

The Science of Slipping Up

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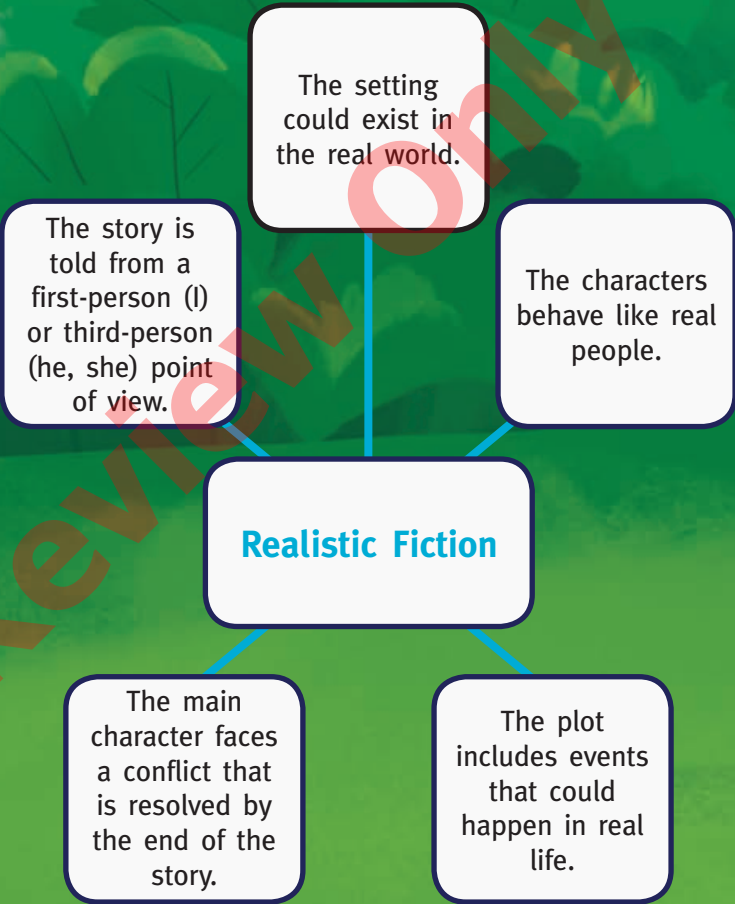


REALISTIC FICTION
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The NanoRovers

Soraya Ochoa lifted the flap of her backpack and took out the earphone case she had made out of an old breath mint container. She plugged her headphones into the library computer.

“Please work,” she mumbled.

Music always helped Soraya focus while she studied. She also wanted to tune out the NanoRovers. The robotics club met on Tuesday afternoons in the library. They were sitting near where Soraya worked while her older sister was at soccer practice.



The bins full of gears and gadgets at the NanoRovers' table tugged at Soraya like a magnet. She stared down at her homework, trying not to look over there.

But it didn't work. Soraya frowned and yanked out her headphones. When she looked up, Ms. Coleman, the club adviser, was holding up a battery and some wires. Homework would have to wait.

Soraya scooted closer—so close she could have reached out and poked Gabby Galindo on the shoulder. She watched as Ms. Coleman passed out pencils—the special kind they used in art class—and instructed the NanoRovers to draw a loop, broken in two places.

“Make sure your lines are thick and dark,” Ms. Coleman said.

Soraya couldn't resist. She reached into the pouch she had made out of an old fuzzy sock and a zipper and took out a pencil. She drew a loop along the margins on a sheet of notebook paper.

The NanoRovers were struggling with their latest challenge: to build a robo-racer using only objects they could find in the cafeteria recycling bin. They thought it would be easy, but when it was time to test the race car, it wouldn't move.

"Ms. Coleman, why can't you just tell us what's wrong?" Mark Cho nagged.

"I'll give you a hint," Ms Coleman said. "What you have here is a circuit problem. So today you are going to create your own circuit, using a battery, a lightbulb, and your pencils."

Soraya pressed her own pencil down harder. Too hard. The point snapped off with a loud crack. She looked up, her cheeks growing warm. *Had anyone noticed?* Gabby turned around. She pointed to an empty seat at the table, inviting Soraya to join them.

Soraya shook her head *no* and stretched her arms to hide the circuit she had just sketched. She didn't know anything about robots, after all. She had never worked with any of those gadgets and gears.

“Now,” Ms. Coleman continued, “who can tell me what the inside of a pencil is made of?”

“Easy,” Mark Cho answered. “Lead.”

“A common mistake,” Ms. Coleman replied. “No. It isn’t lead. Any other guesses?”

“Graphite,” Soraya muttered, sliding the pencil case into her backpack.

“Excuse me?” Ms. Coleman asked. “Miss Ochoa, did you say something?”

Soraya glanced up. Ms. Coleman was looking at her, and so was the whole robotics club.



“I think she said ‘graphite,’” Gabby said, turning back to Ms. Coleman.

“N-no,” Soraya sputtered. “I didn’t say anything.” She sure wished she hadn’t spoken up. What if she had been wrong?

“Well, if you had said ‘graphite,’ you would have been right,” Ms. Coleman replied. “Graphite has a very important property. Watch.”

Ms. Coleman held up a piece of paper on which she had drawn a dark, oval-shaped loop with two small gaps on either end. Then she placed the paper at the center of the table where all the NanoRovers could see it. Once again, Soraya couldn’t help it. She slid her chair even closer and watched as Ms. Coleman took an LED light from a basket. The light had two wires poking out of it.

Ms. Coleman gently bent the wires and taped each one to either side of the broken ends of her graphite oval, as if she were building a bridge over the gap. Then she placed a battery on the other side of the oval. The light glowed.



“I’ve created a very simple circuit,” explained Ms. Coleman. “This experiment works because graphite is conductive. Who remembers what *conductive* means?”

The NanoRovers were silent. Some twirled their pencils. Some stared down at their shoes as if they had just noticed frogs tap-dancing on them. The clock on the wall tick-tick-ticked.

“Anyone?” Ms. Coleman asked.

“It means it can carry electricity,” Soraya blurted out. Now the NanoRovers were staring at her. Her cheeks went from warm to hot.

“That’s right,” Ms. Coleman said. Then she added, “Come join us, Soraya, and bring your circuit, too.”

Soraya bit her lip as she walked over to the robotics table. She took out her circuit drawing and put it on the table. Ms. Coleman looked at Soraya’s circuit, nodded, and then pushed the basket of LED lights toward her.

“Go ahead and test it. You were paying attention to what I did, right?”

Soraya tried not to think about all the eyes that were glued to her face like syrup after Sunday breakfast. She took one of the lights, bent the wires, and taped them to her circuit.

Ms. Coleman handed her the battery. Soraya took a deep breath. Her hand shook as she placed the battery on the other end of the circuit and watched the LED. What if it didn't work?

It didn't glow. It didn't even flicker.

