Curious Miguel Asks about Soil

Texas Education Agency

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region 4

This is Miguel. Miguel is in third grade. He has chores to do at home.

One of Miguel’s chores is to put the scraps in the bin. Vegetable and fruit scraps go in the bin. Leaves from the yard go in the bin. The bin is a compost bin.

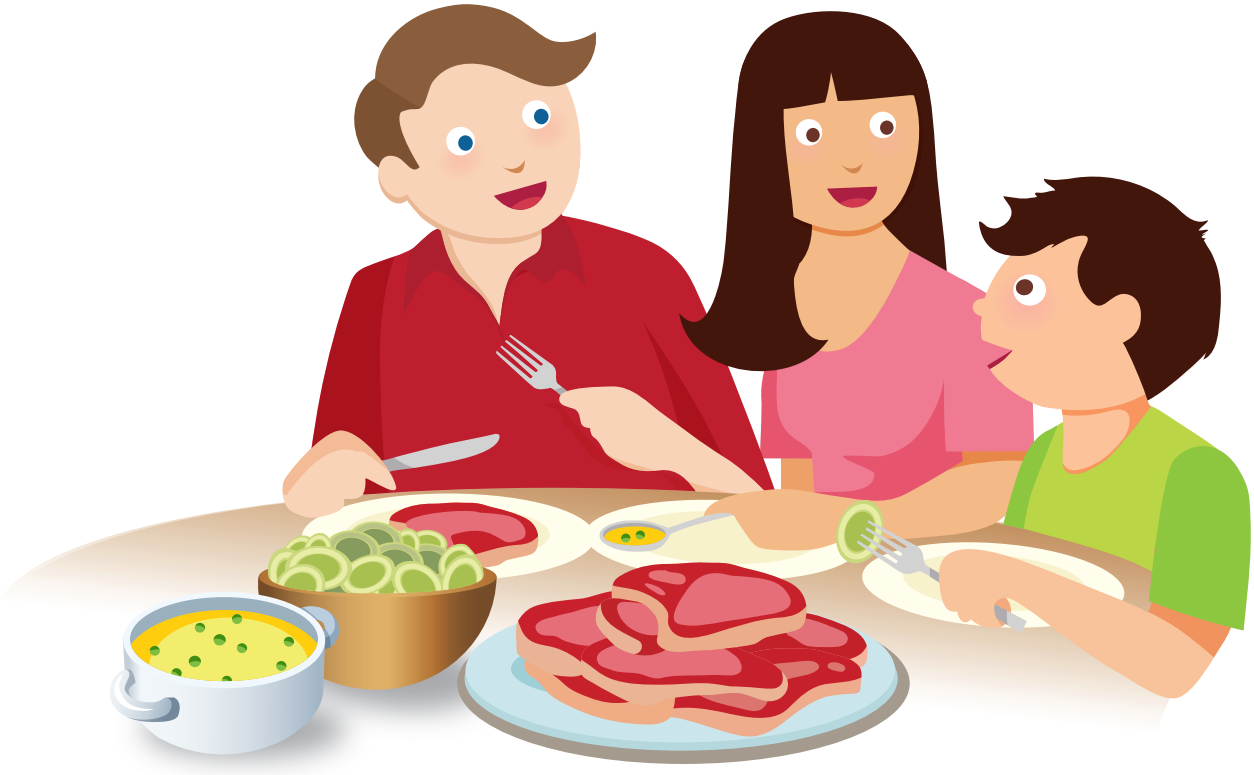
Miguel looks inside the bin. It looks gross and smells funny. *Mamá* says the scraps are decomposing.

Mamá takes the dark material from the bin. She adds it to the soil in her flower garden. Miguel does not know why she does this.

"*Mamá*?" Miguel asked at dinner.

"Yes, what is it?" Miguel's mother replied.

"Why do you put the dark material from the compost bin in the flower garden?" Miguel questioned.



“You have so many questions, Miguel. You are your father’s child,” *Mamá* replied.

“Miguel, you should call your Aunt Sarah. She is a soil scientist. I’m sure she would love to answer all your questions,” Miguel’s father said.

Miguel smiled. “Thanks, Dad. Can I call her tonight?”

“Yes, Miguel. Now finish your dinner,” his father replied.

After dinner, Miguel called his Aunt Sarah.

“Hi, it’s Miguel. I have some questions about soil. Dad said you work with soil,” he said excitedly.

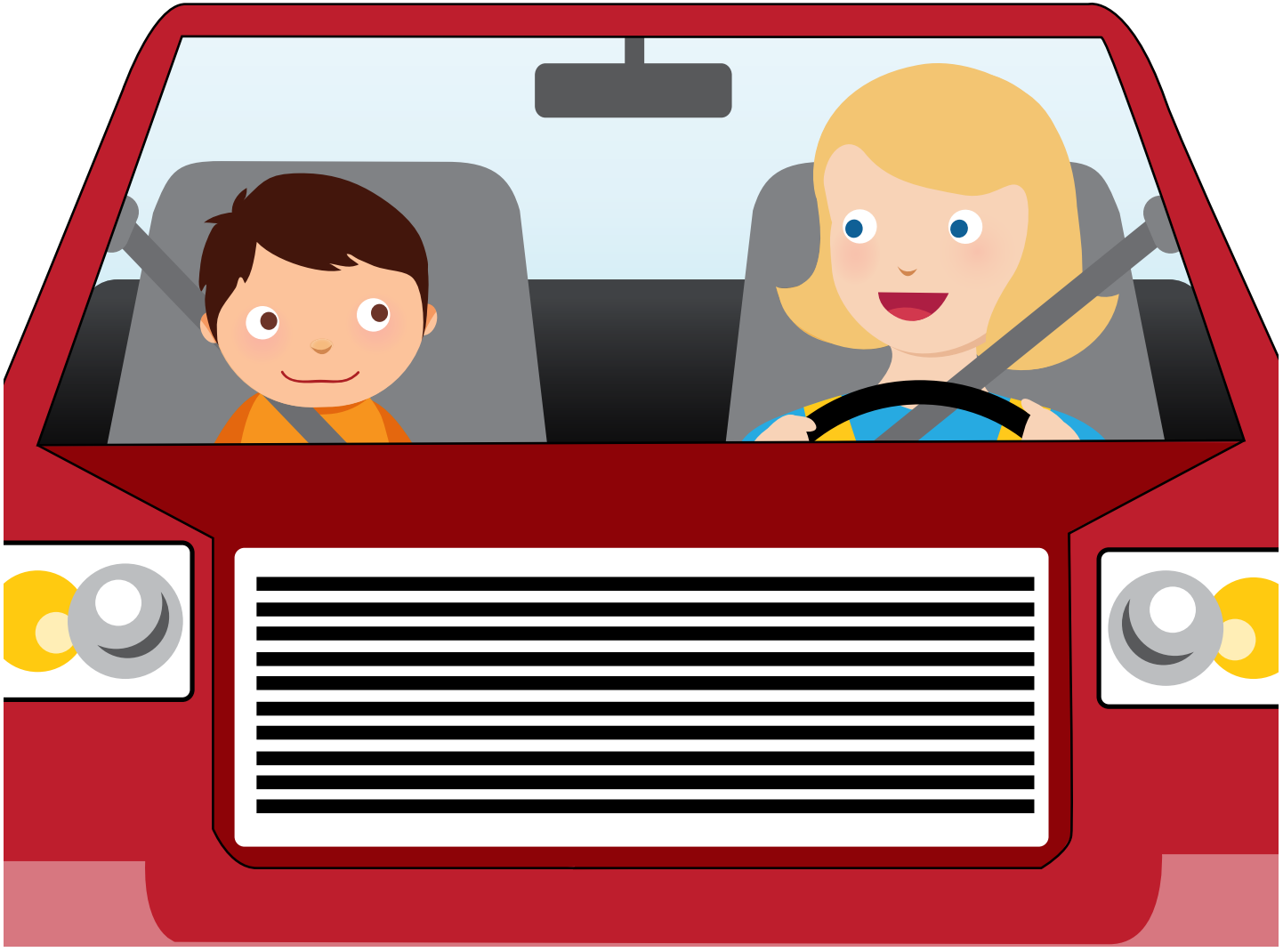
“Hi, Miguel, it is good to hear from you. I do work with soil,” Aunt Sarah said.

“I would love to talk to you about it. Can you come to work with me on Thursday afternoon?” she asked.

“My Dad and *Mamá* said I can. I have a half day at school that day,” Miguel replied happily.

“Great! See you then, Miguel,” Aunt Sarah said.

Aunt Sarah picked up Miguel from school on Thursday. She drove him to her field office. It was in a farming community.



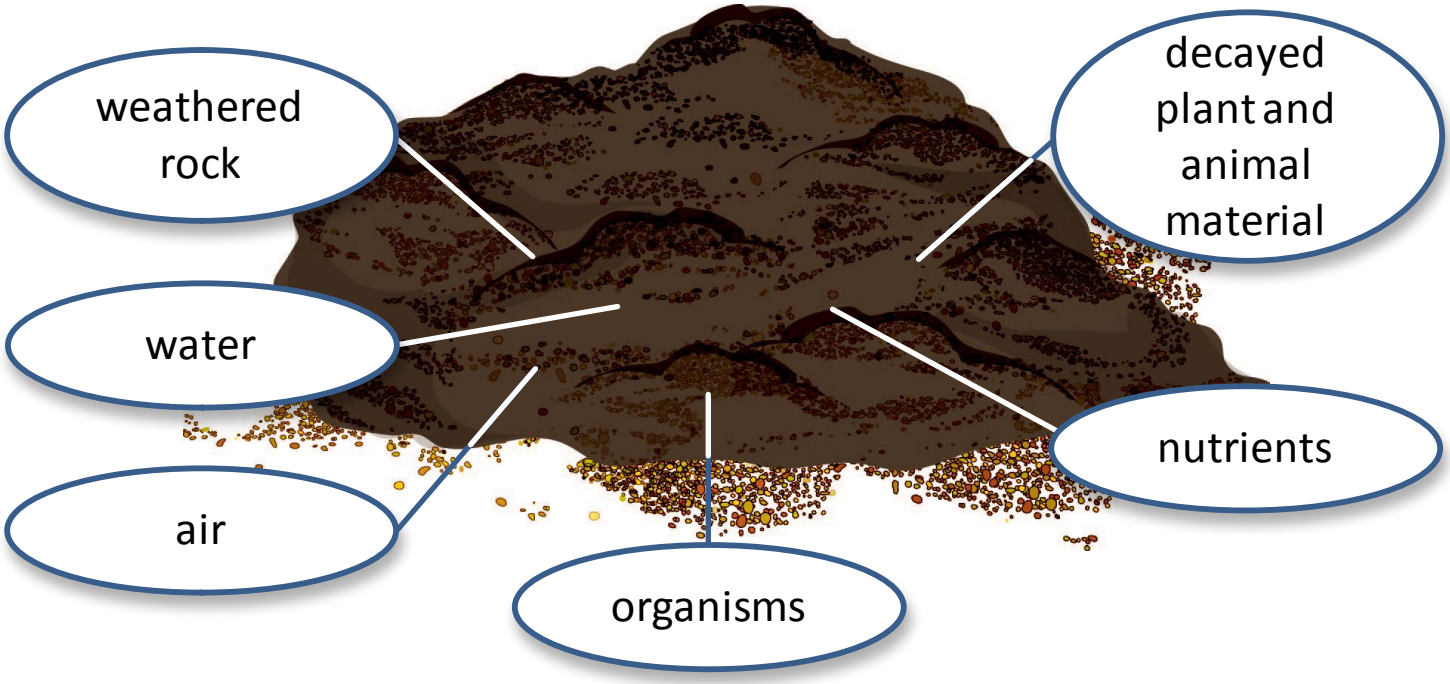
“Tell me what you know about soil,” Aunt Sarah said.

“Well,” Miguel said, “it has rocks and leaves in it and sometimes worms.”

Miguel continued, “Soil is made of many components. I learned that in first grade.”

“Soil is made of many things,” Aunt Sarah said. “But do you know about weathered rocks, where the story of soil begins?”

Aunt Sarah showed Miguel some of the soil samples she had collected.



Miguel asked, “What are weathered rocks? Are they rocks that have been through a thunderstorm?”

“Not quite, Miguel,” Aunt Sarah replied. “*Weathered* is another word for broken down.”

She explained, “Bedrock is the layer of solid rock you see as hard ground. It is where soil begins.”

Aunt Sarah continued, “Bedrock is weathered by water, wind, or ice. Huge pieces of bedrock are broken down into pebbles.”

“And pebbles are weathered into small pieces of rock?” Miguel added.

“Yes, weathered, or broken down, rocks are part of soil. The rocks were broken down over time. A very long time,” Aunt Sarah replied.

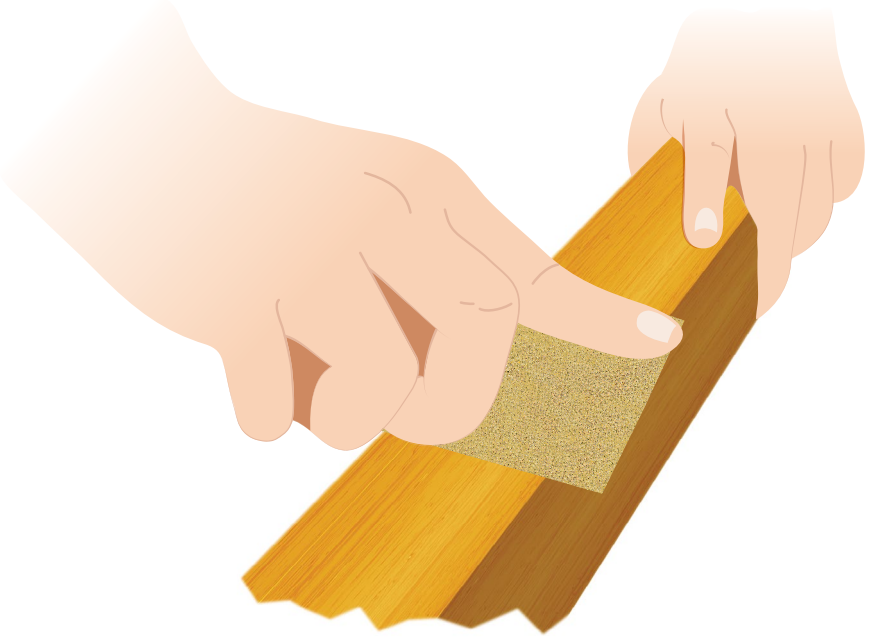
“Water, wind, or ice can cause weathering, right?” Miguel asked.

“That’s right,” Aunt Sarah said with a smile. “Water, wind, and ice break rocks into smaller and smaller pieces.”

Aunt Sarah continued, “The weathering is like sanding a piece of wood. Using the sandpaper on the corners makes them rounded.”

“Okay. Sanding the wood makes it smaller. Weathering of rocks is the same. But weathering takes a lot longer than sanding wood,” Miguel said.

“Exactly,” Aunt Sarah replied. “Most rocks are weathered this way—from boulders to pebbles to sand.”



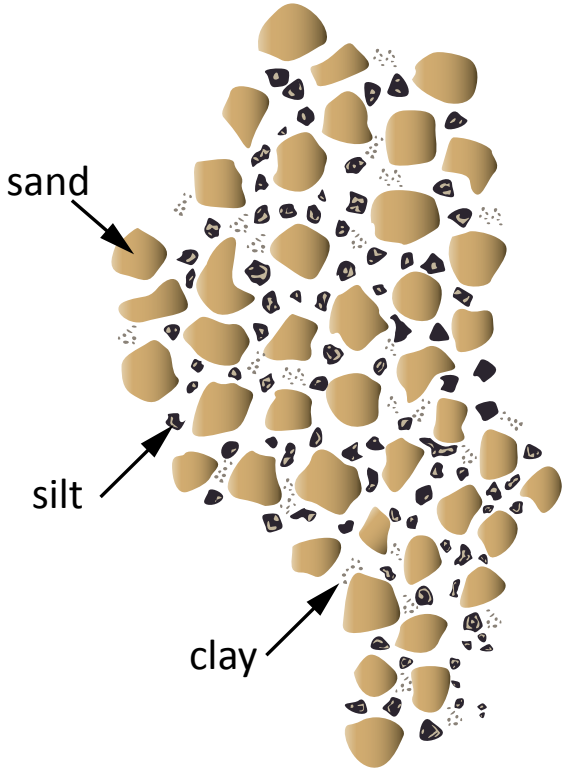
“So the small rocks that I find on the playground used to be part of a larger rock?” Miguel asked.

“Yes, after a while they become so small that they are hard to see even with a hand lens,” Aunt Sarah replied.

“Sand is made of many small weathered pieces of rock.”

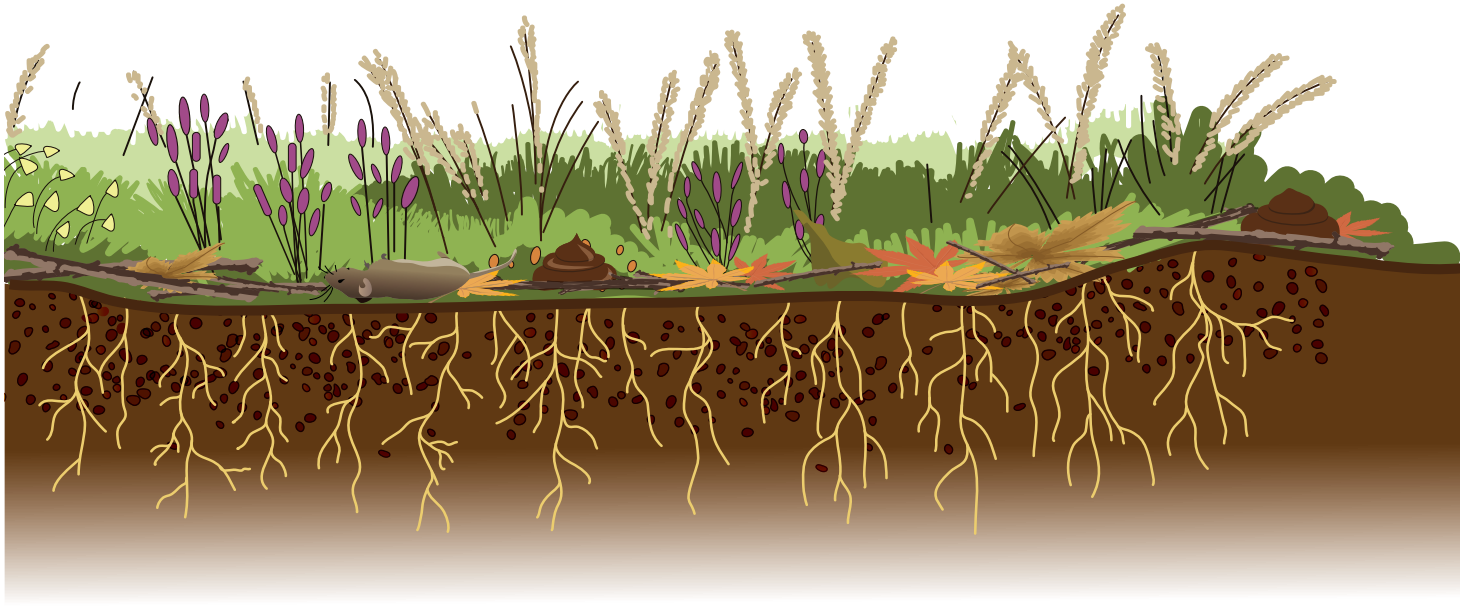
“Silt particles are even smaller than sand.”

“Clay is made of smaller pieces of rock.”



“I study many types of soil. I see different amounts of sand, silt, and clay in all of them. We could never have soil without the weathering of rock,” Aunt Sarah continued. “But then again, we could never have soil without plants and animals.”

Miguel looked puzzled. “How do plants and animals help?” he asked.



“Small plants begin to grow in the soil. Leaves and other plant parts fall on the soil. Some plants die and fall on top of the soil. This is where the process of decomposition begins,” Aunt Sarah replied.

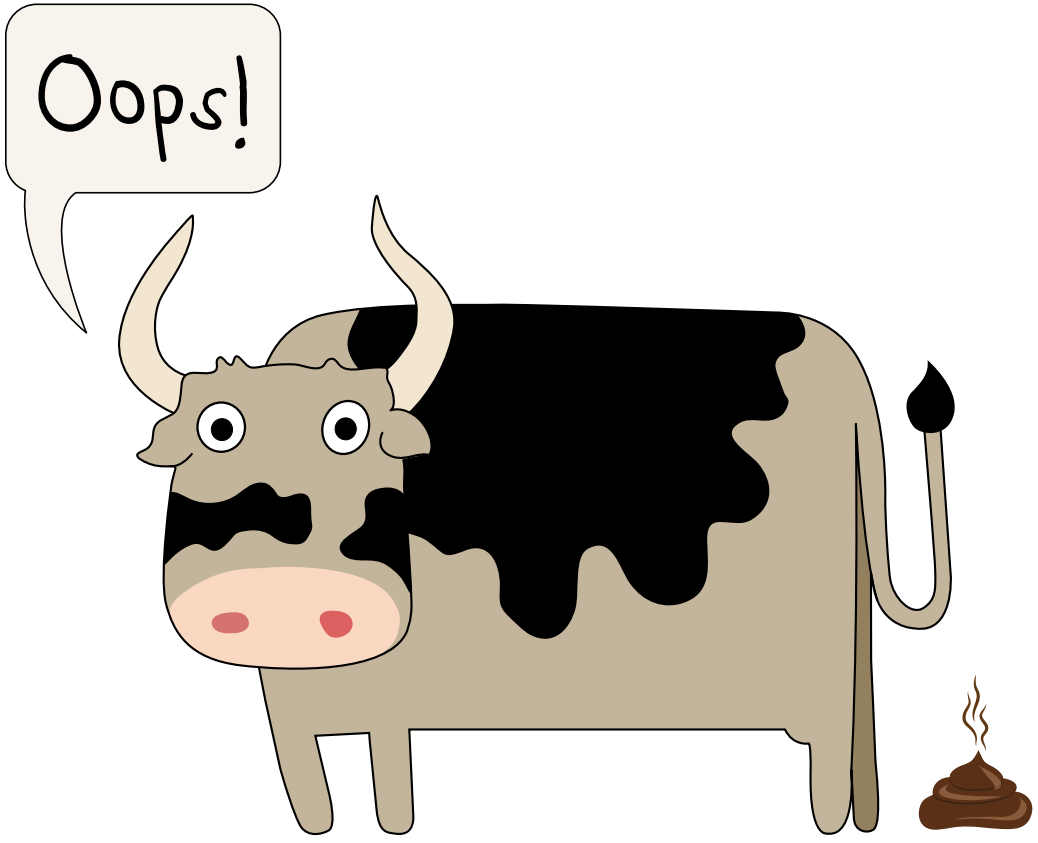
"Oh, I see," Miguel said. "*Mamá* said the scraps in the bin are decomposing. What does that mean?" he asked.

"Decomposition is when the remains of plants and animals decompose or decay," Aunt Sarah said.

"So the scraps are plant remains?" Miguel asked.

"Yes. Remains are the parts of plants or animals that are left behind after they die," Aunt Sarah replied.

“It is not just plant and animal remains. Cow manure and other waste products get mixed with the plant remains,” Aunt Sarah said. “After decomposition, you are left with humus.”



“So humus has animal poop in it, too? That’s really yucky, Aunt Sarah. What does humus look like? How does it help us?” Miguel replied.

“Humus is a dark brown or black material. It does not look like its ingredients. Humus has a lot of nutrients that are good for the soil to support life,” Aunt Sarah said.

“You said *Mamá* takes the dark material from the bin and puts it in her garden. What do you think is happening in the bin?” Aunt Sarah asked.

“I think the scraps are decomposing in the bin. That would mean that the dark-colored stuff *Mamá* is putting in the flower beds is humus!” Miguel exclaimed.

“That’s right. What would happen if you didn’t pick up the leaves from the yard and put them in the compost bin, Miguel?” Aunt Sarah asked.

“They’d stay on the ground,” Miguel responded.

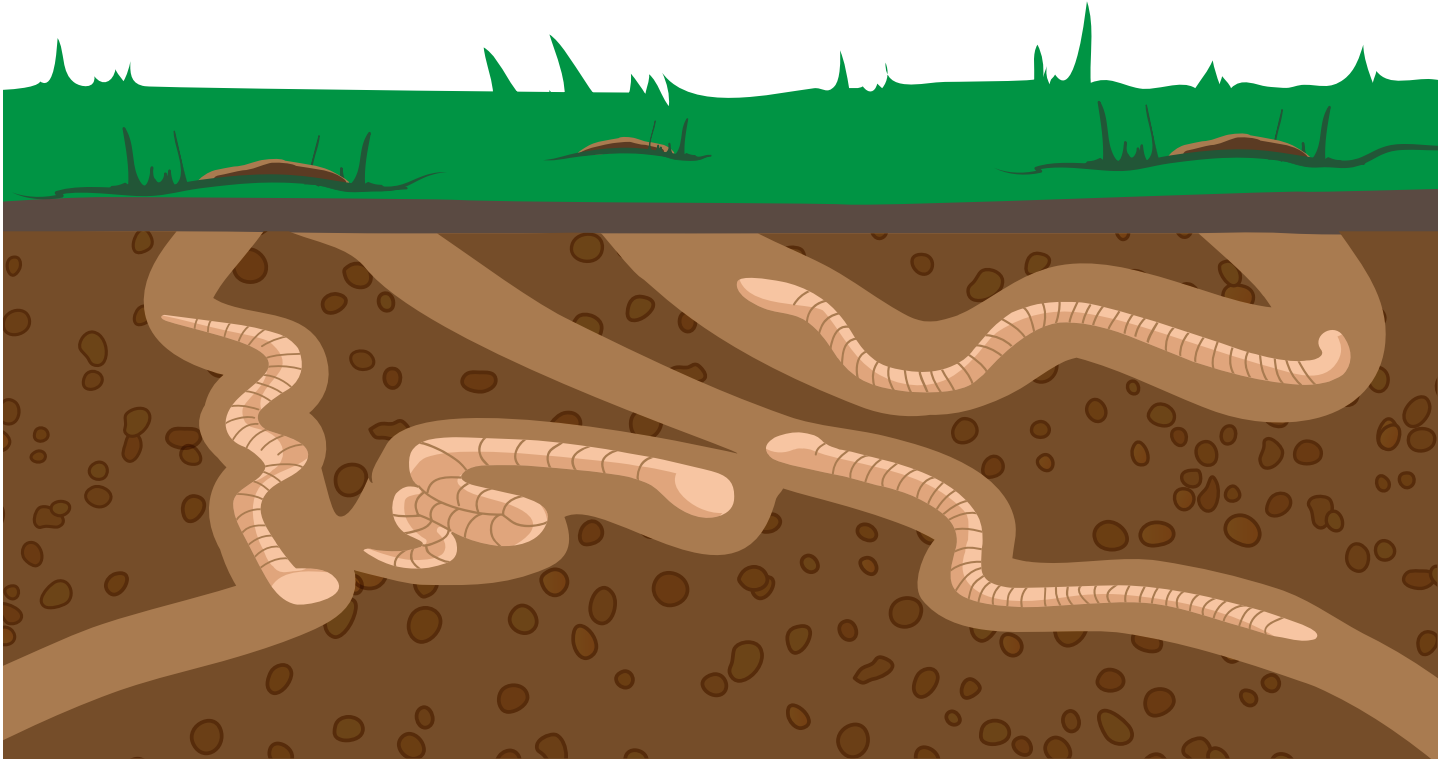
“Correct. They would pile together with other remains left on the ground to decompose and form humus,” Aunt Sarah said.

“How do they de-com-pose?” Miguel asked, pronouncing the word slowly.

“There are worms and insects that help with the decomposition,” Aunt Sarah explained.

“Really?” Miguel asked. “I did not know that.”

“Yes. There are also small organisms that you cannot see with just your eyes,” Aunt Sarah said.



“They help decompose, or break down, the plant and animal remains. Humus is what is left,” Aunt Sarah said. Miguel used Aunt Sarah’s microscope to look at a soil sample.

“So, why do you think your *Mamá* adds the material from the bin to the flower beds?” Aunt Sarah asked.

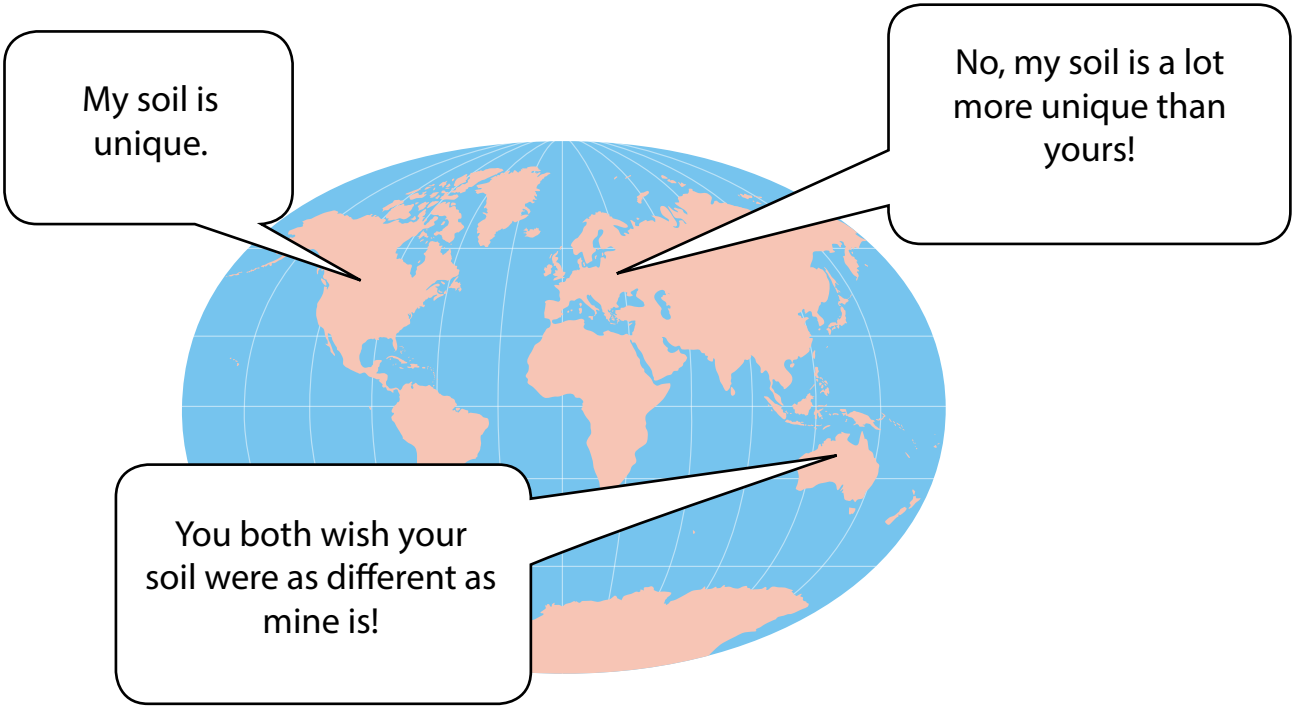
“Maybe she adds it to the soil to make the recipe right, or better,” Miguel thought. “She wants to make the soil recipe right for the flowers.”

“I think she adds it because the soil in her garden needs help,” Miguel said. “*Mamá* is changing the recipe of the soil in her flower bed. Just like when she adds salt to a recipe, right?”

“Yes, Miguel. Rock particles and humus mix through the soil as plants push with their roots,” Aunt Sarah said.

“There are different types of soil in the world. The type of soil is based on what is in it,” Aunt Sarah said.

“So, different plants decompose and different rocks are weathered, and this makes different soils, right?” Miguel asked.



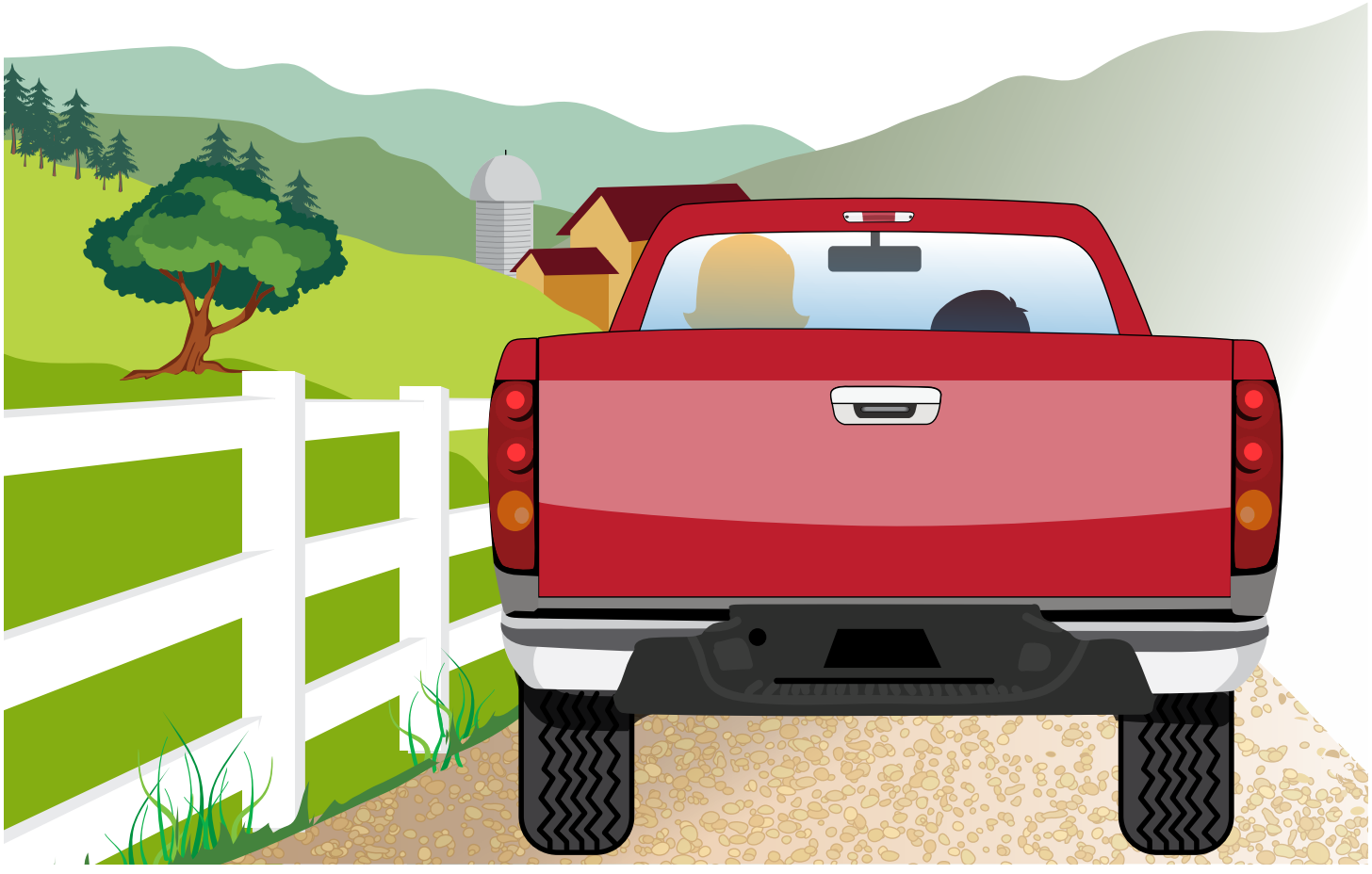
“Yes. I help areas like this one make sure their soil is right for growing crops,” Aunt Sarah explained. “Soil is always forming. It forms over time as more rock is weathered and more plant and animal materials decompose.”

Soil

- particles of weathered rock
- humus
- air
- water
- living organisms

"I think I understand it now," Miguel said. "Soil forms from the weathering of rock into small particles. The particles combine with humus. It is like a recipe. The types of plants and rocks in the environment determine what is in the soil."

“That’s right,” Aunt Sarah replied. “Now let’s get you home in time for dinner.”



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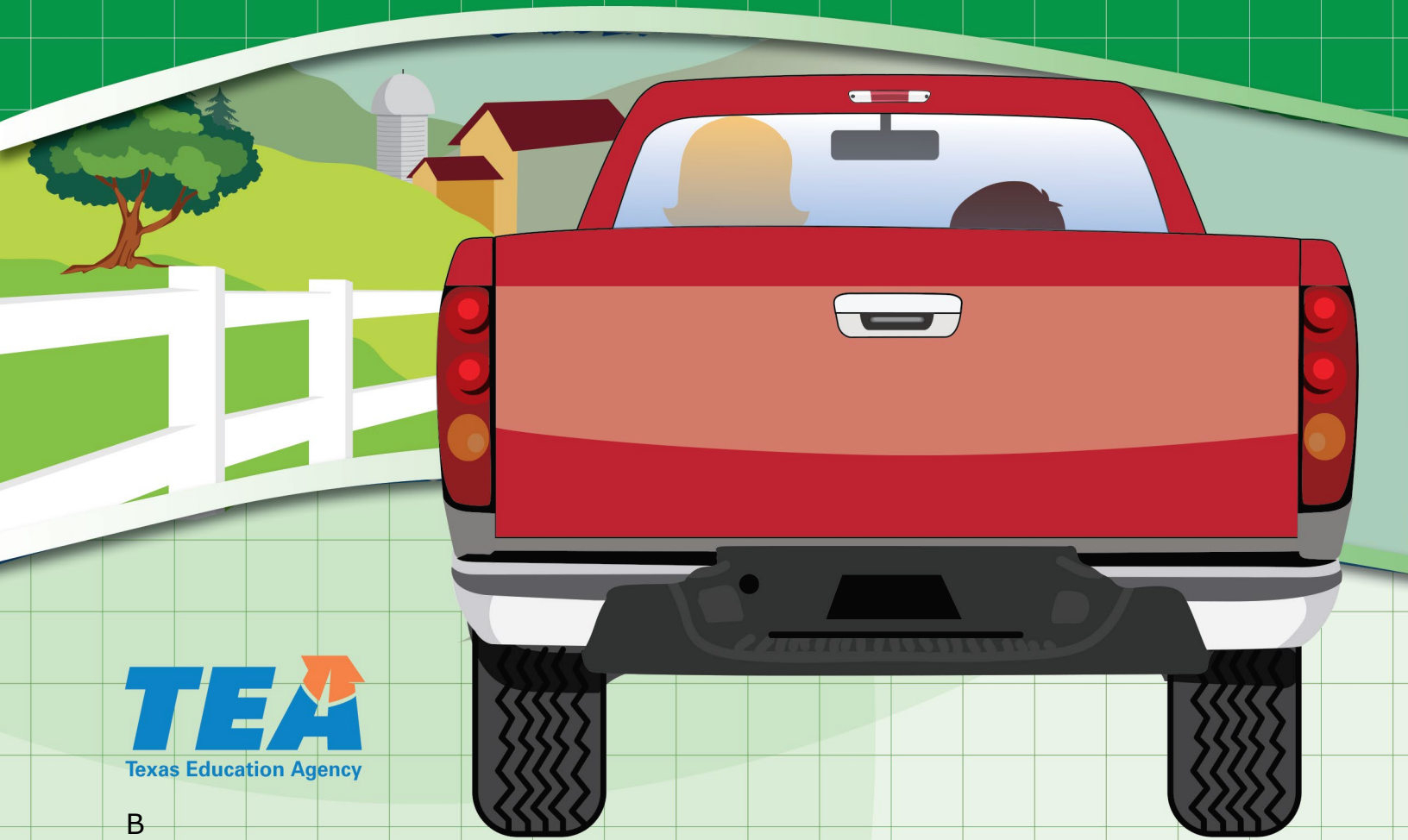

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