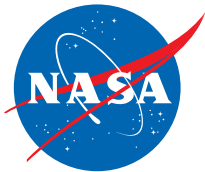


Educational Product	
Educators and Students	Grades K-4
NP-2020-02-005-JSC	

National Aeronautics and Space Administration



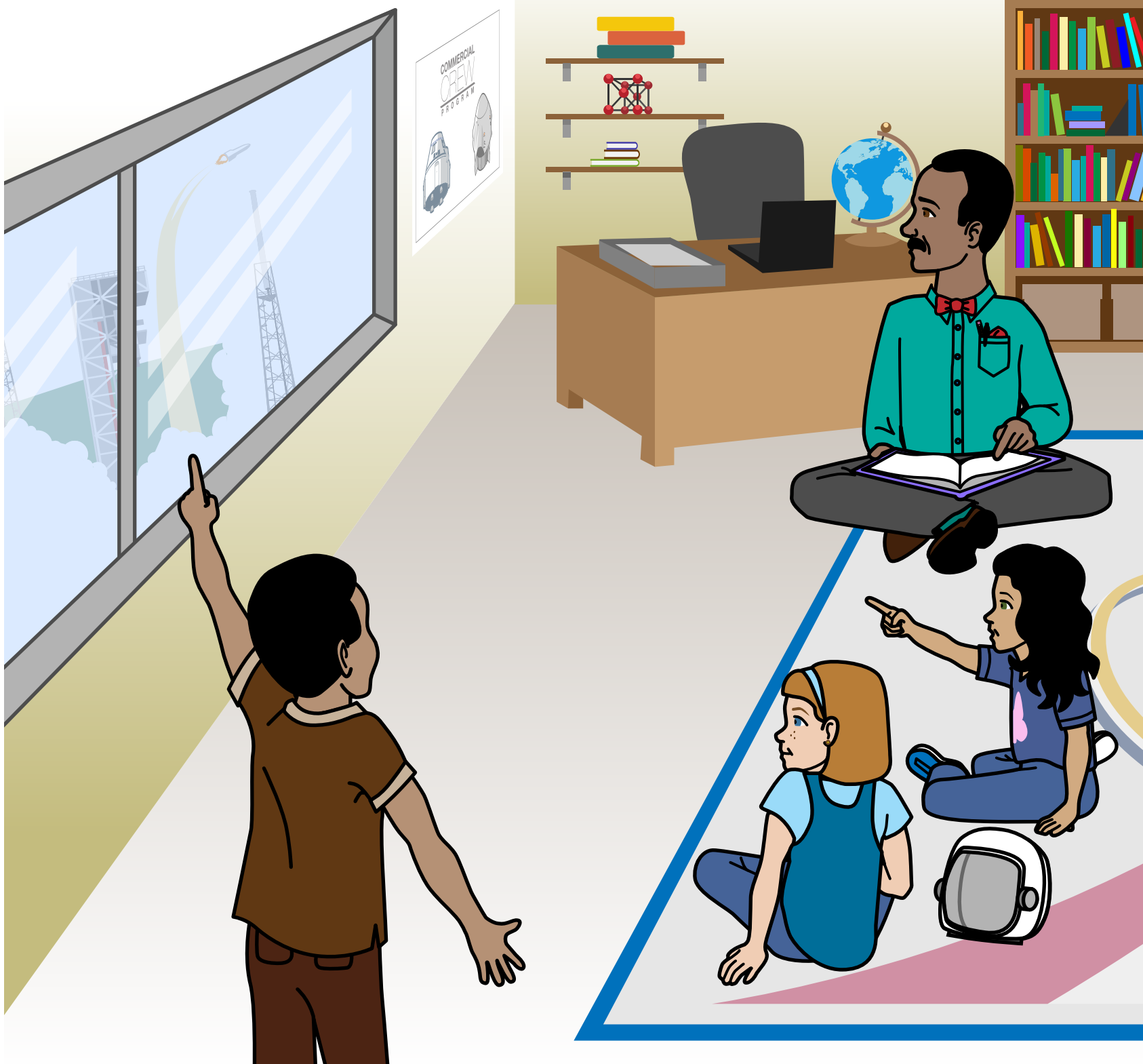
THE **ASTRO-NOT-YETS** ***EXPLORE***

SOUND



THE
ASTRO-NOT-YETS
EXPLORE
SOUND

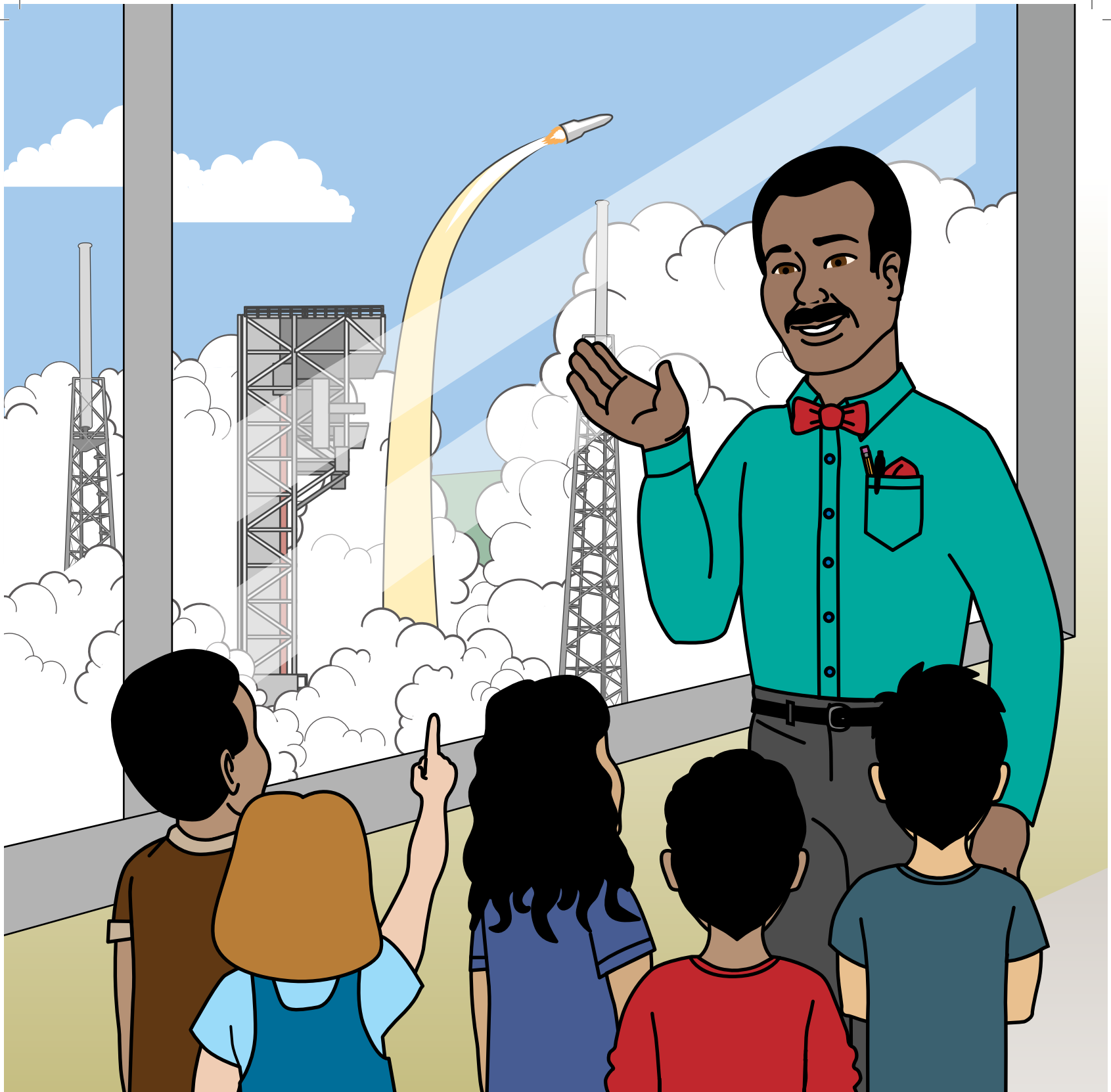
Author: Jessica Sain
Co-Author: Rachel Power
Illustrator: Cindy Bush



On a Friday morning in Cocoa Beach, Florida, Mr. Armstrong's classroom was getting ready for their daily story time. They sat on the carpet, waiting to hear more about the thrilling new book their classmate brought to share.



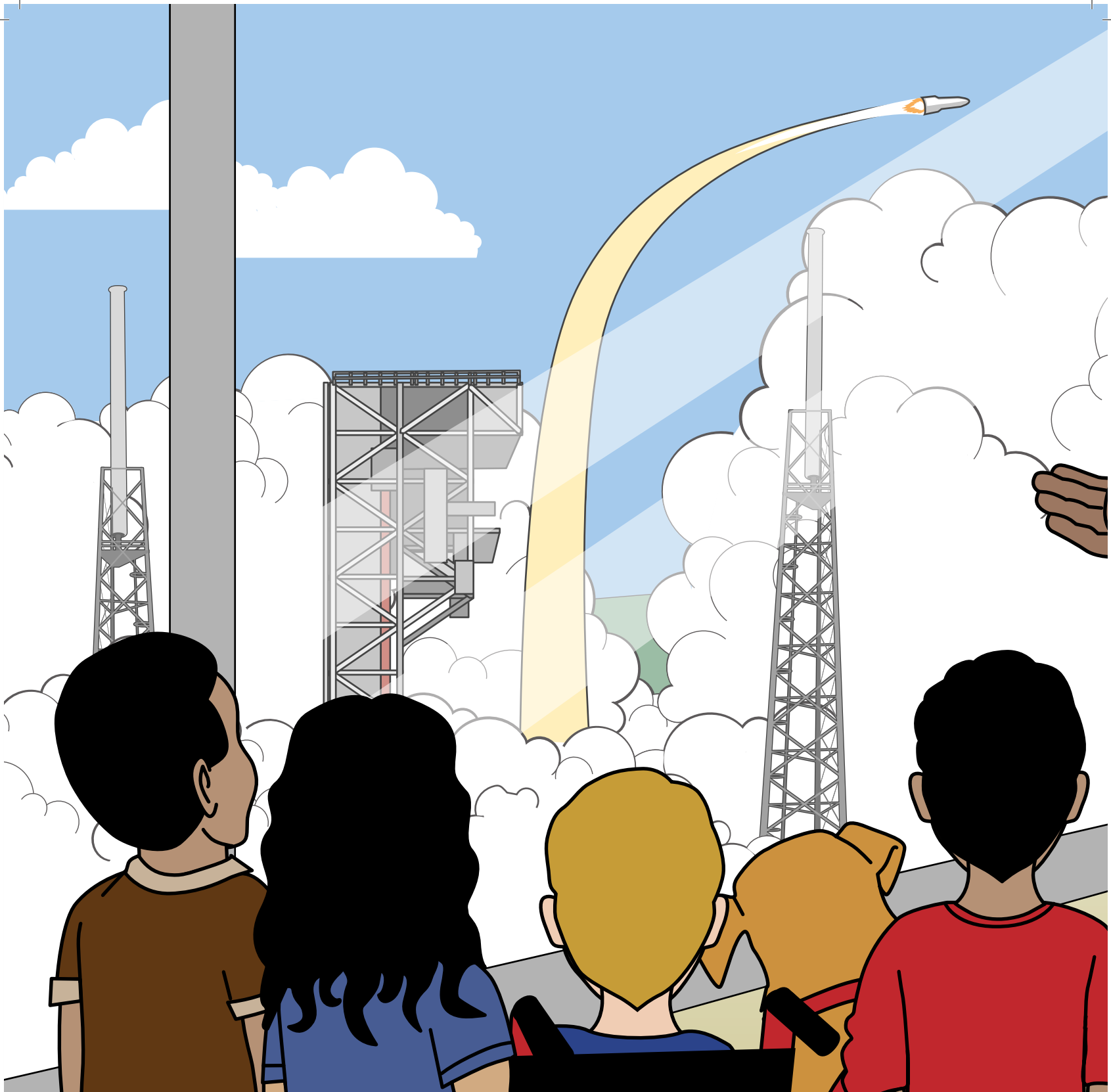
As Mr. Armstrong began introducing the exciting book, a rumbling and roaring noise grew louder and louder outside. It felt like the whole classroom was shaking. Orion pointed to the window and shouted, “Look, Mr. Armstrong! The window is rattling! What is going on?!”



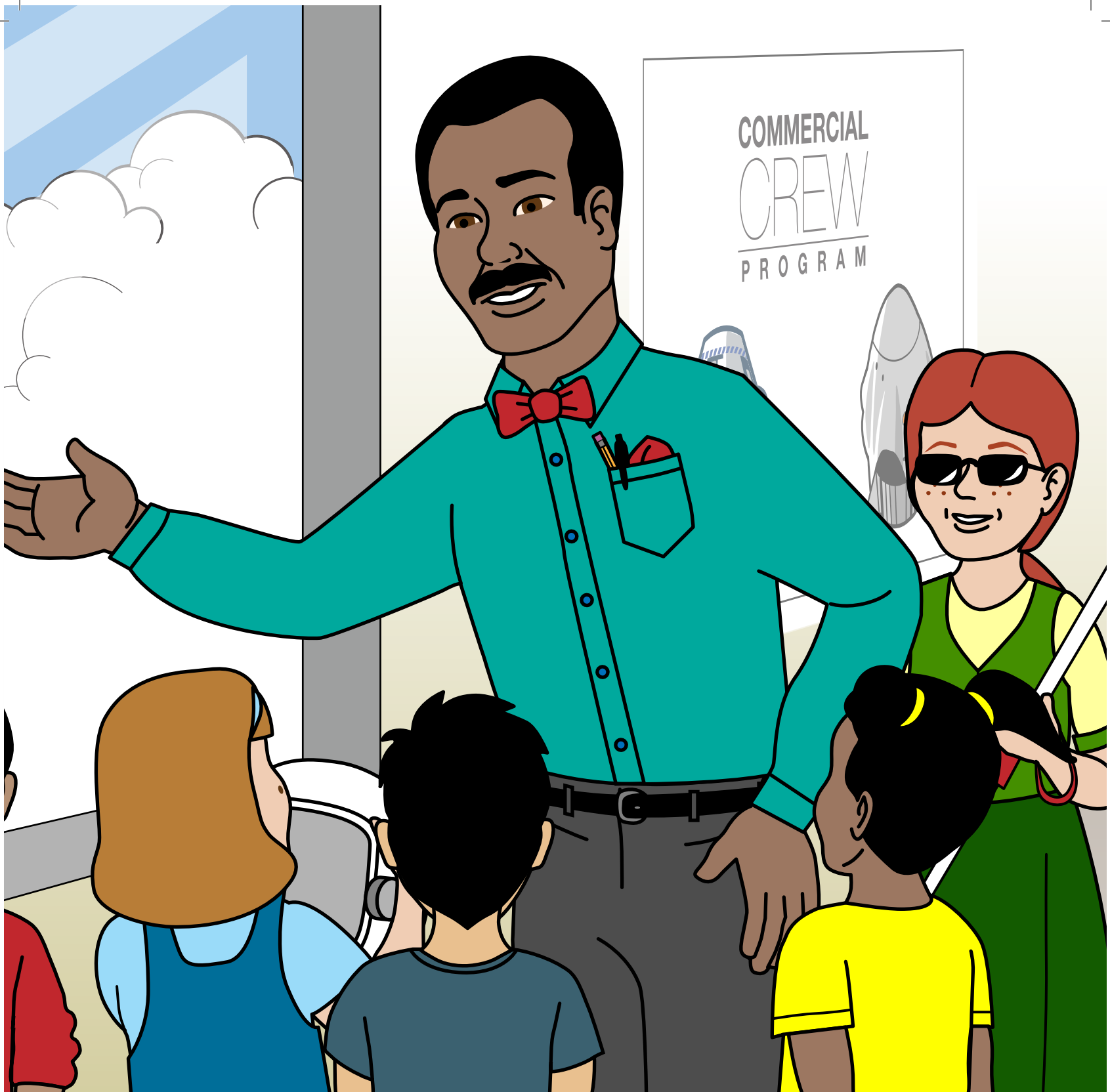
Mr. Armstrong smiled and quickly gathered his students around the window, where he pointed to an object near the clouds. The object had left a trail of fire and smoke as it raced toward the sky.



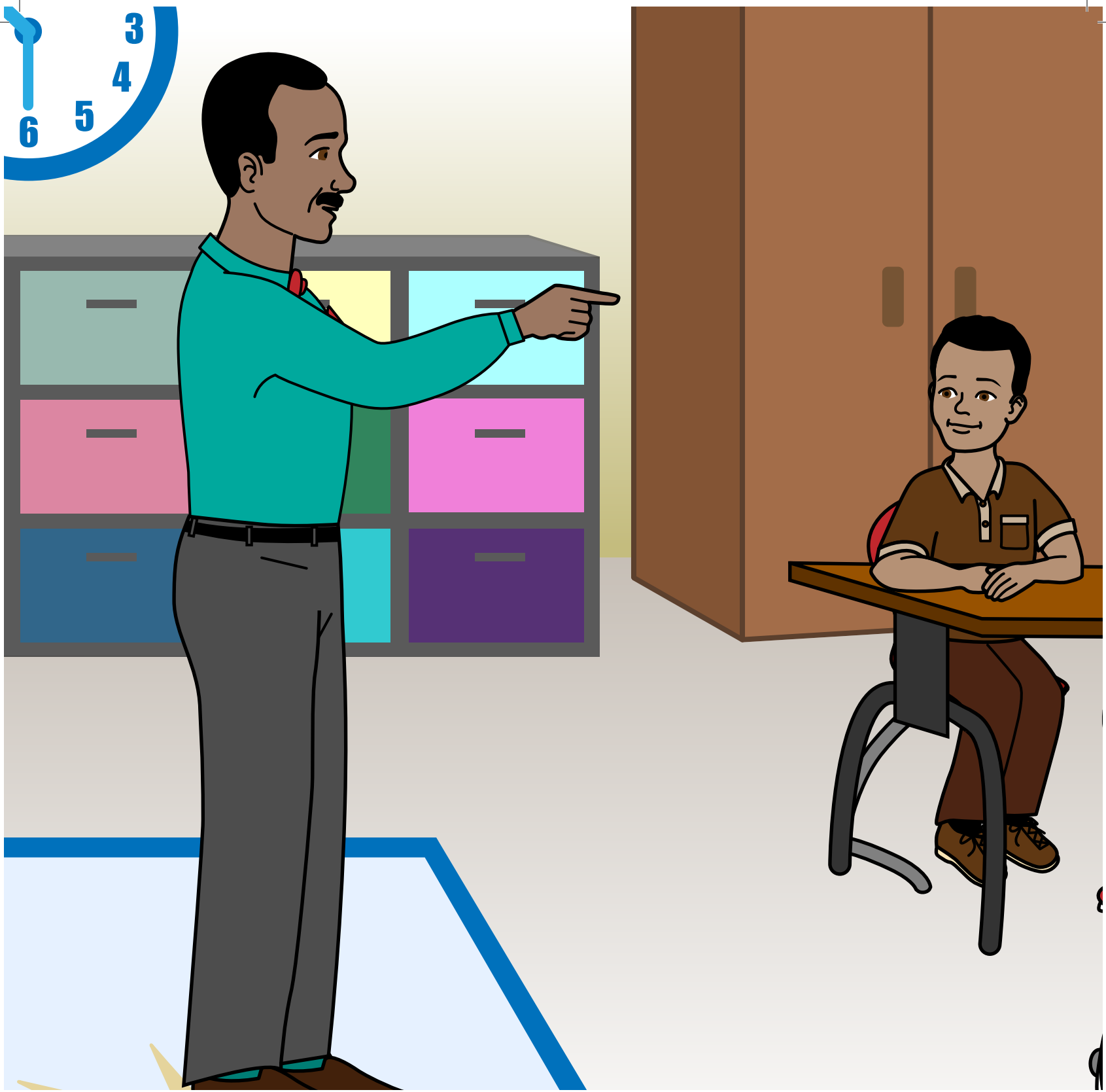
Mr. Armstrong explained “That noise is coming from NASA’s Commercial Crew Program rocket launch! Astronauts are headed to do very important science experiments on the International Space Station. Our windows are rattling, or vibrating, because the sound from the rocket is so loud, it’s reaching as far as our classroom! The vibrations are caused by the sound moving through the floor, walls and windows.”



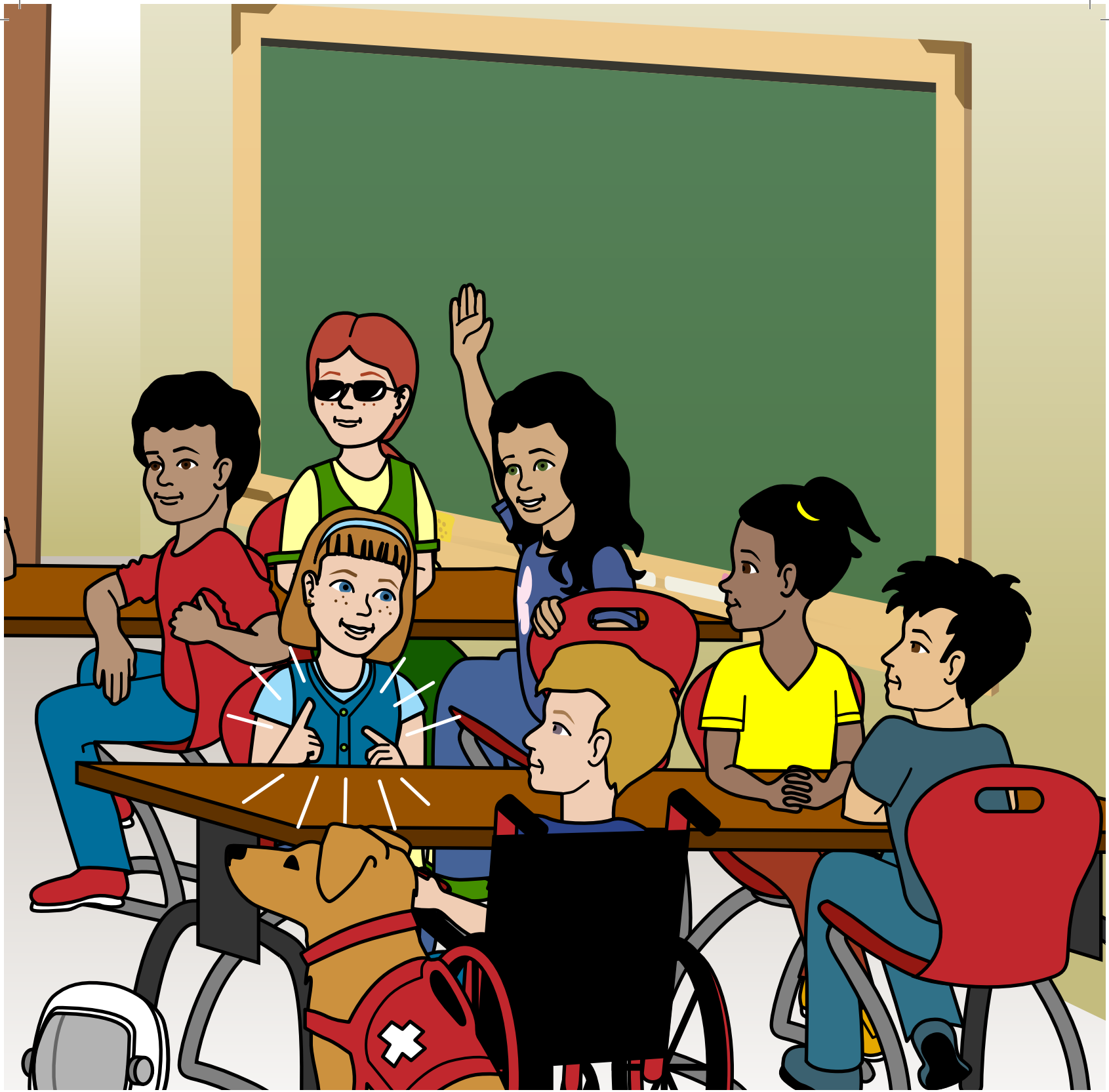
As the students watched in amazement at the rocket taking NASA astronauts to the space station, Stella looked at Mr. Armstrong and exclaimed, “This is the coolest thing I have ever seen! Can we sit here and watch the next one?”



Mr. Armstrong responded, “Commercial Crew will not launch another rocket again until next month. Even though we can’t see another launch today, I think this would be a great time to learn about sound vibrations so that we are ready for the next one.”



The students returned to their seats and listened to Mr. Armstrong explain their new design challenge. They love new challenges because they get to work together to solve a problem. Mr. Armstrong asked, “Does anyone remember what caused the windows to vibrate?”

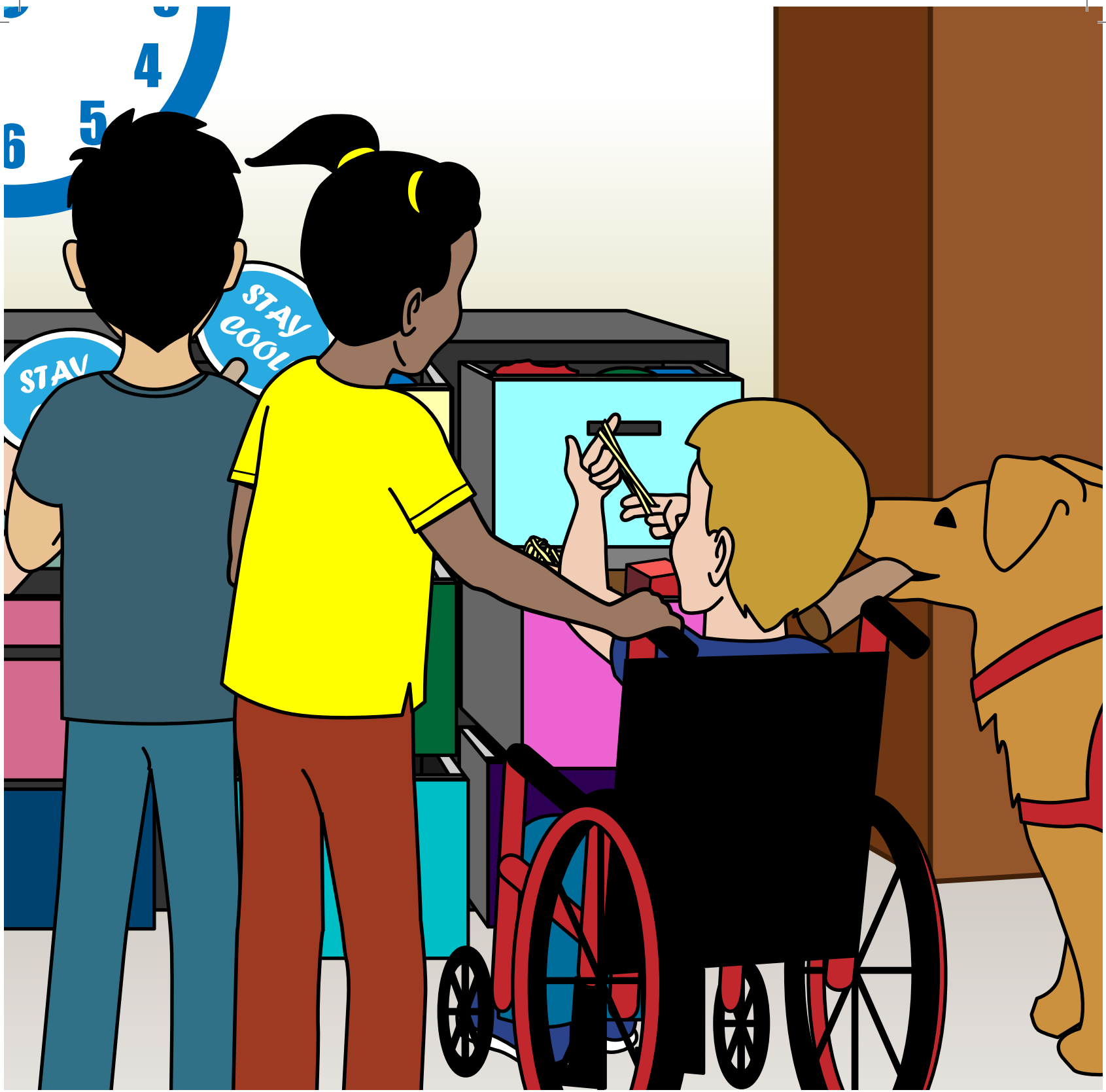


Aurora raised her hand and correctly answered that sound made those vibrations. When Mr. Armstrong asked if anything else makes sound, Stella paused from drumming on her desk, and added, “Musical instruments do!”

Mr. Armstrong smiled. “Exactly! Today, you will work in groups to design an instrument that shows sound moving with vibrations.”



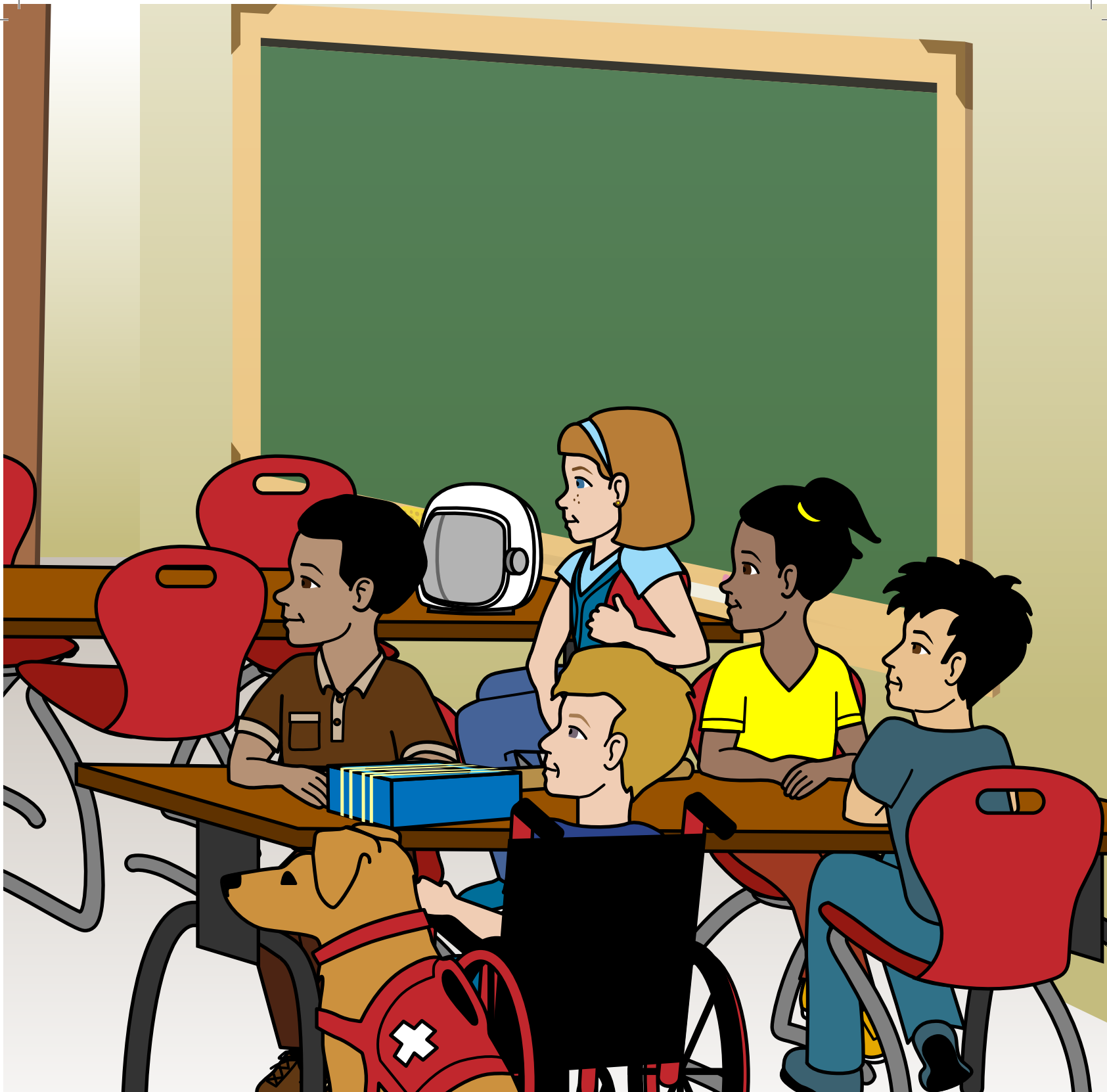
The classroom hummed with ideas. Each group brainstormed designs for their instrument, and predicted how they might sound. Mr. Armstrong reminded the students they could use any of the items in the classroom makerspace, a place where the students collected old items that could be reused to create something new.



The students worked together in harmony to plan, build and test their instrument ideas. Some of the designs didn't work at first, but the students didn't give up! Soon, each group was ready to present an idea to the classroom, and they were all excited to find out what the others had done.



Aurora quickly volunteered her group as the first to show the class their new kazoos, which were each made with a toilet paper roll that had a piece of wax paper rubber banded to the end. When they blew air into the rolls, the wax paper buzzed and vibrated.



Orion's table shared their new guitar that they made out of an old tissue paper box with rubber bands wrapped around the sides. When one of the students plucked the rubber band, it made a thumping noise and also vibrated!



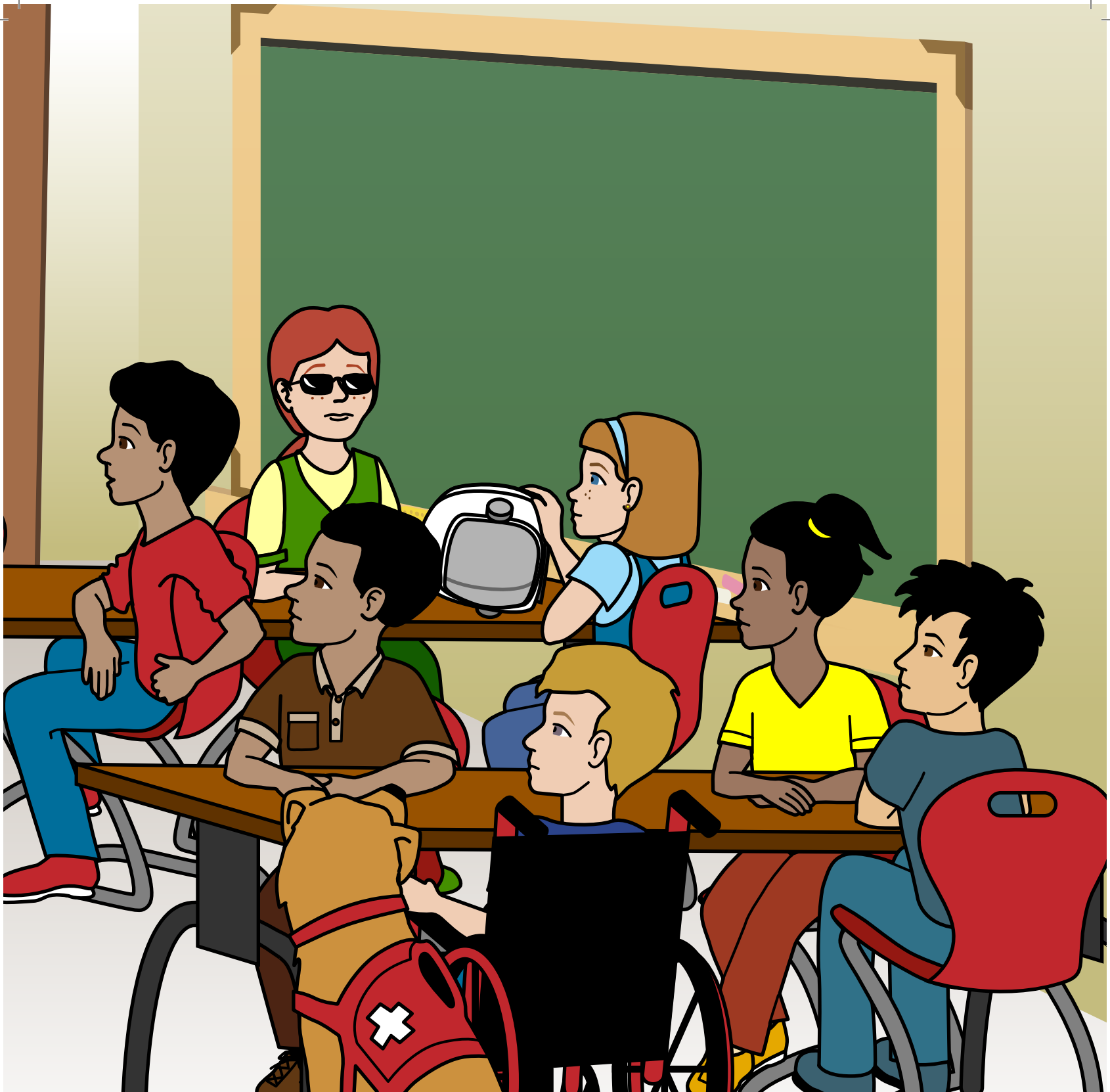
Leo and Stella were in the last group to share, but when they all stood, they were empty-handed. The other students looked around, confused. Aurora asked, “Where is your instrument? Were you listening to Mr. Armstrong’s directions? You have to have one!”



Leo gave a signal to his group. They all started humming and placed their hands over their own throats. Leo stopped to explain to Aurora that they do have an instrument... their voices. Mr. Armstrong smiled and said, "That's right, Leo! Our voices carry sound and we can feel the vibration on our throat. Let's all try it!" The whole classroom began to hum.



After each group shared their instruments, Aurora raised her hand and asked, “Mr. Armstrong, which group designed the best instrument?”



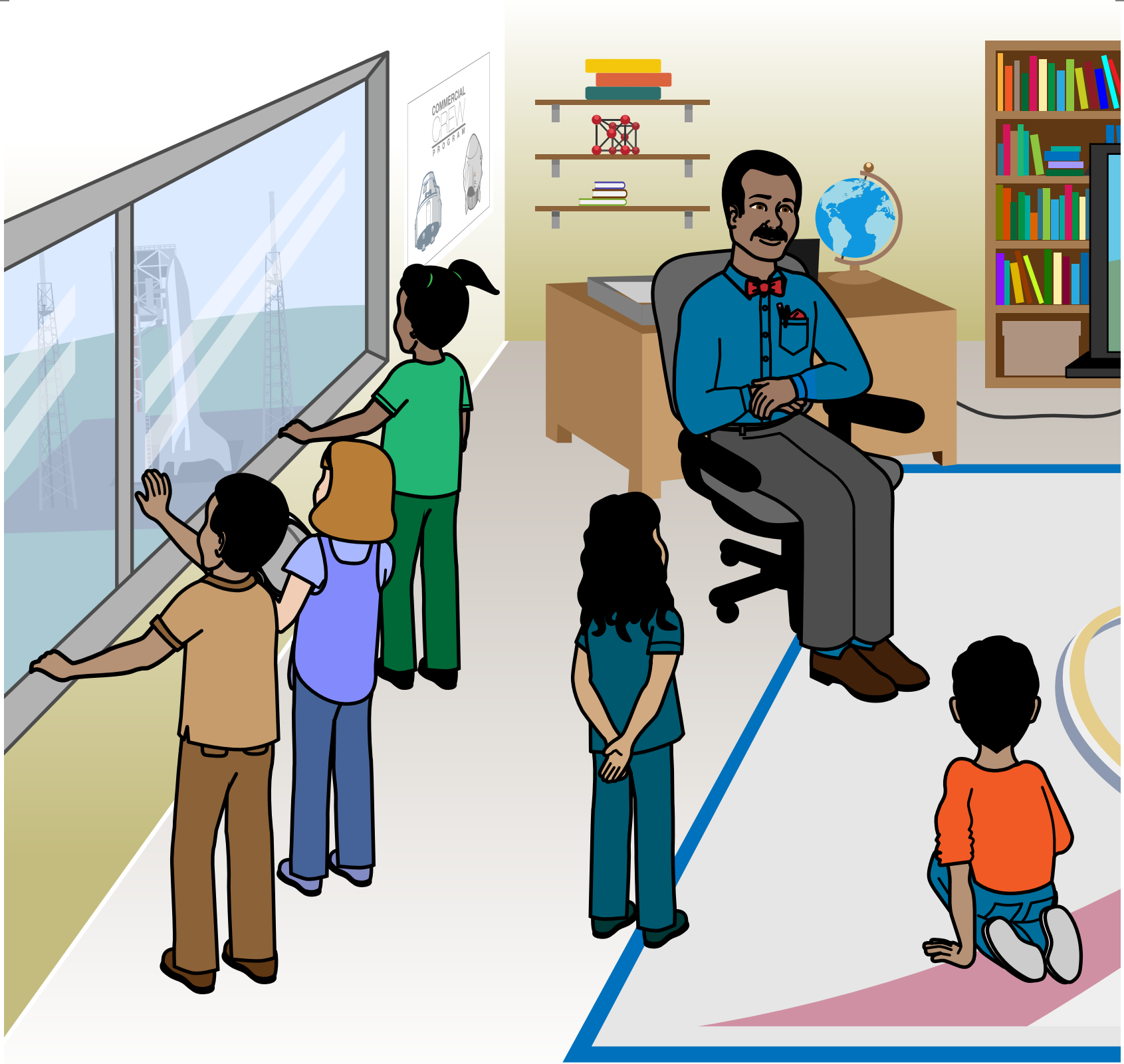
All of the group members looked at each other, then at Mr. Armstrong, hoping that he would choose their design.



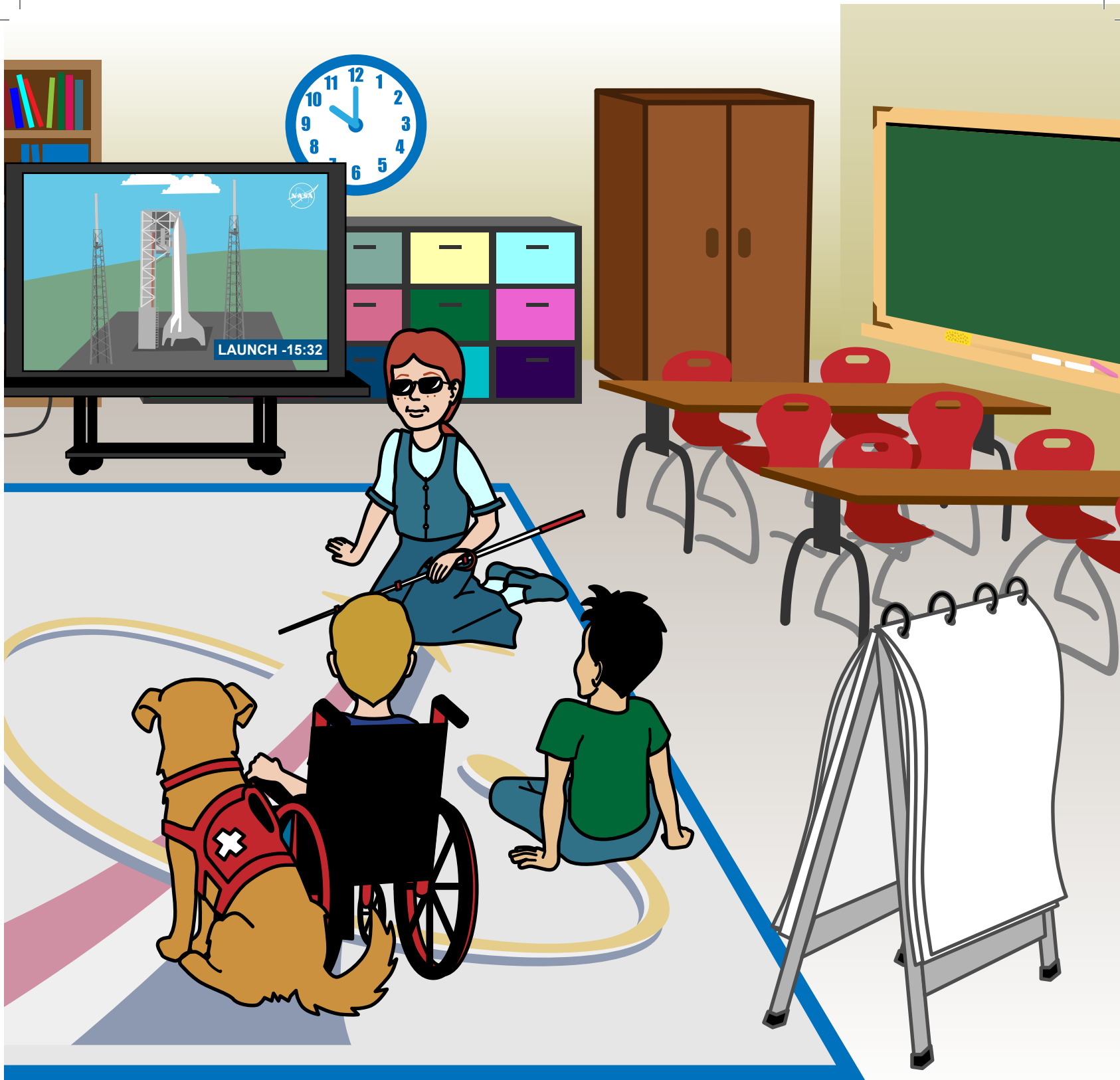
Instead, Mr. Armstrong said, “That’s the funny thing about design challenges... you all designed the best version of your idea! For these challenges, there isn’t just one right answer. You can solve problems in many different ways and still reach a common goal.”



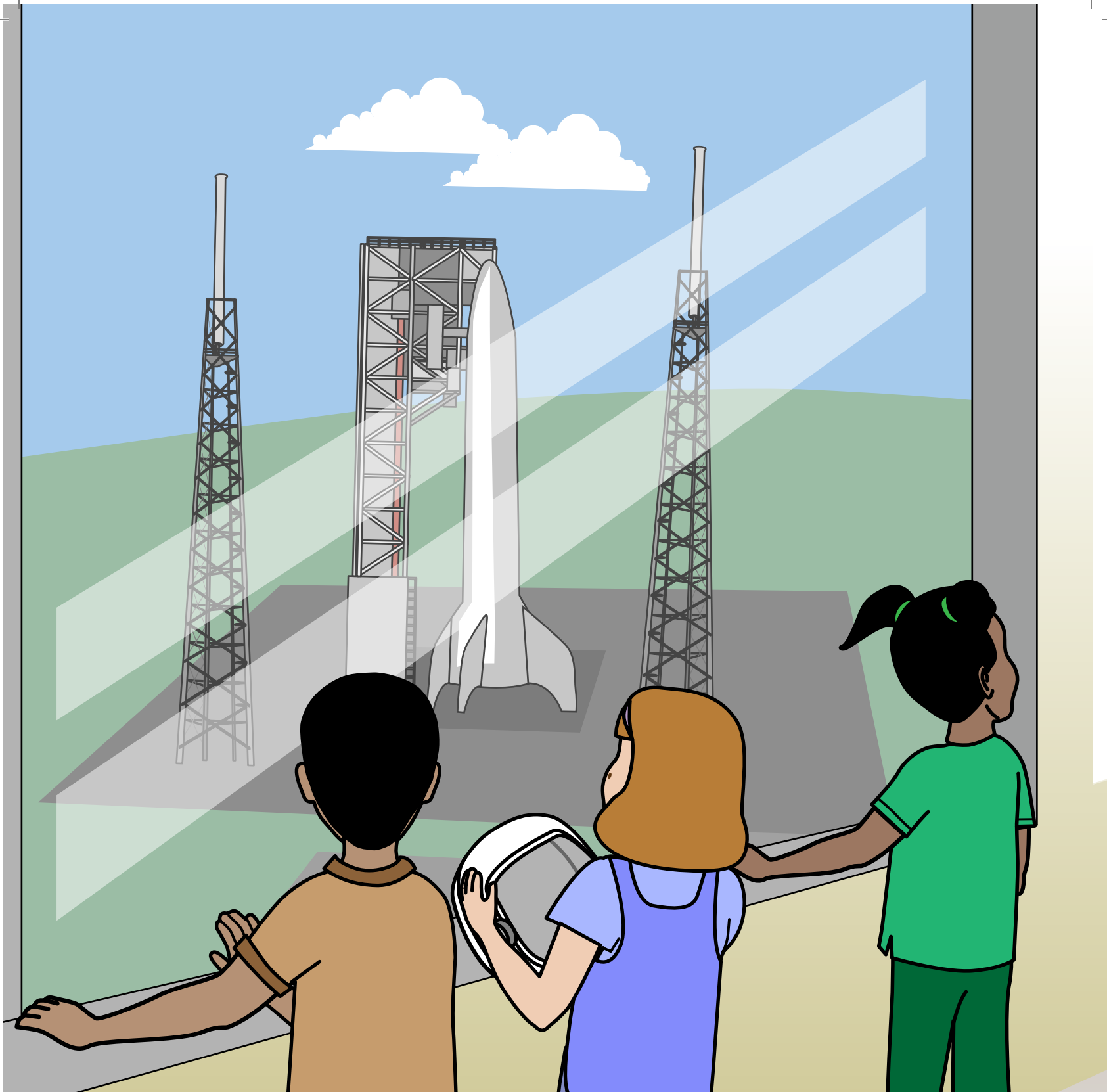
Orion spoke up. “I never thought of that, Mr. Armstrong, but you’re right! We all found a different way to show sound through vibrations. That means we all solved the problem in our own way. I’d say that was a success!”



A month later, Mr. Armstrong's class anxiously awaited the next Commercial Crew spacecraft launch. Some students watched the countdown on the classroom TV, while others gathered at the window, waiting to see the rocket lift off in the distance.



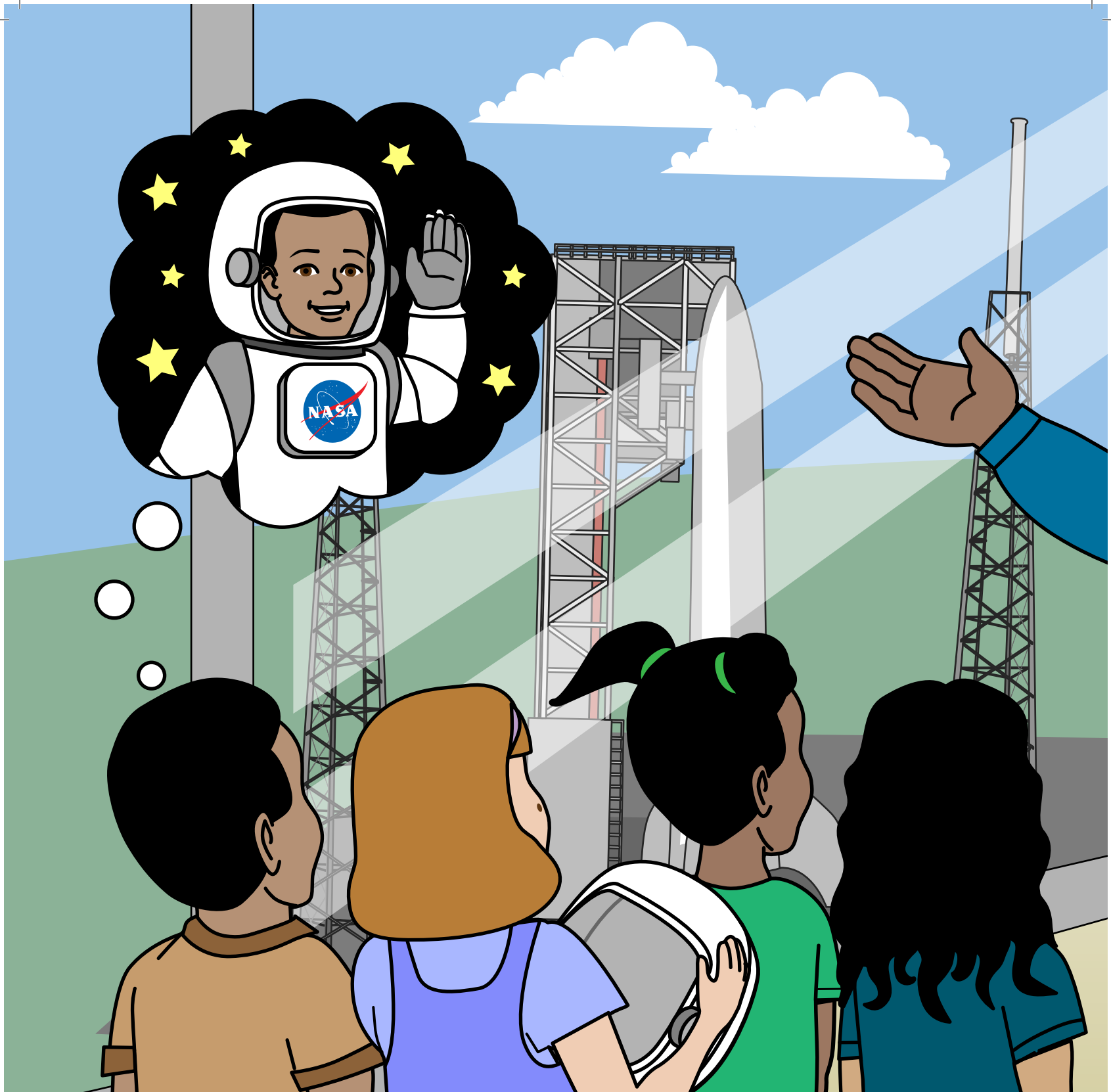
Aurora noticed some differences between the spacecraft on TV and the one from the last launch, and asked, “Mr. Armstrong, why does this rocket look different from the one we saw a month ago?”



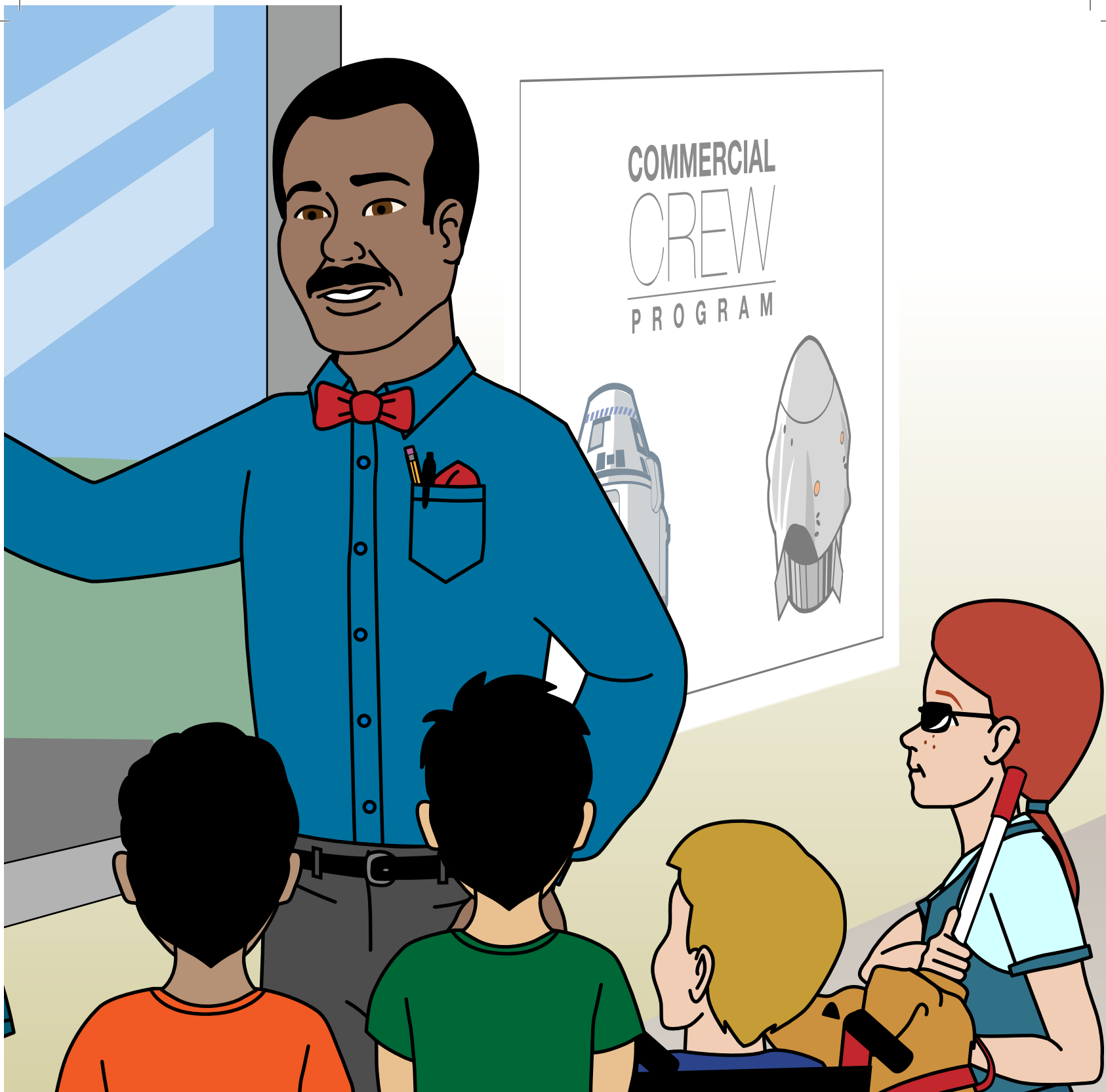
Mr. Armstrong explained, “NASA’s Commercial Crew Program works with two different companies designing two different spacecraft to take astronauts safely to the space station. Just like the two companies working with NASA, you all designed different objects to do the same thing last month, do you remember?”



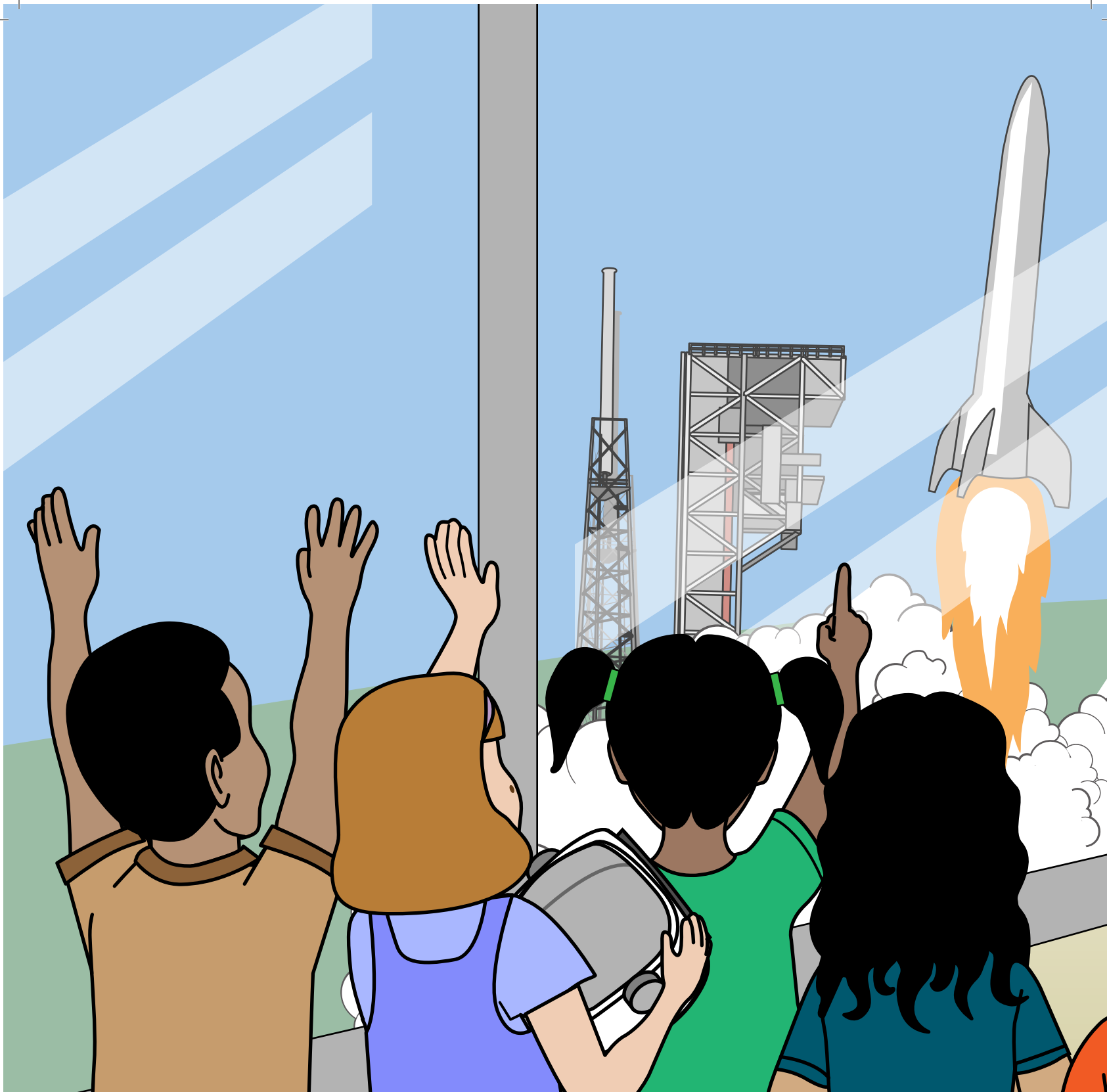
Leo spoke up. “I do! I do! We all designed instruments that showed sound through vibration, and even though our groups made different designs, we were all right!”



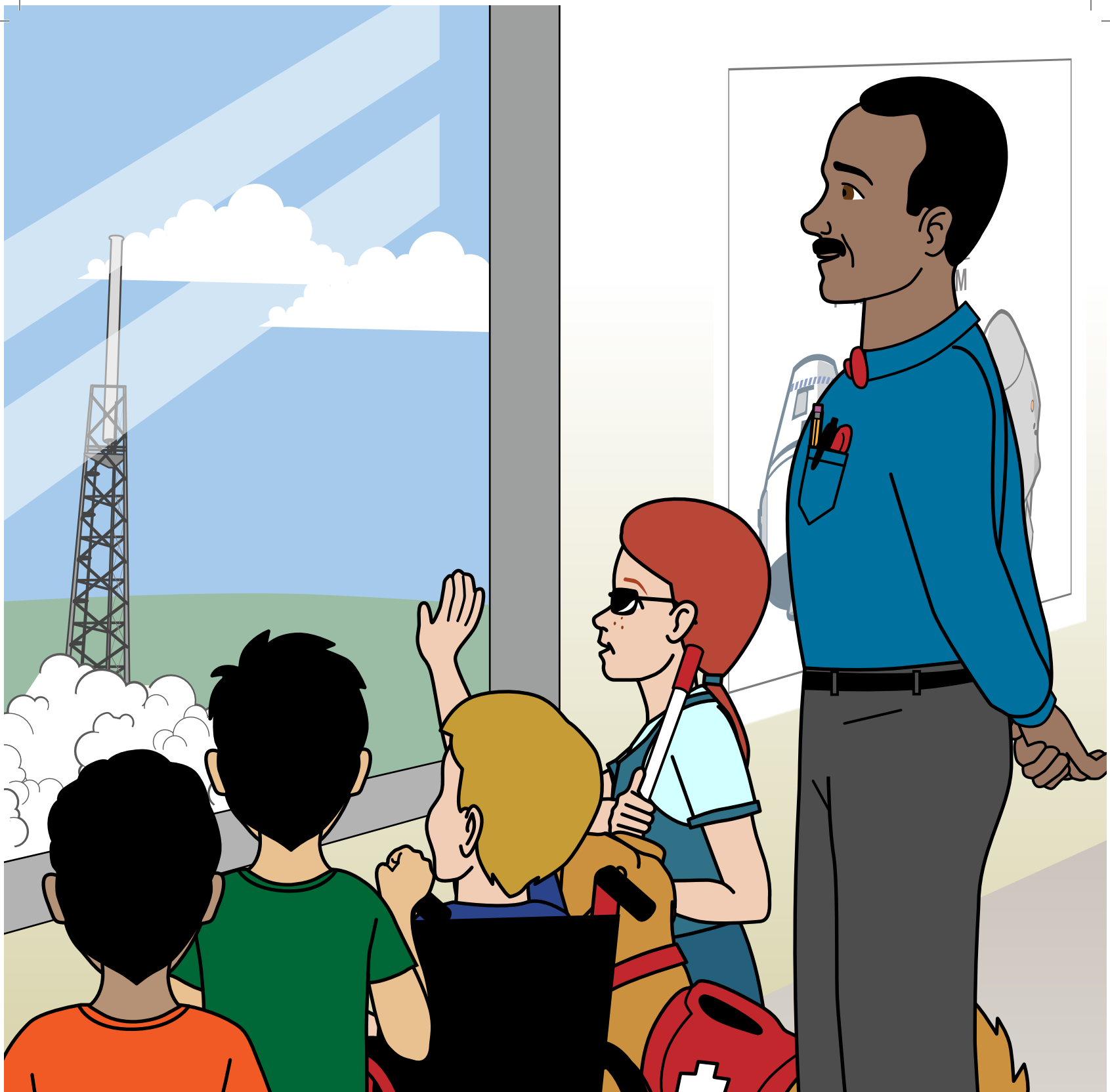
O rion looked out the window, then back to Mr. Armstrong and asked, “Do you think we can be astronauts when we grow up?”



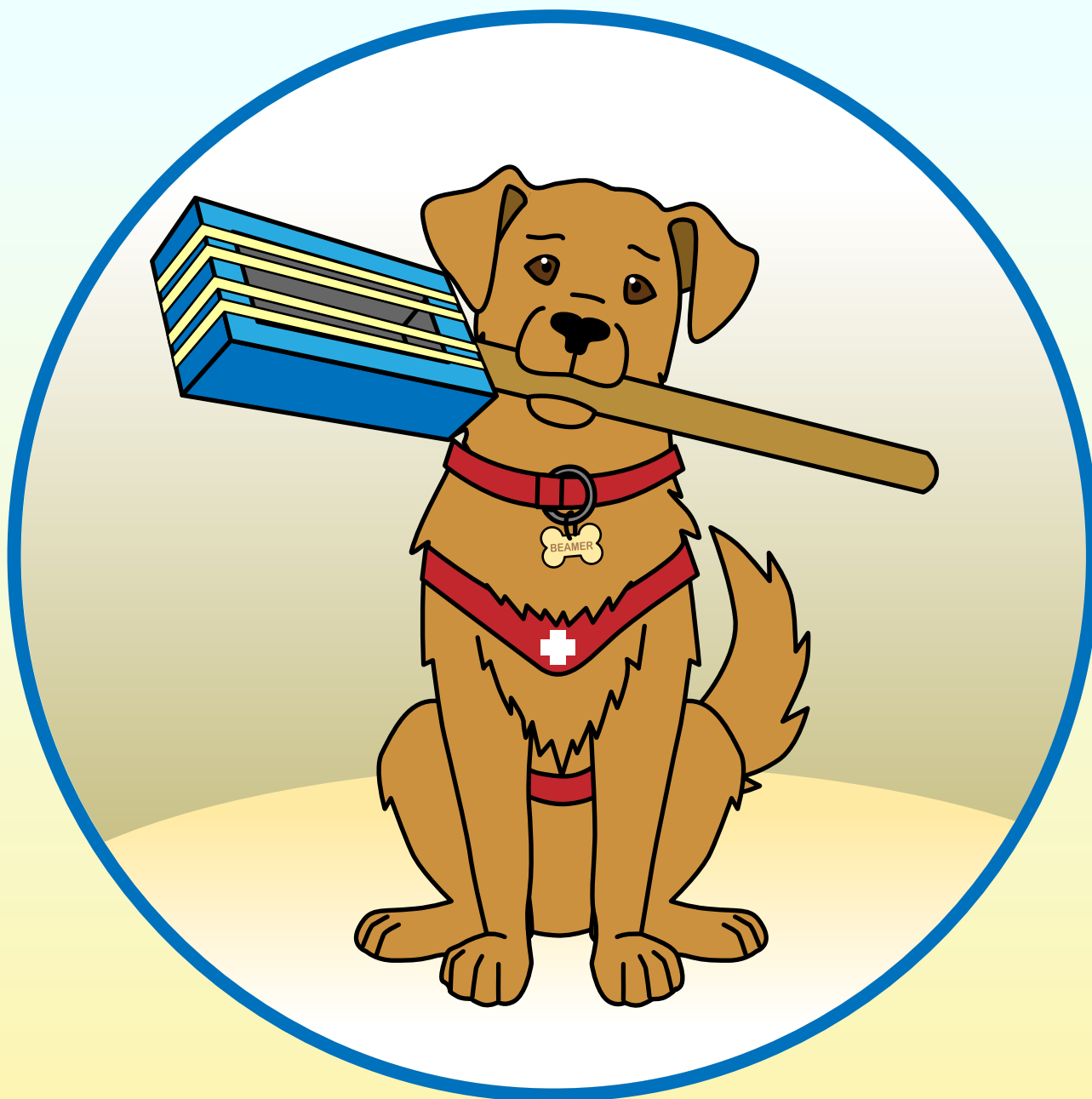
With a smile, Mr. Armstrong explained, “NASA is working hard to make sure more students your age can grow up and become astronauts, engineers, and scientists. You have to remember to always try your best in school and, when you grow up, choose a job that you will love. With hard work, one day you may be on your way to the space station too! You all are the Astro-Not-Yets!”



Suddenly the countdown began on the TV, but everyone looked out the window instead.



The students counted along with “10... 9... 8... 7... 6... 5... 4... 3... 2... 1... LIFTOFF!” Seconds later, the rumbling noise made the windows vibrate, once again, as the Commercial Crew rocket raced toward the stars.



Explore activities with sound and learn more
about NASA's Commercial Crew Program at
www.nasa.gov/stem/ccp