fast they ran 1 mile and 2 miles. Jamal recorded his times using fractions, and Matthew recorded his times using decimals. **TEKS 7.4B**

Distance	Jamal	Matthew
1 mi	$10\frac{1}{2}$ min	10.4 min
2 mi	$22\frac{1}{4}$ min	22.3 min

- Who ran the mile faster, Jamal or Matthew? How much faster?
Matthew ran the mile faster, by 0.1 minute.
 - Who ran 2 miles faster, Jamal or Matthew? How much faster?
Jamal ran 2 miles faster, by 0.05 minute.
- A small submarine is at an elevation of -30 feet compared to sea level. What is its elevation after it ascends 9 feet? **TEKS 7.3B**
 -21 feet
 - On Tuesday, Ashley was \$45 short of her fundraising goal. The next day, she was \$5 over her goal. Write an equation to show how much she raised in one day. **TEKS 7.3B**
 $5 - (-45) = 50$; Ashley raised \$50 in one day.
 - What is 12% of 350? **TEKS 7.4D**
42
 - What is 35% of 120? **TEKS 7.4D**
42

Notes



Notes

TOPIC 1 Operating with Rational Numbers

V. Evaluating Algebraic Expressions

Topic Practice

- A. Define a variable and write an algebraic expression for each problem. Evaluate the expression for the given values.

TEKS 7.3A (Interleaved Practice), TEKS 7.3B (Interleaved Practice),
Prerequisite for TEKS 7.10A, Prerequisite for TEKS 7.11A

1. The charge for roller skating is \$3 for the skate rental and \$2 per hour to skate. How much will you pay if you skate for:

h = hours you skate

$$3 + 2h$$

- a. 2 hours?

\$7

- b. 4 hours?

\$11

- c. $3\frac{1}{2}$ hours?

\$10

2. A birthday party at the skating rink costs \$60 to reserve a party area and \$2.50 per guest for skating and skate rental. How much will a party cost if you invite:

g = number of guests invited

$$60 + 2.5g$$

- a. 8 guests?

\$80

- b. 15 guests?

\$97.50

- c. 40 guests?

\$160

3. You have \$20 to spend at the snack bar. All of the snacks at the snack bar cost \$1.25. How much money will you have left if you buy:

s = number of snacks bought

$$20 - 1.25s$$

- a. 2 snacks?

\$17.50

- b. 7 snacks?

\$11.25

- c. 12 snacks?

\$5



TOPIC 1 Operating with Rational Numbers

4. A cooking school is running a promotion on cooking lessons. For every twelve lessons you take, you get one free lesson. If you have already taken 7 lessons, how many free lessons will you get if you take:

a = number of additional lessons

$$\frac{a + 7}{12}$$

- a. 5 more lessons?

1 free lesson

- b. 29 more lessons?

3 free lessons

- c. 53 more lessons?

5 free lessons

5. A taxicab company charges \$4.50 for each trip plus an additional \$2.50 per mile traveled. How much will the company charge if the trip is:

m = number of miles traveled

$$2.5m + 4.50$$

- a. 5 miles?

\$17

- b. 16 miles?

\$44.50

- c. 12.5 miles?

\$35.75

6. Tiara has a prepaid phone card with \$40 on it. It costs her \$0.09 for each minute she spends on the phone. How much money will be left on the card if Tiara speaks for:

t = number of minutes on phone

$$40 - 0.09t$$

- a. 15 minutes?

\$38.65

- b. 60 minutes?

\$34.60

- c. 150 minutes?

\$26.50

Notes



Notes

TOPIC 1 Operating with Rational Numbers

7. Josh puts 9 sports cards each on the front and back page of each page in his card album. How many pages are in Josh's album if he has:

c = number of cards

$$\frac{c}{18}$$

- a. 90 cards?

5 pages

- b. 144 cards?

8 pages

- c. 180 cards?

10 pages

8. There are 5 gallons of lemonade in a container. Lizzie fills glasses with $\frac{1}{8}$ of a gallon of lemonade from the container. How many gallons of lemonade are left in the container if Lizzie fills:

g = number of glasses

$$5 - \frac{1}{8}g$$

- a. 7 glasses?

$4\frac{1}{8}$ gallons

- b. 20 glasses?

$2\frac{1}{2}$ gallons

- c. 32 glasses?

1 gallon

9. A county fair costs \$8 to enter plus an additional \$1.50 per ticket for rides and food. What is the total cost for a visit to the fair if you purchase:

t = number of tickets

$$1.5t + 8$$

- a. 8 tickets?

\$20

- b. 25 tickets?

\$45.50

- c. 40 tickets?

\$68

TOPIC 1 Operating with Rational Numbers

10. The temperature when you got up this morning was -4°C . The temperature is predicted to increase by 2 degrees every hour. What will the temperature be after:

h = number of hours

$$-4 + 2h$$

- a. 2 hours?

$$0^{\circ}\text{C}$$

- b. 5 hours?

$$6^{\circ}\text{C}$$

- c. 8 hours?

$$12^{\circ}\text{C}$$

- B. Evaluate each algebraic expression. TEKS 7.3A (Interleaved Practice), TEKS 7.3B (Interleaved Practice), Prerequisite for TEKS 7.10A, Prerequisite for TEKS 7.11A**

1. $20x$

- a. for $x = 2$

$$20x = 20(2) = 40$$

- b. for $x = -8$

$$20x = 20(-8) = -160$$

- c. for $x = 0$

$$20x = 20(0) = 0$$

3. $64 - 9p$

- a. for $p = 4$

$$64 - 9p = 64 - 9(4) = 28$$

- b. for $p = 9$

$$64 - 9p = 64 - 9(9) = -17$$

- c. for $p = -3$

$$64 - 9p = 64 - 9(-3) = 91$$

2. $3c + 17$

- a. for $c = 5$

$$3c + 17 = 3(5) + 17 = 32$$

- b. for $c = -2$

$$3c + 17 = 3(-2) + 17 = 11$$

- c. for $c = -15$

$$3c + 17 = 3(-15) + 17 = -28$$

4. $-w + 8.5$

- a. for $w = 12$

$$-w + 8.5 = -(12) + 8.5 = -3.5$$

- b. for $w = -1.5$

$$-w + 8.5 = -(-1.5) + 8.5 = 10$$

- c. for $w = 5.3$

$$-w + 8.5 = -(5.3) + 8.5 = 3.2$$

Notes



Notes

TOPIC 1 Operating with Rational Numbers

5. $46 + (-2k)$

a. for $k = 3$

$$46 + (-2k) = 46 + (-2)(3) = 40$$

b. for $k = 23$

$$46 + (-2k) = 46 + (-2)(23) = 0$$

c. for $k = -2$

$$46 + (-2k) = 46 + (-2)(-2) = 50$$

7. $\frac{-7d + 14}{2}$

a. for $d = 2$

$$\frac{-7d + 14}{2} = \frac{-7(2) + 14}{2} = 0$$

b. for $d = -2$

$$\frac{-7d + 14}{2} = \frac{-7(-2) + 14}{2} = 14$$

c. for $d = 4$

$$\frac{-7d + 14}{2} = \frac{-7(4) + 14}{2} = -7$$

6. $n^2 - 25$

a. for $n = -10$

$$n^2 - 25 = (-10)^2 - 25 = 75$$

b. for $n = -5$

$$n^2 - 25 = (-5)^2 - 25 = 0$$

c. for $n = 3$

$$n^2 - 25 = (3)^2 - 25 = -16$$

8. $32.68 - 4.15q$

a. for $q = 0$

$$32.68 - 4.15q = 32.68 - 4.15(0) = 32.68$$

b. for $q = 10$

$$32.68 - 4.15q = 32.68 - 4.15(10) = -8.82$$

c. for $q = -3$

$$32.68 - 4.15q = 32.68 - 4.15(-3) = 45.13$$

TOPIC 1 Operating with Rational Numbers

- C. Complete each table. TEKS 7.3A (Interleaved Practice),
TEKS 7.3B (Interleaved Practice), Prerequisite for TEKS 7.10A,
Prerequisite for TEKS 7.11A

1.

b	$3b + 14$
-5	-1
-3	5
0	14
4	26

2.

t	$-(t^2 - 6)$
2	2
-5	-19
6	-30
1	5

3.

v	1	2	5	-3.25
$6.75 - 6v$	0.75	-5.25	-23.25	26.25

4.

f	4	8	-12	-1
$\frac{f}{4} - 3$	-2	-1	-6	$-3\frac{1}{4}$

5.

s	$34 - \frac{1}{6}s$
3	$33\frac{1}{2}$
-1	$34\frac{1}{6}$
2	$33\frac{2}{3}$
-3	$34\frac{1}{2}$

6.

z	1	2	4	9
$-2.5z + 1.7$	-0.8	-3.3	-8.3	-20.8

Notes



Notes

TOPIC 1 Operating with Rational Numbers

Extension

Evaluate each algebraic expression for the given quantity. **Extension of TEKS 7.3A**

1. $-3(2x - 7.9)$ for $x = -18.1, -0.3, 14.4$

$132.3, 25.5, -62.7$

2. $-9.8t^2 + 20t + 8$ for $t = -2, 0, 3.5$

$-71.2, 8, -42.05$

Spaced Practice

Rewrite each numeric expression by factoring out (-1) . **TEKS 7.3A**

1. $-7 + 5$

$-7 + 5 = -(7 - 5)$

2. $3 + 8$

$3 + 8 = -(-3 - 8)$

Determine each quotient. **TEKS 7.3A**

3. $-8.9 \div -0.1$

89

4. $-4\frac{1}{3} \div \frac{2}{5}$

$-10\frac{5}{6}$

Write two unit rates for each given ratio. **TEKS 7.4C**

5. $\frac{3}{4}$ inch : $\frac{1}{2}$ hour

$1\frac{1}{2}$ inches per hour and $\frac{2}{3}$ hours per inch

6. $\frac{4}{5}$ gallon : $\frac{1}{4}$ cup

$3\frac{1}{5}$ gallons per cup and $\frac{5}{16}$ cup per gallon

VI. Rewriting Expressions Using the Distributive Property

Topic Practice

A. Draw a model for each expression and calculate or simplify.

TEKS 7.3A (Interleaved Practice)

1. $3(x - 11)$

	x	-11
3	3x	-33

$3x - 33$

3. $\frac{a+9}{3}$

	a	9
$\frac{1}{3}$	$\frac{1}{3}a$	3

$\frac{1}{3}a + 3$

5. $-5(12x - 7)$

	$12x$	-7
-5	-60x	35

$-60x + 35$

7. $\frac{-2b+25}{-5}$

	$-2b$	25
$-\frac{1}{5}$	$\frac{2}{5}b$	-5

$\frac{2}{5}b - 5$

2. $-4(2x + 5)$

	$2x$	5
-4	-8x	-20

$-8x - 20$

4. $8(-4b - 9)$

	$-4b$	-9
8	-32b	-72

$-32b - 72$

6. $\frac{12a-28}{4}$

	$12a$	-28
$\frac{1}{4}$	3a	-7

$3a - 7$

8. $-4.5(2x + 1.3)$

	$2x$	1.3
-4.5	-9x	-5.85

$-9x - 5.85$

Notes



TOPIC 1 Operating with Rational Numbers

Notes

B. Evaluate each expression for the given value. Choose whether to simplify before evaluating or not. Show your work.

TEKS 7.3A (Topic-Aligned), TEKS 7.3B (Topic-Aligned),
Prerequisite for TEKS 7.10A, Prerequisite for TEKS 7.11A

1. $5(-4a + (-13))$ for $a = 2.7$

$$\begin{aligned} 5(-4a + (-13)) &= 5(-4a) + 5(-13) \\ &= -20a + (-65) \\ &= -20(2.7) - 65 \\ &= -54 - 65 \\ &= -119 \end{aligned}$$

3. $-3(2x - 14)$ for $x = 1\frac{1}{6}$

$$\begin{aligned} -3(2x - 14) &= -3\left(2\left(\frac{7}{6}\right) - 14\right) \\ &= -3\left(\frac{14}{6} - 14\right) \\ &= -3\left(-\frac{70}{6}\right) \\ &= 35 \end{aligned}$$

5. $\frac{3.2x - 5.6}{0.4}$ for $x = 7$

$$\begin{aligned} \frac{3.2x - 5.6}{0.4} &= \frac{3.2(7) - 5.6}{0.4} \\ &= \frac{22.4 - 5.6}{0.4} \\ &= \frac{16.8}{0.4} \\ &= 42 \end{aligned}$$

2. $\frac{8x + 5}{11} - 9$ for $x = -2$

$$\begin{aligned} \frac{8x + 5}{11} - 9 &= \frac{8(-2) + 5}{11} - 9 \\ &= \frac{-16 + 5}{11} - 9 \\ &= \frac{-11}{11} - 9 \\ &= -1 - 9 \\ &= -10 \end{aligned}$$

4. $\frac{5.2(4a + 3.8)}{1.3}$ for $a = 4.3$

$$\begin{aligned} \frac{5.2(4a + 3.8)}{1.3} &= \frac{5.2(4a)}{1.3} + \frac{5.2(3.8)}{1.3} \\ &= 4(4a) + 4(3.8) \\ &= 16a + 15.2 \\ &= 16(4.3) + 15.2 \\ &= 84 \end{aligned}$$

6. $\left(-1\frac{3}{4} + \frac{7}{12}a\right) - \frac{19}{24}$ for $a = -\frac{4}{7}$

$$\begin{aligned} &= \left(-1\frac{3}{4} + \frac{7}{12}a\right) - \frac{19}{24} \\ &= \left(-\frac{7}{4} + \frac{7}{12}\left(-\frac{4}{7}\right)\right) - \frac{19}{24} \\ &= \left(-\frac{7}{4} - \frac{1}{3}\right) - \frac{19}{24} \\ &= \left(-\frac{25}{12}\right) - \frac{19}{24} \\ &= -\frac{69}{24} \\ &= -2\frac{21}{24} \\ &= -2\frac{7}{8} \end{aligned}$$

TOPIC 1 Operating with Rational Numbers

C. Rewrite each expression by factoring out the greatest common factor. **TEKS 7.3A (Interleaved Practice)**

1. $64x + 24$

$$8(8x) + 8(3) = 8(8x + 3)$$

3. $36 - 8z$

$$4(9) + 4(-2z) = 4(9 - 2z)$$

5. $-36 + 18a$

$$18(-2 + a)$$

7. $42 + 27m$

$$3(14 + 9m)$$

2. $-5y - 35$

$$-5(y) - 5(7) = -5(y + 7)$$

4. $54n - 81$

$$27(2n) + 27(-3) = 27(2n - 3)$$

6. $-7b - 21$

$$-7(b + 3)$$

8. $-24x + 9$

$$3(-8x + 3)$$

Notes



Notes

TOPIC 1 Operating with Rational Numbers

Extension

1. Mario decides to grow and sell bean plants. Let p represent the number of plants he will grow and sell. After considering his expenses, the expression $-3p(p - 10) - 6p(p - 10)$ represents his profit. **Extension of TEKS 7.3B**

- a. Rewrite and simplify the profit expression by factoring out the greatest common factor.

$$-3p(p - 10)(1 + 2) = -9p(p - 10)$$

- b. Rewrite the expression in simplest form with no parentheses.

$$-9p^2 + 90p$$

Spaced Practice

Evaluate each expression for the given value. **TEKS 7.3A**

1. $-20a - 65$ for $a = 2.7$

$$-119$$

2. $-6x + 52$ for $x = 1\frac{1}{6}$

$$45$$

Determine each product. **TEKS 7.3A**

3. $(-3.472)(0.89)$

$$-3.09008$$

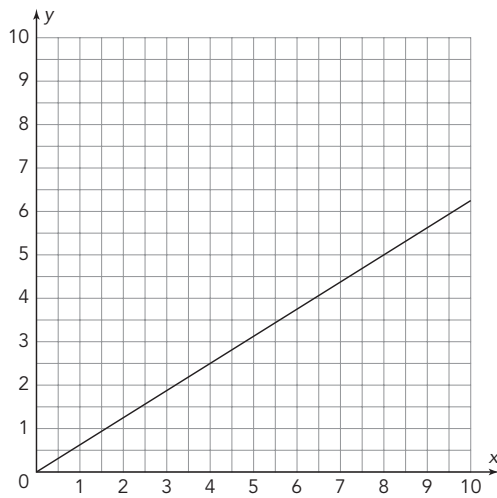
4. $(-2\frac{7}{8})(-4\frac{4}{5})$

$$13\frac{4}{5}$$

TOPIC 1 Operating with Rational Numbers

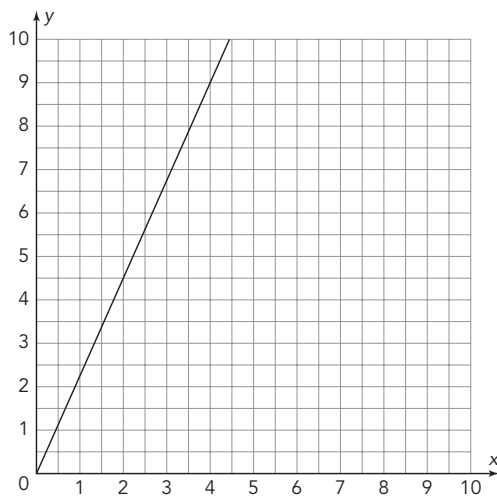
Identify the constant of proportionality in each graph and use it to write an equation in the form $y = kx$. **TEKS 7.4C, 7.7A**

5.



$$y = \frac{5}{8}x$$

6.



$$y = 2\frac{1}{4}x$$



Notes

Notes

Handwriting practice lines on the left side of the page.



Name _____ Date _____

I. Modeling Equations as Equal Expressions

Topic Practice

A. Use a model to write an addition equation to represent each problem situation. Then, use your equation to answer the given question. **TEKS 7.10A (Topic-Aligned), TEKS 7.11A (Topic-Aligned)**

1. Ashley and Tiara have 82 pins together. Tiara has 34 more pins than Ashley. How many pins are in Tiara's collection? How many pins are in Ashley's collection?

Let p represent the number of pins Ashley has.

$$2p + 34 = 82$$

$$p = 24$$

Ashley has 24 pins and Tiara has 58 pins.

3. Tripp and Rico are two dogs. Tripp weighs exactly 35 pounds more than Rico. Together, they weigh exactly 49 pounds. How much does each dog weigh?

Let w represent the number of pounds Rico weighs.

$$2w + 35 = 49$$

$$w = 7$$

Rico weighs 7 pounds and Tripp weighs 42 pounds.

2. Put together, Matthew and Josh have 110 total action figures. Josh's collection has 42 more action figures in it than Matthew's collection. How many action figures does Josh have? How many action figures are in Matthew's collection?

Let f represent the number of action figures Matthew has.

$$2f + 42 = 110$$

$$f = 34$$

Matthew has 34 action figures and Josh has 76 action figures.

4. Lizzie buys bananas, grapes, and apples. She buys twice the amount of bananas as grapes. She buys 2 more pounds of apples than grapes. Altogether, Lizzie bought 14 pounds of fruit. How many pounds of each fruit did she buy?

Let g represent the number of pounds of grapes Lizzie bought.

$$4g + 2 = 14$$

$$g = 3$$

Lizzie bought 3 pounds of grapes, 5 pounds of apples, and 6 pounds of bananas.



TOPIC 2 Two-Step Equations and Inequalities

Notes

5. You and your friends Alyssa and Paolo decide to make some money during summer vacation by building and selling birdhouses. To get the business started, Alyssa contributes \$22, and Paolo contributes \$18 to buy equipment and materials. You all agree that each person will earn the same amount of money after Alyssa and Paolo get back what they invested. Your business earns a total of \$280. How much does each person get at the end of the summer?

Let p represent the amount each person will earn from the profits.

$$3p + 40 = 280$$

$$p = 80$$

Each person will earn \$80.

6. In a small town, there are two main sections called the Hill Section and the Lake Section. The town has a population of 4298. The number of people who live in the Hill Section is 188 more than twice the number of people who live in the Lake Section. How many people live in each section of the town?

Let p represent the population of the Lake Section.

$$3p + 188 = 4298$$

$$p = 1370$$

The population of the Lake Section is 1370 and the population of the Hill Section is 2928.

- B. Use a model to write a subtraction equation to represent each problem situation. Then, use your equation to answer the given question. **TEKS 7.10A (Topic-Aligned), TEKS 7.11A (Topic-Aligned)**

1. Mario's collection has 64 fewer refrigerator magnets in it than Andrew's collection. They have 112 refrigerator magnets together. How many refrigerator magnets does Mario have? How many refrigerator magnets does Andrew have?

Let m represent the number of magnets Peter has.

$$2m - 64 = 112$$

$$m = 88$$

Andrew has 88 magnets and Mario has 24 magnets.

2. Alejandro is 3 years younger than his sister, Natalia. The sum of the siblings' ages is 33. How old are Alejandro and Natalia?

Let a represent Natalia's age.

$$2a - 3 = 33$$

$$a = 18$$

Natalia is 18 and Alejandro is 15.

TOPIC 2 Two-Step Equations and Inequalities

3. Two friends pooled the tickets they won from playing video games to get a prize that requires 800 tickets. If one friend won 130 more tickets than the other friend, how many tickets did each friend win?

Let t represent the number of tickets won by the friend who won more tickets.

$$2t - 130 = 800$$

$$t = 465$$

One friend won 465 tickets and the other won 335 tickets.

5. Kaya, Samantha, and Trung are swimming laps to raise money for charity. Together, the three swimmers swam a total of 1875 laps. Samantha swam twice as many laps as Trung. Kaya swam 125 fewer laps than Samantha. How many laps did each person swim?

Let t represent the number of laps Trung swam.

$$5t - 125 = 1875$$

$$t = 400$$

Trung swam 400 laps, Samantha swam 800 laps, and Kaya swam 675 laps.

4. Of the 3120 books in the library, there are three times as many books in the fiction section as are in the nonfiction section. Also, there are 400 fewer books in the reference section than are in the nonfiction section. How many books are in each section?

Let n represent the number of nonfiction books.

$$5n - 400 = 3120$$

$$n = 704$$

There are 704 nonfiction books, 304 reference books, and 2112 fiction books.

6. There are 7800 workers in the three main buildings downtown. Three hundred fewer people work in the second-largest building than the largest building and 900 fewer people work in the smallest building than the largest building. How many workers are in each building?

Let w represent the number of workers in the largest building.

$$3w - 1200 = 7800$$

$$w = 3000$$

There are 3000 workers in the largest building, 2700 workers in the second-largest building, and 2100 workers in the smallest building.

Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

- C. Use a model to write an equation to represent each problem situation. Then, use your equation to answer the given question.

TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)

1. The members of the student council are selling raffle tickets. The school decides that the top three raffle ticket sellers will share a portion of the profits. The second-place seller will receive \$8 more than the third-place seller. The first-place seller will receive twice as much as the second-place seller. The profit portion they will share is \$104. How much will each of the top three sellers receive?

Let t represent the amount the third-place seller will receive.

 $4t + 24 = 104$

 $t = 20$

The third-place seller will receive \$20, the second-place seller will receive \$28, and the first-place seller will receive \$56.
2. A park covers a total area of 644 acres. There are 482 more acres of woods than grassy areas in the park. How many acres are there of woods and how many acres are there of grassy areas in the park?

Let w represent the acres of woods.

 $2w - 482 = 644$

 $w = 563$

There are 81 acres of grassy areas and 563 acres of woods.



TOPIC 2 Two-Step Equations and Inequalities

3. During the summer, Eduardo and Chris started their own business mowing lawns. Before starting any work, Eduardo spent \$20 to fill up the gas tank for the lawnmower. The boys agreed that each person would earn the same amount after Eduardo was reimbursed the money he spent for gas. After a week of work, the boys were paid a total of \$177. Eduardo filled up the gas tank just once. How much did each boy earn?

Let p represent the amount each boy earns.

$$2p + 20 = 177$$

$$p = 78.5$$

Each boy will profit \$78.50.

5. Jorge and Elena spent \$3043.51 to buy a new computer together. Jorge spent \$438.47 more than Elena. How much did Jorge spend and how much did Elena spend?

Let d represent the amount of dollars Elena spent.

$$2d + 438.47 = 3043.51$$

Elena spent \$1302.52 and Jorge spent \$1740.99.

4. The ages of three siblings total 32 years. The middle child is 4 years older than the youngest, and the eldest is twice as old as the youngest. How old is each child?

Let y represent the age of the youngest child.

$$4y + 4 = 32$$

$$y = 7$$

The youngest child is 7, the middle child is 11, and the oldest child is 14.

6. In a 10,508-gallon swimming pool the deep end has 1295 more than twice the number of gallons in the shallow end. How many gallons are in the deep end of the pool? How many gallons are in the shallow end?

Let s represent the number of gallons in the shallow end.

$$3s + 1295 = 10,508$$

There are 3071 gallons in the shallow end and 7437 gallons in the deep end.

Notes



Notes

TOPIC 2 Two-Step Equations and Inequalities

Extension

Describe how to solve any equation in the form $ax + b = c$ for the variable x . **Extension of TEKS 7.11A**

The solution to any equation in the form $ax + b = c$ is $x = \frac{c-b}{a}$ or $(c - b) \div a$.

Spaced Practice

1. Simplify each expression by combining like terms. **TEKS 7.3A, 7.3B**

a. $3b + 2 + b$
 $4b + 2$

b. $\frac{1}{2}(h + 4) - \frac{1}{8}(h + 4)$
 $\frac{3}{8}(h + 4)$

2. Rewrite each linear expression by factoring out the GCF.

TEKS 7.3A, 7.3B

a. $25x - 5$
 $5(5x - 1)$

b. $9n + 36$
 $9(n + 4)$

3. A salesperson receives 12% commission on all the sales that she makes. Calculate the commission on each sale. **TEKS 7.4D**

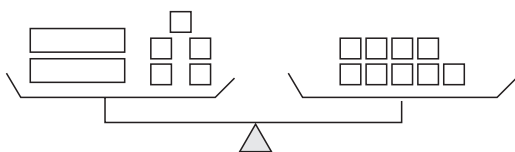
a. A quarter-page ad for \$250.00
 $\$30.00$

b. A full-page ad for \$800.00
 $\$96.00$

Topic Practice

- TEKS 7.11A (Interleaved Practice)**

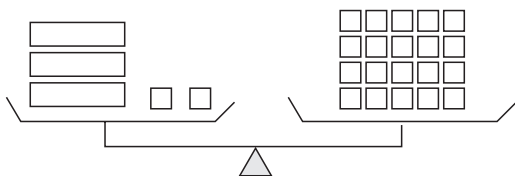
1.



I subtracted 5 squares from each side which left 2 rectangles on one side and 4 squares on the other side. Then, I divided each side by 2 which left 1 rectangle on one side and 2 squares on the other side.

$$2x + 5 = 9$$

2.



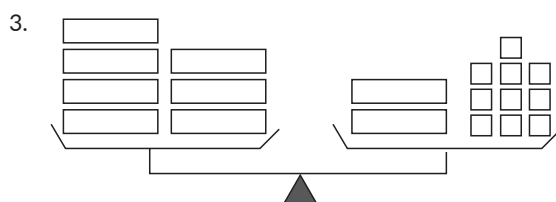
I subtracted 2 squares from each side which left 3 rectangles on one side and 18 squares on the other side. Then, I divided each side by 3 which left 1 rectangle on one side and 6 squares on the other side.

$$3x + 2 = 20$$



TOPIC 2 Two-Step Equations and Inequalities

Notes

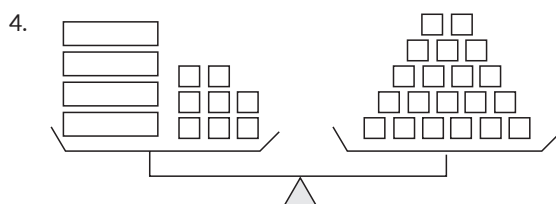


Sample explanation:

I subtracted 2 rectangles from each side which left 5 rectangles on one side and 10 squares on the other side. Then, I divided each side by 5 which left 1 rectangle on one side and 2 squares on the other side.

1 rectangle = 2 squares

$$7x = 2x + 10$$



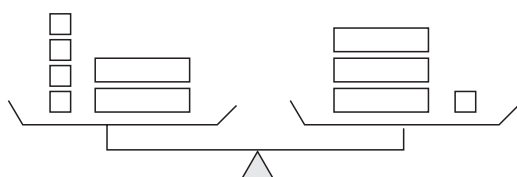
Sample explanation:

I subtracted 8 squares from each side which left 4 rectangles on one side and 12 squares on the other side. Then, I divided each side by 4 which left 1 rectangle on one side and 3 squares on the other side.

1 rectangle = 3 squares

$$4x + 8 = 20$$

5.



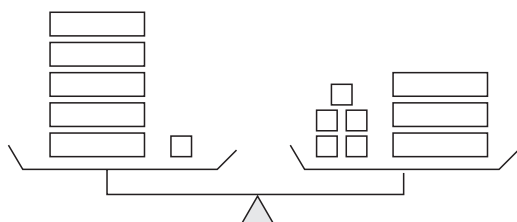
Sample explanation:

I subtracted 1 square and 2 rectangles from each side which left 3 squares on one side and 1 rectangle on the other side.

1 rectangle = 3 squares

$$4 + 2x = 3x + 1$$

6.



Sample explanation:

I subtracted 1 square and 3 rectangles from each side which left 2 rectangles on one side and 4 squares on the other side. Then, I divided each side by 2 which left 1 rectangle on one side and 2 squares on the other side.

1 rectangle = 2 squares

$$5x + 1 = 5 + 3x$$

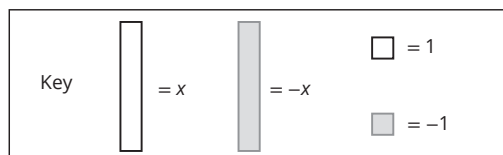


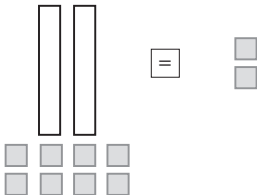
Notes

TOPIC 2 Two-Step Equations and Inequalities

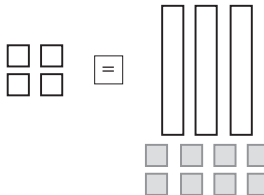
Notes

- B. Use the key to write the equation represented in each algebra tiles diagram. **TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)**

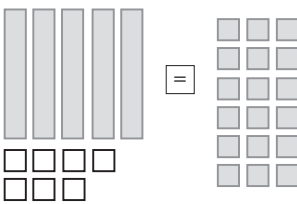


1. 

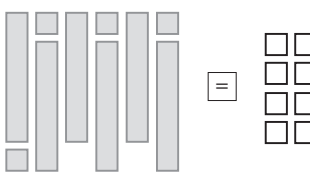
$$2x - 8 = -2$$

2. 

$$4 = 3x - 8$$

3. 

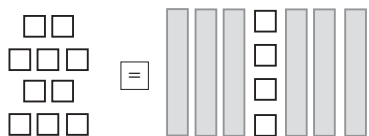
$$-5x + 7 = -18$$

4. 

$$-6x - 4 = 8$$

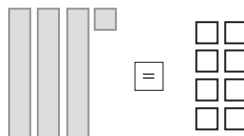
TOPIC 2 Two-Step Equations and Inequalities

5.



$$10 = -6x + 4$$

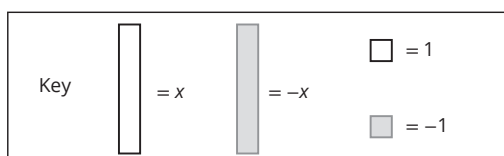
6.



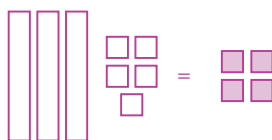
$$-3x - 1 = 8$$

C. Use the key to model and solve each equation using algebra tiles.

TEKS 7.11A (Interleaved Practice)

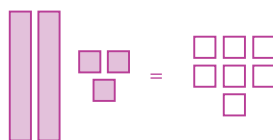


1. $3x + 5 = -4$



$$x = -3$$

2. $-2x - 3 = 7$



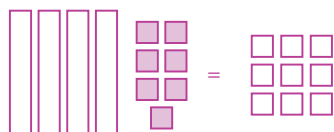
$$x = -5$$

Notes

TOPIC 2 Two-Step Equations and Inequalities

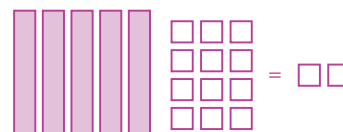
Notes

3. $4x - 7 = 9$



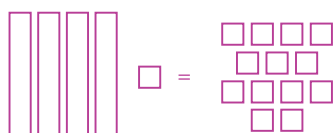
$x = 4$

4. $-5x + 12 = 2$



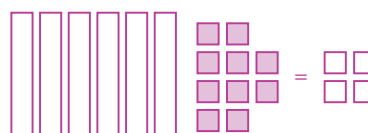
$x = -2$

5. $4x + 1 = 13$



$x = 3$

6. $6x - 10 = -4$

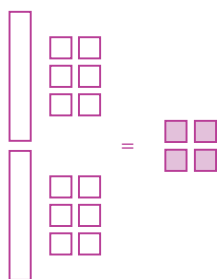


$x = 1$

Extension

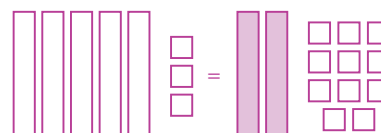
Model and solve each equation with algebra tiles. **Extension of TEKS 7.11A**

1. $2(x + 6) = -4$



$x = -8$

2. $5x + 3 = -2x + 11$



$x = 2$

TOPIC 2 Two-Step Equations and Inequalities

Spaced Practice

Calculate each percent increase or decrease. Round to the nearest whole percent when necessary. **TEKS 7.4D**

1. Original amount: 20, new amount: 25 25% increase	2. Original amount: 50, new amount: 40 20% decrease
3. Original amount: 48, new amount: 72 50% increase	4. Original amount: 120, new amount: 102 15% decrease

For each family's expenses, determine the percentage of the total expenses for each category. **TEKS 7.13B**

5. The Sanchez family's expenses: • Household: \$1200 • Living: \$350 • Credit Cards: \$125 • Savings: \$250 Total Expenses: $1200 + 350 + 125 + 250 = 1925$ Household: $1200 \div 1925 \approx 0.62 = 62\%$ Living: $350 \div 1925 \approx 0.18 = 18\%$ Credit Cards: $125 \div 1925 \approx 0.06 = 6\%$ Savings: $250 \div 1925 \approx 0.13 = 13\%$	6. The Rodriguez family's expenses: • Household: \$1050 • Living: \$525 • School Loans: \$315 • Savings: \$475 Total Expenses: $1050 + 525 + 315 + 475 = 2365$ Household: $1050 \div 2365 \approx 0.44 = 44\%$ Living: $525 \div 2365 \approx 0.22 = 22\%$ School Loans: $315 \div 2365 \approx 0.13 = 13\%$ Savings: $475 \div 2365 \approx 0.20 = 20\%$

Notes



Notes

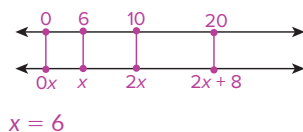
III. Solving Equations on a Double Number Line

Topic Practice

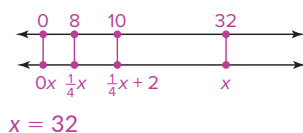
A. Solve each equation using a double number line.

TEKS 7.10B (Topic-Aligned), TEKS 7.11A (Interleaved Practice)

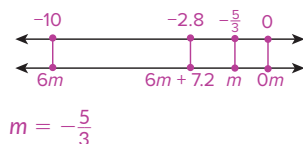
1. Solve the equation $2x + 8 = 20$.



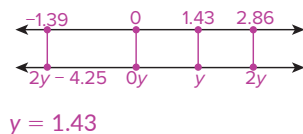
3. Solve the equation $\frac{1}{4}x + 2 = 10$.



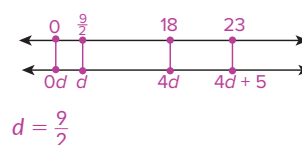
5. Solve the equation $6m + 7.2 = -2.8$.



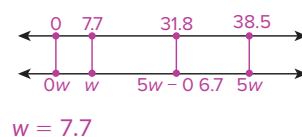
7. Solve the equation $2y - 4.25 = -1.39$.



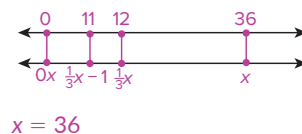
2. Solve the equation $23 = 4d + 5$.



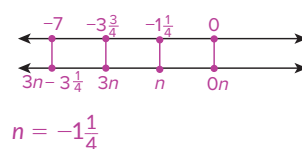
4. Solve the equation $31.8 = 5w - 6.7$.



6. Solve the equation $\frac{1}{3}x - 1 = 11$.



8. Solve the equation $3n - 3\frac{1}{4} = -7$.

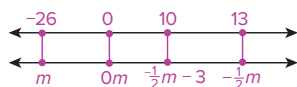


TOPIC 2 Two-Step Equations and Inequalities

B. Solve each equation using a double number line.

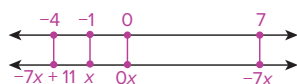
TEKS 7.10B (Topic-Aligned), TEKS 7.11A (Interleaved Practice)

1. Solve the equation $-\frac{1}{2}m - 3 = 10$.



$m = -26$

3. Solve the equation $-7x - 11 = -4$.



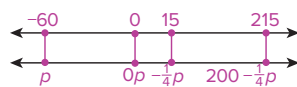
$x = -1$

5. Solve the equation $-16 = 13 - g$.



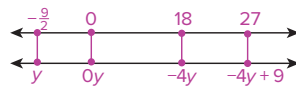
$g = 29$

7. Solve the equation $200 - \frac{1}{4}p = 215$.



$p = -60$

2. Solve the equation $-4y + 9 = 27$.



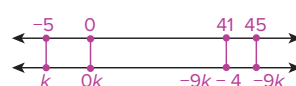
$y = -\frac{9}{2}$

4. Solve the equation $-1.2s + 6.4 = 8.8$.



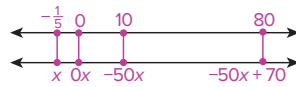
$s = -2$

6. Solve the equation $41 = -9k - 4$.



$k = -5$

8. Solve the equation $-50x + 70 = 80$.



$x = -\frac{1}{5}$

Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

Extension

What operation(s) could you use to solve the equation $x^2 + 5 = 86$?

What is the solution? **TEKS A.8A; Extension of TEKS 7.11A**

Subtract 5 from both expressions, resulting in

$x^2 = 81$. Take the square root of both expressions, resulting in $x = \sqrt{81}$.

The solution is $x = 9$.

Spaced Practice

- During the summer, Matthew and Jaylen started their own business mowing lawns for people in the Lake Section. Before starting any work, Matthew spends \$15 to fill up the gas tank for the lawnmower. The boys agree that each person will earn the same amount after Matthew is reimbursed the money he spent for gas. After a week of work, the boys earn a total of \$243. Matthew filled up the gas tank just once. How much did each boy earn?

- Draw a bar model to represent the situation. **TEKS 7.11A**

Matthew's earnings:

m	15

 } \$243
Jaylen's earnings:

m

- Write an equation to represent the situation. **TEKS 7.10A**

$$2m + 15 = 243$$

- Use the model to solve the problem. **TEKS 7.11A**

Matthew's earnings are \$129; Devan's earnings are \$114

- Evaluate each algebraic expression for the indicated value.

TEKS 7.3A, 7.3B

- $9g + 5$, for $g = 1.5$

$$18.5$$

- $\frac{2x+3}{4}$, for $x = 1$

$$1.25$$



TOPIC 2 Two-Step Equations and Inequalities

3. Determine each product. **TEKS 7.3A**

a. $-6.2(9.1)$

-56.42

b. $-0.03(-15)$

0.45

Notes



Notes

IV. Using Inverse Operations to Solve Equations

Topic Practice

A. Determine which the possible solution makes each equation true.

TEKS 7.11B (Interleaved Practice)

1. Equation: $\frac{c}{2} + 5 = 2$ Possible solutions: $-6, 3, 6$ (-6) makes the equation true.	2. Equation: $-6 = 2p - 2$ Possible solutions: $-4, -2, 4$ (-2) makes the equation true.
3. Equation: $2.1p - 7 = -15.4$ Possible solutions: $-4, -2, 1$ (-6) makes the equation true.	4. Equation: $-3u + 8 = 23$ Possible solutions: $-8, -5, 6$ (-5) makes the equation true.
5. Equation: $-7.5 = \frac{h}{9} - 4.9$ Possible solutions: $-24.2, -23.4, -25.9$ (-23.4) makes the equation true.	6. Equation: $8 = \frac{z}{-3} + 4$ Possible solutions: $-14, -12, -8$ (-12) makes the equation true.

TOPIC 2 Two-Step Equations and Inequalities

B. Solve each equation and then graph the solution.

TEKS 7.10B, TEKS 7.11A (Interleaved Practice)

1. $8x = 56$

$$8x = 56$$

$$\frac{8x}{8} = \frac{56}{8}$$

$$x = 7$$



2. $144 = -12x$

$$144 = -12x$$

$$\frac{144}{-12} = \frac{-12x}{-12}$$

$$-12 = x$$



3. $-\frac{1}{4}x + 4 = 5\frac{3}{8}$

$$-\frac{1}{4}x + 4 = 5\frac{3}{8}$$

$$-\frac{1}{4}x + 4 - 4 = 5\frac{3}{8} - 4$$

$$-\frac{1}{4}x = 1\frac{3}{8}$$

$$-\frac{1}{4}x \cdot -4 = \frac{11}{8} \cdot -4$$

$$x = -\frac{44}{8}$$

$$x = -5\frac{1}{2}$$



Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

4. $-17 = 3 - 5x$

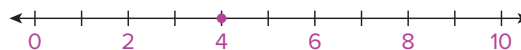
$$-17 = 3 - 5x$$

$$-17 - 3 = 3 - 3 - 5x$$

$$-20 = -5x$$

$$\frac{-20}{-5} = \frac{-5x}{-5}$$

$$4 = x$$



5. $21 - 9x = -6$

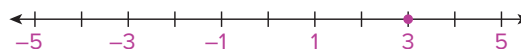
$$21 - 9x = -6$$

$$21 - 21 - 9x = -6 - 21$$

$$-9x = -27$$

$$\frac{-9x}{-9} = \frac{-27}{-9}$$

$$x = 3$$



6. $27.8 = -11x - 71.2$

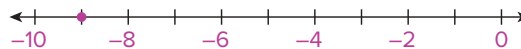
$$27.8 = -11x - 71.2$$

$$27.8 + 71.2 = -11x - 71.2 + 71.2$$

$$99 = -11x$$

$$\frac{99}{-11} = \frac{-11x}{-11}$$

$$-9 = x$$



TOPIC 2 Two-Step Equations and Inequalities

- C. Write an equation to represent each situation. Define your variables, solve the equation, and verify your solution.

TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice),
TEKS 7.11B (Interleaved Practice)

1. Ms. Patel charges her piano students \$40 per lesson plus a semester recital fee of \$55. How many lessons did Jamal take if he paid a total of \$695 for lessons this semester?

$$40p + 55 = 695$$

Let p represent the number of lessons taken during the semester.

$$40p + 55 = 695$$

$$40p + 55 - 55 = 695 - 55$$

$$\frac{40p}{40} = \frac{640}{40}$$

$$p = 16$$

Jamal took 16 lessons.

Verify the solution by substituting 16 for p in the equation.

$$40(16) + 55 \stackrel{?}{=} 695$$

$$695 = 695$$

2. A local nursery offers a spring flower deal. If a customer purchases at least one flat of 6 annuals, they will receive 3 free perennials. How many flats of annuals must you buy to get a total of 21 plants?

$$6f + 3 = 21$$

Let f represent the number of flats of 6 annuals bought.

$$6f + 3 = 21$$

$$6f + 3 - 3 = 21 - 3$$

$$\frac{6f}{6} = \frac{18}{6}$$

$$f = 3$$

When you buy 3 flats of annuals, you get a total of 21 plants.

Verify the solution by substituting 3 for f in the equation.

$$6(3) + 3 \stackrel{?}{=} 21$$

$$21 = 21$$

Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

3. The student council ordered 1000 pencils embossed with the school name to give to honor roll students. If they give each honor roll student two pencils and they have 840 pencils left after the first quarter, how many students are on the honor roll in the first quarter?

$$1000 - 2s = 840$$

Let s represent the number of honor roll students.

$$1000 - 2s = 840$$

$$1000 - 1000 - 2s = 840 - 1000$$

$$\frac{-2s}{-2} = \frac{-160}{-2}$$

$$s = 80$$

There are 80 students on the honor roll in the first quarter.

Verify the solution by substituting 80 for s in the equation.

$$1000 - 2(80) \stackrel{?}{=} 840$$

$$840 = 840$$

4. Josh and four of his friends had a car wash to earn some extra money. They split the profits, and Josh got an extra \$18 to repay his parents for the car wash supplies. If Josh got \$32, how much total money did they split among themselves?

$$32 = \frac{x}{5} + 18$$

Let x represent the total amount of money they split among themselves.

$$32 = \frac{x}{5} + 18$$

$$32 - 18 = \frac{x}{5} + 18 - 18$$

$$5(14) = 5\left(\frac{x}{5}\right)$$

$$70 = x$$

The friends split a total of \$70 among themselves.

Verify the solution by substituting 70 for x in the equation.

$$32 \stackrel{?}{=} \frac{70}{5} + 18$$

$$32 = 32$$

TOPIC 2 Two-Step Equations and Inequalities

5. Mario has a collection of 125 comic books. He gives each of his 3 friends the same number of comic books and keeps his favorite 38 comic books for himself. How many comic books did he give to each of his friends?

$$125 = 3c + 38$$

Let c represent the number of comic books each friend received.

$$125 = 3c + 38$$

$$125 - 38 = 3c + 38 - 38$$

$$\frac{87}{3} = \frac{3c}{3}$$

$$29 = c$$

Mario gives each of his friends 29 comic books.

Verify the solution by substituting 29 for c in the equation.

$$125 \stackrel{?}{=} 3(29) + 38$$

$$125 = 125$$

6. Mariana is planning a party at a restaurant. There is a flat fee of \$250 to reserve the restaurant for the evening and a charge of \$20 per person for food and soft drink. If Mariana has \$500 to spend, what is the maximum number of people that can attend the party?

$$250 + 20p = 500$$

Let p represent the number of people.

$$250 + 20p = 500$$

$$250 - 250 + 20p = 500 - 250$$

$$\frac{20p}{20} = \frac{250}{20}$$

$$p = 12.5$$

The maximum number of people that can attend the party without going over budget is 12.

Verify the solution by substituting 12.5 for p in the equation.

$$250 + 20(12.5) \stackrel{?}{=} 500$$

$$500 = 500$$

Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

D. Write a real-world situation that is modeled by the equation.

TEKS 7.10C (Topic-Aligned)

1. $25.75t + 30.55 = 82.05$

Sample answer:

Andrew is buying concert tickets for himself and a friend. Tickets cost \$25.75 and he buys t tickets. He also spends \$30.55 on a concert T-shirt. He spends a total of \$82.05 at the concert.

2. $\frac{c}{4} = 18$

Sample answer:

Ashley is baking cookies for her teachers. She bakes c cookies and is dividing them among her 4 favorite teachers. She wants to make sure each teacher gets 18 cookies.

3. $45.99c - 50 = 133.96$

Sample answer:

Mrs. Davis is buying new ink cartridges for the computer lab. She buys c cartridges and each cartridge costs 45.99. She also has a \$50 rebate. She pays a total of \$133.96 for the cartridges after the rebate.

4. $110 = 32.50s + 45$

Sample answer:

Alejandro bought a new printer for \$45.00. Every time that it runs out of toner, Alejandro has to spend \$32.50 to buy a new toner cartridge. Alejandro's printer runs out of toner s times per year. He wants to spend \$110.00 for the year.



TOPIC 2 Two-Step Equations and Inequalities

5. $345 = 45 + 20p$

Sample answer:

Trung must finish reading a book for his English class. He has already read 45 pages. There are 20 chapters left and each chapter has p pages. There are a total of 345 pages in the book.

6. $30 = \frac{t}{2} - 30$

Sample answer:

The temperature outside is 30 degrees below zero. As the sun comes out, the temperature rises $\frac{1}{2}$ degree every minute. The sun comes out for t minutes. The temperature reaches 30 degrees.

Extension

Solve each equation. Check your solution. **Extension of TEKS 7.11A**

1. $1.95(6.2 - 3x) - 4.81 = -18.46$

$x = 4.4$

2. $\frac{2}{3}\left(x - \frac{5}{2}\right) - \frac{7}{6} = -\frac{13}{3}$

$x = -\frac{9}{4}$

Spaced Practice

Solve each equation using a double number line model. **TEKS 7.10B, 7.11A**

1. $4x - 5 = 7$

$x = 3$

2. $\frac{1}{3}x + 2 = 5$

$x = 9$

Notes



Notes

TOPIC 2 Two-Step Equations and Inequalities

Evaluate each expression for the indicated value. **TEKS 7.3A, 7.3B**

3. $-\frac{1}{2}a + \frac{5}{6}$, for $a = \frac{6}{7}$
 $\frac{17}{42}$

4. $-5.3r - 7.6 + 0.4r$, for $r = -2.4$
 4.16

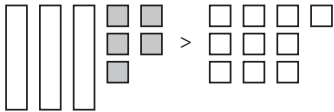
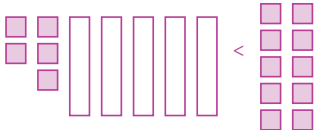
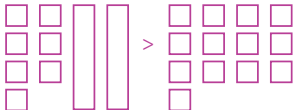
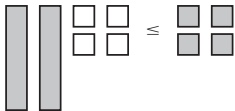
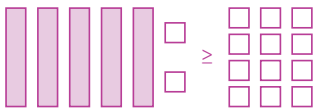
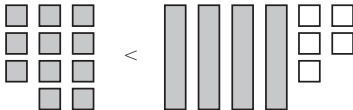
Determine each quotient. **TEKS 7.3A**

5. $2\frac{3}{8} \div -2\frac{1}{2}$
 $-\frac{19}{20}$

6. $-14.8 \div -1.2$
 $12.\overline{3}$

Topic Practice

- Key
-  = x
-  = $-x$
-  = 1
-  = -1

Inequality	Algebra Tile Model	Solution to the Inequality
$3x - 5 > 10$		$x > 5$
$-5 + 5x < -10$		$x < -1$
$7 + 2x > 13$		$x > 3$
$-2x + 4 \leq -4$		$x \geq 4$
$-5x + 2 \geq 12$		$x \leq -2$
$-11 < -4x + 5$		$4 > x$

Notes

TOPIC 2 Two-Step Equations and Inequalities

B. Determine whether the possible solutions make each inequality true.

TEKS 7.11B (Topic-Aligned)

1. Inequality: $\frac{c}{3} + 4 \leq 3$

Possible solutions: $-6, -3, 2$

-6 and -3 make the inequality true.

3. Inequality: $1.8p - 7 > -18.6$

Possible solutions: $-9, -5, 3$

-5 and 3 make the inequality true.

5. Inequality: $10 \geq 3n - \frac{1}{2}$

Possible solutions: $-2, 2, 9$

-2 and 2 make the inequality true.

2. Inequality: $-4 > 2p - 8$

Possible solutions: $-4, 0, 5$

-4 and 0 make the inequality true.

4. Inequality: $-3u - 8 < 10$

Possible solutions: $-7, -5, 8$

-5 and 8 make the inequality true.

6. Inequality: $-2m - 10 \leq 4$

Possible solutions: $-7, -2, 15$

$-7, -2$, and 15 make the inequality true.



TOPIC 2 Two-Step Equations and Inequalities

C. Solve each inequality and then graph the solution.

TEKS 7.10B (Interleaved Practice), TEKS 7.11A (Interleaved Practice)

1. $6x > 42$

$$6x > 42$$

$$\frac{6x}{6} > \frac{42}{6}$$

$$x > 7$$



2. $36 \leq -3x$

$$36 \leq -3x$$

$$\frac{36}{-3} \geq \frac{-3x}{-3}$$

$$-12 \geq x$$



3. $-17 < 3 - 5x$

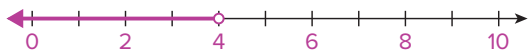
$$-17 < 3 - 5x$$

$$-17 - 3 < 3 - 3 - 5x$$

$$-20 < -5x$$

$$\frac{-20}{-5} > \frac{-5x}{-5}$$

$$4 > x$$



Notes



TOPIC 2 Two-Step Equations and Inequalities

Notes

4. $21 - 9x \geq -6$

$$21 - 9x \geq -6$$

$$21 - 21 - 9x \geq -6 - 21$$

$$-9x \geq -27$$

$$\frac{-9x}{-9} \leq \frac{-27}{-9}$$

$$x \leq 3$$



5. $31 < 2x - 5$

$$31 < 2x - 5$$

$$31 + 5 < 2x - 5 + 5$$

$$36 < 2x$$

$$\frac{36}{2} < \frac{2x}{2}$$

$$18 < x$$



6. $-x + 14 < 37$

$$-x + 14 < 37$$

$$-x + 14 - 14 < 37 - 14$$

$$-x < 13$$

$$\frac{-x}{-1} > \frac{13}{-1}$$

$$x > -13$$



TOPIC 2 Two-Step Equations and Inequalities

D. Write and solve an inequality for each situation. Explain the solution set in terms of the problem situation.

TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)

1. Eduardo needs to buy a book for school that costs \$13. He also wants to get a book for each of his two sisters, and he wants to be sure he spends the same amount on each of their books. He only has \$27 to spend. Let b represent the amount he can spend on each additional book.

$$13 + 2b \leq 27$$

$$b \leq 7$$

Eduardo can spend \$7 or less on each additional book.

3. There must be less than 36 people on one bus. There are already 17 people on the bus. Let p represent the additional number of people that can ride the bus.

$$36 > 17 + p$$

$$19 > p$$

Fewer than 19 additional people can ride on the bus.

5. Chris wants to keep the cost per person of his party under \$15. The Party Place charges a flat fee of \$250 for an all-inclusive party. Let g represent the number of guests, including himself, he can invite.

$$15 > \frac{250}{g}$$

$$g > 16\frac{2}{3}$$

Chris can invite 17 or more guests to his party.

2. Tiara rents a cart for her bike to carry tools and wood to school for her science project. Her toolbox weighs 20 pounds, and the cart can carry a maximum of 50 pounds. Each wood board weighs 3 pounds. Let w represent the number of wood boards she can carry.

$$50 \geq 20 + 3w$$

$$10 \geq w$$

Tiara can carry 10 or fewer wood boards.

4. A family of three has a coupon for \$5 off their total bill when everyone orders the same meal. The family has \$40 to spend on dinner. Let m represent the cost of the meal they can order.

$$3m - 5 \leq 40$$

$$m \leq 15$$

The meal they order has to cost \$15 or less.

6. The temperature of the liquid starts at 72°F and drops 2 degrees per second. The liquid is not to go below 40°F. Let s represent the number of seconds.

$$72 - 2s \geq 40$$

$$s \leq 16$$

The temperature of the liquid can drop for 16 seconds or less.

Notes



Notes

TOPIC 2 Two-Step Equations and Inequalities

E. Write a real world situation that is modeled by the equation or inequality. **TEKS 7.10C (Topic-Aligned)**

1. $13.75t + 8.50 < 82.05$

Sample answer:

Jorge wants to buy movie tickets for himself and some friends. Tickets cost \$13.75, and he buys t tickets. He also wants to spend \$8.50 on a bucket of popcorn. He only has \$70 to spend.

2. $\frac{c}{3} \geq 15$

Sample answer:

Lizzie is baking cookies for her teachers. She bakes c cookies and is dividing them among her 3 favorite teachers. She wants to make sure each teacher gets 15 or more cookies.

3. $165 > 27.50s + 55$

Sample answer:

Alyssa bought a new printer for \$55.00. Every time that it runs out of toner, Alyssa has to spend \$27.50 to buy a new toner cartridge. Alyssa's printer runs out of toner s times per year. She wants to spend under \$165.00 for the year.

4. $250 \leq 75 + 15l$

Sample answer:

Natalia wants to save at least \$250. She already has \$75. Natalia earns additional money by tutoring his classmates in biology for \$15 an hour.

5. $15 > \frac{t}{2} - 20$

Sample answer:

The temperature outside is 20 degrees below zero. As the sun comes out, the temperature rises $\frac{1}{2}$ degree every minute. The sun comes out for t minutes. The temperature does not rise above 15 degrees.

6. $55 \leq 5t + 15$

Sample answer:

Captain Jaylen's boat has sailed 15 miles to the east. He will sail 5 more miles to the east every minute. Captain Jaylen sails east for t minutes. Captain Jaylen travels 55 or more total miles to the east.

Extension

Solve each inequality and graph the solution set on a number line.

Extension of TEKS 7.10B and TEKS 7.11A

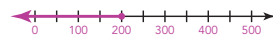
1. $78 < -9x - 3(-56 + 12x)$

$2 > x$



2. $0.20x - 0.08(x - 10) \leq 24.80$

$$x \leq 200$$



Notes

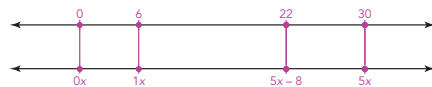
TOPIC 2 Two-Step Equations and Inequalities

Notes

Spaced Practice

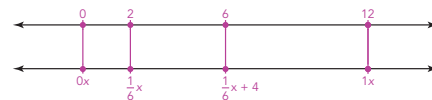
Solve each equation using a double number line model. **TEKS 7.10B, 7.11A**

1. $5x - 8 = 22$



$x = 6$

2. $\frac{1}{6}x + 4 = 6$



$x = 12$

Evaluate each expression for the indicated value. **TEKS 7.3A, 7.3B**

3. $-\frac{1}{3}a + \frac{5}{9}$, for $a = \frac{6}{7}$
 $\frac{11}{36}$

4. $-2.7r - 1.4 + 0.6r$, for $r = -1.2$
 1.12

Determine each quotient. **TEKS 7.3A**

5. $2\frac{1}{8} \div (-2\frac{1}{4})$
 $-\frac{17}{18}$

6. $(-12.8) \div (-1.2)$
 $5.\bar{3}$

Name _____ Date _____

I. Representing Equations with Tables and Graphs

Topic Practice

A. Identify the independent and dependent quantity in each scenario.

TEKS 7.7A (Interleaved Practice)

1. A forest fire can move at the rate of three meters per second in windy conditions. A fire started by a careless camper has already moved 45 meters.

The independent quantity is the time in seconds. The dependent quantity is the distance in meters.
2. Samantha's dog sleeps 9 hours at night and then takes several 2-hour naps during the daytime.

The independent quantity is the number of naps. The dependent quantity is the time in hours spent sleeping.
3. The cooking club sells stickers featuring Featherbrain the Turkey, the school's mascot. In one hour, they sell \$28 worth of stickers. Each member who sells stickers is paid \$1.

The independent quantity is the number of members. The dependent quantity is the amount in dollars made by the club.
4. The music club takes polls each year about the popularity of musicians. Jazzy Joe's popularity peaked when he scored 20 points in the poll. Since then, his score has dropped 2 points every year.

The independent quantity is the time in years. The dependent quantity is Jazzy Joe's popularity score.



TOPIC 3 Multiple Representations of Equations

Notes

5. For the school's Track and Field Day, every class participated in the egg-in-spoon relay race. The eighth grade class started 14 meters behind the starting line to eliminate their age advantage, and the class walked at a rate of 2 meters per second.

The independent quantity is the time in seconds. The dependent quantity is the distance in meters compared to the starting line.

6. You want to track your net savings from using a particular rechargeable battery. The rechargeable battery costs \$19 more than a similar disposable battery, which costs \$4. That means for every recharging of the battery, you save \$4 that you would otherwise have spent on a new disposable battery.

The independent quantity is the number of rechargings. The dependent quantity is your net savings in dollars.

- B. Define variables and write an equation to represent each problem situation. Then, use your equation to answer the given question.

TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)

1. Paola's Flower Shop sells long-stem roses for \$5 each. In addition, the shop charges a \$15 shipping fee. How many roses can Chris purchase if he plans to spend \$90?

Let r represent the number of roses.

$$5r + 15 = 90$$

$$5r + 15 - 15 = 90 - 15$$

$$5r = 75$$

$$\frac{5r}{5} = \frac{75}{5}$$

$$r = 15$$

Chris can purchase 15 roses.

2. Elena is practicing for her next track meet by running laps and recording her time. For each timed practice run, Elena runs a total of 2000 meters. Each lap is exactly 200 meters. If Elena has exactly 200 meters left to run, how many laps has she completed?

Let l represent the number of laps.

$$2000 - 200l = 200$$

$$2000 - 200l - 2000 = 200 - 2000$$

$$-200l = -1800$$

$$\frac{-200l}{-200} = \frac{-1800}{-200}$$

$$l = 9$$

Elena has completed 9 laps.



TOPIC 3 Multiple Representations of Equations

3. Jorge buys 40 yards of wire fence to create a triangular pen for his dog. One side of the pen will use 19 yards of fencing. The other two sides will be equal in length. Jorge would like his pen to use exactly 40 yards of fencing so that he doesn't have any left over. What is the length of each of the other two sides of the pen?

Let y represent the number of yards.

$$19 + 2y = 40$$

$$19 + 2y - 19 = 40 - 19$$

$$2y = 21$$

$$\frac{2y}{2} = \frac{21}{2}$$

$$y = 10.5$$

The other two sides of the pen will be 10.5 yards each.

5. Since beginning his artistic career, Jaylen has painted 6 paintings a year. He has sold all but two of his paintings. If Jaylen has sold 70 paintings, how many years has he been painting?

Let y represent the number of years.

$$6y - 2 = 70$$

$$6y - 2 + 2 = 70 + 2$$

$$6y = 72$$

$$\frac{6y}{6} = \frac{72}{6}$$

$$y = 12$$

Jaylen has been painting for 12 years.

4. Your cable bill this month was exactly \$105. The regular fee for cable is \$97, but this month you rented 2 movies that each cost the same amount to rent. How much did each movie cost to rent?

Let m represent the cost to rent a movie.

$$97 + 2m = 105$$

$$97 + 2m - 97 = 105 - 97$$

$$2m = 8$$

$$\frac{2m}{2} = \frac{8}{2}$$

$$m = 4$$

Each movie cost \$4 to rent.

6. The student council started the year with a balance of $-\$15$ (they were in debt), but after they came up with the idea to sell tickets to a student vs. faculty basketball game, the fund grew by \$15 per minute. By the time the student council had a balance of \$90, how long had they been selling tickets?

Let m represent the number of minutes.

$$-15 + 15m = 90$$

$$-15 + 15m + 15 = 90 + 15$$

$$15m = 105$$

$$\frac{15m}{15} = \frac{105}{15}$$

$$m = 7$$

The student council had been selling tickets for 7 minutes.

Notes



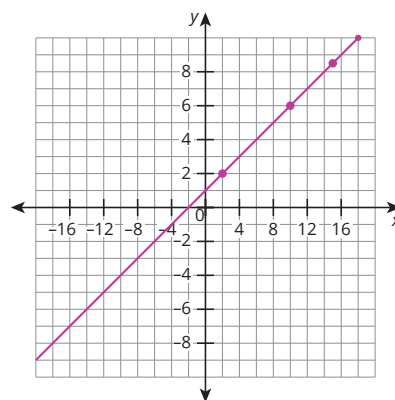
TOPIC 3 Multiple Representations of Equations

Notes

C. Solve each problem. **TEKS 7.7A (Topic-Aligned), TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)**

- The library charges \$1 to use the copier and \$0.50 for each page copied. Complete the table. Then, use the table to graph the relationship.

Number of Pages	Total Cost (dollars)
2	2
10	6
15	8.50
18	10



- Write an algebraic equation to represent the situation.

$$y = 0.5x + 1$$

- How many pages were copied if the total cost was \$7.50?

13 pages

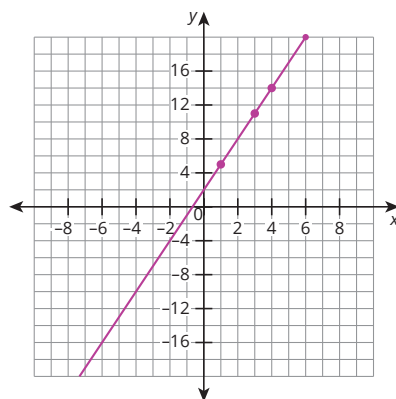
- What is the total cost to copy 50 pages?

\$26

TOPIC 3 Multiple Representations of Equations

2. At a local farm it costs \$5 to pick your own peck of apples. It costs \$3 for each additional peck. Complete the table. Then, use the table to graph the relationship.

Number of Pecks	Total Cost (dollars)
1	5
3	11
4	14
6	20



- a. Write an algebraic equation to represent the situation.

$$y = 2 + 3x$$

- b. How much will 11 pecks of apples cost?

\$35

- c. How many pecks can you buy for \$17?

5 pecks

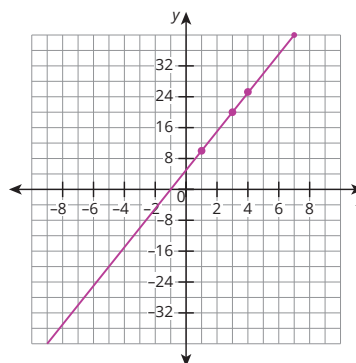
Notes

TOPIC 3 Multiple Representations of Equations

Notes

3. A children's museum charges \$10 admission for the first visitor and \$5 for each additional visitor in a group. Complete the table. Then, use the table to graph the relationship

Number of Visitors	Total Cost (dollars)
1	10
3	20
4	25
7	40



- a. Write an algebraic equation to represent the situation.

$$y = 5 + 5x$$

- b. How much will a group of 14 visitors cost?

\$75

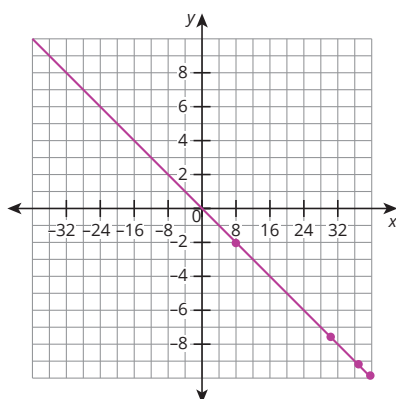
- c. How many visitors are in a group if the admission cost for the group is \$50?

9 visitors

TOPIC 3 Multiple Representations of Equations

4. A submarine is diving at a rate of 0.25 meter per second. Complete the table. Then, use the table to graph the relationship.

Time (seconds)	Depth (meters)
8	-2
30	-7.5
37	-9.25
40	-10



- a. Write an algebraic equation to represent the situation.

$$y = -0.25x$$

- b. What is the submarine's depth after 24 seconds?

-6 meters

- b. After how many seconds will the submarine be at a depth of -50 meters?

200 seconds

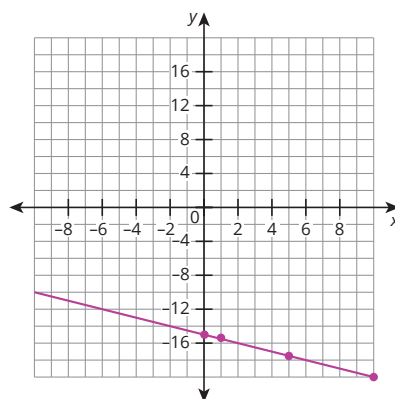
Notes

TOPIC 3 Multiple Representations of Equations

Notes

5. A submarine starts at a depth of -15 meters and then dives down 0.5 meter every second. Complete the table. Then, use the table to graph the relationship.

Time (seconds)	Depth (meters)
0	-15
1	-15.5
5	-17.5
10	-20



- a. Write an algebraic equation to represent the situation.

$$y = -0.5x - 15$$

- b. How deep will the submarine be after 25 seconds?

-27.5 meters

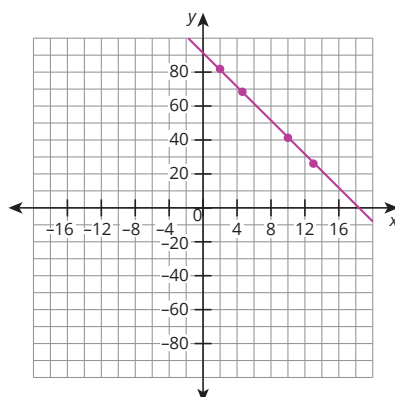
- c. After how many seconds will the submarine be at a depth of -30 meters?

30 seconds

TOPIC 3 Multiple Representations of Equations

6. At noon, the temperature was 92 degrees Fahrenheit. The temperature dropped 5 degrees every hour after that. Complete the table. Then, use the table to graph the relationship.

Time (hours)	Temperature (°F)
2	82
5	67
10	42
13	27



- a. Write an algebraic equation to represent the situation.

$$y = 92 - 5x$$

- b. After how many hours will the temperature be 74°F?

3.6 hours

- c. What will the temperature be in 8 hours?

52°F

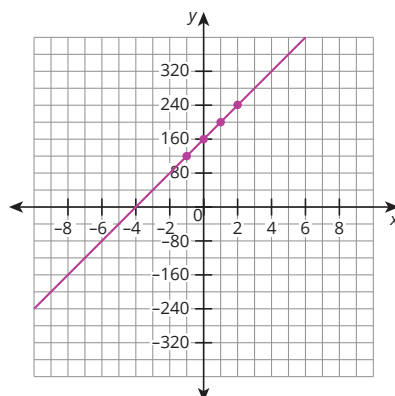
Notes

TOPIC 3 Multiple Representations of Equations

Notes

7. Jamal is considering a new internet service provider. He has been using his current provider for 4 months and has already paid \$160 for the service. His bills average \$40 per month. Complete the table. Then, use the table to graph the relationship.

Time (months)	Total Cost (dollars)
-1	120
0	160
1	200
2	240



- a. Write an algebraic equation to represent the situation.

$$y = 160 + 40x$$

- b. When did the cost of Jamal's internet service exceed \$100?

-1.5, or 1.5 months ago

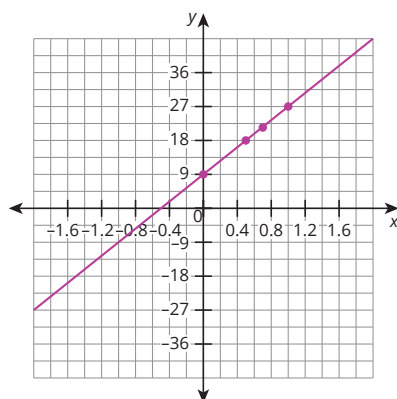
- c. What had Jamal's internet service cost 3 months ago?

\$40

TOPIC 3 Multiple Representations of Equations

8. Right now, Matthew is 9 kilometers into a 36-kilometer race. He is running an average of 18 kilometers every hour. Complete the table. Then, use the table to graph the relationship.

Time (hour)	Distance (kilometers)
0	9
0.5	18
0.75	22.5
1	27



- a. Write an algebraic equation to represent the situation.

$$y = 9 + 18x$$

- b. How many kilometers of the race had Matthew completed half an hour ago?

0 kilometers

- c. How much longer will it take Matthew to complete the race?

1.5 hours

Notes



Notes

TOPIC 3 Multiple Representations of Equations

Extension

Write a linear problem situation in which negative values of both the independent and dependent variables are useful in analyzing the situation. Write the related equation and create a graph of the situation.

Extension of TEKS 7.7A

Answers will vary.

Spaced Practice

- Mr. Davis has coins and old stamps for sale. He decides to advertise the items on an internet site for collectors. It will cost him \$84 initially to advertise and \$28 for each day he keeps the items on sale. If Mr. Davis does not want to spend more than \$700 on advertising, what is the maximum number of days he should advertise? Write and solve an inequality to answer the question.

TEKS 7.10A, 7.11A

$$84 + 28d \leq 700, d \leq 22.$$

Mr. Davis can advertise for 22 days and not go over his budget.

- Solve and graph the inequality: $-2x + 3 < 12$ TEKS 7.10B, 7.11A

$$x > -\frac{9}{2}$$



- Solve each equation. Check your solution. TEKS 7.11A, 7.11B

a. $16 = 3x - 4$

$$\frac{20}{3} = x$$

b. $1.2x + 5.3 = 5.9$

$$x = 0.5$$

TOPIC 3 Multiple Representations of Equations

4. Use long division to convert each fraction to a decimal. Identify each decimal as terminating or non-terminating. **TEKS 7.3A**

a. $\frac{5}{9}$

$0.\overline{55}$; non-terminating

b. $\frac{11}{20}$

0.55; terminating

Notes



Notes

II. Building Inequalities and Equations to Solve Problems

Topic Practice

- A. Determine the unit rate of change and write an equation to represent each table of values. **TEKS 7.4A (Interleaved Practice), TEKS 7.7A (Interleaved Practice)**

1.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	0
	1	-15
	2	-30
	3	-45
	4	-60

-15 meters per second

$$h = -15t$$

2.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	108
	1	96
	2	84
	3	72
	4	60

-12 meters per second

$$h = -12t + 108$$

TOPIC 3 Multiple Representations of Equations

3.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	0
	1	-14
	2	-28
	3	-42
	4	-56

-14 meters per second

$$h = -14t$$

5.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	0
	1	-18.5
	2	-37
	3	-55.5
	4	-74

-18.5 meters per second

$$h = -18.5t$$

4.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	520
	1	455
	2	390
	3	325
	4	260

-65 meters per second

$$h = -65t + 520$$

6.

	Independent Quantity	Dependent Quantity
Label	Time	Height
Units	seconds	meters
	0	0
	1	-13.2
	2	-26.4
	3	-39.6
	4	-52.8

-13.2 meters per second

$$h = -13.2t$$

Notes



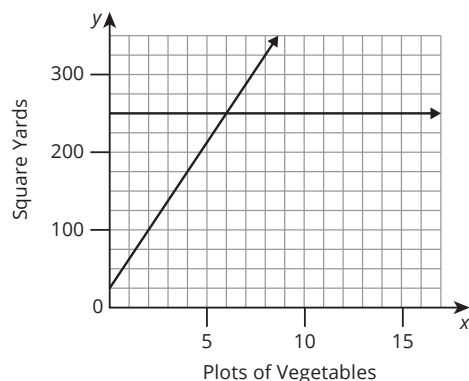
TOPIC 3 Multiple Representations of Equations

Notes

- B. Analyze each graph to estimate the solution set, then write an inequality to represent the scenario. Solve the inequality and graph its solution on a number line.

TEKS 7.10A (Interleaved Practice), TEKS 7.11A (Interleaved Practice)

1. Josh is creating a garden in his backyard. He has less than 250 square yards of space to use. He plans to use 25 square yards to plant flowers. He plans to divide the remaining space into plots of equal size for vegetables. Each vegetable plot will be 30 square yards. How many plots of equal size can Josh plan for vegetables?

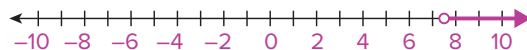


$$30p + 25 < 250$$

$$30p < 225$$

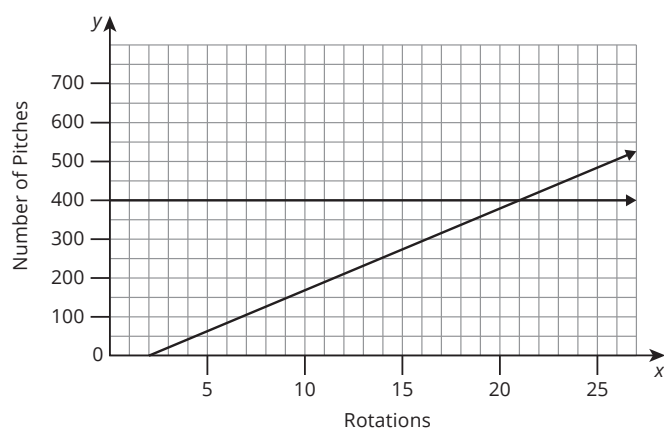
$$p < 7.5$$

Josh can plant 7 plots of equal size.



TOPIC 3 Multiple Representations of Equations

2. Mariana is practicing her pitching. She rotates pitching from the mound with the other pitchers on the team. Mariana throws 20 pitches each time she rotates to the mound. Her coach said she must throw more than 400 pitches in the strike zone during today's practice. How many rotations must Mariana take if a total of 20 of her pitches miss the strike zone?

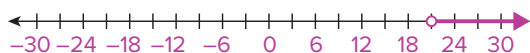


$$20r - 20 > 400$$

$$20r > 420$$

$$r > 21$$

Mariana must take more than 21 rotations.



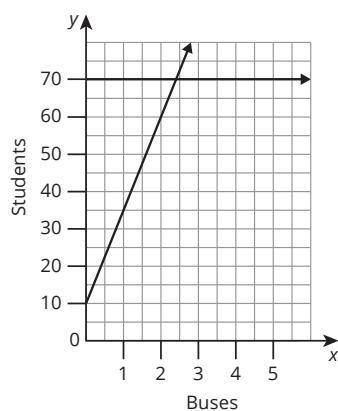
Notes



TOPIC 3 Multiple Representations of Equations

Notes

3. The principal of a local high school promised that the school will provide busing for more than 70 students to the homecoming game. The 9 senior athletes are taking part in a special awards ceremony, so the principal rents a large van to bring them to the game. He rents large buses for all of the other students. Each bus holds 25 students. How many buses will the principal need to rent to keep his promise?



$$25b + 9 > 70$$

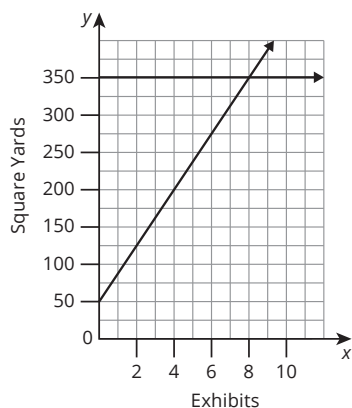
$$25b > 61$$

$$b > 2.44$$

The principal must rent 3 busses.



Notes



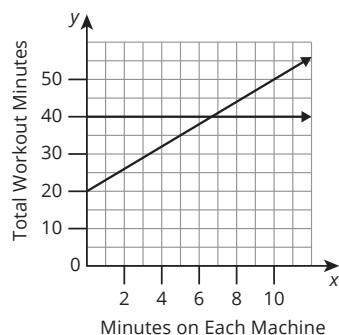
Ashley can have 7 exhibits in the show.



TOPIC 3 Multiple Representations of Equations

Notes

5. Tiara is planning her workout at her gym. She wants to spend more than 40 minutes exercising. Her workout plan includes 20 minutes lifting weights and the rest of the time on 3 different cardio machines. She wants to spend the same amount of time on each cardio machine. How many minutes should Tiara spend on each cardio machine?

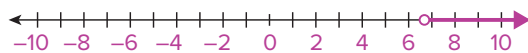


$$3t + 20 > 40$$

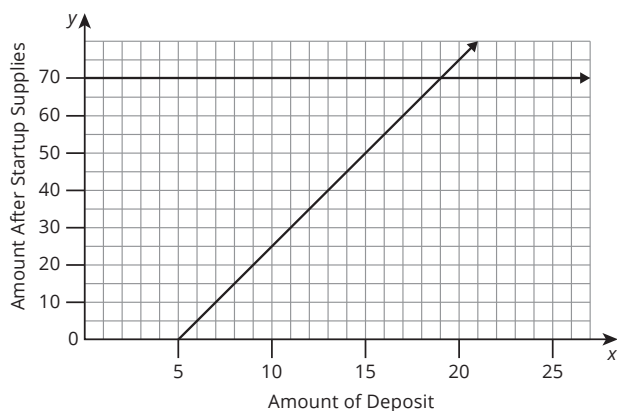
$$3t > 20$$

$$t > 6.67$$

Tiara should spend more than 6.67 minutes or 6 minutes and 40 seconds on each cardio machine.



Notes



$$5d - 25 \geq 70$$

$$5d \geq 95$$

$d \geq 19$

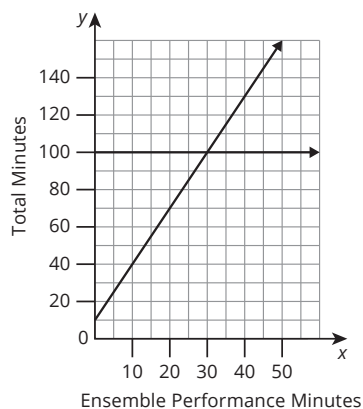
Each person will need to deposit at least 19 dollars into the account.



TOPIC 3 Multiple Representations of Equations

Notes

7. Ms. Ramirez is in charge of the school music assembly. The assembly is 100 minutes in length and contains music from 3 different ensembles. She would like less than 13 minutes of “down time” during the assembly, which includes the time it takes the ensembles to get on and off the stage. Each ensemble will have the same whole-number amount of time, in minutes, to perform. How many minutes should Ms. Ramirez allow for each ensemble?



$$3t + 13 < 100$$

$$3t < 87$$

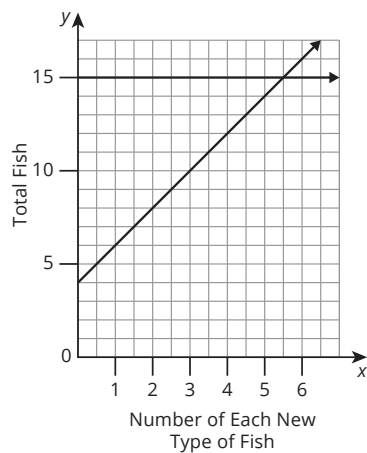
$$t < 29$$

Ms. Ramirez should allow 29 minutes for each ensemble to perform.



TOPIC 3 Multiple Representations of Equations

8. Lizzie read that she should have less than 15 fish based upon the size of her fish tank. She already has 4 tetras in her tank. She would like to add 2 new types of fish to her tank. She would like the same number of each new type of fish. How many of each new type of fish can Lizzie add to her tank?

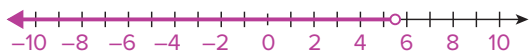


$$2n + 4 < 15$$

$$2n < 11$$

$$n < 5.5$$

Lizzie can add 5 of each new type of fish to her tank.



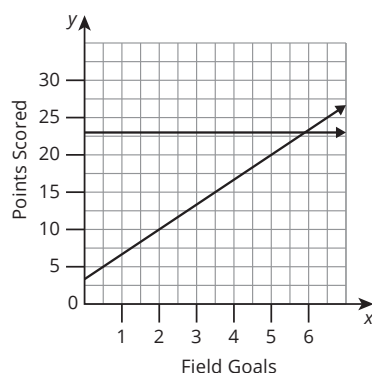
Notes



TOPIC 3 Multiple Representations of Equations

Notes

9. In a game against the Creek Side Crickets, the East Port Pandas football team scored one touchdown with an extra point, which gave them 7 points. Their kicker made every field goal he attempted for 3 points each. How many field goals did the Panda's kicker have to make to beat the Crickets' score of 23?



$$3f + 7 > 23$$

$$3f > 16$$

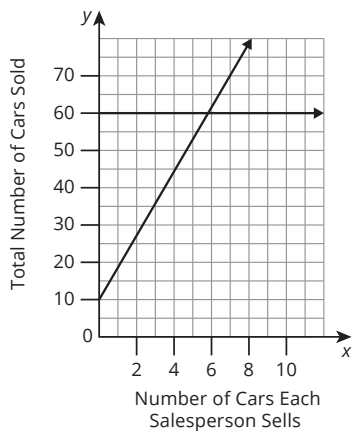
$$f > 5.33$$

The Panda's kicker had to make 6 field goals.



TOPIC 3 Multiple Representations of Equations

10. A car dealership must sell at least 60 cars per week to fulfill their quota. The owner, Ms. Patel, knows that she personally will sell 9 cars per week. She has 10 other salespeople that each work at her dealership. If each of Ms. Patel's salespeople sells the same number of cars, how many must each of them sell each week to meet the dealership's quota?



$$10c + 9 \geq 60$$

$$10c \geq 51$$

$$c \geq 5.1$$

Each salesperson must sell at least 6 cars to meet the quota.

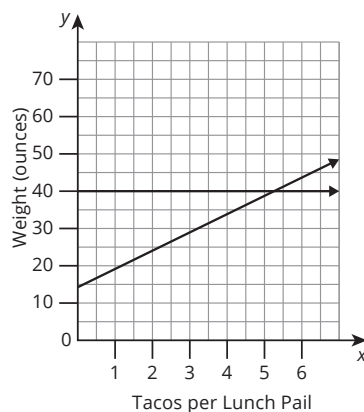


Notes

TOPIC 3 Multiple Representations of Equations

Notes

11. Alyssa makes fresh tacos each day to be shipped and sold in local grocery stores. She packages the tacos in collectible lunch pails. Each taco weighs 5 ounces. Each lunch pail weighs 14 ounces. Due to shipping regulations, the total weight of each taco lunch pail can be, at most, 40 ounces. How many tacos can Alyssa package in each lunch pail?



$$5t + 14 \leq 40$$

$$5t \leq 26$$

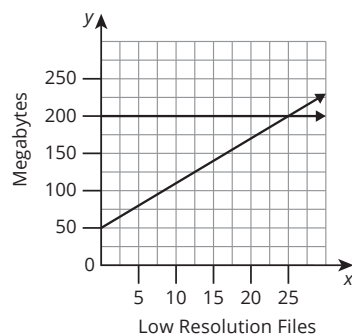
$$t \leq 5.2$$

Alyssa can package 5 tacos in each lunch pail.



TOPIC 3 Multiple Representations of Equations

12. Mario is a graphic artist. He is saving files on a USB drive to give to a client. The USB drive can hold at most 200 megabytes of data. Mario has one high resolution file already on the USB drive. It is 50 megabytes. Mario wants to add some low resolution files to the USB drive. Each low resolution file is 6 megabytes. How many low resolution files can Mario add to the USB drive?



$$6f + 50 \leq 200$$

$$6f \leq 150$$

$$f \leq 25$$

Mario can add 25 low resolution files to the USB drive.



Notes



Notes

TOPIC 3 Multiple Representations of Equations

Extension

Andrew and his manager have discussed the use of an herbicide to help decrease the growth of plants that will grow near the trees, because they will take nutrients away from the tree and thus the trees will grow at a slower rate. They decide to do some research on the subject to decide. They find a study that indicates that the growth of the seedlings without using herbicides was $8(2h + 2) - 4(2h + 9)$ and the growth of the seedlings with herbicides was $7h + 1\frac{3}{4}(4h - 2\frac{1}{8})$. Graph each expression. Sketch the portion of the graphs that make sense to this problem. Are the two growth rates the same? Explain your reasoning. **Extension of TEKS 7.7A**

Check students' graphs.

No. The two growth rates are not the same. The graphs are not the same, so the expressions are not equivalent. It appears that the growth rate was better when the herbicide was used.

Spaced Practice

1. Rewrite each expression with the fewest terms possible. **TEKS 7.3A**

a. $(-2y + 3) + (-7y - 14)$
 $-9y - 11$

b. $(9x - 4) - 5(2x - 7)$
 $-x + 31$



TOPIC 3 Multiple Representations of Equations

2. Solve each equation for the variable. **TEKS 7.11A**

a. Solve for z : $-2 + 10z = 28$.

$z = 3$

c. Solve for w : $-11 = 9 + 10w$.

$w = -2$

b. Solve for a : $\frac{a}{9} - 10 = 8$.

$a = -162$

d. Solve for x : $-10 = -5x + 5$.

$x = 3$

Notes



Notes

III. Using Multiple Representations to Solve Problems

Topic Practice

A. Use the given information to answer each question. **TEKS 7.4A**
(Interleaved Practice), **TEKS 7.7A (Topic-Aligned)**

1. Natalia is running a 26-mile marathon. The table shows how far she ran at different times during the race. Define the independent and dependent variables and the unit rate of change. (Assume Natalia runs at a constant rate.) Write an equation that represents the data shown in the table. Complete the table.

Time	Distance
Hours	miles
0.1	1
0.2	2
0.3	3
1	10
2	20
2.6	26

Independent variable: t = time in hours

Dependent variable: d = distance in miles

Unit rate of change = 10 miles per hour

$$d = 10t$$

TOPIC 3 Multiple Representations of Equations

2. Kaya is refilling her fish tank after cleaning it. The table shows the amount of water in the tank while she is filling it. Define the independent and dependent variables and the unit rate of change. (Assume the tank is filled at a constant rate.) Write an equation that represents the data shown in the table. Complete the table.

Time	Water
minutes	gallons
1	8
2	16
3	24
4	32
5	40
6	48

Independent variable: t = time in minutes

Dependent variable: w = water in gallons

Unit rate of change = 8 gallons per minute

$$w = 8t$$

3. Samantha is saving money for a new car. The table shows the amount of money in her savings account over a 5-month period. Define the independent and dependent variables and the unit rate of change. (Assume Samantha saves the same amount of money each month.) Write an equation that represents the data shown in the table. Complete the table.

Time	Savings
months	dollars
0	1350
1	1500
2	1650
3	1800
4	1950
5	2100

Independent variable: t = time in months

Dependent variable: s = saving in dollars

Unit rate of change = 150 dollars per month

$$s = 1350 + 150t$$

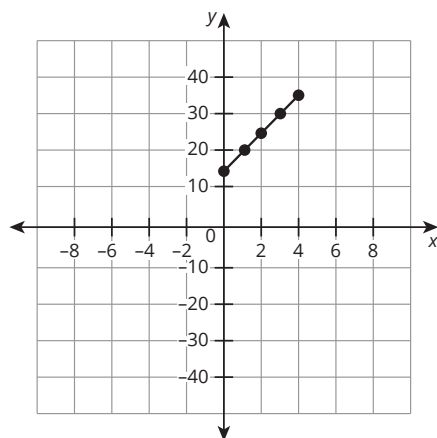
Notes



TOPIC 3 Multiple Representations of Equations

Notes

4. The graph shows the relationship between two quantities. Complete the table. Define the independent and dependent variables and the unit rate of change. Write an equation that represents the data shown.



x	y
0	15
1	20
2	25
3	30
4	35

Independent variable: x

Dependent variable: y

Unit rate of change = 5

$$y = 15 + 5x$$



Notes

-
- A coordinate plane with x and y axes ranging from -16 to 16. Grid lines are spaced every 4 units. A line is graphed passing through the points $(-4, 16)$, $(-2, 12)$, $(0, 8)$, $(2, 4)$, and $(4, 0)$. The line has a negative slope of -1 .

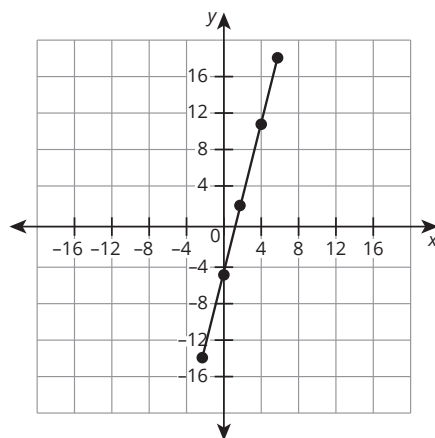
x	y
-4	18
-2	14
0	10
2	6
4	2

$$y = 10 - 2x$$

TOPIC 3 Multiple Representations of Equations

Notes

6. The graph shows the relationship between two quantities. Complete the table. Define the independent and dependent variables and the unit rate of change. Write an equation that represents the data shown.



x	y
-2	-14
0	-6
2	2
4	10
6	18

Independent variable: x

Dependent variable: y

Unit rate of change = 4

$$y = -6 + 4x$$

TOPIC 3 Multiple Representations of Equations

- B. Write a real-world problem that could be represented by the given information. **TEKS 7.4A (Topic-Aligned), TEKS 7.7A (Interleaved Practice), TEKS 7.10C (Interleaved Practice)**

1.

Number of Toppings	Total Cost (dollars)
0	7.50
1	8.00
4	9.50
5	10.00

Sample answer:

It costs \$7.50 for a pizza and \$0.50 for each additional topping.

2.

Number of Games	Total Cost (dollars)
0	18
1	20
2	22
4	26

Sample answer:

It costs \$18 to join an online video game club. It costs \$2 to play each game.

3.

Number of Text Messages	Total Cost (dollars)
0	4.50
1	4.75
4	5.50
6	6

Sample answer:

It costs \$4.50 for a text messaging plan. It costs \$0.25 for each additional text.

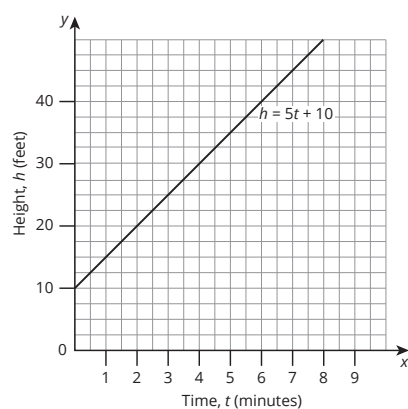
Notes



TOPIC 3 Multiple Representations of Equations

Notes

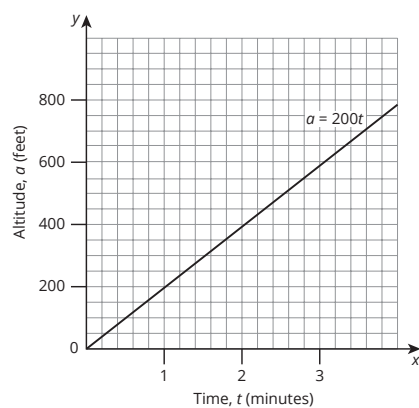
4.



Sample answer:

Trung starts hiking 10 ft above sea level. She continues to hike up a mountain at a rate of 5 feet per minute.

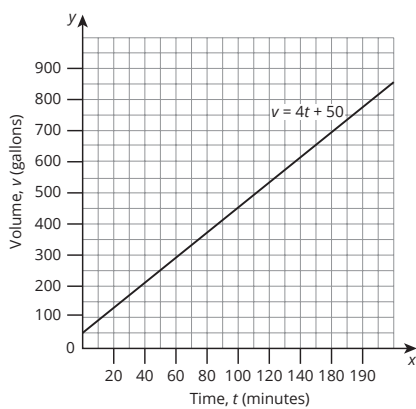
5.



Sample answer:

Alejandro lets a helium balloon go from the ground. It rises into the air at a rate of 200 feet per minute.

6.



Sample answer:

Eduardo's pool has 50 gallons of water. He continues to add water at a rate of 4 gallons per minute.

Extension

How could you graph the solutions of an inequality on a coordinate plane? Create a situation that can be modeled with an equation on the coordinate plane. Then, show how to model inequalities and their solutions on the coordinate plane. **TEKS A.3D, Extension of TEKS 7.10A**

Sample answer:

The solutions to linear inequalities on a coordinate plane are shown as shaded regions above or below the line graphed to represent the equation.

Notes

TOPIC 3 Multiple Representations of Equations

Notes

Spaced Review

- Paola is using a garden hose to fill his backyard pool at a rate of 10 gallons per minute. The pool already contains 9000 gallons of water. The capacity of the pool is 12,000 gallons. **TEKS 7.4A**

- Define the independent and dependent variables.

Independent variable: t = time in minutes;

dependent variable: w = amount of water in gallons

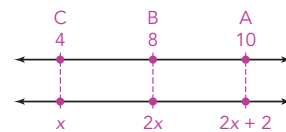
- Define the unit rate of change.

10 gallons per minute Steps are labeled as A, B, and C.

- Use double number lines to solve each equation. **TEKS 7.10B, 7.11A**

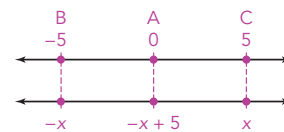
- $2x + 2 = 10$

$$x = 4$$



- $-x + 5 = 0$

$$x = 5$$



- Solve for each unknown. **TEKS 7.4D, 7.11A**

- $\frac{1.6}{2.8} = \frac{x}{7}$
 $x = 4$

- $\frac{2}{d} = \frac{0.4}{5}$
 $d = 25$

Analyzing Populations and Probabilities

TOPIC 1: Introduction to Probability

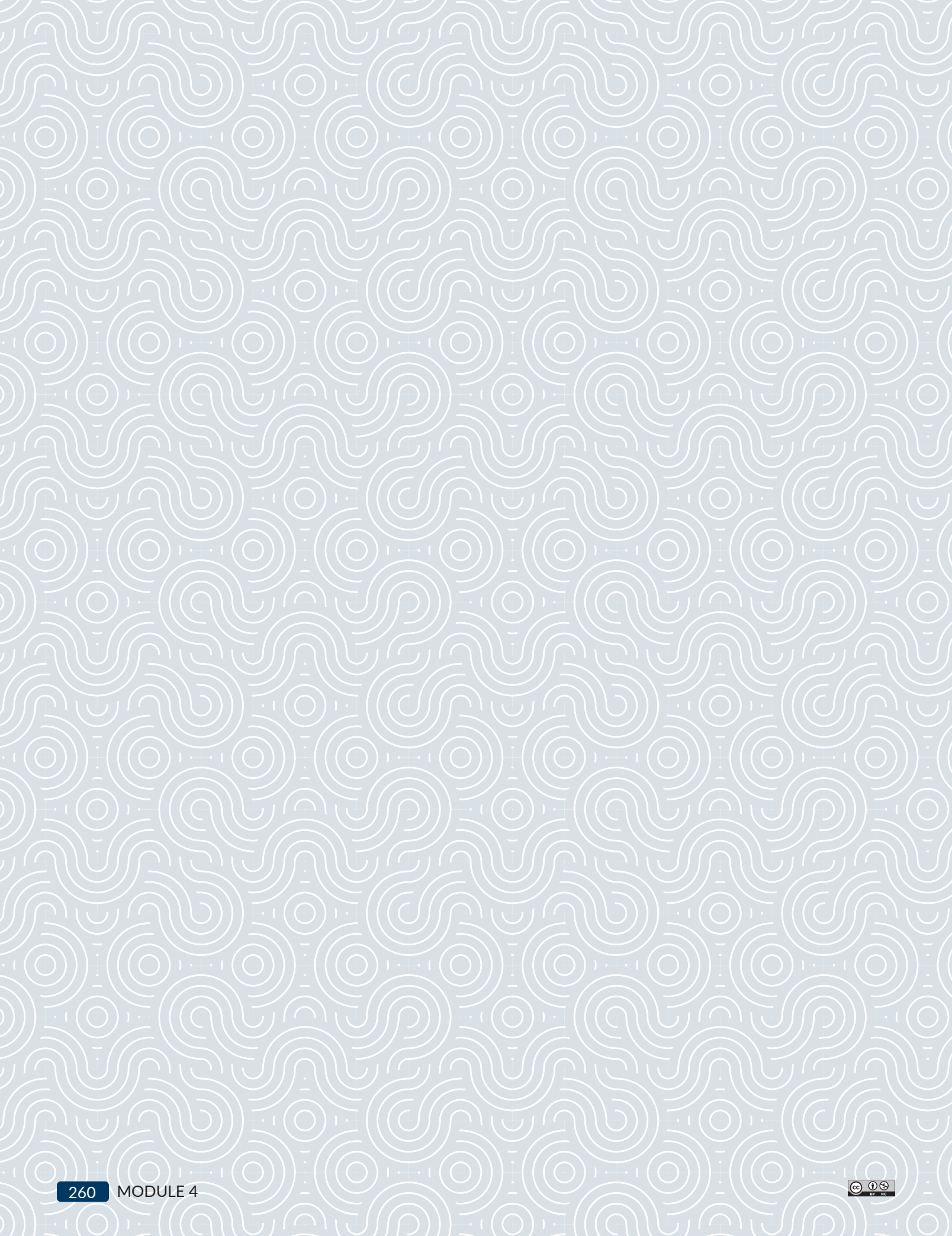
I. Defining and Representing Probability.....	261
II. Probability Models.....	266
III. Determining Experimental Probability of Simple Events.....	277
IV. Simulating Simple Experiments.....	288

TOPIC 2: Compound Probability

I. Using Arrays to Organize Outcomes.....	299
II. Using Tree Diagrams.....	311
III. Determining Compound Probability.....	319
IV. Simulating Probability of Compound Events.....	324

TOPIC 3: Drawing Inferences

I. Collecting Random Samples.....	331
II. Using Random Samples to Draw Inferences.....	340
III. Bar Graphs.....	354
IV. Comparing Two Populations.....	372
V. Using Random Samples from Two Populations to Draw Conclusions.....	384

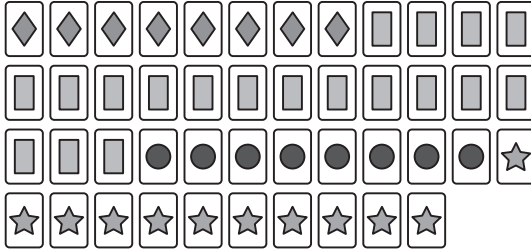


Name _____ Date _____

I. Defining and Representing Probability

Topic Practice

- A. You choose a card from the deck of 46 cards shown. Determine each probability. **TEKS 7.6E (Interleaved Practice)**



1. $P(\text{Diamond})$

$$\frac{8}{46} = \frac{4}{23}$$

3. $P(\text{not a Circle})$

$$\frac{38}{46} = \frac{19}{23}$$

5. $P(\text{Star or Diamond})$

$$\frac{19}{46}$$

2. $P(\text{Rectangle})$

$$\frac{19}{46}$$

4. $P(\text{Rectangle or Star})$

$$\frac{30}{46} = \frac{15}{23}$$

6. $P(\text{complement of } P(\text{star}))$

$$\frac{35}{46}$$

TOPIC 1 Introduction to Probability

Notes

7. $P(\text{Rectangle or Circle})$

$$\frac{27}{46}$$

9. $P(\text{Diamond or Rectangle})$

$$\frac{27}{46}$$

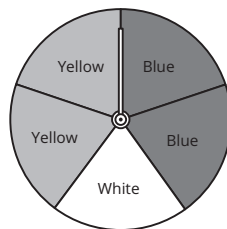
8. $P(\text{Circle or Star})$

$$\frac{19}{46}$$

10. $P(\text{Circle or Diamond})$

$$\frac{16}{46} = \frac{8}{23}$$

- B. You spin a spinner with equal-sized sections, as shown. Determine each probability. Then, identify and calculate the complement of each event. Describe the relationship between each probability and its complement. **TEKS 7.6E (Topic-Aligned)**



1. $P(\text{landing on white})$

The probability of landing on white is $\frac{1}{5}$.

The complement is not landing on white.
 $P(\text{not landing on white}) = 1 - \frac{1}{5} = \frac{4}{5}$.

The probability of landing on white and its complement have a sum of 1.

2. $P(\text{landing on yellow})$

The probability of landing on yellow is $\frac{2}{5}$.

The complement is not landing on yellow.
 $P(\text{not landing on yellow}) = 1 - \frac{2}{5} = \frac{3}{5}$.

The probability of landing on yellow and its complement have a sum of 1.

TOPIC 1 Introduction to Probability

3. $P(\text{landing on blue})$

The probability of landing on blue is $\frac{2}{5}$.

The complement is not landing on blue.
 $P(\text{not landing on blue}) = 1 - \frac{2}{5} = \frac{3}{5}$.

The probability of landing on blue and its complement have a sum of 1.

5. $P(\text{not landing on yellow})$

The probability of not landing on yellow is $\frac{3}{5}$.

The complement is landing on yellow.
 $P(\text{not landing on yellow}) = 1 - \frac{3}{5} = \frac{2}{5}$.

The probability of not landing on yellow and its complement have a sum of 1.

4. $P(\text{not landing on blue})$

The probability of not landing on blue is $\frac{3}{5}$.

The complement is landing on blue.
 $P(\text{landing on blue}) = 1 - \frac{3}{5} = \frac{2}{5}$.

The probability of not landing on blue and its complement have a sum of 1.

6. $P(\text{not landing on white})$

The probability of not landing on white is $\frac{4}{5}$.

The complement is landing on white.
 $P(\text{landing on white}) = 1 - \frac{4}{5} = \frac{1}{5}$.

The probability of not landing on white and its complement have a sum of 1.

- C. Determine whether the event is impossible, just as likely as unlikely, or certain to occur. Write 0, $\frac{1}{2}$, or 1 to indicate the most appropriate probability for each event. **Prerequisite for TEKS 7.6E**

1. It will snow in Houston, Texas in July.

Impossible, 0

3. A six-sided number cube is rolled and lands on an integer.

Certain, 1

2. A coin is flipped and lands on heads.

Just as likely as unlikely, $\frac{1}{2}$

4. The next tiger at your local zoo will be a male.

Just as likely as unlikely, $\frac{1}{2}$

Notes



TOPIC 1 Introduction to Probability

Notes

5. The sun will shine in Long Beach, California, in July.

Certain, 1

6. You will live to be over 900 years old.

Impossible, 0

Extension

1. Create a spinner with 4 sections, A through D, so that each section has the given probability. **Extension of TEKS 7.6E**

The central angle for each section should be approximately these measurements:

Section A: 10%

Section A: 36°

Section B: 20%

Section B: 72°

Section C: 30%

Section C: 108°

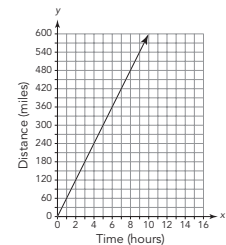
Section D: 40%

Section D: 144°

Spaced Practice

1. Linh is driving north from Austin along Interstate 35. The graph represents the relationship between the time that Linh has driven and the distance that she has driven. **TEKS 7.4A, TEKS 7.4D**
- a. How far does Linh drive in 5 hours?

300 miles



Notes

- b. How fast is Linh driving?

60 miles per hour

- c. Write an equation to determine the number of miles that Linh drives for any number of hours. Be sure to define your variables.

Let x = the amount of time Linh is driving in hours.

Let y = the distance Linh travels in miles.

$$y = 60x$$

2. Jackson is researching a type of fish called *carp*. He discovers that one variety of carp can grow 5 pounds during each year of its life. He decides to purchase a very young carp of this variety that weighs 2 pounds.

Define variables and write an equation that represents the relationship between the amount of time in years that Louis has the carp and the weight of the carp. **TEKS 7.7A**

Let x = the time in years that Louis has owned the carp.

Let y = the weight of the carp.

$$y = 5x + 2$$

3. Solve each equation using any method. **TEKS 7.11A**

a. $\frac{x}{3} + 2 = 14$

$$x = 36$$

⋮

b. $6n - 13 = 27$

$$n = 6\frac{2}{3}$$



Notes

TOPIC 1 Introduction to Probability

II. Probability Models

Topic Practice

- A. Construct a probability model for each situation. Determine whether the model is a uniform probability model or a non-uniform probability model. **TEKS 7.6I (Interleaved Practice)**

1. Roll a 10-sided number polyhedron

Outcome	1	2	3	4	5	6	7	8	9	10
Probability	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Uniform probability model

2. Select a painted rock from a bag at random that contains 4 purple rocks, 3 green rocks, 3 orange rocks, and 2 blue rocks

Outcome	Purple	Green	Orange	Blue
Probability	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}$

Non-uniform probability model

3. Spin a spinner with 8 numbered sections of equal size

Outcome	1	2	3	4	5	6	7	8
Probability	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Uniform probability model

4. Select 1 of 5 members of your hockey team at random to take the first shot in an overtime shootout

Outcome	1	2	3	4	5
Probability	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

Uniform probability model

5. Spin a spinner with colored sections of equal size. The spinner has 3 blue sections, 3 red sections, and 2 yellow sections

Outcome	Blue	Red	Yellow
Probability	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{4}$

Non-uniform probability model

6. Select a member of the math club at random whose name starts with a vowel; The members are Ricardo, Alejandra, Gracie, Omar, Antonio, Ben, James, and Juliana.

Outcome	Vowels	Consonants
Probability	$\frac{3}{8}$	$\frac{5}{8}$

Non-uniform probability model

Notes

Notes

TOPIC 1 Introduction to Probability

7. Select a day of the week at random to give your dog a bath by writing each day of the week on a slip of paper and choosing a slip of paper from a bag

Outcome	Sun.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.
Probability	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$

Uniform probability model

8. Choose a sock from a drawer at random that contains 4 black socks, 2 brown socks, and 2 blue socks

Outcome	Black	Brown	Blue
Probability	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$

Non-uniform probability model

9. Toss a coin two times

Outcome	HH	HT	TH	TT
Probability	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Uniform probability model

10. Spin a spinner with equal sections; Four of the sections contain numbers and eight of the sections contain letters.

Outcome	Number	Letter
Probability	$\frac{1}{3}$	$\frac{2}{3}$

Non-uniform probability model

11. Select a colored marble from a bag at random that contains 5 red marbles, 5 blue marbles, 5 green marbles, 5 yellow marbles, and 5 purple marbles

Outcome	Red	Blue	Green	Yellow	Purple
Probability	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

Uniform probability model

12. Select a coin from a jar at random that contains 14 quarters, 26 dimes, 12 nickels, and 8 pennies

Outcome	Quarter	Dime	Nickel	Penny
Probability	$\frac{7}{30}$	$\frac{13}{30}$	$\frac{1}{5}$	$\frac{2}{15}$

Non-uniform probability model

Notes

Notes

TOPIC 1 Introduction to Probability

B. Use the probability model to answer each question.

TEKS 7.6I (Topic-Aligned)

Outcome	1	2	3	4	5	6
Probability	$\frac{3}{18}$	$\frac{2}{18}$	$\frac{1}{18}$	$\frac{3}{18}$	$\frac{5}{18}$	$\frac{4}{18}$

1. What is the probability of an outcome of 4?

$$P(4) = \frac{3}{18} = \frac{1}{6}$$

The probability of an outcome of 4 is $\frac{1}{6}$.

2. What is the probability of an outcome of 6?

$$P(6) = \frac{4}{18} = \frac{2}{9}$$

The probability of an outcome of 6 is $\frac{2}{9}$.

3. What is the probability of an outcome that is less than 6?

$$P(\text{less than } 6) = P(1) + P(2) + P(3) + P(4) + P(5)$$

$$= \frac{3}{18} + \frac{2}{18} + \frac{1}{18} + \frac{3}{18} + \frac{5}{18} = \frac{14}{18} = \frac{7}{9}$$

The probability of an outcome that is less than 6 is $\frac{7}{9}$.

4. What is the probability of an outcome that is greater than 8?

Because none of the outcomes in the probability model are greater than 8, $P(\text{greater than } 8) = 0$.

Notes

5. What is the probability of an outcome that is an odd number?

$$P(\text{odd}) = P(1) + P(3) + P(5)$$

$$= \frac{3}{18} + \frac{1}{18} + \frac{5}{18} = \frac{9}{18} = \frac{1}{2}$$

The probability of an outcome that is an odd number is $\frac{1}{2}$.

6. What is the probability of an outcome that is less than 10?

Because all of the outcomes in the probability model are less than 10, $P(\text{less than } 10) = 1$.

Use the probability model to answer each question.

Outcome	A	B	C	D	E	F
Probability	$\frac{5}{24}$	$\frac{6}{24}$	$\frac{3}{24}$	$\frac{7}{24}$	$\frac{2}{24}$	$\frac{1}{24}$

7. What is the probability of an outcome of B?

$$P(B) = \frac{6}{24} = \frac{1}{4}$$

The probability of an outcome of B is $\frac{1}{4}$.

8. What is the probability of an outcome of F?

$$P(F) = \frac{1}{24}$$

The probability of an outcome of F is $\frac{1}{24}$.



Notes

TOPIC 1 Introduction to Probability

9. What is the probability of an outcome that is not C?

$$P(\text{not } C) = P(A) + P(B) + P(D) + P(E) + P(F)$$

$$= \frac{5}{24} + \frac{6}{24} + \frac{7}{24} + \frac{2}{24} + \frac{1}{24} = \frac{21}{24} = \frac{7}{8}$$

The probability of an outcome that is not C is $\frac{7}{8}$.

10. What is the probability of an outcome that is a consonant?

$$P(\text{consonant}) = P(B) + P(C) + P(D) + P(F)$$

$$= \frac{6}{24} + \frac{3}{24} + \frac{7}{24} + \frac{1}{24} = \frac{17}{24}$$

The probability of an outcome that is a consonant is $\frac{17}{24}$.

11. What is the probability of an outcome that is not A?

$$P(\text{not } A) = P(B) + P(C) + P(D) + P(E) + P(F)$$

$$= \frac{6}{24} + \frac{3}{24} + \frac{7}{24} + \frac{2}{24} + \frac{1}{24} = \frac{19}{24}$$

The probability of an outcome that is not A is $\frac{19}{24}$.

12. What is the probability of an outcome that is a vowel?

$$P(\text{vowel}) = P(A) + P(E)$$

$$= \frac{5}{24} + \frac{2}{24} = \frac{7}{24}$$

The probability of an outcome that is a vowel is $\frac{7}{24}$.

Candy Flavor	Number
Cherry	8
Watermelon	3
Pineapple	4
Lemon	2
Orange	5
Grape	7
Blueberry	1

- Xavier has 30 pieces of candy in his bag.

Outcome	Cherry	Watermelon	Pineapple	Lemon	Orange	Grape	Blueberry
Probability	$\frac{4}{15}$	$\frac{1}{10}$	$\frac{2}{15}$	$\frac{1}{15}$	$\frac{1}{6}$	$\frac{7}{30}$	$\frac{1}{30}$



Notes

TOPIC 1 Introduction to Probability

3. Use the probability model to determine the probability of choosing a pineapple flavored candy at random.

$$P(\text{pineapple}) = \frac{4}{30} = \frac{2}{15}$$

The probability of choosing a pineapple flavored candy at random is $\frac{2}{15}$.

4. Use the probability model to determine the probability of choosing a candy that is not grape at random.

$$P(\text{not grape}) = \frac{23}{30}$$

The probability of choosing a candy that is not grape at random is $\frac{23}{30}$.

5. Suppose cherry and watermelon candies are both red. Use the probability model to determine the probability of choosing a red candy at random.

$$P(\text{red}) = \frac{11}{30}$$

The probability of choosing a red candy at random is $\frac{11}{30}$.

6. Use the probability model to determine the probability of choosing a candy that is not red at random.

$$P(\text{not red}) = \frac{19}{30}$$

The probability of choosing a candy that is not red at random is $\frac{19}{30}$.

7. Suppose pineapple and lemon candies are both yellow. Use the probability model to determine the probability of choosing a candy that is yellow at random.

$$P(\text{yellow}) = \frac{6}{30} = \frac{1}{5}$$

The probability of choosing a candy that is yellow at random is $\frac{1}{5}$.



8. Suppose pineapple and lemon candies are both yellow. Use the probability model to determine the probability of choosing a candy that is not yellow at random.

$$P(\text{not yellow}) = \frac{24}{30} = \frac{4}{5}$$

The probability of choosing a candy that is not yellow at random is $\frac{4}{5}$.

Extension

1. Nakota flipped a coin 10 times and got 70% heads and 30% tails. What will happen to these percents as Nakota continues flipping the coin? Try it out to test your prediction. **Extension of TEKS 7.6C, Extension of 7.6D**
The percents approach 50% as the number of trials increases.

Spaced Practice

1. A drawer contains 15 T-shirts. There are 4 blue, 9 green, and 2 black T-shirts. A T-shirt is grabbed at random from the drawer. Which statement(s) correctly describe(s) the likelihood of an event? Select True or False and explain your reasoning. **TEKS 7.6A, TEKS 7.6E**

Explanations will vary.

- a. It is unlikely that a black T-shirt will be selected. ☒ True ☐ False
b. It is certain that a green T-shirt will be selected. ☐ True ☒ False
c. It is impossible that a red T-shirt will be selected. ☒ True ☐ False
d. It is likely that a blue T-shirt will be selected. ☐ True ☒ False

Notes



Notes

TOPIC 1 Introduction to Probability

2. A local park rents cabins for people who want to vacation by the forest. The fee for the rental is \$27 per night. There is also a \$55 cleaning and maintenance charge that is added to the total bill.

TEKS 7.7A, TEKS 7.10A, TEKS 7.11A

- a. Define variables for the number of days that a cabin is rented and the cost of the rental. Use the variables to write an equation that represents the cost to rent the cabin given the number of days that the cabin is rented.

Let d represent the number of days that the cabin is rented.

Let t represent the cost of the rental.

Equation: $t = 27d + 55$

- b. Use the equation to determine how many days the cabin can be rented for \$190. Show all of your work.

The cabin can be rented for 5 days.

3. Use the distributive property to rewrite each expression. TEKS 7.3A, TEKS 7.3B

a. $-7(-5g + 12) - 27$

$35g - 111$

⋮

b. $\frac{-6.4y + 14.4}{-0.16}$

$40y - 90$

III. Determining Experimental Probabilities of Simple Events

Topic Practice

A. Determine each experimental probability. **TEKS 7.6I (Topic-Aligned)**

1. Suppose you toss a coin 20 times and record the results shown in the table. Complete the table and calculate the experimental probability of tossing tails.

Result	Tally	Total
Heads		8
Tails		12
		20

$$P(\text{tails}) = \frac{12}{20} = \frac{3}{5}$$

2. Suppose you roll a number cube 40 times and record the results shown in the table. Complete the table and calculate the experimental probability of rolling an even number.

Result	Tally	Total
1		5
2		7
3		4
4		6
5		10
6		8
		40

$$P(\text{even}) = \frac{21}{40}$$

Notes



TOPIC 1 Introduction to Probability

Notes

3. Suppose you put two white socks and one brown sock into a bag and you choose one sock without looking. You repeat this 15 times, and you record the results shown in the table. Note that you always put the sock you chose back into the bag before choosing the next sock. Complete the table and calculate the experimental probability of choosing the brown sock.

Result	Tally	Total
White		12
Brown		3
		15

$$P(\text{brown}) = \frac{3}{15} = \frac{1}{5}$$

4. Suppose you write the letters A, B, C, and D on four equal-size slips of paper. Then, you put them in a bag and choose one slip from the bag without looking. You repeat this 40 times and record the results shown in the table. Note that you always put the slip you chose back into the bag before choosing the next slip. Complete the table and calculate the experimental probability of choosing D.

Result	Tally	Total
A		7
B		12
C		12
D		9
		40

$$P(D) = \frac{9}{40}$$

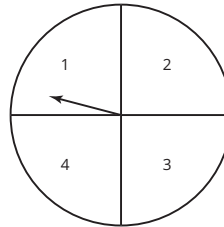
TOPIC 1 Introduction to Probability

5. Suppose you put 2 dimes, 2 nickels, and 1 penny into a bag. Then, you choose one coin from the bag without looking and record the results shown. You repeat this experiment 25 times. Note that you always put the coin you chose back into the bag before choosing the next coin. Complete the table and calculate the experimental probability of choosing a nickel.

Result	Tally	Total
Dime		12
Nickel		9
Penny		4
		25

$$P(\text{nickel}) = \frac{9}{25}$$

6. Suppose you use a paper clip as the arrow part of the spinner. You spin the spinner 30 times and record the data shown in the table. Complete the table and calculate the experimental probability of spinning a number greater than 1.



Result	Tally	Total
1		6
2		9
3		7
4		8
		30

$$P(\text{number} > 1) = \frac{24}{30} = \frac{4}{5}$$

Notes



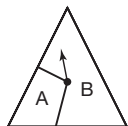
TOPIC 1 Introduction to Probability

Notes

B. Predict $P(A)$ for a single spin of each spinner. Write your answer as a fraction.

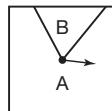
TEKS 7.6H (Topic-Aligned)

1.



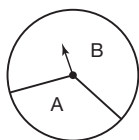
The probability is about $\frac{1}{3}$.

2.



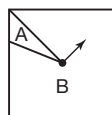
The probability is about $\frac{4}{5}$.

3.



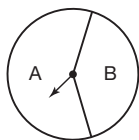
The probability is about $\frac{2}{5}$.

4.



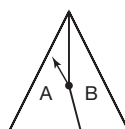
The probability is about $\frac{1}{16}$.

5.



The probability is about $\frac{3}{5}$.

6.



The probability is about $\frac{11}{20}$.

- C. Suppose the probabilities for the colors on a spinner are known to be:

$$P(\text{pink}) = \frac{1}{3} \quad P(\text{blue}) = \frac{1}{6} \quad P(\text{orange}) = \frac{1}{2}$$

Predict the number of times you would land on each letter if you were to spin the spinner the number of times given. **TEKS 7.6D**

(Topic-Aligned)

1. You spin the spinner 18 times.

$P(\text{pink}) :$

$$\frac{x}{18} = \frac{1}{3}$$

$$3x = 18$$

$$x = 6$$

I predict that out of 18 spins, the spinner will land on pink 6 times.

$P(\text{blue}) :$

$$\frac{x}{18} = \frac{1}{6}$$

$$6x = 18$$

$$x = 3$$

I predict that out of 18 spins, the spinner will land on blue 3 times.

$P(\text{orange}) :$

$$\frac{x}{18} = \frac{1}{2}$$

$$2x = 18$$

$$x = 9$$

I predict that out of 18 spins, the spinner will land on orange 9 times.

2. You spin the spinner 54 times.

$P(\text{pink}) :$

$$\frac{x}{54} = \frac{1}{3}$$

$$3x = 54$$

$$x = 18$$

I predict that out of 54 spins, the spinner will land on pink 18 times.

$P(\text{blue}) :$

$$\frac{x}{54} = \frac{1}{6}$$

$$6x = 54$$

$$x = 9$$

I predict that out of 54 spins, the spinner will land on blue 9 times.

$P(\text{orange}) :$

$$\frac{x}{54} = \frac{1}{2}$$

$$2x = 54$$

$$x = 27$$

I predict that out of 54 spins, the spinner will land on orange 27 times.

TOPIC 1 Introduction to Probability

Notes

3. You spin the spinner 72 times.

$P(\text{pink}) :$

$$\frac{x}{72} = \frac{1}{3}$$

$$3x = 72$$

$$x = 24$$

I predict that out of 72 spins, the spinner will land on pink 24 times.

$P(\text{blue}) :$

$$\frac{x}{72} = \frac{1}{6}$$

$$6x = 72$$

$$x = 12$$

I predict that out of 72 spins, the spinner will land on blue 12 times.

$P(\text{orange}) :$

$$\frac{x}{72} = \frac{1}{2}$$

$$2x = 72$$

$$x = 36$$

I predict that out of 72 spins, the spinner will land on orange 36 times.

4. You spin the spinner 90 times.

$P(\text{pink}) :$

$$\frac{x}{90} = \frac{1}{3}$$

$$3x = 90$$

$$x = 30$$

I predict that out of 90 spins, the spinner will land on pink 30 times.

$P(\text{blue}) :$

$$\frac{x}{90} = \frac{1}{6}$$

$$6x = 90$$

$$x = 15$$

I predict that out of 90 spins, the spinner will land on blue 15 times.

$P(\text{orange}) :$

$$\frac{x}{90} = \frac{1}{2}$$

$$2x = 90$$

$$x = 45$$

I predict that out of 90 spins, the spinner will land on orange 45 times.

5. You spin the spinner 198 times.

$P(\text{pink}) :$

$$\frac{x}{198} = \frac{1}{3}$$

$$3x = 198$$

$$x = 66$$

I predict that out of 198 spins, the spinner will land on pink 66 times.

$P(\text{blue}) :$

$$\frac{x}{198} = \frac{1}{6}$$

$$6x = 198$$

$$x = 33$$

I predict that out of 198 spins, the spinner will land on blue 33 times.

$P(\text{orange}) :$

$$\frac{x}{198} = \frac{1}{2}$$

$$2x = 198$$

$$x = 99$$

I predict that out of 198 spins, the spinner will land on orange 99 times.

6. You spin the spinner 450 times.

$P(\text{pink}) :$

$$\frac{x}{450} = \frac{1}{3}$$

$$3x = 450$$

$$x = 150$$

I predict that out of 450 spins, the spinner will land on pink 150 times.

$P(\text{blue}) :$

$$\frac{x}{450} = \frac{1}{6}$$

$$6x = 450$$

$$x = 75$$

I predict that out of 450 spins, the spinner will land on blue 75 times.

$P(\text{orange}) :$

$$\frac{x}{450} = \frac{1}{2}$$

$$2x = 450$$

$$x = 225$$

I predict that out of 450 spins, the spinner will land on orange 225 times.

- D. Use the given information to answer each question.

TEKS 7.6C (Topic-Aligned), TEKS 7.6D (Interleaved Practice),
TEKS 7.6I (Interleaved Practice)

The table shows the results of James tossing a coin several times.

Result	Total
Heads	16
Tails	24

1. Determine the percent error for tossing heads and interpret the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{16}{40} - \frac{1}{2}}{\frac{1}{2}} = \frac{\frac{16 - 20}{40}}{\frac{1}{2}} = \frac{-\frac{4}{40}}{\frac{1}{2}} = -\frac{1}{5}$$

The percent error is -20% . This means that the experimental probability is less than the theoretical probability.

2. Determine the percent error for tossing tails and interpret the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{24}{40} - \frac{1}{2}}{\frac{1}{2}} = \frac{\frac{24 - 20}{40}}{\frac{1}{2}} = \frac{\frac{4}{40}}{\frac{1}{2}} = \frac{1}{5}$$

The percent error is 20% . This means that the experimental probability is greater than the theoretical probability.

Notes



TOPIC 1 Introduction to Probability

Notes

Hailey stood at an intersection where the theoretical probability for turning left or right is $\frac{1}{2}$ for either direction. She recorded whether cars turned left or right for one hour. The table shows the data.

Result	Total
Left	24
Right	12

3. Determine the percent error for turning left and the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{24}{36} - \frac{1}{2}}{\frac{1}{2}} = \frac{\frac{24}{36} - \frac{18}{36}}{\frac{1}{2}} = \frac{\frac{6}{36}}{\frac{1}{2}} = \frac{1}{3}$$

The percent error is about 33%. This means that the experimental probability is greater than the theoretical probability.

4. Determine the percent error for turning right and interpret the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{12}{36} - \frac{1}{2}}{\frac{1}{2}} = \frac{\frac{12}{36} - \frac{18}{36}}{\frac{1}{2}} = \frac{\frac{-6}{36}}{\frac{1}{2}} = -\frac{1}{3}$$

The percent error is about -33%. This means that the experimental probability is less than the theoretical probability.

Alejandra recorded the results of spinning a game spinner several times, where the sections are of equal size. She recorded the data in the table.

Result	Total
Red	5
Yellow	7
Green	2
Orange	8
Blue	3

- Determine the percent error for landing on red and interpret the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{5}{25} - \frac{1}{5}}{\frac{1}{5}} = \frac{\frac{5}{25} - \frac{5}{25}}{\frac{1}{5}} = \frac{0}{\frac{1}{5}} = 0$$

The percent error is 0%. This means that the experimental probability is the same as the theoretical probability.

- Determine the percent error for landing on green and interpret the meaning.

$$\frac{P_E - P_T}{P_T} = \frac{\frac{2}{25} - \frac{1}{5}}{\frac{1}{5}} = \frac{\frac{2}{25} - \frac{5}{25}}{\frac{1}{5}} = \frac{-\frac{3}{25}}{\frac{1}{5}} = -\frac{3}{5}$$

The percent error is -60% . This means that the experimental probability is less than the theoretical probability.

Notes

Notes

TOPIC 1 Introduction to Probability

Extension

- Suppose you were to flip a coin and spin a spinner with four equal sections labeled A, B, C, and D. **Extension of TEKS 7.6I**

- What are all of the possible outcomes?

(H, A), (H, B), (H, C), (H, D), (T, A), (T, B), (T, C), (T, D)

- What is the probability of landing on heads and not landing on section B?

$\frac{3}{8}$

- What is the probability of landing on heads or tails and a consonant?

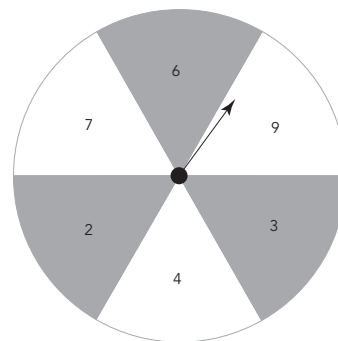
$\frac{3}{4}$

Spaced Practice

- Ricardo got a new board game that came with the spinner shown. **TEKS 7.6E, TEKS 7.6I**

- Complete the probability model for using this spinner.

Outcome	2	3	4	6	7	9
Probability	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$



Notes

- b. What is the sum of the probabilities in the probability model?

The sum of the probabilities is 1.

- c. What is the probability that Charlie spins the spinner and gets an even number?

The probability that Charlie gets an even number is $\frac{1}{2}$.

2. Nia is researching her smartphone data plan. She currently gets 2 gigabytes of data per month. She looks at her past usage and notices that she uses an average of 0.04 gigabytes of data per day.

- a. Write an equation to represent the relationship between the number of days and the amount of data Nia has left for the month. **TEKS 7.7A**

x = number of days

y = amount of data Nia has left for the month

$y = 2 - 0.04x$

- b. Does she have enough data in her monthly plan for her average usage? Should she change plans? **TEKS 7.10A, TEKS 7.11A**

Using 31 days per month, $2 - 0.04(31) = 0.76$. Nia has more than enough data for her average usage, and she does not need to change plans.



Notes

TOPIC 1 Introduction to Probability

3. Use long division to convert each fraction to a decimal. Show all your work. Label each decimal as *terminating* or *non-terminating*.

TEKS 7.3A

a. $\frac{5}{6}$

0.8 $\overline{3}$, non-terminating

.....

b. $\frac{15}{16}$

0.9375, terminating

IV. Simulating Simple Experiments

Topic Practice

- A. Conduct each experiment as described and record your results in the table. Use your results to determine the experimental probability. TEKS 7.6B (Interleaved Practice), TEKS 7.6C, TEKS 7.6I (Interleaved Practice)

1. A school assembly is made up of half seventh-graders and half eighth-graders. Suppose a student is selected at random to lead the pledge of allegiance. Flip a coin to model choosing the grade of the student who will lead the pledge. Perform 20 trials of the experiment. Record the results in the table using tally marks.

Sample data given in table.

Result	Tally	Total	Percent (total/20)
Seventh-Graders		8	40%
Eighth-Graders		12	60%

Notes

2. What is the experimental probability of selecting a seventh-grade student at random to lead the pledge?

Answer based on sample data:

40%

3. What is the experimental probability of selecting an eighth-grade student at random to lead the pledge?

Answer based on sample data:

60%

4. A bucket of crayons has red, orange, yellow, green, blue, and purple. There are an equal number of each color in the bucket. Suppose you reach into the bucket and select one crayon at random. Roll a number cube to model selecting each crayon color. Perform 40 trials of the experiment. Record the results in the table using tally marks.

Sample data given in table.

Result	Tally	Total	Percent (total/40)
Red		5	12.5%
Orange		7	17.5%
Yellow		4	10%
Green	I	6	15%
Blue		10	25%
Purple		8	20%



TOPIC 1 Introduction to Probability

Notes

5. What is the experimental probability of selecting a green crayon?

Answer based on sample data:

15%

6. What is the experimental probability of selecting an orange crayon?

Answer based on sample data:

17.5%

7. A large snack bin in the cafeteria is filled with bag of chips, pretzels, and popcorn. $\frac{1}{2}$ of the bin is chips, $\frac{1}{4}$ is pretzels, and $\frac{1}{4}$ is popcorn. Suppose you reach into the bucket without looking to select a snack. Use 4 equal-size slips of paper to model choosing each type of snack. Label two slips of paper as *chips*, one as *pretzels*, and one as *popcorn*. Perform 40 trials of the experiment, where each trial consists of pulling a slip of paper from a bag without looking. Be sure to return the paper you chose back into the bag before choosing again. Record the results in the table.

Sample data given in table.

Result	Tally	Total	Percent (total/40)
Chips		7	17.5%
Chips		12	30%
Pretzels		12	30%
Popcorn		9	22.5%

8. What is the experimental probability of selecting pretzels from the snack bin?

Answer based on sample data:

30%

9. What is the experimental probability of selecting chips from the snack bin?

Answer based on sample data:

47.5%

10. A streaming website allows customers to download movies. The most popular genres are comedy, drama, science fiction, and documentary. The percent of movies downloaded for each genre is shown in the table.

Movie Type	Comedy	Drama	Science Fiction	Documentary
Percent of Movies Downloaded	30%	40%	25%	5%

The streaming website is trying to determine whether to advertise for an upcoming comedy movie. Perform a simulation to determine the probability that out of the next 5 movie downloads, at least 1 will be a comedy. Consider the data provided. Describe how you could assign two-digit numbers to represent the percent of movie downloads for each genre.

Sample answer:

Assign the numbers 00 to 29 to represent comedy movie downloads.

Assign the numbers 30 to 69 to represent drama movie downloads.

Assign the numbers 70 to 94 to represent science fiction movie downloads.

Assign the numbers 95 to 99 to represent documentary movie downloads.

Notes



Notes

TOPIC 1 Introduction to Probability

11. Perform 10 trials of the simulation, where each trial consists of selecting 5 two-digit numbers from a random number table and determining how many of those numbers represent comedy movie downloads. A random number table is provided at the end of this question.

Sample data given in table.

Trial Number	Numbers	Number of Comedy Movie Downloads
1	65, 28, 59, 71, 98	1
2	12, 13, 85, 30, 10	3
3	94, 60, 11, 58, 38	1
4	16, 80, 56, 14, 04	3
5	43, 51, 61, 70, 20	1
6	17, 26, 45, 73, 27	3
7	38, 22, 42, 93, 01	2
8	18, 16, 43, 81, 09	3
9	34, 97, 66, 56, 92	0
10	98, 56, 62, 95, 50	0

12. What is the experimental probability that out of 5 movie downloads, at least 1 is a comedy?

Out of the 10 trials, 8 trials had at least 1 comedy movie download.

$$\begin{aligned} P(\text{at least 1 comedy movie download}) &= \frac{8}{10} \\ &= 0.8 \\ &= 80\% \end{aligned}$$

Random Number Table										
Line 1	65285	97198	12138	53010	94601	15838	16805	61404	43516	17020
Line 2	17264	57327	38224	29301	18164	38109	34976	65692	98566	29550
Line 3	95639	99754	31199	92558	68368	04985	51092	37780	40261	14479
Line 4	61555	76404	86214	11808	12840	55147	97438	60222	12645	62090
Line 5	78137	98768	04689	87130	79225	08153	84967	64539	79493	74917

- B. Describe a simulation to model each situation and then describe one trial. **TEKS 7.6B (Topic-Aligned)**

1. One in every 4 cereal boxes has a coupon for a free box of cereal. How many boxes of cereal should you expect to buy before you find a coupon?

Sample answer: Use a spinner with 4 equal sections. Label one section "coupon" and label the other 3 "no coupon." One trial would consist of spinning the spinner 1 time. Count how many trials you perform until it lands on "coupon."

Notes



Notes

TOPIC 1 Introduction to Probability

2. A bag contains 5 lemons and 1 lime. You choose a fruit without looking. What is the probability that you choose the lime?

Sample answer: Roll a number cube. Let the numbers 1 through 5 represent lemons and the number 6 represent a lime. One trial is 1 roll of the cube. Determine the percent of trials that result in a 6.

3. From past experience, you know that your probability of getting a ringer in horseshoes is about 20%. You throw 3 horseshoes. What is the probability that all 3 throws are ringers?

Sample answer: Divide a spinner into 5 equal sections. Label 1 section "ringer" and the other 4 as "not a ringer." One trial is spinning the spinner 3 times. Determine the percent of trials that result in 3 ringers.

4. A stack of cards in a game contains 10 cards that tell the player to move forward a certain number of spaces and 5 cards that tell the player to move back a certain number of spaces. A player selects a card. What is the probability that the player will move back?

Sample answer: Divide a spinner into 3 equal sections. Label 1 section "move back" and the other 2 sections as "move forward." One trial is spinning the spinner 1 time. Determine the percent of trials that result in "move back."

5. Joey's batting record shows that his probability of striking out is about 40%. Joey will go to bat 8 times at baseball practice. What is the probability that he strikes out 5 times or more?

Sample answer: Label 4 slips of paper as "strike out" and 6 slips of paper as "no strike out." Put the papers in a bag. One trial is selecting a paper from the bag 8 times. Be sure to return the paper you chose back to the bag before choosing again. Determine the percent of trials that result in 5, 6, 7, or 8 "strike outs."

- A test has 20 true/false questions. What is the probability of getting at least 12 questions correct just by guessing?

Sample answer: Flip a coin. Let heads represent a correct guess and tails represent an incorrect guess. One trial is flipping the coin 20 times. Determine the percent of trials that result in 12 or more correct guesses.

Extension

- You will learn about compound probability in the next topic. However, you can always use experimental probability to help you make a better guess about a theoretical probability that you don't know about.

Determine the experimental probability of rolling two ones in a row on a number cube. Use your results to reason about determining the theoretical probability for this compound event. **Extension of TEKS 7.6C, Extension of 7.6D**

Sample answer:

The result should approach $\frac{1}{36}$ over a large number of trials.

Spaced Practice

- Determine if each probability can be determined experimentally, theoretically, or both. Explain your reasoning. **TEKS 7.6C, TEKS 7.6D**

- Humans will land on Mars in the next 10 years.

This is experimental only. There is no way to calculate the theoretical probability of landing on Mars. The experimental probability will either be 0 or 1.

Notes



Notes

TOPIC 1 Introduction to Probability

- b. A number cube is rolled two times and the product of the two numbers is recorded.

This can be a theoretical probability as well as an experimental probability. I could do an experiment or use a number array to help calculate the products.

- c. A box contains red, white, and blue marbles, and you are not allowed to look inside the box. You reach in and grab a blue marble.

This is an experimental probability. Since I cannot look inside the box and I do not know how many of each color marble is in the box, I will need to conduct an experiment to determine the probability.

- d. A coin is tossed ten times and the results are recorded.

This can be a theoretical probability as well as an experimental probability. I could actually toss the coin or use a formula to calculate the result.

- e. The next car to pass you will be silver.

This is an experimental probability. Since I cannot do a mathematical calculation about the color of cars that pass, I will need to conduct an experiment to determine the probability.

2. Write an equation to represent each situation. Define your variables and solve the equation. **TEKS 7.10A, TEKS 7.11A**

- a. Alejandra has to earn \$230 for her dance team fundraiser selling candy bars. If she has already earned \$165, how many more candy bars does she have to sell at \$1.50 each to meet her goal?

$1.5c + 165 = 230$; Alejandra needs to sell 44 more candy bars to meet her goal.

TOPIC 1 Introduction to Probability

- b. Lucia is making a 60-minute playlist of her favorite songs. If each song is approximately 4 minutes and 30 seconds long, how many songs will be in the playlist?

$4.5s = 60$; Lucia can have 13 songs on her playlist with a minute and a half to spare. If she puts 14 songs on the playlist, then she will go over the 60 minutes by 3 minutes.

3. Determine each sum. Show your work. **TEKS 7.3A**

a. $-44.3 + 94.2$

49.9

⋮

b. $6\frac{4}{5} + (-10\frac{2}{3})$

$-3\frac{13}{15}$

4. Identify each item as a liability or asset. Explain your reasoning.

TEKS 7.13C

- a. rent on an apartment

This is a liability because it is a property you do not own, and you must pay to reside in the apartment each month.

⋮

- b. an investment account

This is an asset because you own the money that is being invested.

Notes



Name _____ Date _____

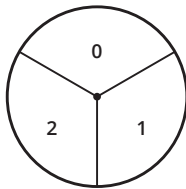
I. Using Arrays to Organize Outcomes

Topic Practice

- A. Use the given information to answer each set of questions. **TEKS 7.6A** (Interleaved Practice), **TEKS 7.6C** (Interleaved Practice), **TEKS 7.6I** (Interleaved Practice)

A spinner divided into 3 equal sections is labeled 0, 1, and 2.
You spin the spinner 3 times and calculate the sum of the numbers.

Sample answers:



Outcome	Tally	Probability
0		0 = 0%
1		$\frac{8}{50} = 0.16 = 16\%$
2		$\frac{11}{50} = 0.22 = 22\%$
3		$\frac{14}{50} = 0.28 = 28\%$
4		$\frac{16}{50} = 0.32 = 32\%$
5		$\frac{1}{50} = 0.02 = 2\%$
6		0 = 0%

1. What is the sample space for this situation?

$S = \{1, 2, 3, 4, 5, 6\}$

Notes

TOPIC 2 Compound Probability

2. List each possible outcome in the first column of the table.

See table.

3. Are all outcomes equally likely? Explain your reasoning.

All outcomes are not equally likely. There is only one way to get some of the outcomes, and there is more than one way to get some of the outcomes.

4. Conduct 50 trials of the experiment and record your results in the second column of the table.

Sample answers listed in table.

5. Calculate the experimental probability for each outcome and complete the last column of the table. Write the probability fraction, decimal, and percent.

Sample answers listed in table.

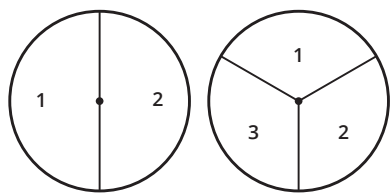


Notes

6. According to your experiment, list the most likely sum(s).
Explain your reasoning.

A sum of 3 or 4 is the most likely since there is more than one way to get these outcomes. These sums occurred most often in the experiment.

A spinner is divided into two equal sections labeled 1 and 2.
A second spinner is divided into three equal sections labeled 1, 2, and 3. You spin each spinner once and then calculate the sum of the numbers.



Outcome	Tally	Probability
2		$\frac{4}{25} = 0.16 = 16\%$
3		$\frac{8}{25} = 0.32 = 32\%$
4		$\frac{8}{25} = 0.32 = 32\%$
5		$\frac{5}{25} = 0.2 = 20\%$

7. What is the sample space for this situation?
 $S = \{2, 3, 4, 5\}$
8. List each possible outcome in the first column of the table.

See table.

9. Are all outcomes equally likely? Explain your reasoning.
All outcomes are not equally likely. There is only one way to get some of the outcomes, and there is more than one way to get some of the outcomes.



Notes

TOPIC 2 Compound Probability

10. Conduct 25 trials of the experiment and record your results in the second column of the table.

Sample answers listed in table.

11. Calculate the experimental probability for each outcome and complete the last column of the table. Write the probability fraction, decimal, and percent.

Sample answers listed in table.

12. According to your experiment, list the most likely sum(s). Explain your reasoning.

A sum of 3 or 4 is the most likely since there is more than one way to get these outcomes. These sums occurred most often in the experiment.



Notes

B. Make an array to show the possible outcomes for each experiment and then use the array to determine the theoretical probability.

TEKS 7.6A (Interleaved Practice), TEKS 7.6D (Interleaved Practice),
TEKS 7.6I (Interleaved Practice)

- Two number cubes are rolled, and the product of the two numbers shown is calculated. Calculate $P(\text{multiple of } 6)$.

		Number Cube 1					
		1	2	3	4	5	6
Number Cube 2	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

The multiples of 6 in the table are 6, 12, 18, 24, 30 and 36.

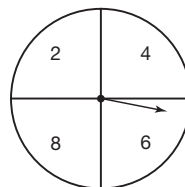
$$P(\text{multiple of 6}) = \frac{15}{36} = \frac{5}{12}$$

TOPIC 2 Compound Probability

Notes

2. Juliana spins the spinner two times. She determines the product of the two numbers. Calculate $P(\text{product is between 20 and 50})$.

		First Spin			
		2	4	6	8
Second Spin	2	4	8	12	16
	4	8	16	24	32
	6	12	24	36	48
	8	16	32	48	64

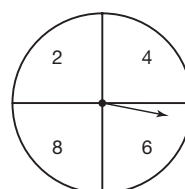


The products between 20 and 50 are 24, 32, 36, and 48.

$$P(\text{product between 20 and 50}) = \frac{7}{16}$$

3. Juliana spins the spinner two times. She determines the sum of the two numbers. Calculate $P(\text{sum} < 8)$.

		First Spin			
		2	4	6	8
Second Spin	2	4	6	8	10
	4	6	8	10	12
	6	8	10	12	14
	8	10	12	14	16



The sums less than 8 in the table are 4 and 6.

$$P(\text{sum} < 8) = \frac{3}{16}$$

4. Jackson writes the numbers 1 through 3 on papers and puts them in a bag. He chooses one paper from the bag without looking, writes the number down, returns it to the bag, and chooses another paper at random. He subtracts the smaller number from the greater number. Calculate $P(1)$.

		First Pick		
		1	2	3
Second Pick	1	0	1	2
	2	1	0	1
	3	2	1	0

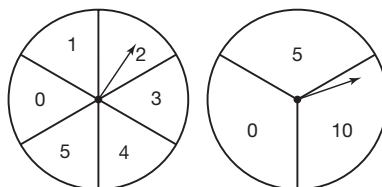
$$P(1) = \frac{4}{9}$$

Notes

TOPIC 2 Compound Probability

Notes

5. Ricardo spins each spinner one time. He determines the product of the two numbers. Calculate $P(\text{multiple of } 10)$.



		First Spinner					
		0	1	2	3	4	5
Second Spinner	0	0	0	0	0	0	0
	5	0	5	10	15	20	25
	10	0	10	20	30	40	50

The products that are multiples of 10 in the table are 10, 20, 30, 40, and 50.

$$P(\text{multiple of } 10) = \frac{7}{18}$$

6. Jackson writes the letters M , A , T , and H on papers of equal size and puts them in bag 1. He writes the letters Y , E , and S on papers of equal size and puts them in bag 2. He selects one paper from bag 1, without looking, writes the letter down, selects one paper out of bag 2 without looking, and writes the letter next to the letter from bag 1. Calculate the probability that the two letters spell a word. (The words are MY , ME , HE , and AS .)

		Bag 1 Letter			
		M	A	T	H
Bag 2 Letter	Y	MY	AY	TY	HY
	E	ME	AE	TE	HE
	S	MS	AS	TS	HS

$$P(\text{word}) = \frac{4}{12} = \frac{1}{3}$$

Notes

TOPIC 2 Compound Probability

Notes

C. Predict the number of times you would get each outcome given the theoretical probability of the outcome and the number of times you spin the spinner. **TEKS 7.6D (Interleaved Practice)**

1. $P(\text{red}) = \frac{3}{8}$; you spin 40 times.

$$\frac{x}{40} = \frac{3}{8}$$

$$8x = 120$$

$$x = 15$$

I predict if I spin the spinner 40 times, it will land on red 15 times.

3. $P(4) = \frac{7}{12}$; you spin 60 times.

$$\frac{x}{60} = \frac{7}{12}$$

$$12x = 420$$

$$x = 35$$

I predict if I spin the spinner 60 times, it will land on four 35 times.

5. $P(\text{odd number}) = \frac{1}{2}$; you spin 100 times.

$$\frac{x}{100} = \frac{1}{2}$$

$$2x = 100$$

$$x = 50$$

I predict if I spin the spinner 100 times, it will land on an odd number 50 times.

2. $P(\text{multiple of 5}) = \frac{3}{4}$; you spin 200 times.

$$\frac{x}{200} = \frac{3}{4}$$

$$4x = 600$$

$$x = 150$$

I predict if I spin the spinner 200 times, it will land on a multiple of five 150 times.

4. $P(\text{blue}) = \frac{8}{9}$; you spin 450 times.

$$\frac{x}{450} = \frac{8}{9}$$

$$9x = 3600$$

$$x = 400$$

I predict if I spin the spinner 450 times, it will land on blue 400 times.

6. $P(3) = \frac{9}{40}$; you spin 2000 times.

$$\frac{x}{2000} = \frac{9}{40}$$

$$40x = 18,000$$

$$x = 450$$

I predict if I spin the spinner 2000 times, it will land on three 450 times.

Extension

1. There is a famous probability problem known as the *Monty Hall problem*—named after the original host of the game show *Let's Make a Deal*. In this problem, there are three doors. Behind one of the doors is a prize. Behind the other two doors are donkeys. You choose one door. The game show host opens one of the doors that you did not choose to reveal a donkey. Then, the host asks you if you would like to stay on the door you chose or switch to the other unopened door. Should you stay or switch? Does it matter?

Extension of TEKS 7.6D

When I switch, you have a $\frac{2}{3}$ chance of getting the prize. If I stay, I have only a $\frac{1}{3}$ chance of winning the prize.

Spaced Practice

1. Since 1903, the National League has played the American League in the World Series. The World Series is usually won by the team winning the best out of 7 games. The table shows the number of games that were played to win each series during the first 100 World Series. **TEKS 7.6C, 7.6I**

Number of Games	Number of Series Won in Given Number of Games
4 games	17 series
5 games	24 series
6 games	21 series
7 games	33 series
8 games	5 series

TOPIC 2 Compound Probability

Notes

- a. What is the probability that the next World Series will take 7 games to determine a winner?

$$\frac{33}{100}$$

- b. What is the probability that the next World Series will take 4 games?

$$\frac{17}{100}$$

- c. Is this theoretical or experimental probability? Use a complete sentence to explain.

These probabilities are experimental probabilities because they are based on data that were gathered for 100 years.

2. Nakota's music collection is 40% hip-hop and 60% rock. If his music player selects songs to play at random, what is the probability of it selecting 3 hip-hop songs in a row? Describe a simulation that could be used to estimate this probability. **TEKS 7.6B**

Sample answer:

I could use a random number generator, assigning the digits 0–3 to represent a hip-hop song and 4–9 to represent a rock song. Look at 3 digits and determine if there were 3 hip-hop songs represented. Run this trial 50 times and use the data to determine experimental probabilities.

3. Rewrite each expression with the fewest number of terms.

TEKS 6.7D, TEKS 7.3A, TEKS 7.3B

a. $\frac{3}{5}a + 7\frac{2}{3} - 11 - \frac{9}{10}a$

$$-\frac{3}{10}a - 3\frac{1}{3}$$

⋮

b. $9 - 0.4(1.1s - 9)$

$$12.6 - 0.44s$$



II. Using Tree Diagrams

Topic Practice

- A. Suppose a 6-sided number cube is rolled 3 times. **TEKS 7.6A**
(Topic-Aligned), TEKS 7.6C (Interleaved Practice), TEKS 7.6D (Interleaved Practice)

1. What is the theoretical probability of rolling a 6-sided number cube 1 time and landing on an even number? An odd number?

Sample answer:

The theoretical probability of rolling an even number is $\frac{3}{6}$, or 50%.

The theoretical probability of rolling an odd number is also $\frac{3}{6}$, or 50%.

2. Choose an appropriate model to simulate the probability of rolling the number cube three times and landing on an even each time. Explain how you will represent odd and even numbers in your model.

Sample answer:

I can use 3 coin flips to simulate the probability of landing on an even number 3 times. I will assign odd numbers to heads and even numbers to tails. Each flip of the coin will represent a roll of the number cube, so I will flip the coin 3 times.

Notes



Notes

TOPIC 2 Compound Probability

3. Conduct 10 trials of the simulation. Record the results in the table shown.

Trial	Result
1	O, E, E
2	O, O, E
3	E, E, E
4	E, E, E
5	O, E, O
6	E, E, E
7	O, E, O
8	E, E, O
9	O, O, O
10	E, O, E

Answers will vary.

4. Use the results of your simulation to construct a probability model.

Outcome	0 even	1 even	2 even	3 even
Probability	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{3}{10}$	$\frac{3}{10}$

Answers will vary.

Notes

5. What is the experimental probability that when rolling a 6-sided number cube three times it will land on an even number each time according to your probability model?

Answers will vary.

Sample answer: $\frac{3}{10}$

6. Construct a tree diagram to show all of the possible outcomes for rolling a 6-sided number cube 3 times.



7. Complete the probability model shown with the information from the tree diagram.

Outcome	0 even	1 even	2 even	3 even
Probability	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

8. What is the theoretical probability of rolling a 6-sided number cube three times and rolling an even number each time?

The theoretical probability of rolling 3 even numbers is $\frac{1}{8}$.

9. Calculate $P(1 \text{ even number})$.

$\frac{3}{8}$



TOPIC 2 Compound Probability

Notes

10. Calculate $P(1 \text{ or } 2 \text{ even numbers})$.

$$\frac{3}{8} + \frac{3}{8} = \frac{6}{8} = \frac{3}{4}$$

11. Calculate $P(3 \text{ odd numbers})$.

$$\frac{1}{8}$$

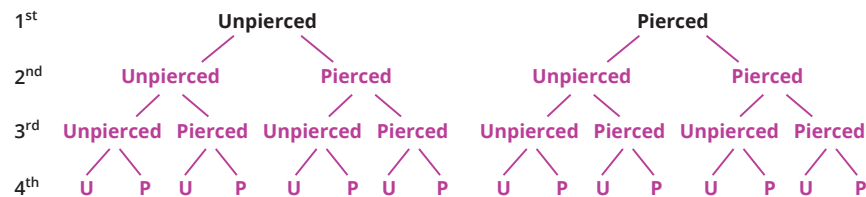
12. What event would be the complementary event for rolling 1 odd number?

The complementary event for rolling 1 odd number is not rolling 1 odd number, which includes rolling 0, 2, or 3 odd numbers.

- B. Complete the tree diagram to determine the possible outcomes for each problem situation. Complete the probability model.

TEKS 7.6A (Topic-Aligned), TEKS 7.6D (Topic-Aligned)

1. The probability of a student having pierced ears is 50%. What is the probability that the first 4 students that enter a classroom have pierced ears? Complete the tree diagram to determine all of the possible outcomes for the first 4 students entering the classroom. Complete the probability model.

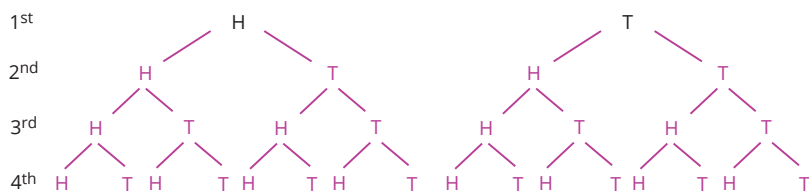


Outcome	0 pierced	1 pierced	2 pierced	3 pierced	4 pierced
Probability	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

The probability that the first 4 students to enter the classroom have pierced ears is $\frac{1}{16}$.

Notes

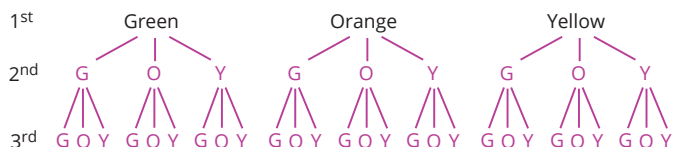
2. You toss a coin 4 times. What is the probability that all 4 tosses result in heads? Complete the tree diagram to determine all of the possible outcomes for the 4 coin tosses. Complete the probability model.



Outcome	0 heads	1 heads	2 heads	3 heads	4 heads
Probability	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

The probability that the first 4 tosses result in heads is $\frac{1}{16}$.

3. A spinner has 3 equal parts. One part is green, one part is orange, and one part is yellow. What is the probability that spinning the spinner 3 times will result in 0 orange results? Complete the tree diagram to determine all of the possible outcomes of the 3 spins. Complete the probability model.



Outcome	0 orange	1 orange	2 orange	3 orange
Probability	$\frac{8}{27}$	$\frac{12}{27}$	$\frac{6}{27}$	$\frac{1}{27}$

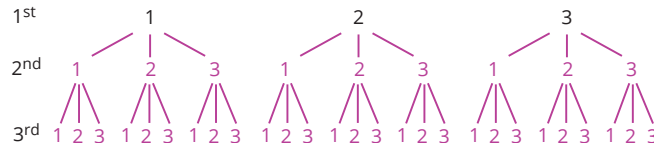
The probability that spinning the spinner 3 times will result in 0 orange results is $\frac{8}{27}$.



TOPIC 2 Compound Probability

Notes

4. A six-sided number cube has two faces with a 1, two faces with a 2, and two faces with a 3. It is tossed 3 times. What is the probability that all 3 tosses result in a 1? Complete the tree diagram to determine all of the possible outcomes of tossing the number cube 3 times. Complete the probability model.



Outcome	Zero 1s	One 1	Two 1s	Three 1s
Probability	$\frac{8}{27}$	$\frac{12}{27}$	$\frac{6}{27}$	$\frac{1}{27}$

The probability that all 3 tosses result in a 1 is $\frac{1}{27}$.

5. A bag contains a red stone, a yellow stone, and a blue stone. A stone is chosen from the bag at random, the stone's color is recorded, and the stone is replaced in the bag. If you choose a stone from the bag 2 times, what is the probability that only 1 of the chosen stones is blue? Complete the tree diagram to determine all of the possible outcomes of choosing 2 stones. Complete the probability model.



Outcome	0 blue	1 blue	2 blue
Probability	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$

The probability that only 1 of the chosen stones is blue is $\frac{4}{9}$.

6. A spinner has 4 equal parts. One part is black, one part is white, one part is red, and one part is yellow. What is the probability that spinning the spinner 2 times will result in 2 red results? Complete the tree diagram to determine all of the possible outcomes of the 2 spins. Complete the probability model.



Outcome	0 red	1 red	2 red
Probability	$\frac{9}{16}$	$\frac{6}{16}$	$\frac{1}{16}$

The probability that both spins result in red is $\frac{1}{16}$.

Extension

Different colored beads are placed in two tin cups. The first cup contains 1 bead of each color: blue, purple, and green. The second cup contains 1 bead of each color: yellow, garnet, blue, and green.

Extension of TEKS 7.6D, Extension of 7.6I

1. What is the probability of choosing the same color from each cup?

$$\frac{1}{6}$$

2. What is the probability of choosing blue from the first cup or blue from the second cup?

$$\frac{7}{12}$$

Notes

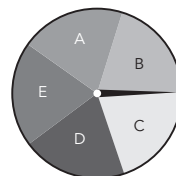


TOPIC 2 Compound Probability

Notes

Spaced Practice

1. The spinner shown has 5 equal sections. Use the spinner to determine each probability. **TEKS 7.6D, TEKS 7.6I**



a. $P(C) =$

$$\frac{1}{5}$$

b. $P(\text{vowel}) =$

$$\frac{2}{5}$$

- c. Suppose you spin twice.

- i. What is the probability of spinning two As?

$$\frac{1}{25}$$

- ii. What is the probability of spinning an A and a B in any order?

$$\frac{2}{25}$$

2. In each table, x varies directly with y . Determine the constant of proportionality and express your answer as $y = kx$. **TEKS 7.4A, TEKS 7.4C**

a.

x	3	6	11	15
y	57	114	209	285

$$y = 19x$$

b.

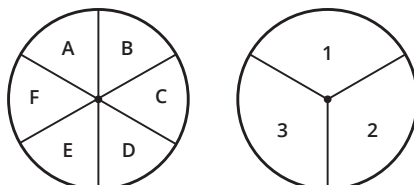
x	5	9	13	15
y	13	23.4	33.8	39

$$y = 2.6x$$

III. Determining Compound Probability

Topic Practice

- A. One spinner has 6 equal parts labeled with the letters A through F. Another spinner has 3 equal parts labeled with the numbers 1, 2, and 3. **TEKS 7.6A (Interleaved Practice), TEKS 7.6D (Topic-Aligned)**



- List all of the possible outcomes for spinning each spinner one time using an organized list.
 $(A, 1), (A, 2), (A, 3), (B, 1), (B, 2), (B, 3), (C, 1), (C, 2), (C, 3), (D, 1), (D, 2), (D, 3), (E, 1), (E, 2), (E, 3), (F, 1), (F, 2), (F, 3)$
- What is the probability of spinning a B and a 3?
 $\frac{1}{18}$
- What is the probability of spinning a B or a 3?
 $\frac{8}{18} = \frac{4}{9}$
- What is the probability of spinning a vowel and a 1?
 $\frac{16}{18} = \frac{8}{9}$
- What is the probability of spinning a letter that is not a vowel and a 2?
 $\frac{2}{18} = \frac{1}{9}$
- What is the probability of spinning a D and an odd number?
 $\frac{2}{18} = \frac{1}{9}$

Notes



TOPIC 2 Compound Probability

Notes

9. What is the probability of spinning a D or an odd number?

$$\frac{13}{18}$$

11. What is the probability of spinning a B or an even number?

$$\frac{8}{18} = \frac{4}{9}$$

10. What is the probability of spinning a B and an even number?

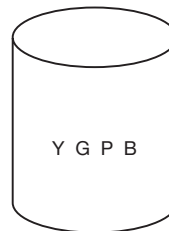
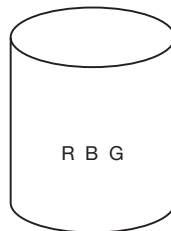
$$\frac{1}{18}$$

12. What is the probability of spinning a G and a 1?

The probability of spinning a G and a 1 is 0 because there is no letter G on either spinner.

- B. Determine each compound probability. Show your work. TEKS 7.6A (Interleaved Practice), TEKS 7.6D (Topic-Aligned)

Marbles were placed in two buckets. The first bucket contains 1 marble of each of the following colors: red, blue, green. The second bucket contains 1 marble of each of the following colors: yellow, green, purple, blue. For the experiment you will choose marbles from the buckets without looking.



1. List all of the possible outcomes for choosing 1 marble from each bucket.

(R, Y), (R, G), (R, P), (R, B), (B, Y), (B, G), (B, P), (B, B), (G, Y), (G, G), (G, P), (G, B)

2. What is the probability of choosing blue from the first bucket and blue from the second bucket?

$$\frac{1}{12}$$

TOPIC 2 Compound Probability

3. What is the probability of choosing blue from the first bucket or blue from the second bucket?

$$\frac{6}{12} = \frac{1}{2}$$

5. What is the probability of choosing red from the first bucket or yellow from the second bucket?

$$\frac{6}{12} = \frac{1}{2}$$

7. What is the probability of choosing two unique colors?

$$\frac{10}{12} = \frac{5}{6}$$

9. What is the probability of choosing two different primary colors?

$$\frac{3}{12} = \frac{1}{4}$$

4. What is the probability of choosing red from the first bucket and yellow from the second bucket?

$$\frac{1}{12}$$

6. What is the probability of choosing two colors that are not blue?

$$\frac{6}{12} = \frac{1}{2}$$

8. What is the probability of choosing two of the same color?

$$\frac{2}{12} = \frac{1}{6}$$

10. What is the probability of choosing two different colors that are not primary colors?

$$\frac{1}{12}$$

Notes



Notes

TOPIC 2 Compound Probability

Extension

1. In a popular board game, if you roll doubles on two 6-sided number cubes, you roll again. However, if you roll doubles three times in a row, you lose your turn and are further penalized. Determine the probability of rolling three doubles in a row. **Extension of TEKS 7.6A, Extension of TEKS 7.6D, Extension of TEKS 7.6I**

The probability of rolling three doubles in a row is $\frac{1}{216}$, which is less than a 0.5% chance.

Spaced Practice

1. Catalina has 3 shirts and 2 pairs of pants in her drawer. She has 2 red shirts and a blue shirt. The pants are a pair of jeans and a pair of khakis. **TEKS 7.6A, TEKS 7.6D, TEKS 7.6I**

- a. What is the probability that she picks a red shirt with khakis at random?

$$\frac{1}{3}$$

- b. What is the probability that she picks the blue shirt and jeans at random?

$$\frac{1}{6}$$

TOPIC 2 Compound Probability

2. Construct a probability model for rolling a 8-sided polyhedron.

Is the probability model a uniform probability model? Explain your reasoning. **TEKS 7.6A, TEKS 7.6D, TEKS 7.6I**

Outcome	1	2	3	4	5	6	7	8
Probability	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Yes, it is uniform because each of the probabilities are equal.

3. Determine each difference. Show your work. **TEKS 7.3A**

a. $-9\frac{3}{4} - 10\frac{7}{10}$
 $-20\frac{9}{20}$

⋮

b. $-34.9 - (-71.2)$
 36.3

Use the Family Budget Estimator to answer Questions 4 and 5. **TEKS 7.13D**

4. Suppose the Jackson family is a family of three. Use the Family Budget Estimator to determine the minimum household budget needed for a family of three to meet its basic needs in your region of the state.

Answers will vary.

5. Use the Family Budget Estimator to determine the average hourly wage necessary to earn enough money to support a family of three in your region of the state.

Answers will vary.

Notes



Notes

TOPIC 2 Compound Probability

IV. Simulating Probability of Compound Events

Topic Practice

- A. The probability that a Chihuahua puppy is born with brindle fur is $\frac{1}{6}$. Suppose you want to determine the probability that at least 1 out of 2 Chihuahua puppies has brindle fur. **TEKS 7.6B (Interleaved Practice), TEKS 7.6C (Topic-Aligned), TEKS 7.6D (Topic-Aligned)**

1. What might be a good simulation tool to determine the probability that a Chihuahua puppy is born with brindle fur?

Sample answer:

The probability of a Chihuahua being born with brindle fur is $\frac{1}{6}$, so rolling a 6-sided number cube would be a good simulation tool for this situation.

2. Describe how you would assign outcomes in the simulation.

Sample answer:

I could assign the number 1 to represent the puppy being born with brindle fur, and I could assign the other numbers to represent puppies born with fur of another color.

3. Describe one trial of the simulation.

Sample answer:

One trial would consist of rolling a number cube 2 times, and recording how many times the cube showed the number 1.

4. Conduct 20 trials of the simulation and record the results in the table.

Sample answers:

Trial Number	Outcome	Number of Times the Cube Showed Number 1
1	2, 5	0
2	3, 6	0
3	1, 4	1
4	5, 3	0
5	6, 5	0
6	4, 4	0
7	3, 1	1
8	2, 6	0
9	4, 3	0
10	1, 2	1

Trial Number	Outcome	Number of Times the Cube Showed Number 1
11	5, 2	0
12	1, 3	1
13	5, 1	1
14	2, 3	0
15	4, 2	0
16	4, 6	0
17	5, 6	0
18	6, 1	1
19	5, 3	0
20	2, 4	0

5. According to your simulation, what is the probability that at least 1 out of 2 Chihuahua puppies has brindle fur?

Sample answer:

$P(\text{at least 1 out of 2 Chihuahuas have brindle fur}) = \frac{6}{20} = 0.3$. (Note that the theoretical probability is ≈ 0.31 .)

Notes

Notes

TOPIC 2 Compound Probability

6. Suppose you collected data on 100 litters of Chihuahua puppies. Predict the number of litters that would have more than 1 Chihuahua puppy with brindle fur.

Sample answer:

Out of 100 litters of Chihuahuas, about 30 would have more than 1 puppy with brindle fur.

- B. The table displays data collected over the last month showing the percent of days each bus was late to school. **TEKS 7.6B (Interleaved Practice), TEKS 7.6C (Topic-Aligned), TEKS 7.6D (Topic-Aligned)**

Bus 1	Bus 2	Bus 3	Bus 4
22%	28%	31%	19%

1. Use the data to predict the likelihood that bus 2 will be late to school tomorrow.

Based on the data, there is a 28% chance that bus 2 will be late tomorrow.

2. Use the data to predict the likelihood that bus 2 or 4 are late to school tomorrow.

Based on the data, there is a 47% chance that bus 2 or 4 will be late tomorrow.

Sample answers provided.

Trials	Two-digit Numbers Selected	Number of Times Bus 3 Occurred
1	From Line 1: 65, 28, 59, 71, 98	3 times
2	From Line 2: 17, 26, 45, 73, 27	1 time
3	From Line 3: 95, 63, 99, 97, 54	2 times
3	From Line 4: 61, 55, 57, 64, 04	4 times
4	From Line 5: 78, 13, 79, 87, 68	3 times

Notes

TOPIC 2 Compound Probability

4. According to your simulation, what is the probability that bus 3 will be late in the next 5 school days? Interpret your results for this situation.

Sample answer:

Bus 3 occurred 13 out of 25 times, so the bus will be late 52% of the time. This means that bus 3 will be late 2 or 3 days out of the week.

5. What would happen if you repeated the simulation using different lines of the random number table?

Sample answer:

My data would most likely be similar but not exactly the same.

6. What do you think would happen if you ran the simulation 100 more times?

The results would become closer to the actual data collected.

Extension

1. In this lesson, you have simulated the probabilities from what is known as binomial distributions or geometric distributions. Research each type of probability distribution. Explain the relationship between your research and the concepts learned in this lesson. **Extension of TEKS 7.6B**

Answers will vary.

1. Lauren has a set of alphabet tiles. She puts the tiles representing the six letters of her name into a bag. Suppose Lauren selects a tile without looking, puts it back, and then selects a second tile without looking. **TEKS 7.6D, TEKS 7.6I**

- a. What is the probability that she selects an A and an N?

$$\frac{2}{36} = \frac{1}{18}$$

- b. What is the probability that she selects an A or an N?

$$\frac{20}{36} = \frac{5}{9}$$

2. A local eatery noticed that there were anywhere from 0 to 4 double yolk eggs in each carton.

Today the eatery opened and used 12 cartons of eggs.

- 8 cartons contained no double yolk eggs.
- 1 carton contained one double yolk egg.
- 1 carton contained two double yolk eggs.
- 1 carton contained three double yolk eggs.
- 1 carton contained four double yolk eggs.

Determine the probability that the next carton of eggs the eatery opens will contain 4 double yolk eggs.

- a. Design a probability model by creating a table. **TEKS 7.6D, TEKS 7.6I**

Outcome	Probability
No double yolk eggs	$\frac{2}{3}$
One double yolk egg	$\frac{1}{12}$
Two double yolk eggs	$\frac{1}{12}$
Three double yolk eggs	$\frac{1}{12}$
Four double yolk eggs	$\frac{1}{12}$



TOPIC 2 Compound Probability

Notes

- b. What could be a good model for using simulation to estimate the probability that a carton of eggs contains an egg with double yolks? **TEKS 7.6B**

Sample answer:

I could create a spinner with 5 sections. One section would be two-thirds of the circle, and the remaining four sections would each be one-twelfth.

- c. Describe one trial of the simulation. **TEKS 7.6B**

Sample answer:

Spinning the spinner until it landed on the 4 double yolk section would be a trial.

- b. How many trials do you think you would need to conduct for the experimental probability to approach the theoretical probability? **TEKS 7.6I**

Answers will vary.

3. Determine each quotient. **TEKS 7.11A**

a. $-4\frac{5}{8} \div 5\frac{1}{2}$
 $-\frac{37}{44}$

b. $-102.9 \div -3.3$
 $31.\overline{18}$



Name _____ Date _____

I. Collecting Random Samples

Topic Practice

A. Determine whether each survey result is a parameter or a statistic.

Prerequisite for TEKS 7.6F

1. According to an online poll, 65% of Americans live in a single-family home.
statistic
2. According to Ms. Tanaka's survey of the students in her class, 50% of her students have at least one dog.
parameter
3. A local journal conducted a survey. Of the 1800 subscribers, 1354 responded. Based on the survey, the journal concludes that 75% of subscribers will renew their subscriptions next year.
statistic
4. According to a random telephone survey of 1000 residents of Jackson County, 43% of the residents of Jackson County eat out at a restaurant more than once per week.
statistic
5. Mr. Flores gives a survey to all of the students in his music classes. He concludes that 85% of music class students would like to attend a live musical in the city.
parameter
6. The state police set up a roadblock on Highway 31 to determine how many drivers wear their seatbelts. They conclude that eight out of every ten drivers in Georgia wear their seatbelts.
statistic



TOPIC 3 Drawing Inferences

Notes

B. Determine whether the data collected in each survey represent a census or a sample. Prerequisite for TEKS 7.6F, Prerequisite for TEKS 7.12B

1. Ms. Lopez concludes that 76% of the students in the school have at least one sibling after she conducts a survey of her class.
sample
2. Nakota reports that one out of every five players on the boys' varsity basketball team can dunk a basketball after he conducts a survey of the players on the team.
census
3. After examining 24 loaves of bread at a local grocery store, Lucia concludes that two loaves out of every 24 are multi-grain bread.
sample
4. James surveys each of the teachers in his school. He concludes that 64% of the teachers in his school enjoy reading as a hobby.
census
5. After surveying each member of the Math Club, Catalina reports that four out of every five members has a graphing calculator.
census
6. Joey surveys each of the students in his seventh-grade class. He concludes that 50% of all seventh-graders have at least one sibling.
sample

C. Determine if each given sample is random or not random.

Explain your reasoning. **TEKS 7.6F (Interleaved Practice), TEKS 7.12B**

(Interleaved Practice)

1. Ricardo chooses each player on his basketball team whose name has five letters to participate in a survey about school sports.
The sample is not random because team members whose names do not have five letters have no chance of being selected.
2. Mr. Tanaka chooses the first seven students to raise their hands in his math class to participate in a survey.
The sample is not random because it only includes those students who want to participate in the survey.
3. Ms. Brown, the Drama Club teacher, writes the names of each of the fifteen team members on separate slips of paper. She puts the slips of paper inside a bag, shakes it, and selects three slips of paper without looking. The three members whose names are selected will complete a survey about the Drama Club.
The sample is random because each team member has an equal chance of being selected.
4. Ms. Patel has 36 students in her English class. The students are seated in 6 rows. The students in each row are assigned a different number 1 through 6. Ms. Patel rolls a 6-sided number cube to select a row. She rolls it again to select one of the students in that row. The selected student is given a survey about Ms. Patel's English class.
The sample is random because each student has an equal chance of being selected.
5. A local coffee shop is conducting a survey to gather information about the coffee consumption of the town's residents. They hand a survey to the first 50 customers of the day.
The sample is not random because it only focuses on the early customers whose eating habits may be different from later customers.
6. Customers at the local grocery store can win a \$25 gift card for throwing a bull's-eye on the dart board after they check out. Winners are also given a survey about their shopping experience at the grocery store.
The sample is not random because people who are good at darts have a better chance to win. The customers selected are also more likely to have a good shopping experience because of winning a gift card.



TOPIC 3 Drawing Inferences

Notes

- D. Use Ms. Davis's Class List and the Random Number Table at the end of this Skills Practice to answer each question. **TEKS 7.6B** (Interleaved Practice), **TEKS 7.6F** (Interleaved Practice), **TEKS 7.12B** (Interleaved Practice)

Ms. Davis's Class List of 6th- and 7th-Graders			
Student Name	Student Number	Student Name	Student Number
Michael (6)	11	Gabriela (6)	21
Olivia (6)	12	Hannah (7)	22
Javier (7)	13	Madison (6)	23
Fernando (7)	14	William (7)	24
Alexander (7)	15	Ana (7)	25
Jacob (6)	16	Maria (7)	26
Amir (6)	17	Abby (6)	27
Daniela (6)	18	Angel (7)	28
Koda (7)	19	Luis (7)	29
Destiny (6)	20	Malik (6)	30



TOPIC 3 Drawing Inferences

1. The students in Ms. Davis's class are each given a student number (11 through 30) as shown in the class list. Use line 14 of the Random Number Table to determine the first four random student numbers.

The first four random student numbers are 14, 24, 22, and 19.

3. Ms. Davis randomly selects 3 sixth-graders in her class using line 8 of the Random Number Table. What are the students' names?

The names of the students are Daniela, Jacob, and Amir.

5. Ms. Davis randomly selects 2 seventh-graders in her class using line 20 of the Random Number Table. What are the students' names?

The names of the students are William and Ana.

2. Ms. Davis randomly selects 3 students in her class according to their student number. She uses line 18 of the Random Number Table. What are the students' names?

The names of the students are Jacob, Amir, and Madison.

4. Ms. Davis randomly selects 3 seventh-graders in her class using line 10 of the Random Number Table. What are the students' names?

The names of the students are Luis, Koda, and Angel.

6. Ms. Davis randomly selects 2 sixth-graders in her class using line 15 of the Random Number Table. What are the students' names?

The names of the students are Abby and Amir.

Notes



TOPIC 3 Drawing Inferences

Notes

Extension

1. Variations of random samples are often preferred to truly random samples. Two variations are called *stratified random samples* and *systematic random samples*. Research each type of random sampling. Define each type of sample and give an example, perhaps from the lesson, of when each might provide a more representative sample than a truly random sample. **Extension of TEKS 7.6F, Extension of 7.12B**

Sample answers:

Stratified random samples divide the population into subgroups, like grade level, and then a sample is randomly selected from each subgroup, or strata. Ms. Brown's lunch situation would be a good opportunity for a stratified random sample. She could randomly select 3 or 4 students from each grade level, rather than selecting 10 students at random.

Systematic random samples first place the population in order and create the sample by selecting every n th object, with n determined by the size of the population and the desired sample size. The starting point for the selection should be random. When Ms. Brown wanted a sample of the entire 1500-student population, she could have used a systematic random sample.

Spaced Practice

1. A soccer player makes 4 out of every 5 penalty shots she attempts.
 - a. What might be a good model for simulating the number of shots the soccer player makes in when attempting 4 penalty shots? **TEKS 7.6B**

Answers will vary.

Students can create spinners, put five slips of paper in a bag, or use other strategies.

- b. Describe how you would assign outcomes and then describe one trial of the simulation. **TEKS 7.6B**

Answers will vary based on the method chosen. If using two-digit numbers on a random number table, students can assign 00–19 to a failure, and 20–99 to a success (80% success rate). One trial would be selecting 4 two-digit numbers and recording how many shots were successes.

- c. Conduct 20 trials of the simulation and record your results in a table. **TEKS 7.6B**

Answers will vary.

- d. According to your simulation, what is the probability that the soccer player makes exactly 3 out of the next 4 penalty shots?

TEKS 7.6C, TEKS 7.6I

Sample answer:

The theoretical probability is 0.3072.

Notes



TOPIC 3 Drawing Inferences

Notes

2. Linh spins 2 spinners. The first spinner is divided into 4 equal sections, and each is labeled with a perfect square (4, 9, 16, 25). The second spinner is divided into 5 equal sections, and each is labeled with an even number (2, 4, 6, 8, 10).
- a. Create an array to illustrate the possible products of the result of spinning both spinners. **TEKS 7.6A**

		First Spinner			
		4	9	16	25
Second Spinner	2	8	18	32	50
	4	16	36	64	100
	6	24	54	96	150
	8	32	72	128	200
	10	40	90	160	250

- b. What is the probability that the product is a perfect square?

TEKS 7.6D, TEKS 7.6I

The probability that the product is a perfect square is $\frac{4}{20} = \frac{1}{5}$.

- c. What is the probability that the product is a perfect cube?

TEKS 7.6D, TEKS 7.6I

The probability that the product is a perfect cube is $\frac{2}{20} = \frac{1}{10}$.

- d. What is the probability that the product is a multiple of 10?

TEKS 7.6D, TEKS 7.6I

The probability that the product is a multiple of 10 is $\frac{8}{20} = \frac{2}{5}$.

3. Solve each equation for the unknown. TEKS 7.11A

a. $7 - 2(3t + 9) = -47$

$t = 6$

b. $-2.5 = \frac{(5.5h - 7)}{1.5 + 4}$

$h = -1.22\overline{7}$

Notes



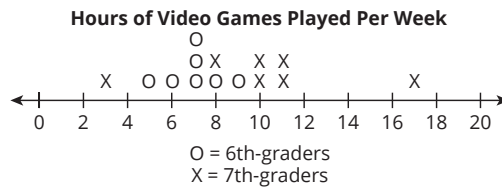
Notes

II. Using Random Samples to Draw Inferences

Topic Practice

- A. Describe the distribution of each dot plot. Then, determine the mean for both data sets. **TEKS 7.6F (Interleaved Practice), TEKS 7.12B (Interleaved Practice)**

1. The dot plot shows the number of hours of video games per week played by 6th-graders and 7th-graders.



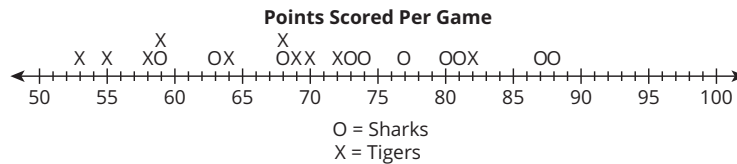
The distribution of the 6th-graders' data is symmetric. The distribution of the 7th-graders' data is roughly symmetric, too.

The mean number of hours of video games played per week is 7 for 6th-graders and 10 for 7th-graders.

$$6\text{th-graders: } 49 \div 7 = 7$$

$$7\text{th-graders: } 70 \div 7 = 10$$

2. The dot plot shows the total points earned per game by two different teams.



The distribution of the Sharks' data is skewed left. The distribution of the Tigers' data is skewed right.

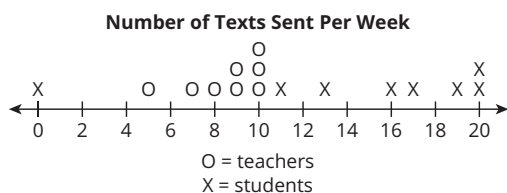
The mean number of points scored per game is 75 for Sharks and 65 for Tigers.

$$\text{Sharks: } 750 \div 10 = 75$$

$$\text{Tigers: } 650 \div 10 = 65$$

Notes

3. The dot plot shows the number of texts sent per week by teachers and students.



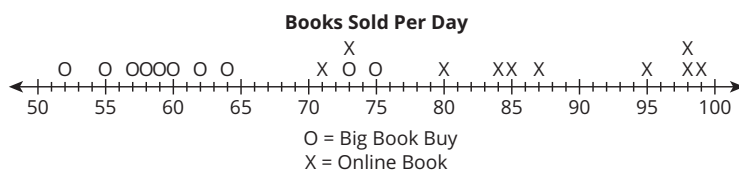
The distribution of the teachers' data is skewed left. The distribution of the students' data is skewed left.

The mean number of texts sent per week is 8.5 for teachers and 14.5 for students.

teachers: $68 \div 8 = 8.5$

students: $116 \div 8 = 14.5$

4. The dot plot shows the number of books sold per day by two different book sellers.



The distribution of Big Book Buy's data is skewed right. The distribution of Online Books' data is skewed left.

The mean number of books sold per day is 61.5 for Big Book Buy and 87 for Online Books.

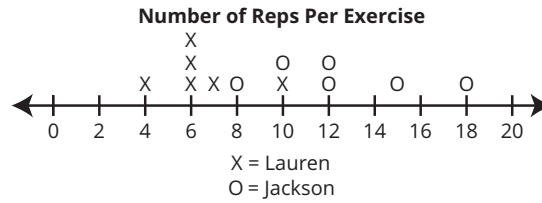
Big Book Buy: $615 \div 10 = 61.5$

Online Books: $870 \div 10 = 87$

TOPIC 3 Drawing Inferences

Notes

5. The dot plot shows the number of reps performed per exercise by Lauren and Jackson.



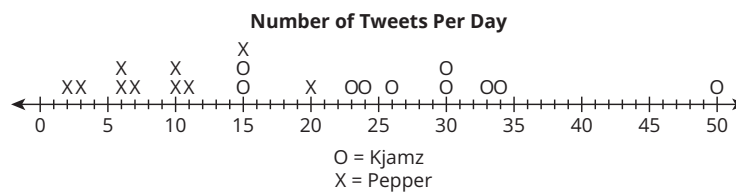
The distribution of Lauren's data is symmetric. The distribution of Jackson's data is symmetric.

The mean number of reps per exercise is 6.5 for Lauren and 12.5 for Jackson.

Lauren: $39 \div 6 = 6.5$

Jackson: $75 \div 6 = 12.5$

6. The dot plot shows the number of tweets sent per day by two celebrities.



The distribution of KJamz's data is skewed left (not considering the outlier).

The distribution of Pepper's data is skewed right.

The mean number of tweets per day is 28 for KJamz and 9 for Pepper.

KJamz: $280 \div 10 = 28$

Pepper: $90 \div 10 = 9$

B. Sample Class Data from Mr. Hernandez’s Math class is shown. Use the data and the random number generator tool to answer each question. TEKS 7.6B (Interleaved Practice), TEKS 7.6F (Topic-Aligned), TEKS 7.12B (Topic-Aligned)

Mr. Hernandez's Math Class			
Student Number	Student Name	Number of Siblings	Number of Pets
11	Isabella	1	3
12	Ethan	0	0
13	Samuel	1	1
14	Harper	0	4
15	Diego	0	0
16	Sofia	5	4
17	Daniel	0	1
18	Chloe	2	3
19	Juan	1	2
20	Mia	0	1
21	Jayden	1	3
22	Mateo	1	6
23	Minh	3	3
24	Victoria	1	6



Notes



TOPIC 3 Drawing Inferences

Notes

Mr. Hernandez's Math Class			
Student Number	Student Name	Number of Siblings	Number of Pets
25	Liam	2	3
26	Elijah	0	1
27	Aaliyah	0	2
28	Kai	1	0
29	Ava	3	4
30	Emma	2	7

1. Mr. Hernandez wants to know the mean number of siblings his students have. He chooses the students with student numbers 11 through 15 as his sample. Determine the mean number of siblings for the students in this sample.

The mean number of siblings is $\frac{2}{5}$ or 0.4 based on the sample.

2. Select a random sample of 5 students using a random number generator tool. Determine the mean number of siblings for the students in your sample.

Sample answer:

I selected Kai (28), Ethan (12), Samuel (13), Emma (30), and Isabella (11) using a random number generator tool. The mean number of siblings is $\frac{5}{5}$ or 1 based on the sample.

Notes

3. Determine the actual mean number of siblings for the 20 students in Mr. Hernandez's class.

The actual mean number of siblings is $\frac{24}{20}$ or 1.2.

4. Mr. Hernandez wants to know the mean number of pets his students have. He chooses the first 5 students to voluntarily raise their hands as his sample. The students selected are Sofia, Chloe, Mateo, Victoria, and Liam. Determine the mean number of pets for the students in this sample.

The mean number of pets is $\frac{22}{5}$ or 4.4 based on the sample.

5. Select a random sample of 5 students using a random number generator tool. Determine the mean number of pets for the students in your sample.

Sample answer:

I selected Daniel (17), Elijah (26), Aaliyah (27), Mateo (22), and Chloe (18) using a random number generator tool. The mean number of pets is $\frac{13}{5}$ or 2.6 based on the sample.

6. Determine the actual mean number of pets for the 20 students in Mr. Hernandez's class.

The actual mean number of pets is $\frac{54}{20}$ or 2.7.



TOPIC 3 Drawing Inferences

Notes

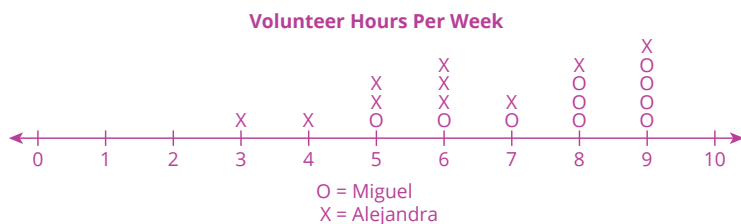
- C. Use the data provided to answer each set of questions. **TEKS 7.6D**
(Interleaved Practice), **TEKS 7.6F** (Interleaved Practice), **TEKS 7.12A**
(Interleaved Practice), **TEKS 7.12B** (Interleaved Practice)

Two students are volunteering at their local hospital. The table shows the data collected for each of their volunteer hours over ten weeks.

Miguel	Alejandra
5	5
9	6
8	3
9	4
7	6
8	5
9	8
9	9
6	6
8	7

Notes

1. Create a dot plot to show the number of volunteer hours worked for each student over ten weeks. Be sure to provide a title and a key.



2. Describe the distribution of each data set.
The data for Miguel is skewed left and the data for Alejandra is symmetric.
3. Determine the mean number of volunteer hours worked per week for each student.

Miguel: $78 \div 10 = 7.8$

Alejandra: $59 \div 10 = 5.9$

The mean number of volunteer hours worked per week is 7.8 for Miguel and 5.9 for Alejandra.

4. Predict the number of volunteer hours worked for each student at 24 weeks.

Miguel: $\frac{7.8 \text{ hours}}{1 \text{ week}} = \frac{x \text{ hours}}{24 \text{ weeks}}$
 $x = 187.2$

Alejandra: $\frac{5.9 \text{ hours}}{1 \text{ week}} = \frac{x \text{ hours}}{24 \text{ weeks}}$
 $x = 141.6$

I predict at 24 weeks that Miguel would have volunteered 187.2 hours and Alejandra would have volunteered 141.6 hours.



TOPIC 3 Drawing Inferences

Notes

5. Predict the number of volunteer hours worked for each student over one year (52 weeks).

$$\text{Miguel: } \frac{7.8 \text{ hours}}{1 \text{ week}} = \frac{x \text{ hours}}{52 \text{ weeks}}$$
$$x = 405.6$$

$$\text{Alejandra: } \frac{5.9 \text{ hours}}{1 \text{ week}} = \frac{x \text{ hours}}{52 \text{ weeks}}$$
$$x = 306.8$$

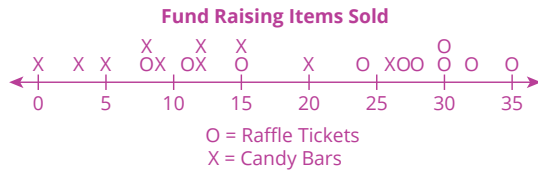
I predict at one year that Miguel would have volunteered 405.6 hours and Alejandra would have volunteer 306.8 hours.

Students are participating in a fundraiser to raise money for the school. The table shows the data collected from ten students for sales in the month of October.

Raffle Tickets Sold	Candy Bars Sold
24	9
15	8
35	0
28	12
30	15
11	5
30	3
32	26
8	20
27	12



6. Create a dot plot to show the items sold in the month of October.
Be sure to provide a title and a key.



7. Describe the distribution of each data set.
The data for raffle tickets is skewed left and the data for candy bars is skewed right.

8. Determine the mean number of each item sold in the month of October.

Raffle Tickets: $240 \div 10 = 24$

Candy Bars: $110 \div 10 = 11$

The mean number of items sold in October is 24 for raffle tickets and 11 for candy bars.

Notes

TOPIC 3 Drawing Inferences

Notes

9. Predict the number of each item sold in the month of October by 150 students.

$$\text{Raffle Tickets: } \frac{24 \text{ raffle tickets}}{10 \text{ students}} = \frac{x \text{ raffle tickets}}{150 \text{ students}}$$

$$10x = 3600$$

$$x = 360$$

$$\text{Candy Bars: } \frac{11 \text{ candy bars}}{10 \text{ students}} = \frac{x \text{ candy bars}}{150 \text{ students}}$$

$$10x = 1650$$

$$x = 165$$

I predict that in the month of October, 150 students would sell 360 raffle tickets and 165 candy bars.

10. Predict the number of each item sold by one student over the course of 6 months.

$$\text{Raffle Tickets: } \frac{24 \text{ raffle tickets}}{1 \text{ month}} = \frac{x \text{ raffle tickets}}{6 \text{ months}}$$

$$x = 144$$

$$\text{Candy Bars: } \frac{11 \text{ candy bars}}{1 \text{ month}} = \frac{x \text{ candy bars}}{6 \text{ months}}$$

$$x = 66$$

I predict that one student, over the course of 6 months, would sell 144 raffle tickets and 66 candy bars.



Extension

Design a simulation that takes 100 samples of size 25 from a population in which 42% of the members of the population have a particular characteristic (e.g., blood group). Formulate a question and collect the data. For each sample, compute the percentage of observations with the given characteristic. Then, analyze your results: summarize your sample percentages in a table and on a dot plot. Interpret the results: What are some predictions or generalizations about the population parameter based on your sample? **Extension of TEKS 7.12B**

Answers will vary. Students may wish to engage in this Extension as a partner project. The results should be clustered around 42%.

Spaced Practice

1. Ms. Patel, the sponsor of the spirit team, wants to survey the team about upcoming events. Which sampling methods would result in representative samples? Explain your reasoning. **TEKS 7.6F, TEKS 7.12B**

- a. Surveying the first 5 members who arrive at the volleyball game.

This is not necessarily representative. Those who like volleyball would be overrepresented.

- b. Drawing 5 names from a box that contains the names of all the members and surveying those 5 members.

This is likely to be representative. It is a random sample because all members have equal chances of being surveyed.

- c. Surveying the 5 members who have been members the longest.

This is not representative. Members who have been on the spirit team for a long time will have a different perspective than those who are new.

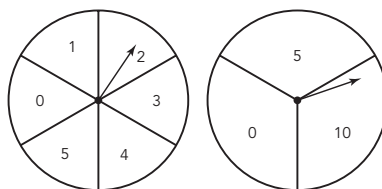


Notes

TOPIC 3 Drawing Inferences

Notes

2. Nicky spins each spinner one time. He determines the product of the two numbers.



- a. Create an array to illustrate the possible products. **TEKS 7.6A**

		First Spinner					
		0	1	2	3	4	5
Second Spinner	0	0	0	0	0	0	0
	5	0	5	10	15	20	25
	10	0	10	20	30	40	50

- b. What is the sample space? **TEKS 7.6A**

$$S = \{0, 5, 10, 15, 20, 25, 30, 40, 50\}$$

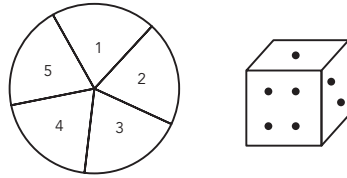
- c. Determine $P(\text{multiple of } 10)$. **TEKS 7.6D, 7.6I**

$$P(\text{multiple of } 10) = \frac{7}{18}$$

- d. Determine $P(0)$. **TEKS 7.6D, 7.6I**

$$P(0) = \frac{8}{18} = \frac{4}{9}$$

- A game requires spinning a spinner numbered 1 through 5 and rolling a six-sided number cube.



- a. Determine the possible outcomes for playing the game.

TEKS 7.6A

(Spinner number, Number cube number):

$(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6),$

$(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6),$

$(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6),$

$(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6),$

$(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)$

- b. What is the probability of spinning an even number and rolling an even number? **TEKS 7.6D, TEKS 7.6I**

$$P(E \text{ and } E) = \frac{6}{30} = \frac{1}{5}$$

- c. What is the probability of spinning a 5 or rolling a 5?

TEKS 7.6D, TEKS 7.6I

$$P(5 \text{ or } 5) = \frac{10}{30} = \frac{1}{3}$$

4. Evaluate the expression $1.2(x + 0.9) - 10.8$ for each unknown.

TEKS 7.3A, TEKS 7.3B

- a. $x = -5.5$

-16.32

- b. $x = 8.9$

0.96

Notes



Notes

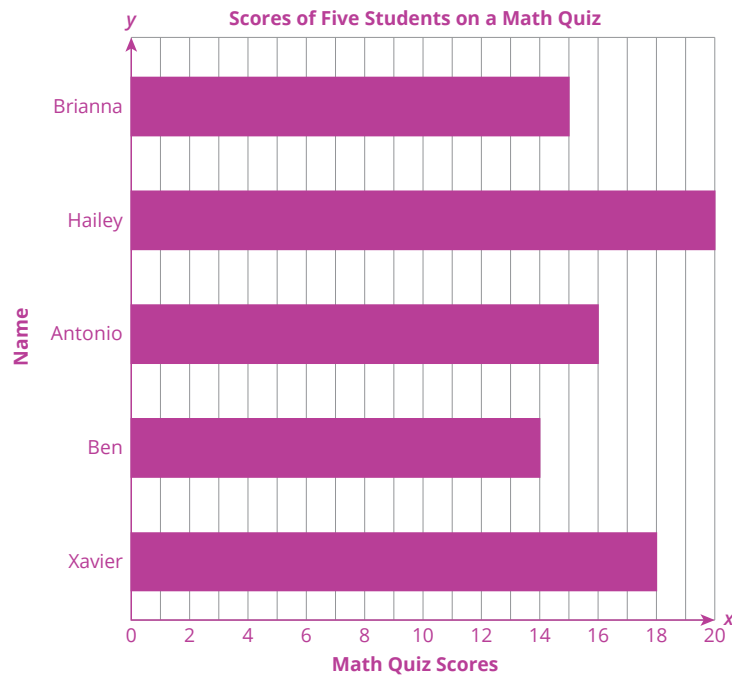
III. Bar Graphs

Topic Practice

A. Use the given information to create each graph. **TEKS 7.6G**
(Interleaved Practice), **TEKS 7.12C** (Interleaved Practice)

1. a. Create a single bar graph to display the scores of five students on a recent math quiz. Xavier scored 18; Ben scored 14; Antonio scored 16; Hailey scored 20; and Brianna scored 15.

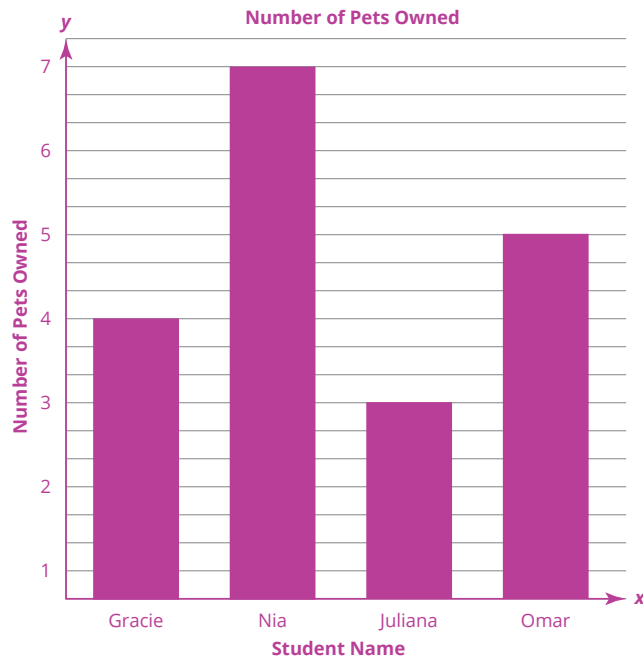
Sample answer:



- b. Which student scored an 80% on their math quiz?
Antonio

2. a. Create a single bar graph to display the number of pets owned by each of the following students. Gracie has 4 pets, Nia has 7 pets, Juliana has 3 pets, and Omar has 5 pets.

Sample answer:



- b. How many more pets does Nia have than Juliana?

Nia has 4 more pets than Juliana.

Notes

TOPIC 3 Drawing Inferences

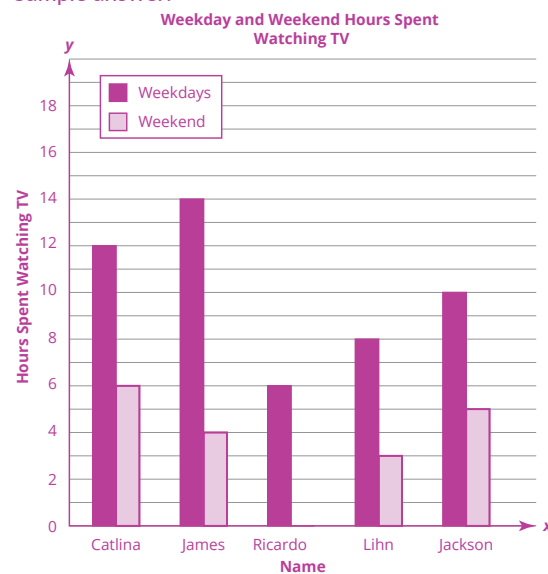
Notes

3. The table displays the number of hours spent watching television during the weekdays and during the weekend for five students last week.

Name	Number of Hours Watching TV During the Weekdays	Number of Hours Watching TV During the Weekend
Catalina	12	6
James	14	4
Ricardo	6	0
Linh	8	3
Jackson	10	5

- a. Create a double bar graph that displays the number of hours spent watching television during the weekdays and during the weekend for five students last week.

Sample answer:



- b. Which student(s) has an amount of weekend TV watching hours that is 50% of their amount of weekday TV watching hours?

Both Catalina and Jackson have an amount of weekend TV watching hours that is 50% of their amount of weekday watching hours. Catalina watches TV on weekends for 6 hours and on weekdays for 12 hours. Jackson watches TV on weekends for 5 hours and on weekdays for 10 hours.

4. The table displays the number of hours spent watching television during the weekdays and during the weekend for five students last week.

Name	Number of Hours Watching TV During the Weekdays	Number of Hours Watching TV During the Weekend
Catalina	12	6
James	14	4
Ricardo	6	0
Linh	8	3
Jackson	10	5

- a. Create a stacked bar graph that displays the number of hours spent watching television during the weekdays and during the weekend for five students last week.

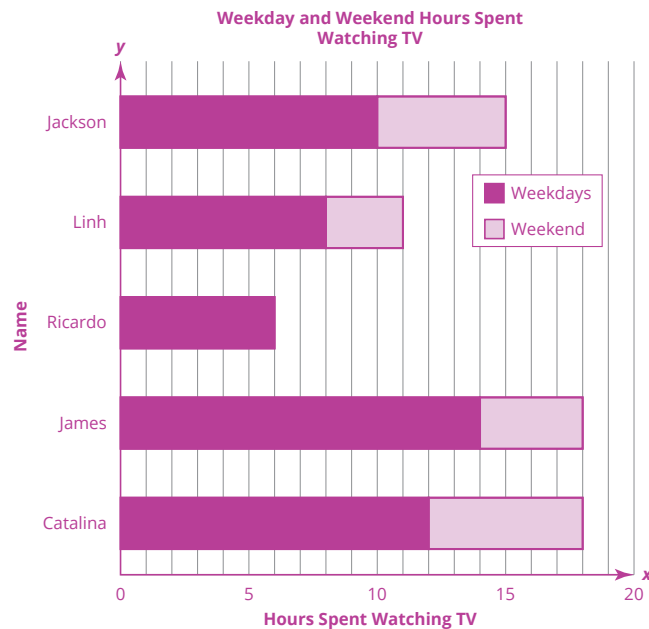
Notes



TOPIC 3 Drawing Inferences

Notes

Sample answer:



- b. What percentage of students watch less than 9 hours of TV on weekdays?

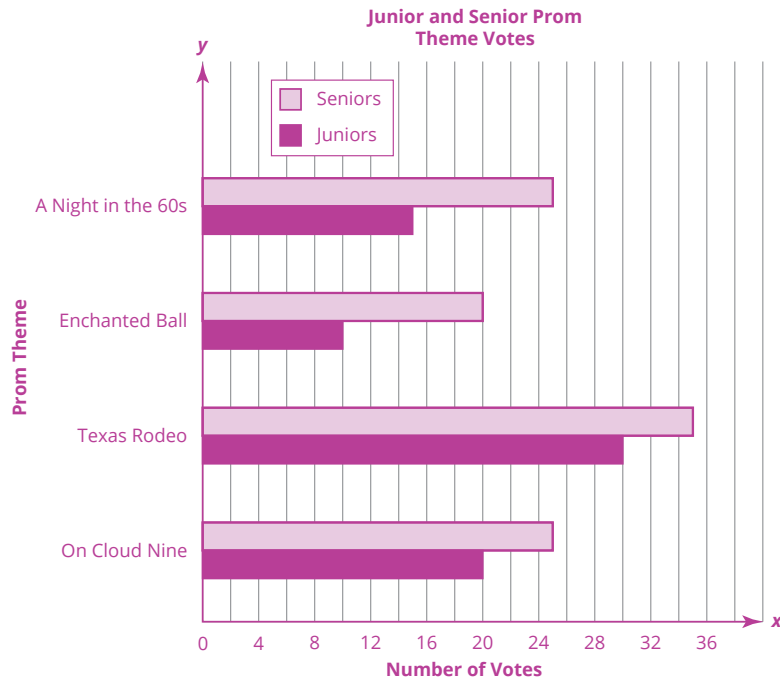
Two out of five students or 40% of students watch less than 9 hours of TV on weekdays.

5. The table shows the votes for this years prom theme.

Prom Theme	Number of Junior Votes	Number of Senior Votes
On Cloud Nine	20	25
Texas Rodeo	30	35
Enchanted Ball	10	20
A Night in the 60s	15	25

- a. Create a double bar graph to display the results of the prom theme vote.

Sample answer:



- b. Write a comparative statement about Juniors and Seniors that would be supported by your double bar graph.

Sample answer:

Of the 105 total votes for the Prom Theme by juniors and seniors, the juniors represented 42% of the votes and seniors represented 58% of the votes.

Notes

TOPIC 3 Drawing Inferences

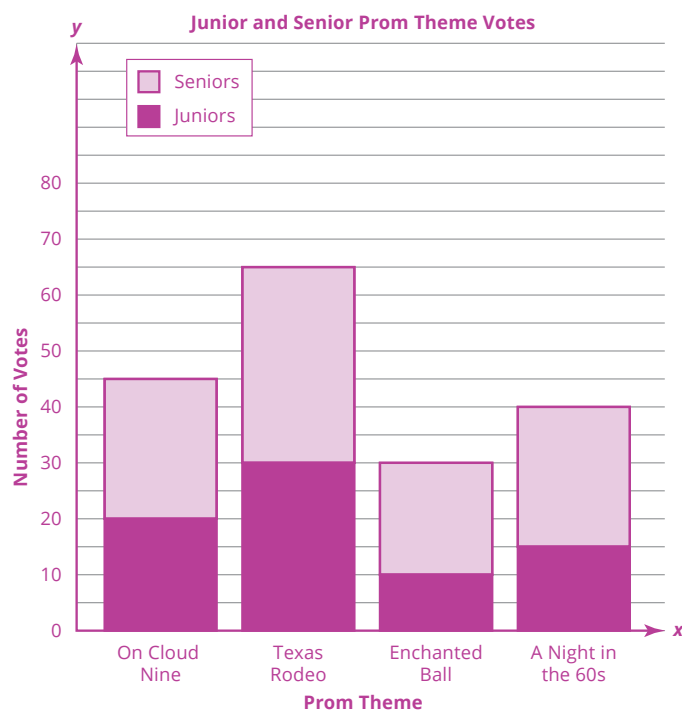
Notes

6. The table shows the votes for this year's prom theme.

Prom Theme	Number of Junior Votes	Number of Senior Votes
On Cloud Nine	20	25
Texas Rodeo	30	35
Enchanted Ball	10	20
A Night in the 60s	15	25

- a. Create a stacked bar graph to display the results of the prom theme vote.

Sample answer:



- b. Write a comparative statement about Juniors and Seniors that would be supported by your stacked bar graph.

Sample answer:

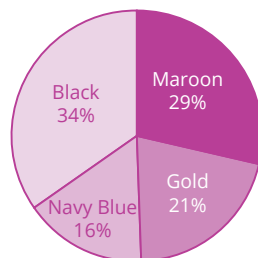
The Texas Rodeo theme not only received the most votes over the other prom themes, but it had the closest margin of votes between juniors and seniors. The juniors had 30 votes out of 65 total votes, which is 46% of votes for Texas Rodeo and the seniors had 35 votes out of 65 total votes, which is 54% of votes. The other prom themes had a wider range of votes between juniors and seniors for the same theme.

7. A softball coach wanted to order new softball jerseys. He asked students to vote on their preferred jersey color. The results are shown in the table.

Preferred Color	Number of Votes
Navy Blue	16
Maroon	29
Gold	21
Black	34

- a. Create a circle graph to represent the data. Be sure to include a title and labels.

Softball Team Jersey Colors



Notes

TOPIC 3 Drawing Inferences

Notes

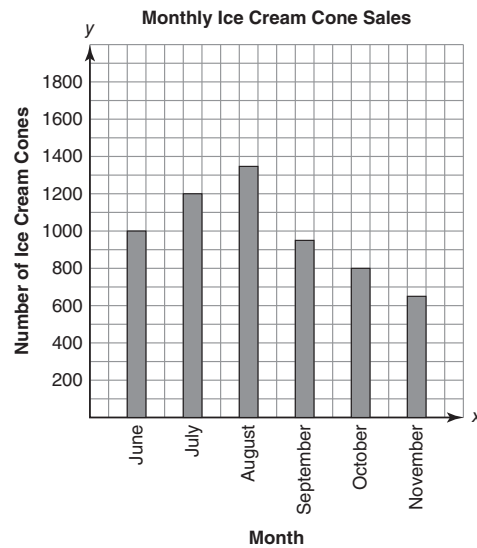
- b. What fraction of students prefer black or gold jerseys?

Sample answer:

$\frac{14}{25}$ students surveyed preferred black or gold jerseys.

B. Analyze the given graph to answer each problem. TEKS 7.6G
(Topic-Aligned)

1. The bar graph shows the number of ice cream cones sold each month at an ice cream parlor.



- a. In which of the six months did the ice cream parlor sell the fewest ice cream cones? How many did they sell in that month?

In November they sold 650 cones.

Notes

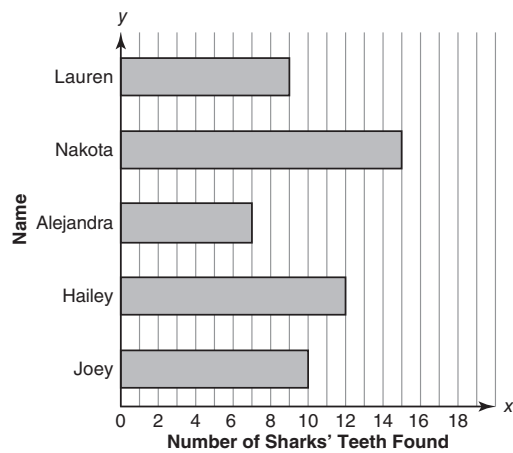
- b. In which of the six months did the ice cream parlor sell the most ice cream cones? How many did they sell in that month?

In August they sold 1350 cones.

- c. How many total ice cream cones did the ice cream parlor sell during the six month period represented in the graph?

They sold a total of 5950 cones.

2. On a recent trip to a beach in southern Florida, five friends competed to see who could find the most sharks' teeth. Their results are displayed in the bar graph.



- a. Who found the most sharks' teeth? How many teeth did that person find?

Nakota found the most teeth. He found 15 teeth.



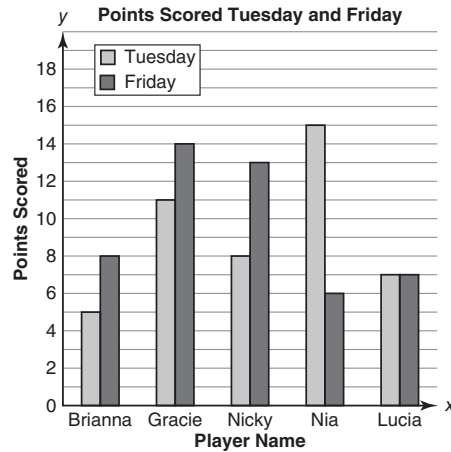
TOPIC 3 Drawing Inferences

Notes

- b. How many total sharks' teeth did the five friends find?

They found a total of 53 teeth.

3. The double bar graph shows the scores of the five starters on the girls' basketball team for their Tuesday and Friday games.



- a. Which player scored fewer points during Friday's game than she did during Tuesday's game?

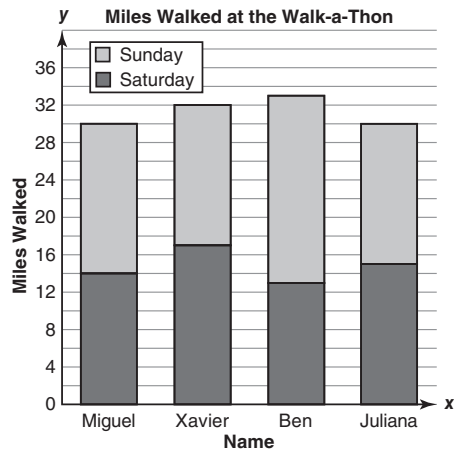
Nia scored fewer points on Friday than she did on Tuesday.

- b. Which player scored the most total points during the two games? How many points did that player score?

Gracie scored the most total points. She scored $14 + 11$, or 25, total points.

- c. Determine the average number of points scored by the five starters during Friday's game.

The average number of points scored is $\frac{8 + 14 + 13 + 6 + 7}{5} = \frac{48}{5}$, or 9.6, points.



a. Who walked the most miles on Saturday? How many miles did that person walk on Saturday?

Xavier walked the most miles on Saturday. She walked 17 miles.

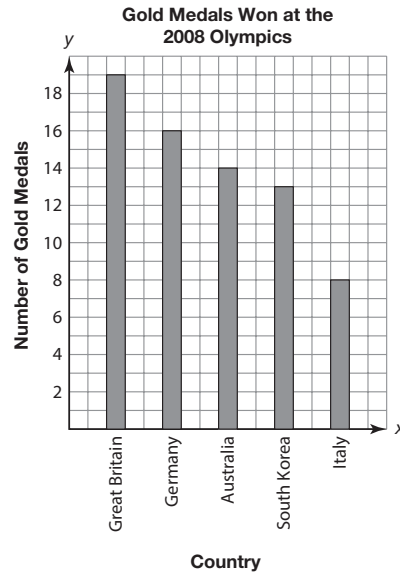
b. Who walked the most total miles during the Walk-a-Thon? How many total miles did that person walk?

Ben walked the most total miles. He walked a total of 33 miles.

TOPIC 3 Drawing Inferences

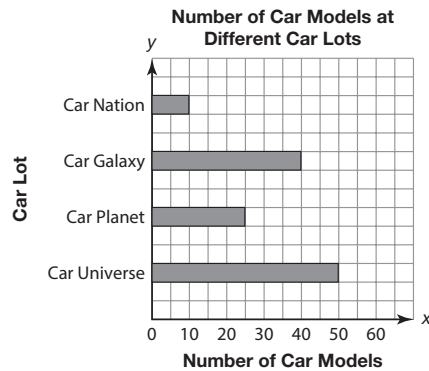
Notes

5. The bar graph represents the number of gold medals won by 5 countries at the 2008 Summer Olympics.



- a. Which country won 13 gold medals at the 2008 Summer Olympics?
South Korea won 13 gold medals at the 2008 Summer Olympics.
- b. How many more gold medals did Germany win than Italy at the 2008 Summer Olympics?
 $16 - 8 = 8$
Germany won 8 more gold medals than Italy during the 2008 Summer Olympics.
- c. How many gold medals did Great Britain win at the 2008 Summer Olympics?
Great Britain won 19 gold medals at the 2008 Summer Olympics.

6. The bar graph represents the number of different car models available at each car lot.



- a. Which car lot has 25 different car models?
- b. What is the difference between the car lot with the most car models and the car lot with the least car models?

Car Planet has 25 different car models.

Car Universe has the most car models with 50 different models.

Car Nation has the least car models with 10 different models.

$$50 - 10 = 40$$

There is a difference of 40 different models between the car lot with the most car models and the car lot with the least car models.

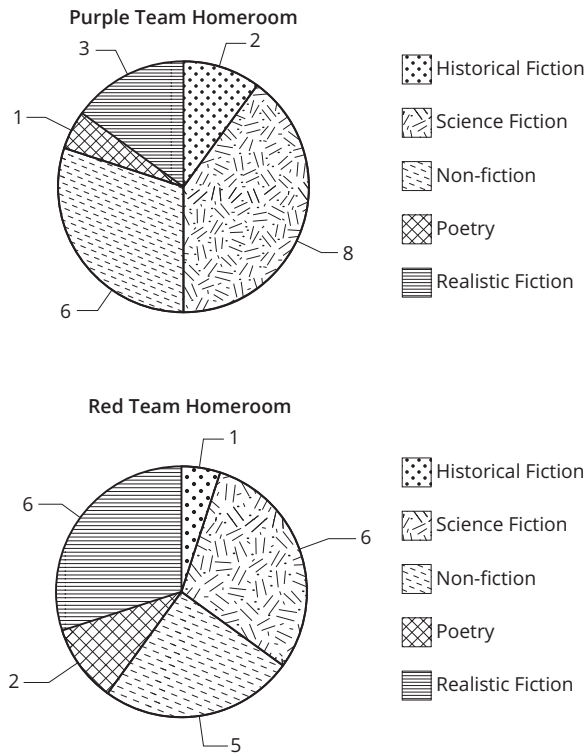
Notes



TOPIC 3 Drawing Inferences

Notes

7. A middle school surveyed students in seventh-grade about their favorite book genre. The data collected for two homerooms is shown in the circle graphs.



- a. Compare the data in both circle graphs. What is the most popular book genre in each classroom? What is the least popular book genre in each classroom?

Both team homerooms prefer science fiction books. The Purple Team's least preferred genre is poetry, and the Red Team's least preferred genre is historical fiction.

Notes

- b. If the Purple Team's homeroom has 28 students, how many prefer either science fiction or historical fiction?

14 students prefer either science fiction or historical fiction.

- c. About 30% of the students in the Red Team homeroom prefer realistic fiction. If there are 27 students in the Red Team homeroom, how many prefer realistic fiction?

About 8 students prefer realistic fiction books.

Extension

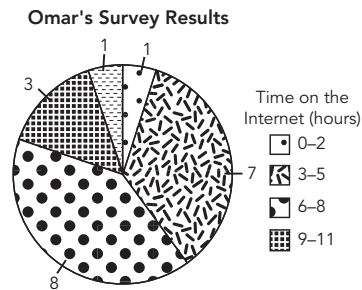
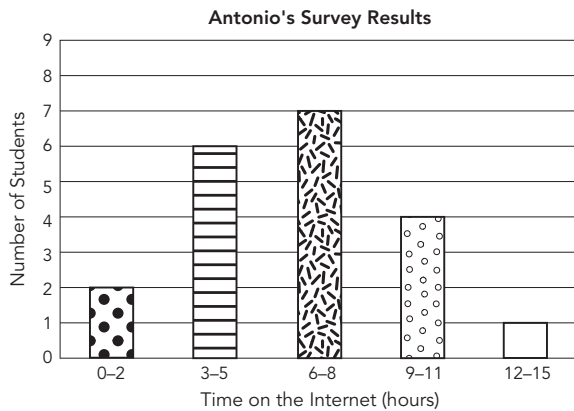
Construct a bar graph to represent each data set shown in the table.

Extension of TEKS 7.6G

Antonio and Omar want to determine the number of hours 7th-grade students spend on the Internet each week. They decide to collect data from a sample of the 7th-grade population at school.

- Antonio surveys twenty 7th-grade students whose student ID number ends with 2.
- Omar surveys twenty 7th-grade students whose student ID number ends with 5.

Antonio and Omar's survey results are represented in the graphs shown.



Notes

TOPIC 3 Drawing Inferences

1. Which sample is a better representation of the 7th-grade population? Explain your reasoning.

Both Antonio and Omar's samples are equally representative of the 7th-grade population. They represent random samples, since choosing a student ID number that ends in a given number has the same chance of being chosen as any other number.

2. Which student's graph is a better visual representation of the number of hours 7th-grade students spend on the Internet each week?

Sample answer:

Antonio's graph is a better representation because the actual number of students in each category can be identified and compared.

3. Identify and explain the advantages and disadvantages of each visual representation.

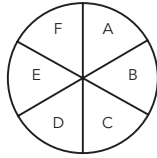
Bar graphs are useful in showing differences, or making comparisons, between different categories of the data.

They also provide a clear picture of data distribution and trends. Circle graphs are useful when comparing individual categories of the data to the whole population.

Spaced Practice

Determine each compound probability. Show your work. **TEKS 7.6D, TEKS 7.6I**

A spinner has 6 equal parts labeled with the letters A through F.



1. What is the probability that the next spin is an A or B?

$$P(A \text{ or } B) = \frac{2}{6}, \text{ or } \frac{1}{3}$$

3. What is the probability that the next spin is not C?

$$P(\text{not } C) = \frac{5}{6}$$

5. What is the probability that the next spin is a D, E, or F?

$$P(D, E, \text{ or } F) = \frac{3}{6}, \text{ or } \frac{1}{2}$$

2. What is the probability that the next spin is a vowel?

$$P(\text{vowel}) = \frac{2}{6}, \text{ or } \frac{1}{3}$$

4. What is the probability that the next spin is a consonant?

$$P(\text{consonant}) = \frac{4}{6}, \text{ or } \frac{2}{3}$$

6. What is the probability that the next spin is not an A or B?

$$P(\text{not } A \text{ or } B) = \frac{4}{6}, \text{ or } \frac{2}{3}$$

Notes



Notes

IV. Comparing Two Populations

Topic Practice

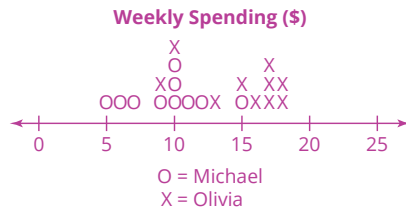
A. Use the data provided to answer each set of questions. **TEKS 7.6G**
(Interleaved Practice), **TEKS 7.12A** (Topic-Aligned)

Michael claims that he spends less money than his sister Olivia, so the siblings decide to track their spending. The table shows the amount of money each sibling spent per week for a total of ten weeks.

Michael	Olivia
10	18
6	15
15	16
9	17
12	10
5	13
10	17
11	18
10	17
7	9



1. Create a dot plot to show the weekly spending for each sibling. Be sure to provide a title and a key.



2. Describe the distribution of each data set.
The data for Michael is symmetric and the data for Olivia is skewed left.

3. Determine the median of each data set.
Michael: \$10
Olivia: \$16.50

4. Determine the mean of each data set.
Michael: $95 \div 10 = \$9.50$
Olivia: $150 \div 10 = \$15$

5. Which measure of center is most useful in this situation?
The median and the mean are close in value for Michael, so either measure of center is useful. The data for Olivia is skewed left, so the median is more useful in this situation.

Notes

Notes

TOPIC 3 Drawing Inferences

6. Compare the difference in the means. Interpret the difference in terms of this problem situation.

The difference in means is \$5.50. This means that Olivia spends an average of \$5.50 more per week than Michael.

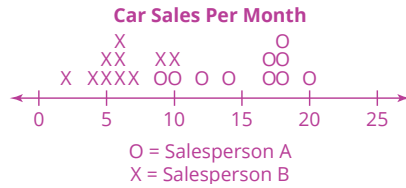
7. What can you conclude about the data based on your observations?

Michael spends less money per week compared to his sister Olivia.

A car dealership is trying to gather information to determine when cars are most likely to be sold. Salesperson A works evenings, and Salesperson B works during the day. The table shows the number of cars each salesperson sold during their shift each month for ten months.

Salesperson A	Salesperson B
18	5
10	6
9	4
12	10
17	9
18	7
20	6
14	6
18	2
17	5

8. Create a dot plot to show the monthly car sales for each salesperson. Be sure to provide a title and a key.



9. Describe the distribution of each data set.
The data for Salesperson A is skewed left and the data for Salesperson B is symmetric.

10. Determine the median of each data set.

Salesperson A: 17 cars

Salesperson B: 6 cars

11. Determine the mean of each data set.

Salesperson A: $153 \div 10 = 15.3$ cars

Salesperson B: $60 \div 10 = 6$ cars

Notes

Notes

TOPIC 3 Drawing Inferences

12. Which measure of center is most useful in this situation?

The data for Salesperson A is skewed left, so the median is more useful in this situation. The median and the mean are the same for Salesperson B, so either measure of center is useful.

13. Compare the difference in the means. Interpret the difference in terms of this problem situation.

The difference in means is 11. This means that Salesperson A sells an average of 11 more cars per month than Salesperson B.

14. What can you conclude about the data based on your observations?

Salesperson A sells more cars per month, so it is possible that cars are more likely to be sold in the evenings.

B. Use the data provided to answer each set of questions. TEKS 7.6G
(Topic-Aligned), TEKS 7.12A (Topic-Aligned)

Two 7th-grade teachers wanted to compare math test scores for students in their classes. Each teacher used a random sample of 10 students in their first period class. The data is shown in the table.

Ms. Ramirez	Mr. Davis
85	88
78	90
77	93
90	84
91	85
93	92
76	95
91	90
79	79
86	89

Notes

TOPIC 3 Drawing Inferences

Notes

1. Create a stem-and-leaf plot to show the math test scores for the sample of students from each teacher's classroom. Be sure to provide a title and a key.

Students' Math Scores

Ms. Ramirez		Mr. Davis
9876	7	9
65	8	4589
3110	9	00235
8 4 = 84		

2. Describe the distribution of each data set.

The data for Ms. Ramirez's class is symmetric and the data for Mr. Davis's class is skewed left.

3. Determine the five-number summary for each data set.

	Ms. Ramirez	Mr. Davis
Minimum	76	79
Q1	78	85
Median	85.5	89.5
Q3	91	92
Maximum	93	95
Interquartile Range (IQR)	13	7

4. Use the five-number summary to interpret and compare the math test scores from each classroom.

Sample answer:

The median test score is 4% higher in Mr. Davis's class than Ms. Ramirez's class. The IQR is 6% lower in Mr. Davis's class than Ms. Ramirez's class.

5. What can you conclude about the data based on your observations?

Ms. Ramirez's class had a wider spread in the data than Mr. Davis's class. This means that students in Mr. Davis's class were more consistent with how they scored on the math test.

The Patel family was trying to decide between two cities for their next vacation. They looked up the daily temperature highs for each city over the course of ten days. The table shows the temperature highs, in degrees Fahrenheit, for each city.

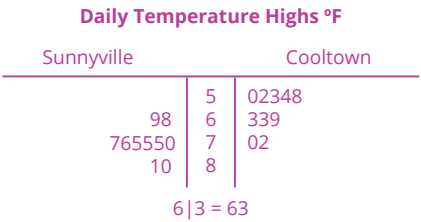
Sunnyville	Cooltown
68	72
70	69
75	63
80	58
76	70
75	50
77	63
69	52
75	54
81	53



TOPIC 3 Drawing Inferences

Notes

6. Create a stem-and-leaf plot to show the daily high temperatures for each city. Be sure to provide a title and a key.



7. Describe the distribution of each data set.
- The data for Sunnyville is symmetric and the data for Cooltown is slightly skewed right.
8. Determine the five-number summary for each data set.

	Sunnyville	Cooltown
Minimum	68	50
Q1	70	53
Median	75	60.5
Q3	77	69
Maximum	81	72
Interquartile Range (IQR)	7	16



9. Use the five-number summary to interpret and compare the math test scores from each classroom.

Sample answer:

The median high daily temperature is 14.5 degrees Fahrenheit higher in Sunnyville than Cooltown. The IQR is 9 degrees lower for Sunnyville than Cooltown.

10. What can you conclude about the data based on your observations?

Cooltown had a wider spread in high daily temperatures than Sunnyville. This means that the daily high temperature is more consistent in the city of Sunnyville.

Extension

1. Write at least two different data sets for which the following five-number summary is accurate. Minimum: 3, Quartile 1: 14, Median: 20, Quartile 3: 35, Maximum: 82 **Extension of TEKS 7.12A**

Sample answer:

{3, 14, 18, 20, 25, 35, 82}

{3, 10, 14, 15, 19, 21, 30, 35, 50, 82}

Notes



Notes

TOPIC 3 Drawing Inferences

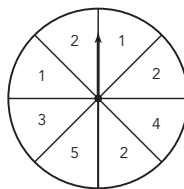
Spaced Practice

1. Joey is using a computer program to randomly generate a digit from 1 to 6. Which statement most accurately describes how many times Joey's program will generate a 3 if he runs it 300 times? Explain your choice. **TEKS 7.6D**
 - a. exactly 50 times
 - b. approximately 50 times
 - c. exactly 100 times
 - d. approximately 100 times

b. Approximately 50 times; The 3 should appear 1 out of every 6 times, but not exactly.
2. The school cafeteria has a hot food line and a cold food line for both breakfast and lunch. The cafeteria manager wants to estimate the percentage of students who select their meals from the hot food line. The manager collected data from the first 50 students who arrive for lunch and determined that 42% of students select their meals from the hot food line. Which statement is true about the cafeteria manager's sample? Explain your choice. **TEKS 7.12B**
 - a. The sample is the percent of students who select foods from the hot food line.
 - b. The sample shows that exactly 42% of the student body selects food from the hot food line.
 - c. The sample might not be representative of the population because it only included the first group of lunch students.
 - d. The sample size is too small to make any generalizations.

c.; the sample might not be representative of the population because it only included the first group of lunch students. She should have taken a random selection of all the students that eat lunch.

3. The spinner is divided into 8 equal sections. Determine each probability. **TEKS 7.6E, 7.6I**



- a. $P(\text{greater than } 3)$

$$\frac{1}{4}$$

- b. $P(\text{not greater than } 3)$

$$\frac{3}{4}$$

4. Determine each difference. **TEKS 7.3A**

- a. $-7.7 - (-77.7)$

70

- b. $4\frac{1}{5} - 10\frac{3}{4}$

$$-6\frac{11}{20}$$

Notes

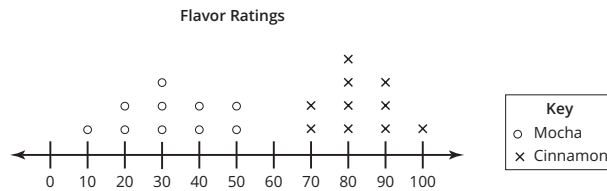
Notes

V. Using Random Samples from Two Populations to Draw Conclusions

Topic Practice

- A. Use the data provided to answer each set of questions. **TEKS 7.6F**
(Interleaved Practice), **TEKS 7.12A (Topic-Aligned)**, **TEKS 7.12C (Topic-Aligned)**

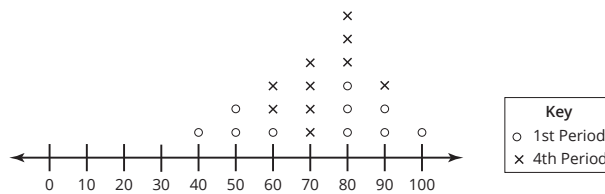
A local bakery recently added two new flavors of cupcake to their selection—mocha and cinnamon. The store randomly selected 20 customers and asked them to rate the flavors on a scale of 0 to 100. The results of the survey are shown in the dot plot.



- Describe the distribution of each data set.
The data for Mocha is symmetric and the data for Cinnamon is skewed left.
- Determine the mean for each data set.
The mean for Mocha is 32 and the mean for Cinnamon is 83.
- Compare the shapes, spreads, and measures of center for each flavor. What can you conclude about the two new cupcake flavors?
Sample answer:
The mean for Cinnamon is rated higher by 51. Customers strongly prefer the Cinnamon flavor to the Mocha.

Mr. Brown randomly selected ten students each from his first and fourth period math classes and used their quiz scores to create the dot plot shown.

Quiz Scores in Mr. Brown's 1st and 4th Period Classes



4. Describe the distribution of each data set.

The data for the 1st period class is skewed left and the data for the 4th period class is symmetric.

5. Determine the mean for each data set.

The mean for the 1st period class is 72 and the mean for the 4th period class is 73.

6. Compare the shapes, spreads, and measures of center for each class. What can you conclude about the math scores of the students in each class period?

The mean for the 1st period class is lower by 1. The 1st period class has a wider spread, and the 4th period class is more consistent in their scores.

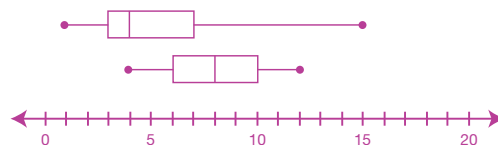
TOPIC 3 Drawing Inferences

Notes

- B. Use the five-number summaries to create box plots for both given data sets on the same number line. **TEKS 7.6F (Interleaved Practice), TEKS 7.12A (Interleaved Practice)**

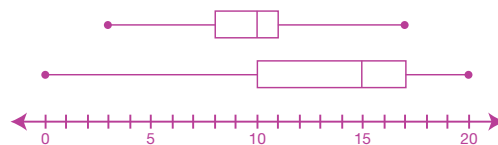
1.

Minimum	4	1
Q1	6	3
Median	8	4
Q3	10	7
Maximum	12	15
IQR	4	4



2.

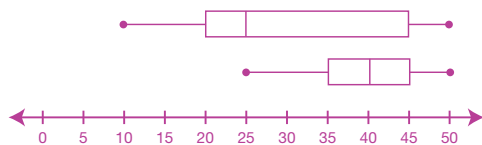
Minimum	0	3
Q1	10	8
Median	15	10
Q3	17	11
Maximum	20	17
IQR	7	3



Notes

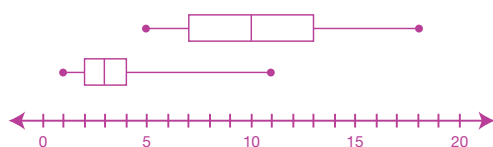
3.

Minimum	25	10
Q1	35	20
Median	40	25
Q3	45	45
Maximum	50	50
IQR	10	25



4.

Minimum	1	5
Q1	2	7
Median	3	10
Q3	4	13
Maximum	11	18
IQR	2	6

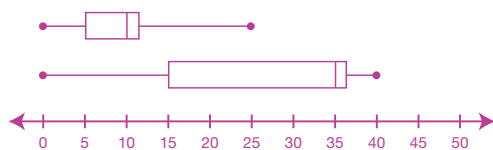


TOPIC 3 Drawing Inferences

Notes

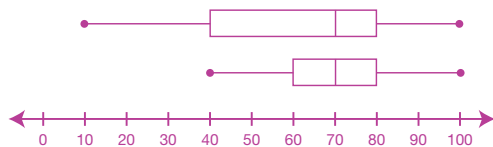
5.

Minimum	0	0
Q1	15	5
Median	35	10
Q3	37	12
Maximum	40	25
IQR	22	7



6.

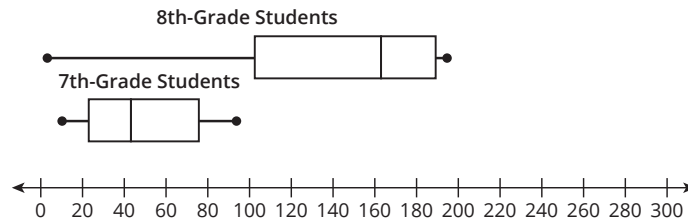
Minimum	40	10
Q1	60	40
Median	70	70
Q3	80	80
Maximum	100	100
IQR	20	40



TOPIC 3 Drawing Inferences

Notes

A local journal surveyed middle school students to determine the number of texts each student sends per day. The journal selected a random sample of 20 seventh- and 20 eighth-graders. The data is shown on the box plots.



4. Describe the distribution of each data set.

The data for the 8th-grade students is skewed left and the data for the 7th-grade students is slightly skewed to the right.

5. Determine the median for each data set.

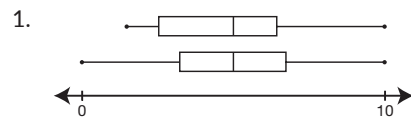
The median number of text messages sent per day is about 162 for 8th-grade students and 42 for 7th-grade students.

6. Compare the shapes, spreads, and measures of center for each grade. What can you conclude about the texts messages sent per day by students in each grade?

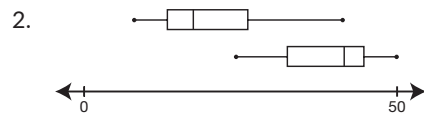
The median number of text messages sent per day is much higher for 8th-grade students than 7th-grade students. There is more variation in the number of text messages sent by 8th-grade students, so 8th-grade students tend to text significantly more than 7th-grade students.

Notes

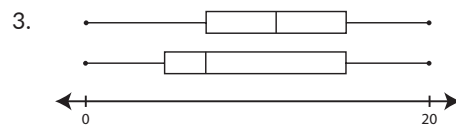
D. Compare the box plots in each data display and describe the variation. TEKS 7.6F (Interleaved Practice), TEKS 7.12A (Topic-Aligned)



The data on the bottom is symmetric and the data on top is skewed right.



The data on the bottom is skewed slightly left and the data on the top is skewed slightly right.

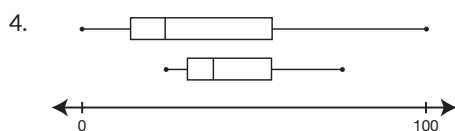


Both data sets have the same range, but the top data is more symmetric and the bottom data is more skewed right.

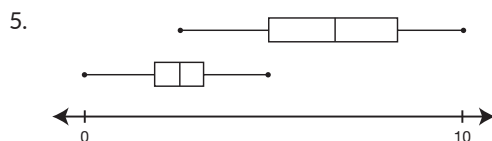


Notes

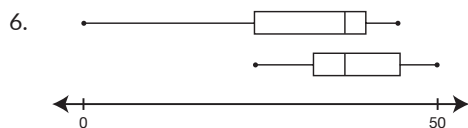
TOPIC 3 Drawing Inferences



Both sets of data are slightly skewed right.



Both sets of data are symmetric.



The top data set is slightly skewed left and the bottom data set is slightly skewed right.

Extension

1. Conduct your own experiment! Collect data from samples drawn from two populations. Then, analyze the data and report on your findings. **Extension of TEKS 7.12A**
Results will vary.

Spaced Practice

A spinner has 6 equal sections, labeled 1 through 6. Determine each compound probability. **TEKS 7.6D, TEKS 7.6I**

1. What is the probability that the next spin is a 2 or a 5?

$\frac{1}{3}$

2. What is the probability that the next spin is a 1, 2, or 3?

$$\frac{1}{2}$$

Evaluate each expression for $x = -0.5$. **TEKS 7.3A, TEKS 7.3B**

3. $x^4 + x^3$

-0.0625

4. $-x^4 - x^3$

0.0625

Notes

Notes

TOPIC 3 Drawing Inferences

5. Huyen is purchasing a new sweater. She has two coupons for a local clothing store, but she can only use one of the coupons. One coupon is for 25% off the list price of any article of clothing. The other is for \$10 off. The list price of the sweater Huyen wants is \$34.95. Which coupon should Huyen use to get the best deal?

TEKS 7.13F

Huyen should use the \$10 off coupon.

$$0.75(34.95) = 26.21$$

$$34.95 - 10 = 24.95$$

6. Malik needs a new bookshelf for his room. The one he likes is available at two different stores. Store A sells the bookshelf for \$137.99 but is having a sale for 15% off that price. Store B sells the bookshelf for \$159.99 and Malik has a coupon for 25% off that price. TEKS 7.13F

Malik should buy the bookshelf from Store A.

$$0.85(137.99) = 117.29$$

$$0.75(159.99) = 119.99$$

Notes

Random Number Table										
Line 1	65285	97198	12138	53010	94601	15838	16805	61404	43516	17020
Line 2	17264	57327	38224	29301	18164	38109	34976	65692	98566	29550
Line 3	95639	99754	31199	92558	68368	04985	51092	37780	40261	14479
Line 4	61555	76404	86214	11808	12840	55147	97438	60222	12645	62090
Line 5	78137	98768	04689	87130	79225	08153	84967	64539	79493	74917

Line 6	62490	99215	84987	28759	19107	14733	24550	28067	68894	38490
Line 7	24216	63444	21283	07044	92729	37284	13211	37485	11415	36457
Line 8	18975	95428	33226	55901	31605	43816	22259	00317	46999	98571
Line 9	59138	39542	71168	57609	91510	27904	74244	50940	31553	62562
Line 10	29478	59652	50414	31966	87912	87154	12944	49862	96566	48825

Line 11	96155	95009	27429	72918	08457	78134	48407	26061	58754	05326
Line 12	29621	66583	62966	12468	20245	14015	04014	35713	03980	03024
Line 13	12639	75291	71020	17265	41598	64074	64629	63293	53307	48766
Line 14	14544	37134	54714	02401	63228	26831	19386	15457	17999	18306
Line 15	83403	88827	09834	11333	68431	31706	26652	04711	34593	22561



TOPIC 3 Drawing Inferences

Notes

Random Number Table

Line 16	67642	05204	30697	44806	96989	68403	85621	45556	35434	09532
Line 17	64041	99011	14610	40273	09482	62864	01573	82274	81446	32477
Line 18	17048	94523	97444	59904	16936	39384	97551	09620	63932	03091
Line 19	93039	89416	52795	10631	09728	68202	20963	02477	55494	39563
Line 20	82244	34392	96607	17220	51984	10753	76272	50985	97593	34320

Constructing and Measuring

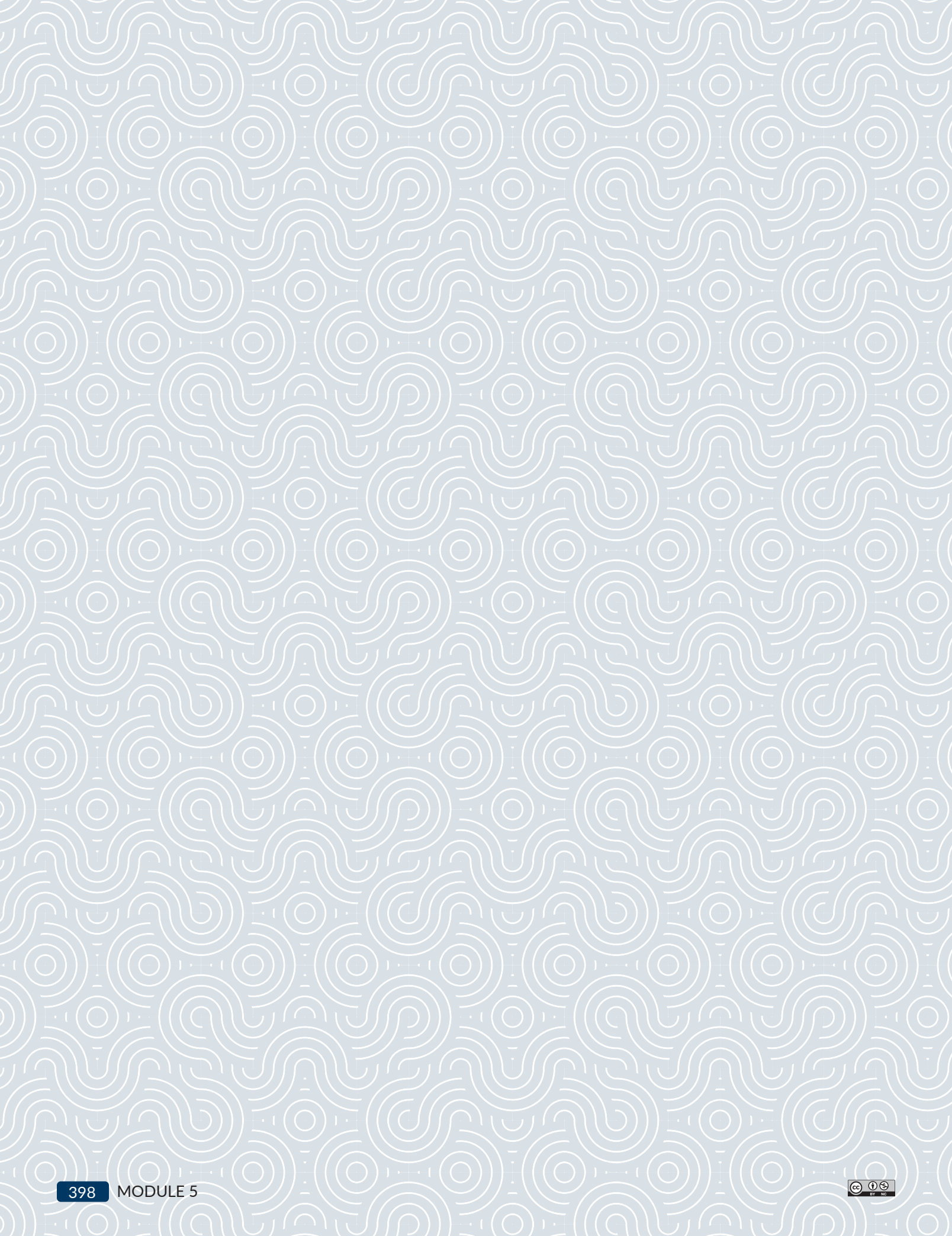
.....

TOPIC 1: Angle Relationships

I. Solving Equations Using the Triangle Sum Theorem	399
II. Relationships Between 90° and 180° Angles	405
III. Special Angle Relationships	411

TOPIC 2: Area, Surface Area, and Volume

I. Composite Figures	419
II. Total Surface Area of Prisms and Pyramids	431
III. Volumes of Prisms and Pyramids	446
IV. Volume and Surface Area Problems with Prisms and Pyramids	454



Name _____ Date _____

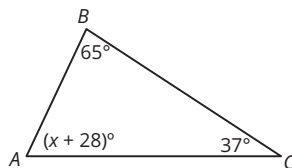
I. Solving Equations Using the Triangle Sum Theorem

Topic Practice

A. Determine the measure of the unknown angle(s) in each triangle.

TEKS 7.11C (Topic-Aligned)

1.



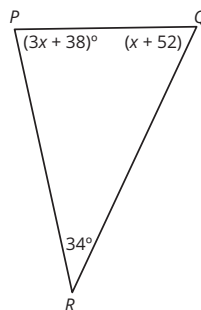
$$(x + 28) + 65 + 37 = 180$$

$$x + 130 = 180$$

$$x = 50$$

$$m\angle A = 50 + 28 = 78^\circ$$

2.



$$(3x + 38) + (x + 52) + 34 = 180$$

$$4x + 124 = 180$$

$$4x = 56$$

$$x = 14$$

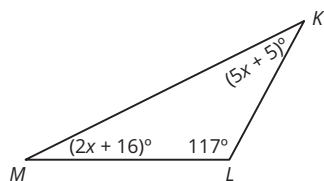
$$m\angle P = (3)(14) + 38 = 42 + 38 = 80^\circ$$

$$m\angle Q = 14 + 52 = 66^\circ$$

TOPIC 1 Angle Relationships

Notes

3.



$$(2x + 16) + (5x + 5) + 117 = 180$$

$$7x + 138 = 180$$

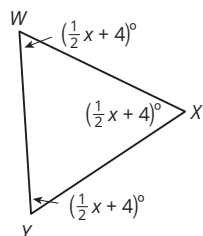
$$7x = 42$$

$$x = 6$$

$$m\angle M = (2)(6) + 16 = 12 + 16 = 28^\circ$$

$$m\angle K = (5)(6) + 5 = 30 + 5 = 35^\circ$$

5.



$$\left(\frac{1}{2}x + 4\right) + \left(\frac{1}{2}x + 4\right) + \left(\frac{1}{2}x + 4\right) = 180$$

$$\frac{3}{2}x + 12 = 180$$

$$\frac{3}{2}x = 168$$

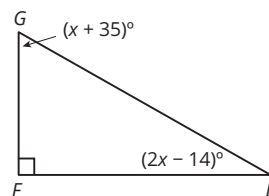
$$x = 112$$

$$m\angle W = \frac{1}{2}(112) + 4 = 56 + 4 = 60^\circ$$

$$m\angle X = 60^\circ$$

$$m\angle Y = 60^\circ$$

4.



$$90 + (x + 35) + (2x - 14) = 180$$

$$3x + 111 = 180$$

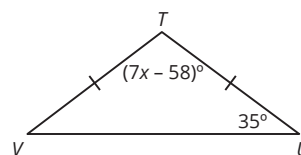
$$3x = 69$$

$$x = 23$$

$$m\angle G = 23 + 35 = 58^\circ$$

$$m\angle E = 2(23) - 14 = 46 - 14 = 32^\circ$$

6.



$$m\angle V = 35^\circ$$

$$(7x - 58) + 35 + 35 = 180$$

$$7x + 12 = 180$$

$$7x = 168$$

$$x = 24$$

$$m\angle T = 7(24) - 58 = 168 - 58 = 110^\circ$$

B. Write and solve an equation to answer each question.

TEKS 7.11C (Topic-Aligned)

1. Determine the measure of the third angle when the base angle of an isosceles triangle is 63° .

$$63 + 63 + x = 180$$

$$126 + x = 180$$

$$x = 54$$

The third angle of the isosceles triangle is 54° .

2. Determine the measure of the base angles of an isosceles triangle when the non-base angle is 36° .

$$36 + x + x = 180$$

$$36 + 2x = 180$$

$$2x = 144$$

$$x = 72$$

Each base angle of the isosceles triangle is 72° .

3. Determine the measure of the third angle when the base angle of an isosceles triangle is 12° .

$$12 + 12 + x = 180$$

$$24 + x = 180$$

$$x = 156$$

The third angle of the isosceles triangle is 156° .

4. Determine the measure of the base angles of an isosceles triangle when the non-base angle is 115° .

$$115 + x + x = 180$$

$$115 + 2x = 180$$

$$2x = 65$$

$$x = 32.5$$

Each base angle of the isosceles triangle is 32.5° .

Notes

TOPIC 1 Angle Relationships

Notes

5. Determine the measure of the third angle when the base angle of an isosceles triangle is 22.5° .

$$22.5 + 22.5 + x = 180$$

$$45 + x = 180$$

$$x = 135$$

The third angle of the isosceles triangle is 135° .

6. Determine the measure of the base angles of an isosceles triangle when the non-base angle is 13° .

$$13 + x + x = 180$$

$$13 + 2x = 180$$

$$2x = 167$$

$$x = 83.5$$

Each base angle of the isosceles triangle is 83.5° .

Extension

1. The base angle of an isosceles triangle is 16 degrees less than half the measure of the non-base angle. Determine the measures of all three angles of the isosceles triangle. Show your work. **Extension of TEKS 11.c**

$$x + 2\left(\frac{1}{2}x - 16\right) = 180$$

$$x + x - 32 = 180$$

$$2x = 212$$

$$x = 106$$

The measure of the non-base angle of the isosceles triangle is 106° . The measure of each base angle of the isosceles triangle is 37° .



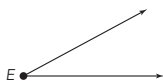
Spaced Practice

1. Construct a line segment that is twice the length of $\overline{JK}$. **TEKS 7.11C**



Check students' constructions.

2. Construct an angle that is twice the measure of $\angle E$. **TEKS 7.11C**



Check students' constructions.

3. Consider the population of integers from -10 to 10 . **TEKS 7.12B**

- a. Select a sample of six numbers. Is this a random sample?
Explain your reasoning.

Answers will vary. If students placed the numbers in a bag or used a random number generator, this is a random sample.

- b. How can you assign random numbers to select a sample using a random number table?

Assign the numbers 00 to 20 to the numbers -10 to 10 . I will ignore two-digit numbers greater than 20.

Notes



Notes

TOPIC 1 Angle Relationships

4. Estimate the likelihood of each event as 0, $\frac{1}{2}$, or 1. **TEKS 7.6I**

a. A dog greeting you with the words, "Good morning!"
0

b. Rolling a prime number on a six-sided number cube.
 $\frac{1}{2}$

5. Decide whether each statement is true or false. Explain your reasoning. **TEKS 7.2A**

a. $5\frac{2}{3}$ is included in the set of integers.

False. The set of integers does not include fractions. Therefore, $5\frac{2}{3}$ is not an integer, but it is included in the set of rational numbers.

b. -12 is included in the set of whole numbers.

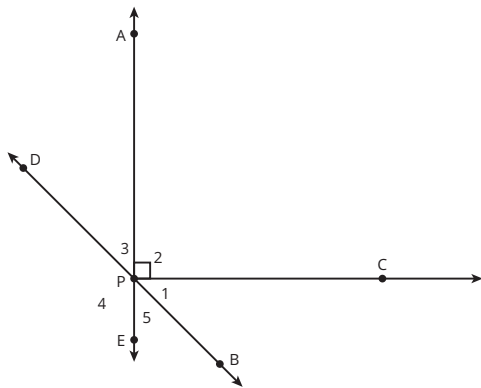
False. Whole numbers only include 0 and positive integers. -12 is a negative integer, so it is not a whole number, but it is included in the set of rational numbers.

II. Relationships Between 90° and 180° Angles

Topic Practice

A. Use the diagram to answer the given questions. **TEKS 7.11C**

(Interleaved Practice)



1. List all of the angle pairs that are supplementary.

Angles 3 and 4, angles 4 and 5

3. Determine the measure of angle 2.

$$m\angle 2 = 90^\circ$$

2. List all of the angle pairs that are complementary.

Angles 1 and 5

4. Describe the relationship between line AE and ray PC .

Line AE is perpendicular to ray PC .



Notes

TOPIC 1 Angle Relationships

Notes

5. Suppose angle 4 has a measure of 132° .
Determine the measure of angle 3.

$$m\angle 3 = 48^\circ$$

7. Suppose angle 3 has a measure of 60° .
Determine the measure of angle 4.

$$m\angle 4 = 120^\circ$$

6. Suppose angle 1 has a measure of 35° .
Determine the measure of angle 5.

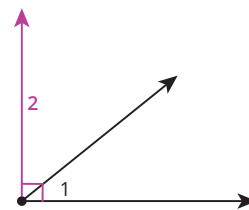
$$m\angle 5 = 55^\circ$$

B. Complete each sketch. TEKS 7.11C (Interleaved Practice)

1. Draw $\angle 2$ such that it supplements $\angle 1$
and does not share a common side.

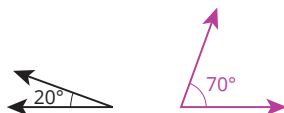


2. Draw $\angle 2$ such that it complements $\angle 1$
and shares a common side.

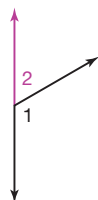


TOPIC 1 Angle Relationships

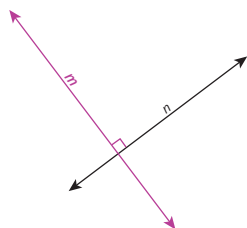
3. Draw $\angle 2$ such that it complements $\angle 1$ and does not share a common side.



4. Draw $\angle 2$ such that it supplements $\angle 1$ and shares a common side.

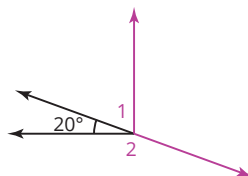


5. Draw line m so that it is perpendicular to line n .



6. Draw $\angle 2$ such that it complements $\angle 1$ and draw $\angle 3$ such that it supplements $\angle 1$.

Sample answer:



Notes



TOPIC 1 Angle Relationships

Notes

C. Determine each unknown angle measure. TEKS 7.11C (Topic-Aligned)

1. If $\angle 1$ and $\angle 2$ are complementary angles and $m\angle 1 = 43^\circ$, what is $m\angle 2$?

$$m\angle 1 + m\angle 2 = 90$$

$$43 + x = 90$$

$$x = 47$$

$$m\angle 2 = 47^\circ$$

2. If $\angle 1$ and $\angle 2$ are supplementary angles and $m\angle 1 = 106^\circ$, what is $m\angle 2$?

$$m\angle 1 + m\angle 2 = 180$$

$$106 + x = 180$$

$$x = 74$$

$$m\angle 2 = 74^\circ$$

3. If $\angle 1$ and $\angle 2$ are supplementary angles and $m\angle 1$ is one-fourth $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 180$$

$$0.25x + x = 180$$

$$1.25x = 180$$

$$x = 144 \text{ and}$$

$$0.25x = 0.25(144) = 36$$

$$m\angle 2 = 144^\circ \text{ and } m\angle 1 = 36^\circ$$

4. If $\angle 1$ and $\angle 2$ are complementary angles and $m\angle 1$ is 40° less than $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 90$$

$$(x - 40) + x = 90$$

$$2x = 130$$

$$x = 65 \text{ and}$$

$$x - 40 = 65 - 40 = 25$$

$$m\angle 2 = 65^\circ \text{ and } m\angle 1 = 25^\circ$$



5. If $\angle 1$ and $\angle 2$ are complementary angles and $m\angle 1$ is five times $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 90$$

$$5x + x = 90$$

$$6x = 90$$

$$x = 15 \text{ and}$$

$$5x = 5(15) = 75$$

$$m\angle 2 = 15^\circ \text{ and } m\angle 1 = 75^\circ$$

6. If $\angle 1$ and $\angle 2$ are supplementary angles and $m\angle 1$ is 18° more than $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 180$$

$$(x + 18) + x = 180$$

$$2x = 162$$

$$x = 81 \text{ and}$$

$$x + 18 = 81 + 18 = 99$$

$$m\angle 2 = 81^\circ \text{ and } m\angle 1 = 99^\circ$$

Extension

TEKS 7.11C

1. Suppose $\angle 1$ and $\angle 2$ are supplementary angles and $m\angle 1$ is three times 14° less than $m\angle 2$. Determine the measure of each angle. Show your work. **Extension of TEKS 7.11C**

$$m\angle 1 + m\angle 2 = 180$$

$$3(x - 14) + x = 180$$

$$3x - 42 + x = 180$$

$$4x - 42 = 180$$

$$4x = 222$$

$$x = 55.5$$

$$m\angle 1 = 124.5^\circ \text{ and } m\angle 2 = 55.5^\circ$$

Notes



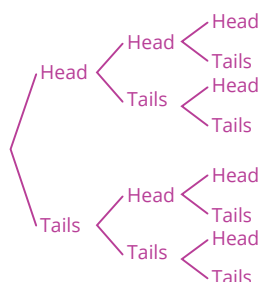
TOPIC 1 Angle Relationships

Notes

Spaced Practice

Xia tosses a coin 3 times. One side is heads and the other side is tails.

1. Represent the sample space as a tree diagram. **TEKS 7.6A**



2. Represent the sample space as a list. **TEKS 7.6A**

HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

3. Determine the theoretical probability of Xia getting all tails. **TEKS 7.6D**

$$\frac{1}{8}$$

4. Determine the theoretical probability of Xia getting no tails. **TEKS 7.6D**

$$\frac{7}{8}$$

5. What is the relationship between the events and probabilities in Questions 3 and 4? **TEKS 7.6D**

The two events, Xia getting all tails and Xia getting no tails, are complement. The sum of the theoretical probabilities of the events is 1.

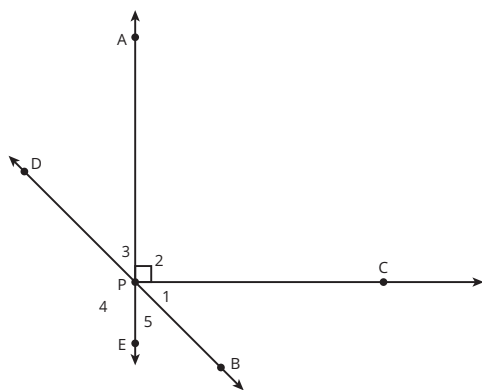


III. Special Angle Relationships

Topic Practice

A. Use the diagram to answer the given questions. **TEKS 7.11C**

(Interleaved Practice)



1. List all of the angle pairs that are adjacent angles.
 $\angle 1$ and $\angle 2$,
 $\angle 1$ and $\angle 5$,
 $\angle 2$ and $\angle 3$,
 $\angle 3$ and $\angle 4$,
 $\angle 4$ and $\angle 5$
 2. List all of the angles that are vertical angles.
 $\angle 3$ and $\angle 5$
 3. List all of the linear pairs.
 $\angle 3$ and $\angle 4$,
 $\angle 4$ and $\angle 5$
 4. Suppose angle 3 has a measure of 40° . Determine the measure of angle 5.
 $m\angle 5 = 40^\circ$



Notes

TOPIC 1 Angle Relationships

Notes

5. Suppose angle 5 has a measure of 52° . Determine the measure of angle 3.

$$m\angle 3 = 52^\circ$$

7. Suppose angle 4 has a measure of 135° . Determine the measure of each unknown angle.

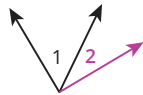
$$m\angle 1 = 45^\circ, m\angle 2 = 90^\circ, m\angle 3 = 45^\circ, \\ m\angle 5 = 45^\circ$$

6. Suppose angle 4 has a measure of 160° . Determine the measure of angle 1.

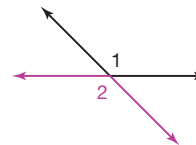
$$m\angle 1 = 70^\circ$$

B. Complete each sketch. TEKS 7.11C (Interleaved Practice)

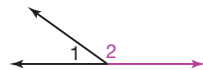
1. Draw $\angle 2$ adjacent to $\angle 1$.



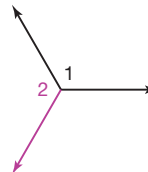
2. Draw $\angle 2$ such that it forms a vertical angle with $\angle 1$.



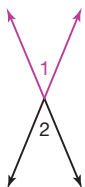
3. Draw $\angle 2$ such that it forms a linear pair with $\angle 1$.



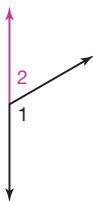
4. Draw $\angle 2$ adjacent to $\angle 1$.



5. Draw $\angle 1$ such that it forms a vertical angle with $\angle 2$.



6. Draw $\angle 2$ such that it forms a linear pair with $\angle 1$.



C. Determine each unknown angle measure. **TEKS 7.11C (Topic-Aligned)**

1. If $\angle 1$ and $\angle 2$ form a linear pair and $m\angle 1 = 72^\circ$, what is $m\angle 2$?

$$m\angle 1 + m\angle 2 = 180$$

$$72 + x = 180$$

$x = 108$

$$m\angle 2 = 108^\circ$$

2. If $\angle 1$ and $\angle 2$ are vertical angles and $m\angle 1 = 87^\circ$, what is $m\angle 2$?

$$m\angle 1 = m\angle 2$$

$$87 = x$$

$$m\angle 2 = 87^\circ$$

Notes

TOPIC 1 Angle Relationships

Notes

3. If $\angle 1$ and $\angle 2$ form a linear pair and $m\angle 1$ is one-fifth $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 180$$

$$0.2x + x = 180$$

$$1.2x = 180$$

$$x = 150 \text{ and}$$

$$0.2x = 0.2(150) = 30$$

$$m\angle 2 = 150^\circ \text{ and } m\angle 1 = 30^\circ$$

5. If $\angle 1$ and $\angle 2$ form a linear pair and $m\angle 1$ is 56° less than $m\angle 2$, what is the measure of each angle?

$$m\angle 1 + m\angle 2 = 180$$

$$(x - 56) + x = 180$$

$$2x - 56 = 180$$

$$2x = 236$$

$$x = 118 \text{ and}$$

$$x - 56 = 118 - 56 = 62$$

$$m\angle 2 = 118^\circ \text{ and } m\angle 1 = 62^\circ$$

4. If $\angle 1$ and $\angle 2$ are vertical angles, $m\angle 1 = 2x^\circ$, and $m\angle 2 = (x + 24)^\circ$, what is the measure of each angle?

$$m\angle 1 = m\angle 2$$

$$2x = x + 24$$

$$x = 24$$

$$2x = 2(24) = 48 \text{ and}$$

$$x + 24 = 24 + 24 = 48$$

$$m\angle 1 = 48^\circ \text{ and } m\angle 2 = 48^\circ$$

6. If $\angle 1$ and $\angle 2$ are vertical angles, $m\angle 1 = (3x + 58)^\circ$, and $m\angle 2 = (5x - 12)^\circ$, what is the measure of each angle?

$$m\angle 1 = m\angle 2$$

$$3x + 58 = 5x - 12$$

$$2x = 70$$

$$x = 35$$

$$3x + 58 = 3(35) + 58 = 163 \text{ and}$$

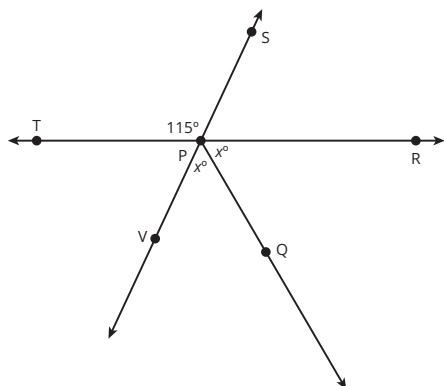
$$5x - 12 = 5(35) - 12 = 163$$

$$m\angle 1 = 163^\circ \text{ and } m\angle 2 = 163^\circ$$

Notes

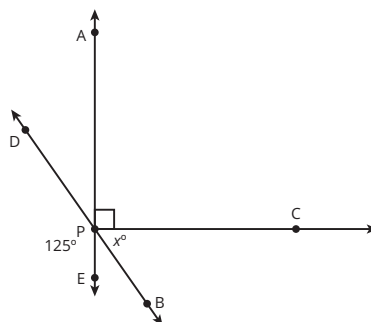
D. Determine the value of x . TEKS 7.11C (Topic-Aligned)

1. Consider the diagram. Points T and R lie on a straight line. Points S and V lie on a straight line.



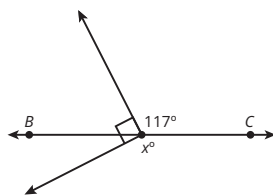
$x = 57.5$

2. Consider the diagram. Points A and E lie on a straight line, points P and C lie on a straight line, and points B and D lie on a straight line.



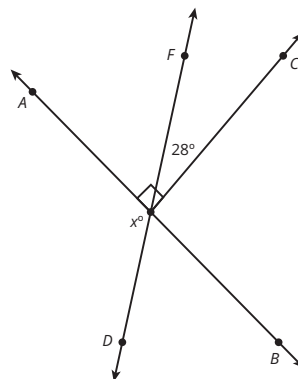
$x = 35$

3. Consider the diagram. Points B and C lie on a straight line.



$x = 153$

4. Consider the diagram. Points A and B lie on a straight line and points D and F lie on a straight line.



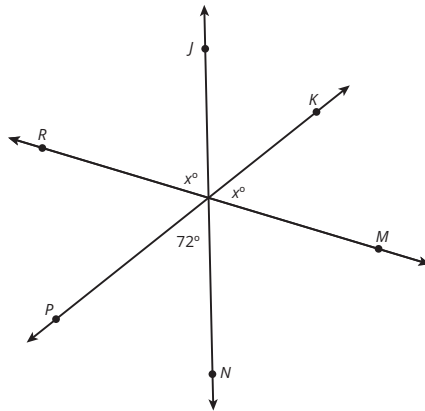
$x = 118$



TOPIC 1 Angle Relationships

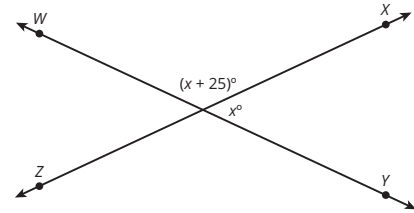
Notes

5. Consider the diagram. Points J and N lie on a straight line, points K and P lie on a straight line, and points M and R lie on a straight line.



$$x = 54$$

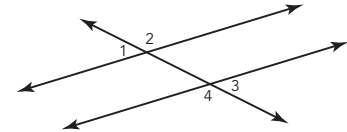
6. Consider the diagram. Points W and Y lie on a straight line and points X and Z lie on a straight line.



$$x = 77.5$$

Extension

1. If $\angle 1$ is the supplement of $\angle 2$, $\angle 3$ is the supplement of $\angle 4$, and $\angle 1$ is congruent to $\angle 3$, what can you conclude about the measures of $\angle 2$ and $\angle 4$? Write this conclusion in a general form. **Extension of TEKS 7.11C**



By the definition of supplementary angles, I know $m\angle 1 + m\angle 2 = 180^\circ$ and $m\angle 3 + m\angle 4 = 180^\circ$, so $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$. By the definition of congruent angles, I know $m\angle 1 = m\angle 3$. I can subtract equal angle measures from both sides of the equation, resulting in $m\angle 2 = m\angle 4$. Supplements of congruent angles are congruent.

Spaced Practice

Consider the two accounts. **TEKS 7.13E**

Account A: Earns 4% simple interest

Account B: Earns 3.5% compound interest

1. Calculate the amount of interest earned if you deposit \$2,000 into Account A for 10 years. Show your work.

$$I = Prt$$

$$I = 2000(0.04)(10)$$

$$I = 800$$

Account A earns \$800 interest.

2. Calculate the amount of interest earned if you deposit \$2,000 into Account B for 10 years. Show your work. **TEKS 7.13E**

$$A = P(1 + r)^t$$

$$A = 2000(1 + 0.035)^{10}$$

$$A = 2000(1 + 0.035)^{10}$$

$$A \approx 2821.20$$

$$I \approx 2821.20 - 2000$$

$$I \approx 821.20$$

Account B earns approximately \$821.20.

3. Which account would you deposit your money in? Explain. **TEKS 7.13E**

Sample answer:

I would deposit my money in Account B because it earns \$21.20 in interest more than Account A.

Notes

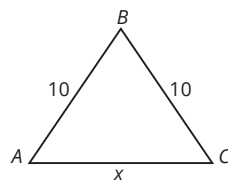
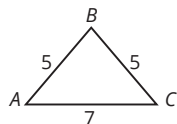


TOPIC 1 Angle Relationships

Notes

4. For each pair of similar triangles, write a proportion that can be used to calculate the length of the missing side, x . Then, determine the value of x . **TEKS 7.5A, TEKS 7.5C**

- a. $\triangle ABC$ is similar to $\triangle XYZ$.

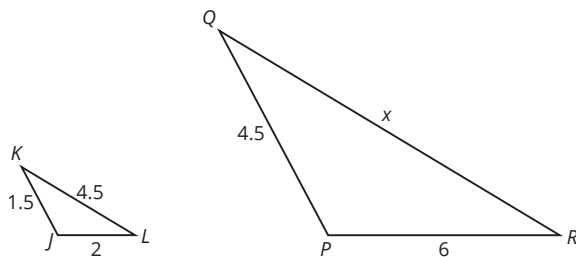


Sample answer:

$$\frac{5}{7} = \frac{10}{x}$$

$$x = 14$$

- b. $\triangle JKL$ is similar to $\triangle PQR$.



Sample answer:

$$\frac{2}{6} = \frac{4.5}{x}$$

$$x = 13.5$$

Notes

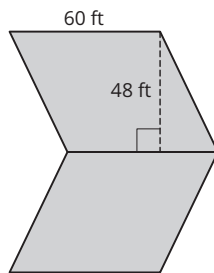
Name _____ Date _____

I. Composite Figures

Topic Practice

A. Calculate the area of each shaded region. **TEKS 7.9C (Topic-Aligned)**

- The figure is composed of 2 congruent rhombi.



Area of 1 rhombus:

$$A = bh$$

$$= 60(48)$$

$$= 2880 \text{ ft}^2$$

The area of the figure is $2(2880) = 5760 \text{ ft}^2$.

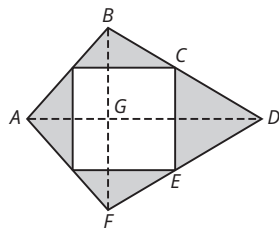


TOPIC 2 Area, Surface Area, and Volume

Notes

2. The figure is composed of a kite and a square.

Given: $AG = 14$ meters, $BG = FG = 16$ meters, $DG = 27$ meters, and $CE = 18$ meters



Area of $\triangle ABD$:

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(41)(16) \\ &= \frac{1}{2}(656) \\ &= 328 \text{ m}^2 \end{aligned}$$

The area of the kite is $2(328) = 656 \text{ m}^2$.

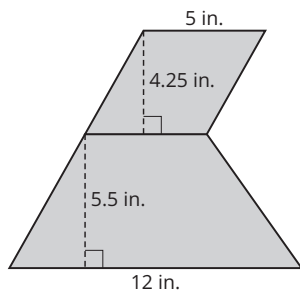
Area of the square:

$$\begin{aligned} A &= s^2 \\ &= (18)^2 \\ &= 324 \text{ m}^2 \end{aligned}$$

The area of the shaded region is $656 - 324 = 332 \text{ m}^2$.

Notes

3. The figure is composed of a trapezoid and a rhombus.



Area of the trapezoid:

$$\begin{aligned} A &= \frac{1}{2}(b_1 + b_2)h \\ &= \frac{1}{2}(5 + 12)(5.5) \\ &= \frac{1}{2}(17)(5.5) \\ &= \frac{1}{2}(93.5) \\ &= 46.75 \text{ in.}^2 \end{aligned}$$

Area of the rhombus:

$$\begin{aligned} A &= bh \\ &= 5(4.25) \\ &= 21.25 \text{ in.}^2 \end{aligned}$$

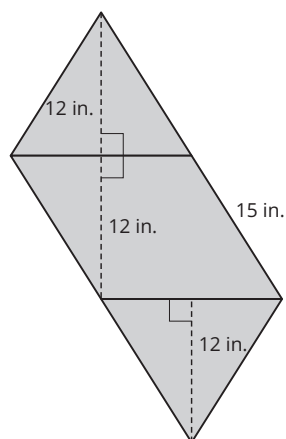
The area of the figure is $46.75 + 21.25 = 68 \text{ in.}^2$.



TOPIC 2 Area, Surface Area, and Volume

Notes

4. The figure is composed of 2 congruent triangles and a rhombus.



Area of the rhombus:

$$\begin{aligned} A &= bh \\ &= 15(12) \\ &= 180 \text{ in.}^2 \end{aligned}$$

Area of one triangle:

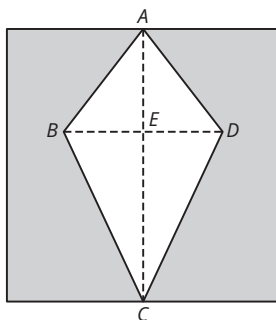
$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(12)(15) \\ &= \frac{1}{2}(180) \\ &= 90 \text{ in.}^2 \end{aligned}$$

The area of the figure is $90 + 90 + 180 = 360 \text{ in.}^2$.

Notes

5. The figure is composed of a square and a kite.

Given: $AE = 27$ inches, $BE = DE = 21$ inches, and $CE = 45$ inches.



Area of the square:

$$\begin{aligned} A &= s^2 \\ &= (72)^2 \\ &= 5184 \text{ in.}^2 \end{aligned}$$

Area of Triangle ADC:

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(72)(21) \\ &= \frac{1}{2}(1512) \\ &= 756 \text{ in.}^2 \end{aligned}$$

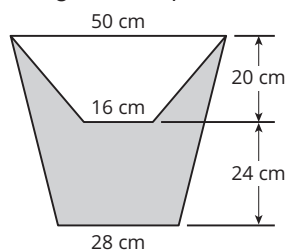
The area of the kite is $2(756) = 1512 \text{ in.}^2$.

The area of the shaded region is $5184 - 1512 = 3672 \text{ in.}^2$.



Notes

6. The figure is composed of two trapezoids.



Area of the larger trapezoid:

$$\begin{aligned} A &= \frac{1}{2}(b_1 + b_2)h \\ &= \frac{1}{2}(50 + 28)(44) \\ &= \frac{1}{2}(78)(44) \\ &= 1716 \text{ cm}^2 \end{aligned}$$

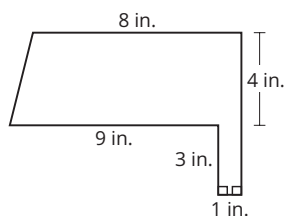
Area of the smaller trapezoid:

$$\begin{aligned} A &= \frac{1}{2}(b_1 + b_2)h \\ &= \frac{1}{2}(50 + 16)(20) \\ &= \frac{1}{2}(66)(20) \\ &= 660 \text{ cm}^2 \end{aligned}$$

The area of the shaded region is $1716 - 660 = 1056 \text{ cm}^2$.

B. Calculate the area of each composite figure. **TEKS 7.9C (Interleaved Practice)**

1.



Area of the trapezoid:

$$A = \frac{1}{2}(b_1 + b_2)h$$

$$A = \frac{1}{2}(8 + 10)(4)$$

$$A = 36 \text{ in.}^2$$

Area of the rectangle:

$$A = lw$$

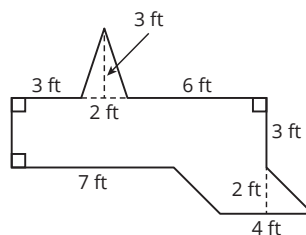
$$A = (3)(1)$$

$$A = 3 \text{ in.}^2$$

Area of composite figure:

$$36 + 3 = 39 \text{ in.}^2$$

2.



Area of the triangle:

$$A = \frac{1}{2}(3)(2)$$

$$A = 3 \text{ ft}^2$$

Area of the rectangle:

$$A = (11)(3)$$

$$A = 33 \text{ ft}^2$$

Area of the parallelogram:

$$A = (4)(2)$$

$$A = 8 \text{ ft}^2$$

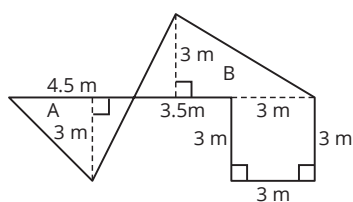
Area of composite figure:

$$3 + 33 + 8 = 44 \text{ ft}^2.$$

Notes

Notes

3.



Area of Triangle A:

$$A = \frac{1}{2}(4.5)(3)$$

$$A = 6.75 \text{ m}^2$$

Area of Triangle B:

$$A = \frac{1}{2}(6.5)(3)$$

$$A = 9.75 \text{ m}^2$$

Area of square:

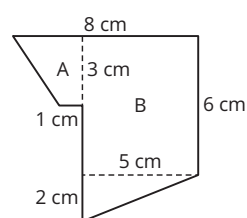
$$A = 3^2$$

$$A = 9 \text{ m}^2$$

Area of composite figure:

$$6.75 + 9.75 + 9 = 25.5 \text{ m}^2$$

4.



Area of Trapezoid A:

$$A = \frac{1}{2}(3 + 8)(1)$$

$$A = 2.5 \text{ cm}^2$$

Area of Trapezoid B:

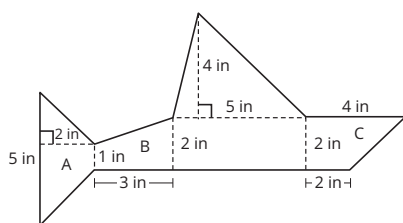
$$A = \frac{1}{2}(6 + 5)(2)$$

$$A = 11 \text{ cm}^2$$

Area of composite figure:

$$2.5 + 11 + 9 = 22.5 \text{ cm}^2$$

5.



Area of Trapezoid A:

$$A = \frac{1}{2}(5 + 1)(2)$$

$$A = 6 \text{ in.}^2$$

Area of Trapezoid B:

$$A = \frac{1}{2}(1 + 2)3$$

$$A = 4.5 \text{ in.}^2$$

Area of Trapezoid C:

$$A = \frac{1}{2}(4 + 2)(2)$$

$$A = 6 \text{ in.}^2$$

Area of triangle:

$$A = \frac{1}{2}(5)(4)$$

$$A = 10 \text{ in.}^2$$

Area of rectangle:

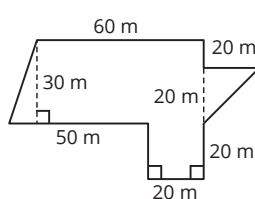
$$A = (5)(2)$$

$$A = 10 \text{ in.}^2$$

Area of composite figure:

$$6 + 4.5 + 6 + 10 + 10 = 36.5 \text{ in.}^2$$

6.



Area of Trapezoid:

$$A = \frac{1}{2}(60 + 50)30$$

$$A = 1950 \text{ m}^2$$

Area of Triangle:

$$A = \frac{1}{2}(20)(20)$$

$$A = 200 \text{ m}^2$$

Area of Square:

$$A = (20)^2$$

$$A = 400 \text{ m}^2$$

Area of composite figure:

$$1950 + 200 + 400 = 2550 \text{ m}^2$$

Notes

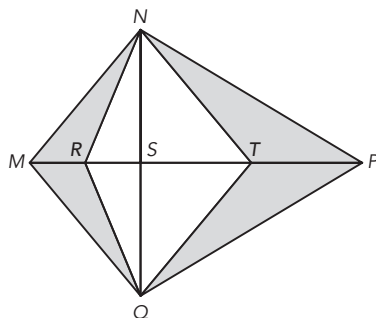
Notes

Extension

Calculate the area of each shaded region. **Extension of TEKS 7.9C**

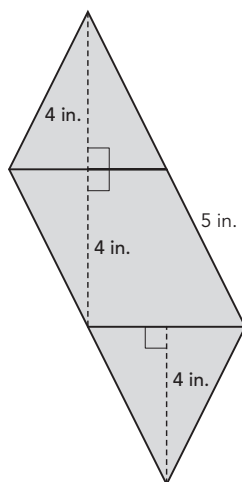
- The figure is composed of two kites.

Given: $MR = RS = 5$ feet, $ST = PT = 10$ feet, and $NS = QS = 12$ feet.



180 sq ft

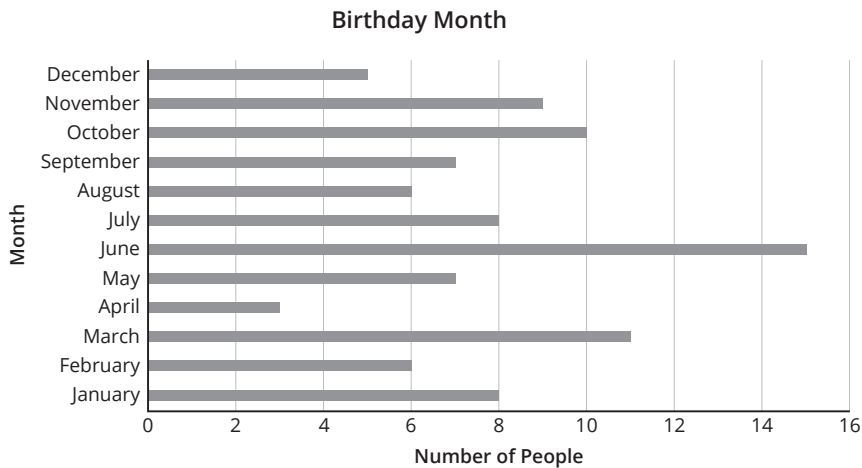
- The figure is composed of two congruent triangles and a rhombus.



40 sq in.

Spaced Practice

1. Analyze the given graph to answer each problem. **TEKS 7.6G**



- a. In which of the twelve months do the most people have a birthday? How many people have a birthday in that month?

In June, there are 15 people with a birthday.

- b. How many people are represented on the graph?

There are 95 people represented on the graph.

2. A bag contains 4 red marbles, 11 blue marbles, 3 green marbles, and 12 white marbles. Predict each probability. **TEKS 7.6H**

a. $P(\text{green marble}) = \frac{3}{30}$ or $\frac{1}{10}$

b. $P(\text{not a red marble}) = \frac{26}{30}$ or $\frac{13}{15}$

Notes



TOPIC 2 Area, Surface Area, and Volume

Notes

3. Write a real-world problem for the equation or inequality.

TEKS 7.10C

a. $3x + 7 = 55$

Jayden buys 3 dozen bagels that costs \$ x per dozen. He also bought a large tub of cream cheese for \$7. Jayden spent \$55 in all. How much does 1 dozen bagels cost?

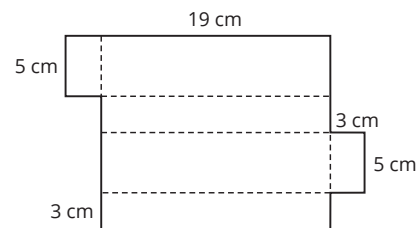
b. $18x - 20 < \$215$

Chloe is having a party. She has a budget of \$215. Chloe spent \$20 on decorations and plans to spend the rest on dinner for each guest. There are 18 guests in all. How much can Chloe spend per person and stay within her budget?

4. Use the net of the prism to answer each problem. TEKS 7.9D

- a. What is the lateral surface area?

Lateral SA = 304 cm^2



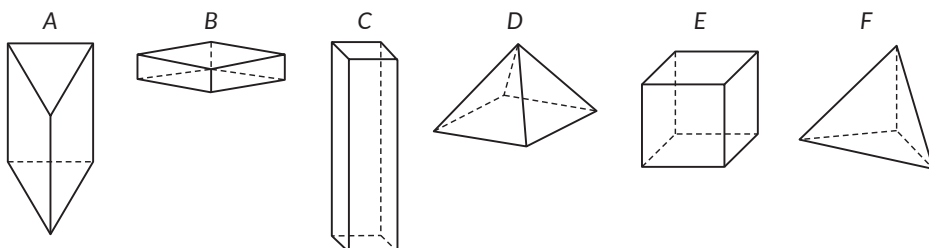
- b. What is the total surface area?

SA = 334 cm^2

II. Total Surface Area of Prisms and Pyramids

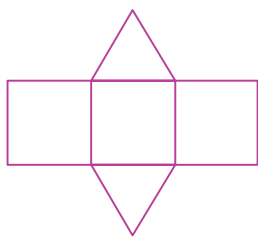
Topic Practice

A. Sketch a net to represent each solid figure. **TEKS 7.9D (Topic-Aligned)**

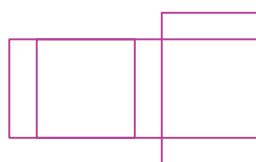


Check students' sketches. Sample answers.

1. Figure A



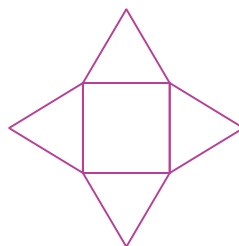
2. Figure B



- ### 3. Figure C



4. Figure D



Notes

Notes

B. Analyze the figures shown to complete the table. **TEKS 7.9D (Topic-Aligned)**

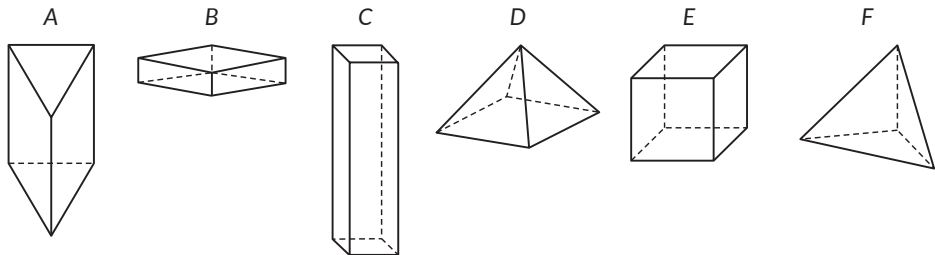


Figure	Number of Faces	Number of Vertices	Number of Edges	Name of Figure
A	5	6	9	Triangular prism
B	6	8	12	Rectangular prism
C	6	8	12	Rectangular prism
D	5	5	8	Square pyramid
E	6	8	12	Cube
F	4	4	6	Triangular pyramid

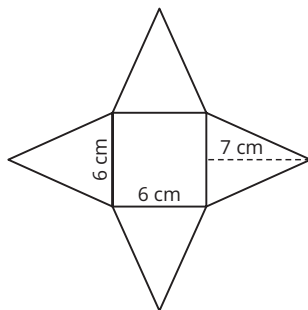


TOPIC 2 Area, Surface Area, and Volume

Notes

C. Determine the surface area of each figure based on the measurements of its net. **TEKS 7.9D (Topic-Aligned)**

1.



Total surface area:

$$36 + 84 = 120 \text{ cm}^2$$

Area of square base:

$$A = (6)(6)$$

$$A = 36 \text{ cm}^2$$

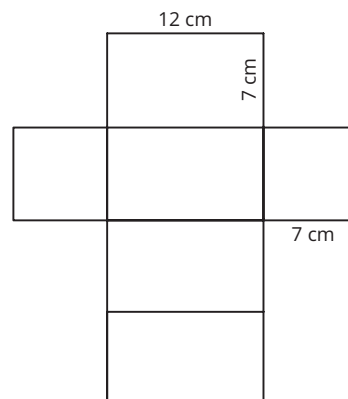
Area of triangular faces:

$$A = \frac{1}{2}(6)(7)$$

$$A = 21$$

$$4(21) = 84 \text{ cm}^2$$

2.



Total surface area:

$$336 + 98 = 434 \text{ cm}^2$$

Area of rectangular bases:

$$A = (12)(7)$$

$$A = 84$$

$$4(84) = 336 \text{ cm}^2$$

Area of left and right rectangles:

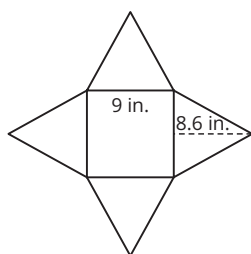
$$A = (7)(7)$$

$$A = 49$$

$$2(49) = 98 \text{ cm}^2$$

Notes

5.



Total surface area:

$$81 + 154.8 = 235.8 \text{ in.}^2$$

Area of square base:

$$A = (9)(9)$$

$$A = 81 \text{ in.}^2$$

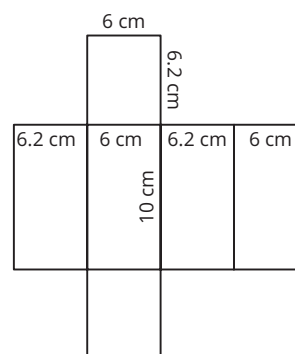
Area of triangular faces:

$$A = \frac{1}{2}(8.6)(9)$$

$$A = 38.7$$

$$4(38.7) = 154.8 \text{ in.}^2$$

6.



Total surface area:

$$120 + 124 + 74.4 = 318.4 \text{ cm}^2$$

Area of rectangular bases:

$$A = (10)(6)$$

$$A = 60 \text{ cm}^2$$

$$2(60) = 120 \text{ cm}^2$$

Area of left and right rectangles:

$$A = (10)(6.2)$$

$$A = 62$$

$$2(62) = 124 \text{ cm}^2$$

Area of top and bottom rectangles:

$$A = (6)(6.2)$$

$$A = 37.2$$

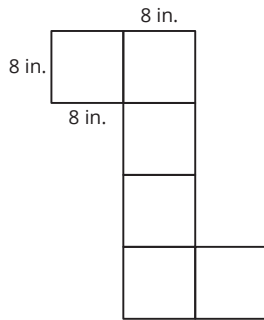
$$2(37.2) = 74.4 \text{ cm}^2$$

Notes

- D. Use the nets to determine the surface area of each figure. Then, use the surface area to answer each question.

TEKS 7.9D (Interleaved Practice)

1. Mia is wrapping two gifts for her friends. The nets show the measurements for each gift. Determine which gift will require more wrapping paper.



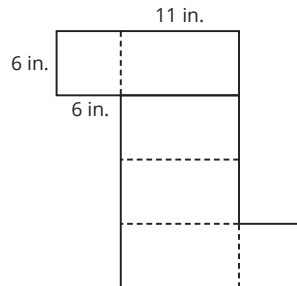
Gift 1

Area of one face:

$$(8)(8) = 64 \text{ in.}^2$$

Area of 6 faces:

$$(64)(6) = 384 \text{ in.}^2$$



Gift 2

Area of left and right faces:

$$(6)(6)(2) = 36(2) = 72 \text{ in.}^2$$

Area of top and bottom faces:

$$(11)(6)(2) = 66(2) = 132 \text{ in.}^2$$

Area of front and back faces:

$$(11)(6)(2) = 66(2) = 132 \text{ in.}^2$$

Total surface area:

$$72 + 132 + 132 = 336 \text{ in.}^2$$

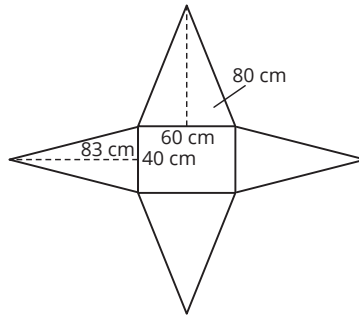
Gift 1 will require more wrapping paper since it has a greater surface area than Gift 2.



TOPIC 2 Area, Surface Area, and Volume

Notes

2. Minh is building replicas out of Styrofoam of two pyramids for a social studies project. The nets with the measurements for her replicas are shown. She then needs to paint the pyramids brown. Determine which pyramid will require more paint.



Pyramid 1:

Area of the base:

$$(60)(40) = 2400 \text{ cm}^2$$

Area of left and right triangles:

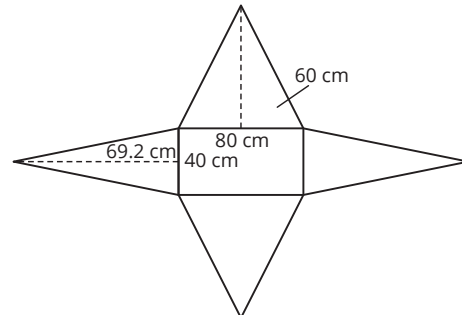
$$\frac{1}{2}(60)(80) = 2400(2) = 4800 \text{ cm}^2$$

Area of front and back triangles:

$$\frac{1}{2}(40)(83) = 1660(2) = 3320 \text{ cm}^2$$

Total surface area:

$$2400 + 4800 + 3320 = 10,520 \text{ cm}^2$$



Pyramid 2:

Area of the base:

$$(80)(40) = 3200 \text{ cm}^2$$

Area of left and right triangles:

$$\frac{1}{2}(80)(60) = 2400(2) = 4800 \text{ cm}^2$$

Area of front and back triangles:

$$\frac{1}{2}(40)(69.2) = 1384(2) = 2768 \text{ cm}^2$$

Total surface area:

$$3200 + 4800 + 2768 = 10,768 \text{ cm}^2$$

Pyramid 2 will require more paint because it has a greater surface area than Pyramid 1.

-

The diagram shows a triangular roof structure. The top horizontal edge is labeled 80 in. The two slanted edges are labeled 48 in. The bottom horizontal edge is labeled 48 in. The vertical height from the top edge to the bottom edge is labeled 41.6 in. The vertical height from the bottom edge to the bottom vertex is labeled 80 in. Dashed lines connect the top vertex to the bottom corners and the bottom vertex to the top corners.

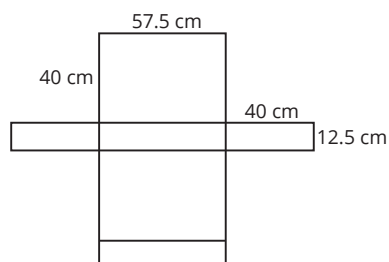
$$998.4 + 5760 = 6758.4 \text{ in.}^2$$

TOPIC 2 Area, Surface Area, and Volume

Notes

4. An instant rice manufacturer is designing a new box to try and cut costs. They felt their old design used too much cardboard to build. They believe their new design, being taller and thinner, will use less cardboard. Determine which instant rice box design will use less cardboard to build.

Old Box Design



Area of front and back faces:

$$(40)(57.5) = 2300(2) = 4600 \text{ cm}^2$$

Area of top and bottom faces:

$$(40)(12.5) = 500(2) = 1000 \text{ cm}^2$$

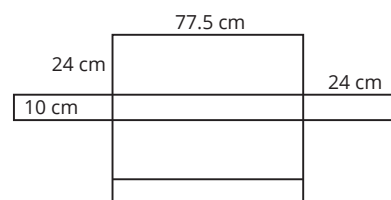
Area of left and right faces:

$$(12.5)(57.5) = 718.75(2) = 1437.5 \text{ cm}^2$$

Total surface area:

$$4600 + 1000 + 1437.5 = 7037.5 \text{ cm}^2$$

New Box Design



Area of front and back faces:

$$(24)(77.5) = 1860(2) = 3720 \text{ cm}^2$$

Area of top and bottom faces:

$$(24)(10) = 240(2) = 480 \text{ cm}^2$$

Area of left and right faces:

$$(10)(77.5) = 775(2) = 1550 \text{ cm}^2$$

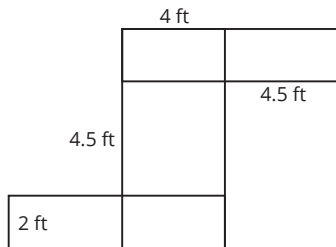
Total surface area:

$$3720 + 480 + 1550 = 5750 \text{ cm}^2$$

The new design will use less cardboard to build because it has the lesser surface area.

5. Liam is refinishing two bookshelves that he found at a yard sale. He has sanded each one down and is now going to repaint them. One bookshelf has a length of 4 feet, a depth of 2 feet, and a height of 4.5 feet. The second bookcase has a height of 3.5 feet, a depth of 2 feet, and a length of 5 feet. Determine which bookshelf will use more paint. (Remember, he cannot paint the front of a bookshelf.)

Bookshelf 1



Bookshelf 1

Area of top and bottom faces:

$$(4)(2) = 8(2) = 16 \text{ ft}^2$$

Area of left and right faces:

$$(2)(4.5) = 9(2) = 18 \text{ ft}^2$$

Area of back face:

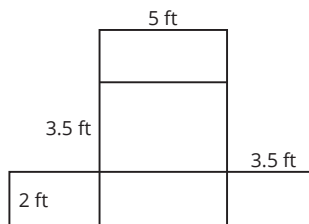
$$(4)(4.5) = 18 \text{ ft}^2$$

Total surface area:

$$16 + 18 + 18 = 52 \text{ ft}^2$$

The first bookshelf will use more paint because it has a greater surface area.

Bookshelf 2



Bookshelf 2

Area of top and bottom faces:

$$(2)(5) = 10(2) = 20 \text{ ft}^2$$

Area of left and right faces:

$$(2)(3.5) = 7(2) = 14 \text{ ft}^2$$

Area of back face:

$$(3.5)(5) = 17.5 \text{ ft}^2$$

Total surface area:

$$20 + 14 + 17.5 = 51.5 \text{ ft}^2$$

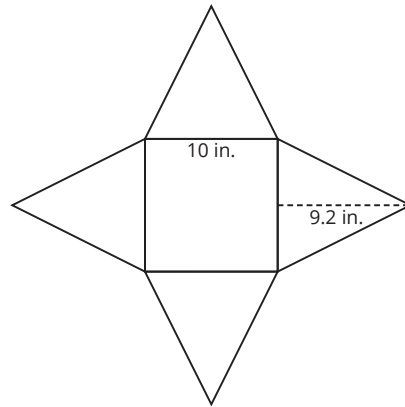
Notes

TOPIC 2 Area, Surface Area, and Volume

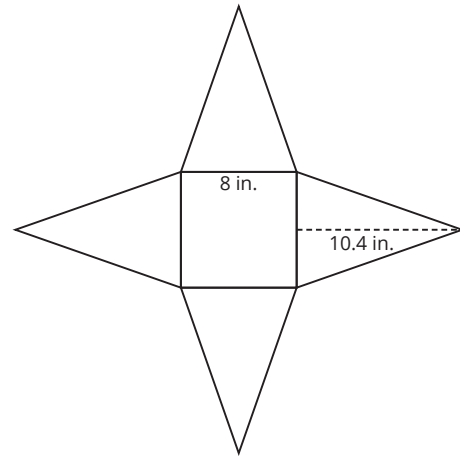
Notes

6. A local basketball league is giving out awards to its top two teams. The awards are shaped like square pyramids. The base of the first place award has a length of 10 inches and a slant height of 9.2 inches. The base of the second place award has a length of 8 inches and a slant height of 10.4 inches. Determine how much greater the surface area of the first place award is than the second place award.

First Place Award



Second Place Award



First place award:

Area of base:

$$(10)(10) = 100 \text{ in.}^2$$

Area of triangular faces:

$$\frac{1}{2}(10)(9.2) = 46(4) = 184 \text{ in.}^2$$

Total surface area:

$$100 + 184 = 284 \text{ in.}^2$$

$$\text{Difference: } 284 - 230.4 = 53.6 \text{ in.}^2$$

The surface area of the first place award is 53.6 square inches greater than the surface area of the second place award.

Second place award:

Area of base:

$$(8)(8) = 64 \text{ in.}^2$$

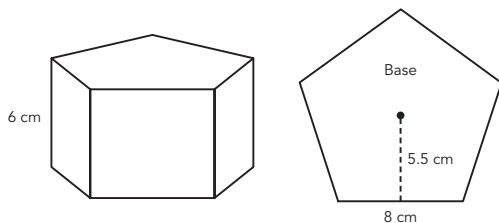
Area of triangular faces:

$$\frac{1}{2}(8)(10.4) = 41.6(4) = 166.4 \text{ in.}^2$$

Total surface area:

$$64 + 166.4 = 230.4 \text{ in.}^2$$

1. A pentagonal prism has pentagons as bases. Each base can be divided into five congruent triangles. Determine the surface area of this pentagonal prism. **Extension of TEKS 7.9D**



The surface area of the pentagonal prism is 460 square centimeters.

1. Victoria is a huge fan of Broadway musicals. She wants to record some of her favorite shows. The table shows the musicals she has chosen and how much space they each take up in megabytes.

TEKS 7.3A, 7.3B

Musical	Disc Space (megabytes)
<i>Annie</i>	109.785
<i>Beauty and the Beast</i>	131.642
<i>Into the Woods</i>	79.4
<i>Les Miserables</i>	192.27
<i>Shrek the Musical</i>	117.005



TOPIC 2 Area, Surface Area, and Volume

Notes

- a. Calculate the total amount of memory the musicals will take up. Show your work.

630.102 megabytes

- b. How much out of 700 megabytes will Victoria have left after she records her musicals? First estimate, then calculate the answer. Show your work.

69.898 megabytes

2. Determine each sum. TEKS 7.3A

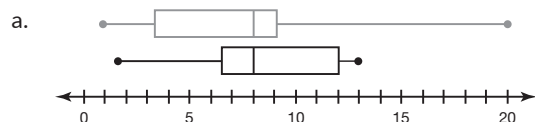
- a. $1.009 + 6.965$

7.974

- b. $3.25 + 0.003$

3.253

3. Compare the box plots in each data display and describe the variation. TEKS 7.12A



The top data set is skewed right and the bottom data set is skewed left. The bottom data set shows less variation than the top data set.

A box plot comparing the number of hours per week spent on housework for men and women. The x-axis represents hours per week, ranging from 25 to 55 with major tick marks every 5 units and minor tick marks every 1 unit. The men's box plot (left) has a minimum at 28, Q1 at 30, Median at 33, Q3 at 38, and Maximum at 53. The women's box plot (right) has a Minimum at 41, Q1 at 47, Median at 48, Q3 at 50, and Maximum at 51.

4. Mr. Nguyen randomly surveyed 10 students in each of his classes to determine the number of minutes that students spend doing homework each week. The data is shown on the box plots.

Number line showing the distribution of the number of hours per week for two periods. The number line ranges from 70 to 100 with major tick marks every 5 units. Period 1 is represented by a box plot with a minimum at 72, a first quartile at 76, a median at 81, a third quartile at 86, and a maximum at 91. Period 2 is represented by a box plot with a minimum at 84, a first quartile at 87, a median at 89, a third quartile at 91, and a maximum at 99.

The data in Period 1 has a wider spread, so there is more variation in the number of minutes students spent doing homework. Students from Period 2 tend to spend more time doing homework.

Notes

III. Volume of Prisms and Pyramids

Topic Practice

- A. Consider each set of figures. Use the given information to answer the questions. Round to the nearest hundredth, if necessary.

TEKS 7.8A (Topic-Aligned), TEKS 7.8B (Topic-Aligned)

	Rectangular Prism A	Rectangular Pyramid B
Length of Base	5.5 cm	5.5 cm
Width of Base	6.2 cm	6.2 cm
Height	12 cm	12 cm

1. What is the relationship between the dimensions of each figure?

The base of both figures has the same length and width. The height of both figures is the same.

3. What is the volume of each figure?

Rectangular Prism A

$$V = Bh$$

$$V = (34.1)(12)$$

$$V = 409.2 \text{ cm}^3$$

Rectangular Pyramid B

$$V = \left(\frac{1}{3}\right)Bh$$

$$V = \left(\frac{1}{3}\right)(34.1)(12)$$

$$V = 136.4 \text{ cm}^3$$

2. What is the area of the base of each figure?

The area of the base for each figure is the same.

$$A = bh$$

$$A = (5.5)(6.2)$$

$$A = 34.1 \text{ cm}^2$$

4. What is the relationship between the volume of each figure?

The volume of Rectangular Prism A is three times the volume of Rectangular Pyramid B.

	Triangular Prism A	Triangular Pyramid B
Length of Base	7.4 in.	7.4 in.
Height of Base	3.6 in.	3.6 in.
Height of Figure	9.5 in.	9.5 in.

5. What is the relationship between the dimensions of each figure?

The base of both figures has the same length and height. The height of both figures is the same.

7. What is the volume of each figure?

Triangular Prism A

$$V = Bh$$

$$V = (13.32)(9.5)$$

$$V = 126.54 \text{ in.}^3$$

Triangular Pyramid B

$$V = \left(\frac{1}{3}\right)Bh$$

$$V = \left(\frac{1}{3}\right)(13.32)(9.5)$$

$$V = 42.18 \text{ in.}^3$$

6. What is the area of the base of each figure?

The area of the base for each figure is the same.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(7.4)(3.6)$$

$$A = 13.32 \text{ in.}^2$$

8. What is the relationship between the volume of each figure?

The volume of Triangular Prism A is three times the volume of Triangular Pyramid B.

Notes



TOPIC 2 Area, Surface Area, and Volume

Notes

- B. Consider each set of figures. Use the given information to answer the questions. Round to the nearest hundredth, if necessary.

TEKS 7.8A (Topic-Aligned), TEKS 7.8B (Topic-Aligned)

	Rectangular Prism A	Rectangular Prism B
Length of Base	8.5 cm	8.5 cm
Width of Base	4.24 cm	4.24 cm
Height	2.5 cm	7.5 cm

1. What is the relationship between the dimensions of each figure?

The base of both figures has the same length and width. The height of Rectangular Prism B is 3 times the height of Rectangular Prism A.

3. What is the volume of each figure?

Rectangular Prism A

$$V = Bh$$

$$V = (36.04)(2.5)$$

$$V = 90.1 \text{ cm}^3$$

Rectangular Prism B

$$V = Bh$$

$$V = (36.04)(7.5)$$

$$V = 270.3 \text{ cm}^3$$

2. What is the area of the base of each figure?

The area of the base for each figure is the same.

$$A = bh$$

$$A = (8.5)(4.24)$$

$$A = 36.04 \text{ cm}^2$$

4. What is the relationship between the volume of each figure?

The volume of Rectangular Prism B is three times the volume of Rectangular Prism A.



TOPIC 2 Area, Surface Area, and Volume

	Triangular Prism A	Triangular Prism B
Length of Base	2.6 in.	2.6 in.
Height of Base	13.7 in.	13.7 in.
Height of Figure	21 in.	7 in.

5. What is the relationship between the dimensions of each figure?

The base of both figures has the same length and height. The height of Triangular Prism A is three times the height of Triangular Prism B.

7. What is the volume of each figure?

Triangular Prism A

$$V = Bh$$

$$V = (17.81)(21)$$

$$V = 374.01 \text{ in.}^3$$

Triangular Prism B

$$V = Bh$$

$$V = (17.81)(7)$$

$$V = 124.67 \text{ in.}^3$$

6. What is the area of the base of each figure?

The area of the base for each figure is the same.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(2.6)(13.7)$$

$$A = 17.81 \text{ in.}^2$$

8. What is the relationship between the volume of each figure?

The volume of Triangular Prism A is three times the volume of Triangular Prism B.

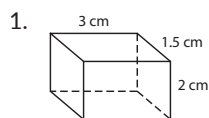
Notes



TOPIC 2 Area, Surface Area, and Volume

Notes

C. Determine the volume of each figure. TEKS 7.9A (Topic-Aligned)

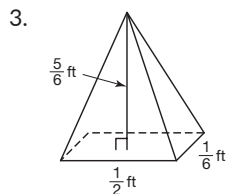


$$V = Bh$$

$$V = 3(1.5)(2)$$

$$V = 9 \text{ cm}^3$$

The volume of the rectangular prism is 9 cm^3 .

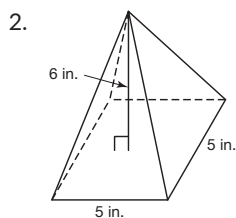


$$V = \frac{1}{3}Bh$$

$$V = \frac{1}{3}\left(\frac{1}{2}\right)\left(\frac{1}{6}\right)\left(\frac{5}{6}\right)$$

$$V = \frac{5}{216} \text{ ft}^3$$

The volume of the rectangular pyramid is $\frac{5}{216} \text{ ft}^3$.

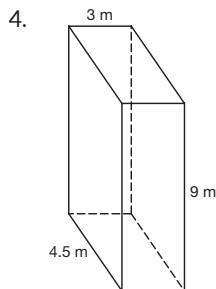


$$V = \frac{1}{3}Bh$$

$$V = \frac{1}{3}(5)(5)(6)$$

$$V = 50 \text{ in.}^3$$

The volume of the square pyramid is 50 in.^3 .



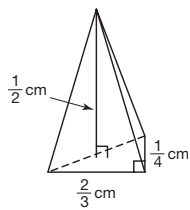
$$V = Bh$$

$$V = (4.5)(3)(9)$$

$$V = 121.5 \text{ m}^3$$

The volume of the rectangular prism is 121.5 m^3 .

5.



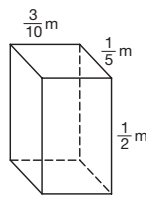
$$V = \frac{1}{3}Bh$$

$$V = \frac{1}{3}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)\left(\frac{1}{4}\right)\left(\frac{1}{2}\right)$$

$$V = \frac{1}{72}\text{ cm}^3$$

The volume of the triangular pyramid is $\frac{1}{72}\text{ cm}^3$.

6.



$$V = Bh$$

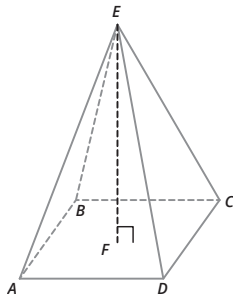
$$V = \left(\frac{3}{10}\right)\left(\frac{1}{5}\right)\left(\frac{1}{2}\right)$$

$$V = \frac{3}{100}\text{ m}^3$$

The volume of the rectangular prism is $\frac{3}{100}\text{ m}^3$.

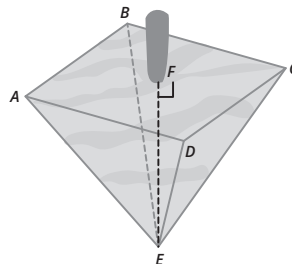
D. Determine each volume. Show your work. Round to the nearest hundredth, if necessary. TEKS 7.9A (Interleaved Practice)

- The given figure is a square pyramid. The side length of the base of the pyramid is 5 inches. The height of the pyramid is 3.3 inches. What is the volume of the pyramid?



$$27.5\text{ in.}^3$$

- You buy a spinning top for your younger cousin. The spinning top is a square pyramid. The side length of the base of the spinning top is 32 millimeters. The height of the spinning top is 32 millimeters. What is the volume of the spinning top?



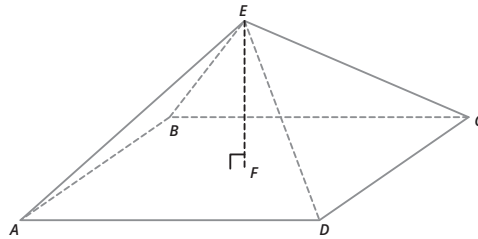
$$10,922.67\text{ mm}^3$$

Notes

TOPIC 2 Area, Surface Area, and Volume

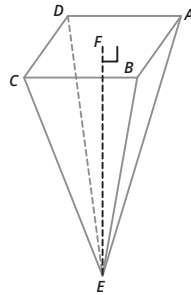
Notes

3. The given figure is a square pyramid. The side length of the base of the pyramid is 6.6 feet. The height of the pyramid is 12.672 feet. What is the volume of the pyramid?



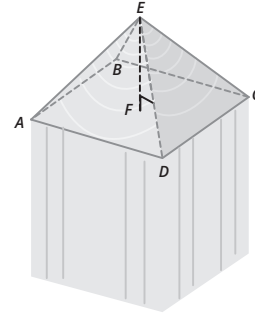
184.00 ft³

5. The given figure is a square pyramid. The side length of the base of the pyramid is 28 millimeters. The height of the pyramid is 14 millimeters. What is the volume of the pyramid?



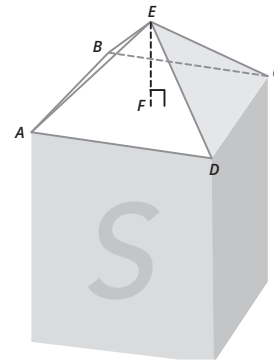
3658.67 mm³

4. Your aunt is building a new fence around her front yard. On top of each fence post is a square pyramid. The side length of the base of the fence post top is 10.1 centimeters. The height of the fence post top is 6.868 centimeters. What is the volume of the fence post top?



233.54 cm³

6. You see a salt shaker at a local restaurant. The top of the salt shaker is a square pyramid. The side length of the base of the salt shaker top is 15 millimeters. The height of the salt shaker top is 7.5 millimeters. What is the volume of the salt shaker top?



562.5 mm³

Extension

1. A rectangular pyramid has one half the volume of a rectangular prism with the same base area. What do you know about the height of the pyramid compared with the height of the prism?

Extension of TEKS 7.8A

The height of the pyramid must be 1.5 times the height of the prism.

Spaced Review

Solve each inequality. TEKS 7.11A

1. $7 > -0.8y + 27$

$$25 < y$$

2. $22\frac{1}{2} \leq -\frac{1}{4}g + 3$

$$22 \geq g$$

Notes



Notes

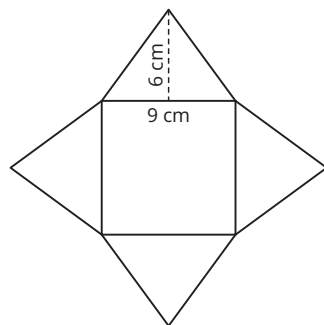
IV. Volume and Surface Area Problems with Prisms and Pyramids

Topic Practice

- A. Calculate the lateral surface area and total surface area of each polyhedron. Round to the nearest hundredth, if necessary.

TEKS 7.9D (Topic-Aligned)

1.



$$LA = 4\left(\frac{1}{2}\right)(9)(6)$$

$$LA = 108 \text{ cm}^2$$

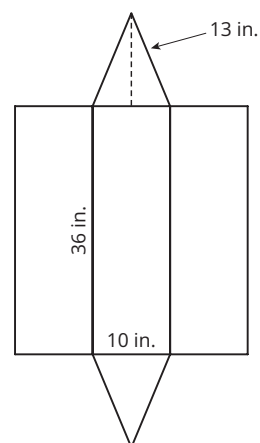
The lateral surface area of the square pyramid is 108 cm^2 .

$$B = (9)(9)$$

$$B = 81 \text{ cm}^2$$

The total surface area is 189 cm^2 .

2.



$$LA = 3(10)(36)$$

$$LA = 1080 \text{ in}^2$$

The lateral surface area of the triangular prism is 1080 in^2 .

$$B = \frac{1}{2}(10)(13)$$

$$B = 65 \text{ in}^2$$

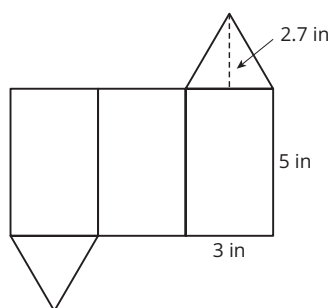
$$2B = 130 \text{ in}^2$$

The total surface area is 1210 in^2 .

TOPIC 2 Area, Surface Area, and Volume

Notes

5.



$$LA = 3(5)(3)$$

$$LA = 45 \text{ in.}^2$$

The lateral surface area of the triangular prism is 45 in.².

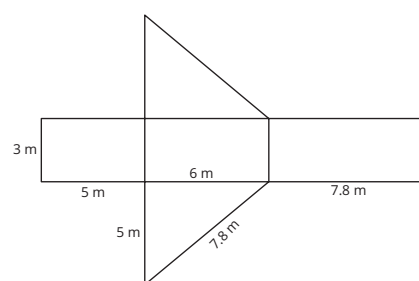
$$B = \frac{1}{2}(2.7)(3)$$

$$B = 4.05 \text{ in.}^2$$

$$2B = 8.1 \text{ in.}^2$$

The total surface area is 53.1 in.².

6.



$$LA = (3)(5) + (3)(6) + (3)(7.8)$$

$$LA = 56.4 \text{ m}^2$$

The lateral surface area of the triangular prism is 56.4 m².

$$B = \frac{1}{2}(5)(6)$$

$$B = 15 \text{ m}^2$$

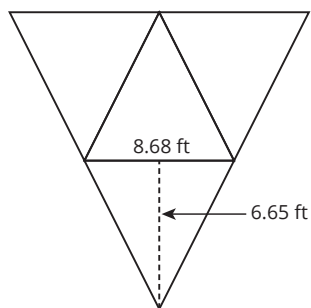
$$2B = 30 \text{ m}^2$$

The total surface area is 86.4 m².

TOPIC 2 Area, Surface Area, and Volume

Notes

3.

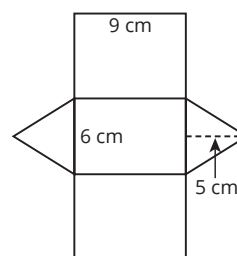


$$LA = 3\left(\frac{1}{2}\right)(8.68)(6.65)$$

$$LA = 86.58 \text{ ft}^2$$

The lateral surface area of the triangular pyramid is 86.58 ft².

4.



$$LA = 9(6)(3)$$

$$LA = 162 \text{ cm}^2$$

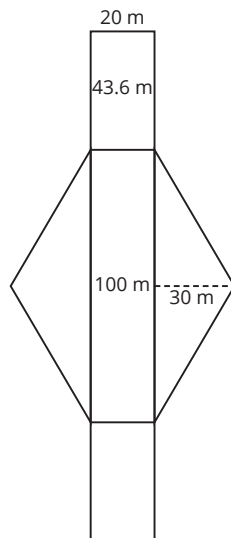
The lateral surface area of the triangular prism is 162 cm².

TOPIC 2 Area, Surface Area, and Volume

Notes

C. Calculate the total surface area of each polyhedron. Round to the nearest hundredth, if necessary. **TEKS 7.9D (Topic-Aligned)**

1.



$$LA = (20)(100) + (20)(43.6)(2)$$

$$LA = 3744 \text{ m}^2$$

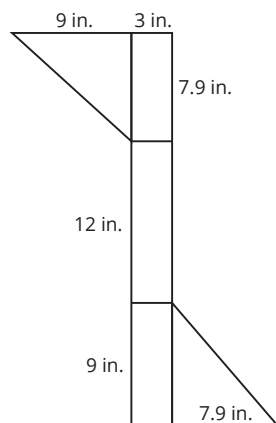
$$B = \frac{1}{2}(30)(100)$$

$$B = 1500 \text{ m}^2$$

$$2B = 3000 \text{ m}^2$$

The total surface area is 6744 m².

2.



$$LA = (7.9)(3) + (12)(3) + (9)(3)$$

$$LA = 86.7 \text{ in.}^2$$

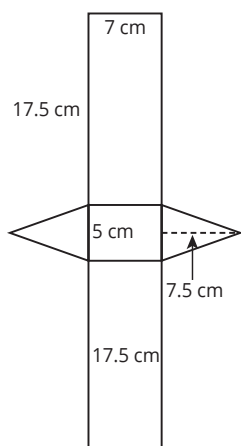
$$B = \frac{1}{2}(9)(7.9)$$

$$B = 35.55 \text{ in.}^2$$

$$2B = 71.1 \text{ in.}^2$$

The total surface area is 157.8 in.².

3.



$$LA = (5)(7) + (17.5)(7)(2)$$

$$LA = 280 \text{ cm}^2$$

$$B = \frac{1}{2}(5)(7.5)$$

$$B = 18.75 \text{ cm}^2$$

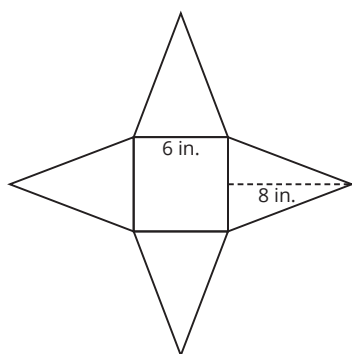
$$2B = 37.5 \text{ cm}^2$$

The total surface area is 317.5 cm^2 .

Notes

Notes

4.



$$LA = \frac{1}{2}(6)(8)(4)$$

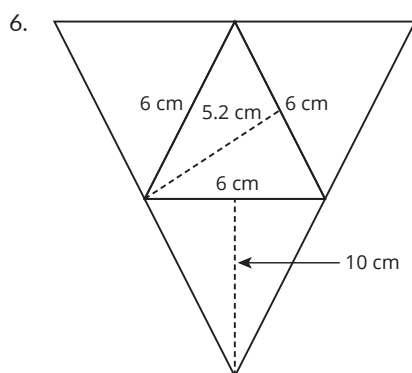
$$LA = 96 \text{ in.}^2$$

$$B = (6)(6)$$

$$B = 36 \text{ in.}^2$$

The total surface area is 132 in.^2 .

Notes



$$LA = \left(\frac{1}{2}\right)(6)(10)(3)$$

$$LA = 90 \text{ cm}^2$$

$$B = \left(\frac{1}{2}\right)(6)(5.2)$$

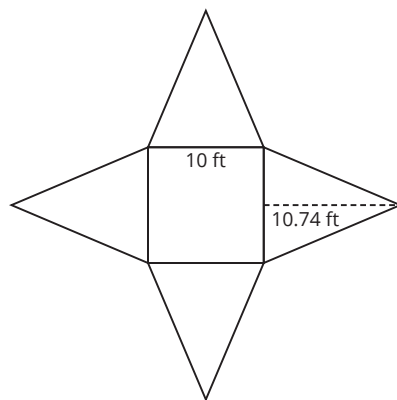
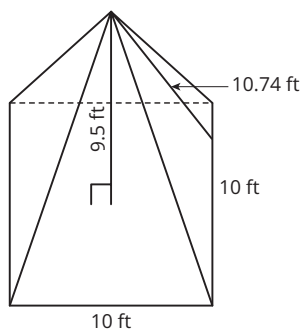
$$B = 15.6 \text{ cm}^2$$

The total surface area is 105.6 cm².

Notes

- D. Determine the surface area, volume, or lateral surface area of each polyhedron. Explain how you determined which value to calculate based on the problem situation. **TEKS 7.9A (Interleaved Practice),**
TEKS 7.9D (Interleaved Practice)

1. Elijah needs to recover the sides of his tent in nylon. How much nylon will he need?



Because I want to know the amount of nylon that will cover the triangular faces of the tent, I can calculate the lateral surface area of the square pyramid.

$$LA = \frac{1}{2}Pl = \frac{1}{2}(40)10.74 = 214.8 \text{ ft}^2$$

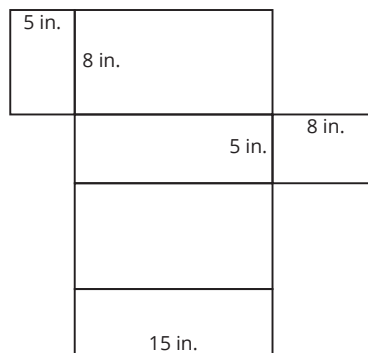
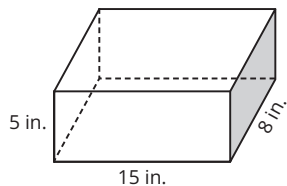
Elijah needs 214.8 square feet of nylon to recover his tent.



TOPIC 2 Area, Surface Area, and Volume

Notes

2. Kai places a gift in a gift box and wraps it for his cousin. How much wrapping paper does he use to cover the box?



Because I want to know the amount of wrapping paper it will take to cover the entire box, I can calculate the total surface area of the rectangular prism.

$$\begin{aligned} SA &= 2(lw) + 2(wh) + 2(lh) \\ &= 2(15 \cdot 8) + 2(8 \cdot 5) + 2(15 \cdot 5) \\ &= 240 + 80 + 150 \end{aligned}$$

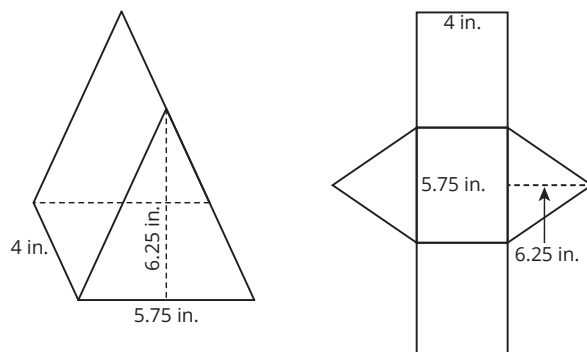
$$SA = 470 \text{ in.}^2$$

Kai needs 470 square inches of wrapping paper.

TOPIC 2 Area, Surface Area, and Volume

Notes

4. Aaliyah is making blocks for her nephew. She carves the blocks out of wood then paints them blue. How much paint will she need to paint this block?



Because I want to know how much paint is needed to cover the entire block, I can calculate the total surface area of the triangular prism.

Surface Area of Lateral Faces:

$$SA = 3(5.75)(4)$$

$$SA = 69 \text{ in.}^2$$

Surface Area of Bases:

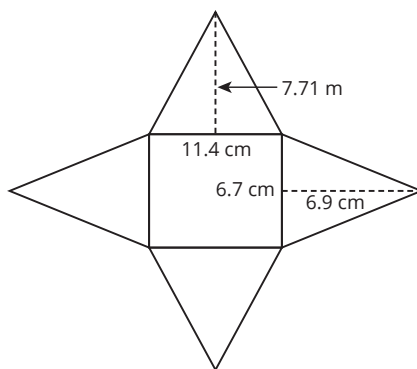
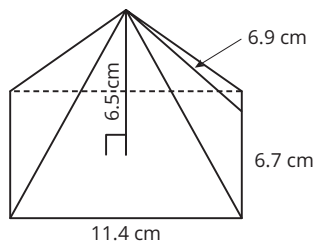
$$SA = 2\left(\frac{1}{2}(5.75)(6.25)\right)$$

$$SA = 35.94 \text{ in.}^2$$

$$\text{Total surface area: } 69 + 35.94 = 104.94$$

Aaliyah needs 104.94 in.^2 of blue paint.

5. Noah is building a model of a pyramid. He builds the pyramid out of cardstock. He then fills the pyramid with sand to weigh it down. How much sand will he need to fill this pyramid?



Because I want to know how much sand is needed to fill the pyramid, I can use the formula for the volume of a rectangular pyramid.

$$V = \frac{1}{3}(11.4)(6.7)(6.5)$$

$$V = 165.49 \text{ cm}^3$$

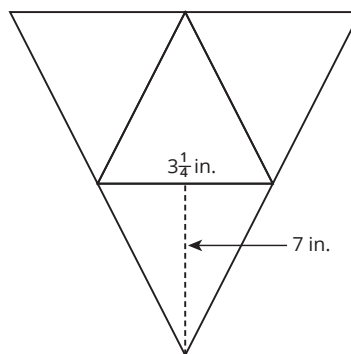
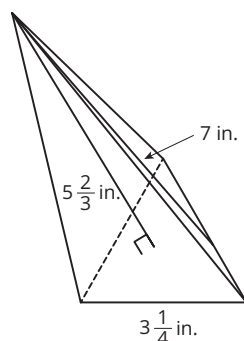
Noah will need 165.49 cubic centimeters of sand to fill the pyramid.

Notes

TOPIC 2 Area, Surface Area, and Volume

Notes

6. Ava is decorating hanging glass sun catchers. She paints every face of a sun catcher except the base. How much paint does she need to paint one sun catcher?



Because I want to know how much paint is needed to cover all of the lateral faces of the sun catcher, I can calculate the lateral surface area of the triangular pyramid.

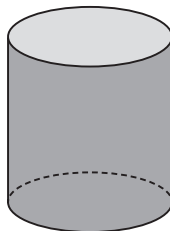
$$LA = 3\left(\frac{1}{2}\right)\left(3\frac{1}{4}\right)(7)$$

$$LA = 34.13 \text{ in.}^2$$

Ava will need 34.13 in.^2 of paint to cover the sun catcher.

Extension

1. You have learned about the diameter, radius, and circumference of circles. How could you determine the surface area of a cylinder, like the one shown? **TEKS 8.7B: Extension of TEKS 7.9D**

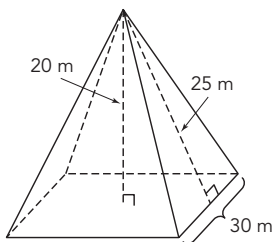


The total surface area of a cylinder is the total area of the bases, $2\pi r^2$, plus the area of the side, which is a rectangle with a height that is the height of the cylinder and a width that is the circumference of the circular base, $2\pi rh$. So, $2\pi r^2 + 2\pi rh$, or $2\pi r(r + h)$.

Spaced Practice

Calculate the volume of each square pyramid. **TEKS 7.9A**

- 1.



6000 cubic meters

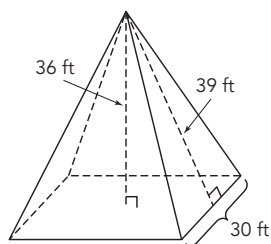


Notes

TOPIC 2 Area, Surface Area, and Volume

Notes

2.



10,800 cubic feet

Draw each pair of special angles. **TEKS 7.11C**

3. Draw a pair of supplementary angles. Explain why the angles are supplementary.

Drawings will vary, but the sum of the angle measures must equal 180 degrees.

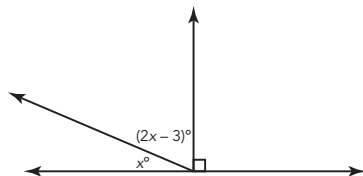
4. Draw a pair of complementary angles. Explain why the angles are complementary.

Drawings will vary, but the sum of the angle measures must equal 90 degrees.

Notes

Write an equation and solve for the unknown angle measures in each figure. **TEKS 7.11C**

5.

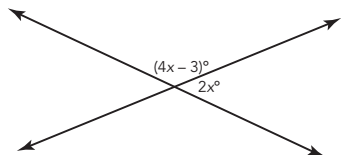


$$x + 2x - 3 = 90$$

$$x = 31^\circ$$

One angle is 31° ; the other angle is 59° .

6.



$$4x - 3 + 2x = 180$$

$$x = 30.5$$

One angle is 61° ; the other angle is 119° .



ISBN: 189-7-19673-467-3

© 2024 Texas Education Agency. Portions of this work are adapted,
with permission, from the originals created by and copyright
© 2021 Carnegie Learning, Inc.

This work is licensed under a Creative Commons Attribution-Non-Commercial-
4.0 International License.

You are free:

to Share—to copy, distribute, and transmit the work

to Remix—to adapt the work

Under the following conditions:

Attribution—You must attribute any adaptations of the work in the following manner:

This work is based on original works of the Texas Education Agency and
Carnegie Learning, Inc. This work is made available under a Creative
Commons Attribution-Non-Commercial-4.0 International License. This does
not in any way imply endorsement by those authors of this work.

NonCommercial—You may not use this work for commercial purposes.

With the understanding that:

For any reuse or distribution, you must make clear to others the license terms of this
work. The best way to do this is with a link to this web page:

<https://creativecommons.org/licenses/by-nc/4.0/>

Trademarks and trade names are shown in this book strictly for illustrative
and educational purposes and are the property of their respective owners.
References herein should not be regarded as affecting the validity of said
trademarks and trade names.

Printed in the USA

Images

www.pixabay.com