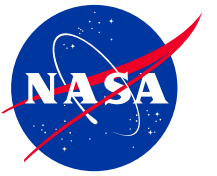


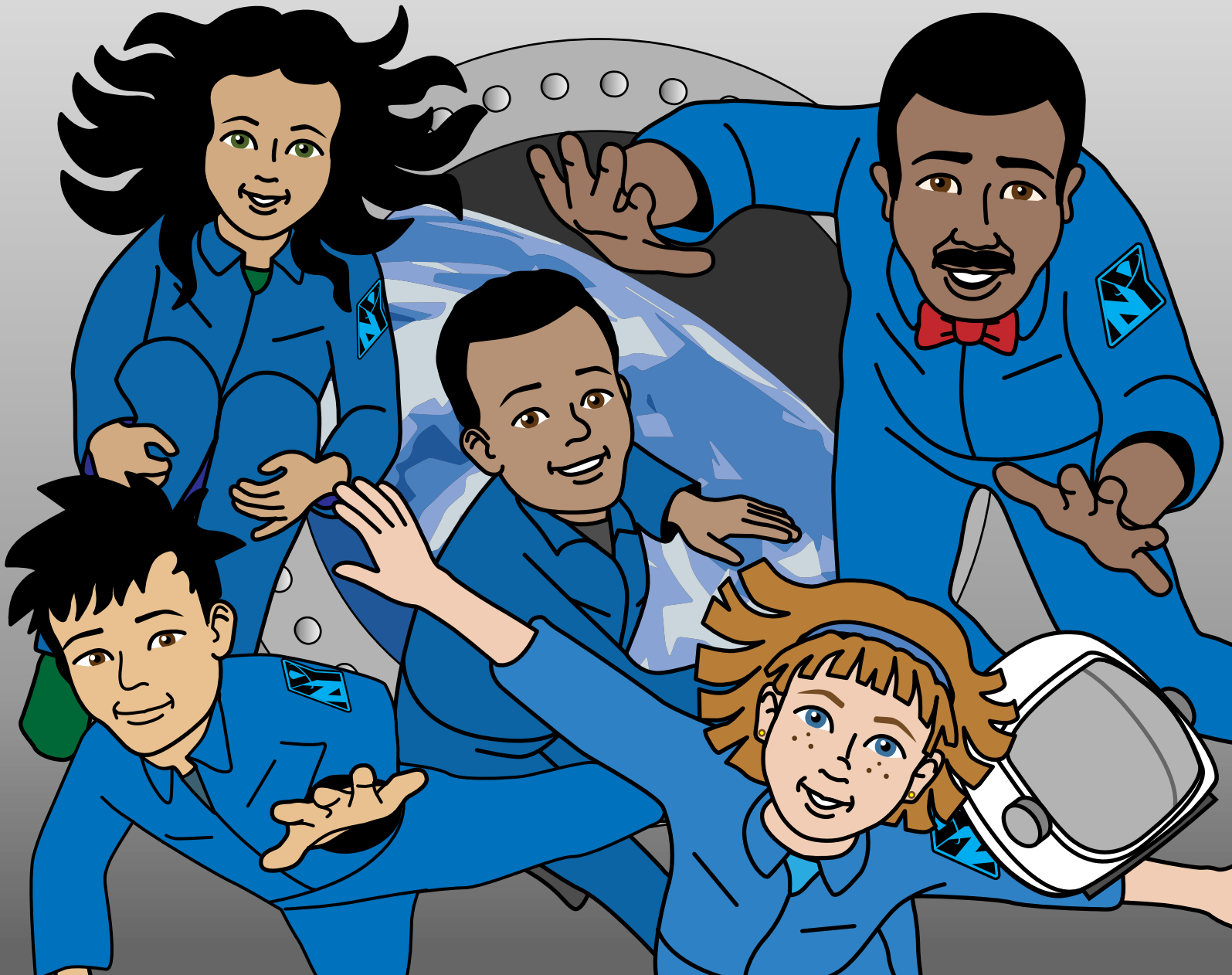
Educational Product	
Educators and Students	Grades K-4

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National Aeronautics and  
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# ***THE*** **ASTRO-NOT-YETS** ***EXPLORE*** **MICROGRAVITY**



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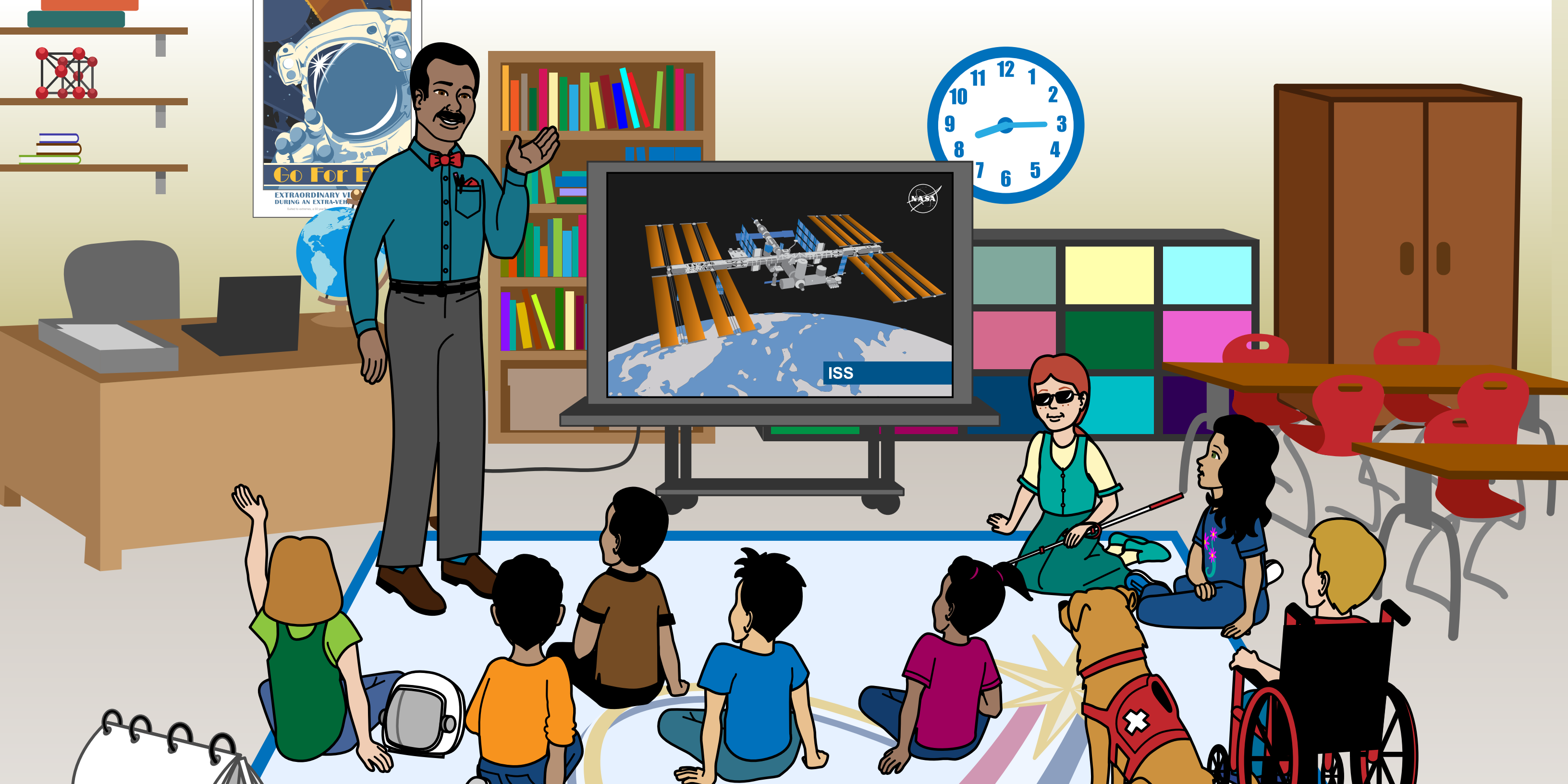
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On a Monday morning in Florida, the Space Coast of the United States, Mr. Armstrong's class of ambitious students, known as the Astro-Not-Yets, buzzed with excitement as they prepared to begin another school day.

The room was filled with chatter as the students greeted each other and shared stories about their weekend adventures.

"Good morning, class!" Mr. Armstrong announced cheerfully as the students sat down.



Mr. Armstrong moved toward the front of the classroom, wearing a jovial smile. The Astro-Not-Yets were anxious to see what challenge was in store for them this morning.

“We are going to start our day in a very exciting way. Can anyone take a guess?” asked Mr. Armstrong.

Stella raised her hand. When called upon, she responded, “I bet there is another Commercial Crew launch!”

Mr. Armstrong smiled. “Great guess, Stella! You are very close. We are actually going to listen to a story read by an astronaut aboard the International Space Station.”

The students bounced up and down with excitement.



Mr. Armstrong reminded the students about the Commercial Crew launch that Stella had mentioned, and how they had observed the launch weeks earlier.

“To get to space, safe rockets and spacecraft are very important.” Mr. Armstrong said. “The launch we recently watched sent four astronauts, including the one we will meet today, to the International Space Station.”



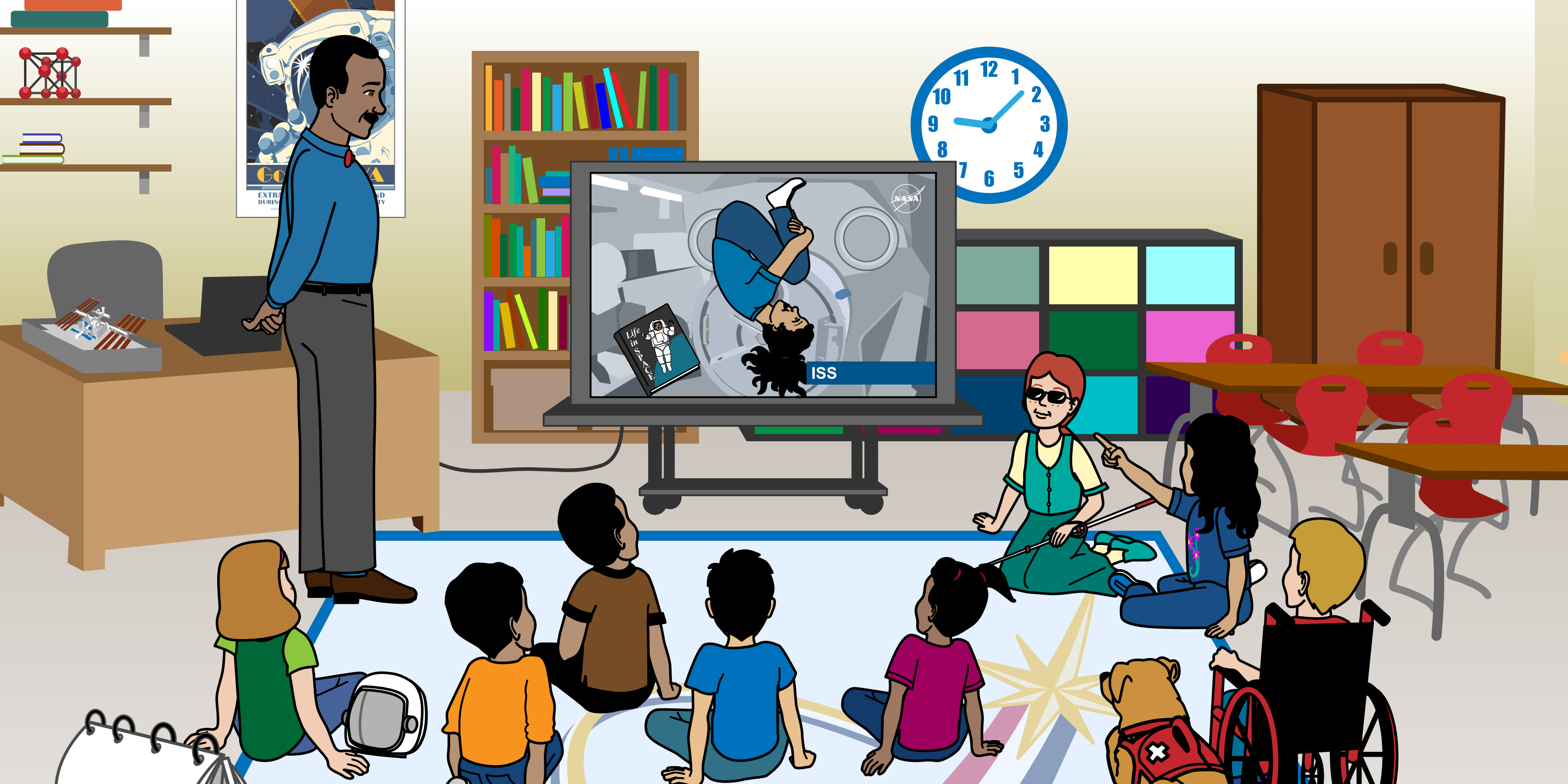
Mr. Armstrong continued. “The space station not only serves as a house for astronauts while they are in space, but also a laboratory where they conduct important science experiments!”

Orion seemed confused. “Why would astronauts need to do science experiments in space?” he asked.



“Good question, Orion! For successful future missions to the Moon and beyond, astronauts must study several topics. For example, they want to learn more about how objects, including the human body, react in microgravity.”

“Microgravity?” the students asked, eyeing each other with puzzled looks on their faces.



“Take a look at this video. I bet you will quickly figure out what microgravity is through your own observations.” Mr. Armstrong directed the students’ attention to the classroom’s screen, which showed an astronaut holding a storybook on board the International Space Station.

The students’ eyes widened as the astronaut began reading the story. Instead of standing still, she floated around inside the space station, with her hair moving in every direction! As she finished and closed the book, the astronaut waved goodbye and performed an effortless flip in front of the camera.

“Did you see that?” exclaimed Aurora. “She did a flip in the air without having to jump!”  
“It looked like she was floating – like you would underwater in a swimming pool!” added Leo.

The students looked at each other in amazement before turning to Mr. Armstrong.  
“Yes, students, what you saw was a result of what I mentioned earlier: microgravity!” Mr. Armstrong explained.





The students still looked puzzled, so Mr. Armstrong directed everyone to stand and spread out across the classroom. “Let’s experiment and see if we can float like the astronaut.”

With everyone standing a safe distance apart, Mr. Armstrong directed the students to jump as high as they could. They all jumped up and landed with a thud when their feet hit the ground.



“Tell me, Stella, what happened when your feet left the floor?” Mr. Armstrong asked.

Stella looked around, unsure of her answer. “Well, I didn’t float like the astronaut did. I just landed right back on the classroom floor.”

“Correct!” Mr. Armstrong said excitedly while motioning the students back to the carpet. “Can anyone tell me why we don’t float like an astronaut does when he or she is in orbit?”

Leo waved his hand in the air. “I think I know! It is because of gravity!”

“Exactly!” Mr. Armstrong nodded. “Can you tell the class what you know about gravity, Leo?”



Leo started, “Gravity is the invisible force that pulls things together and keeps our solar system in place. When we throw a ball up in the air, gravity brings it back to the ground.”

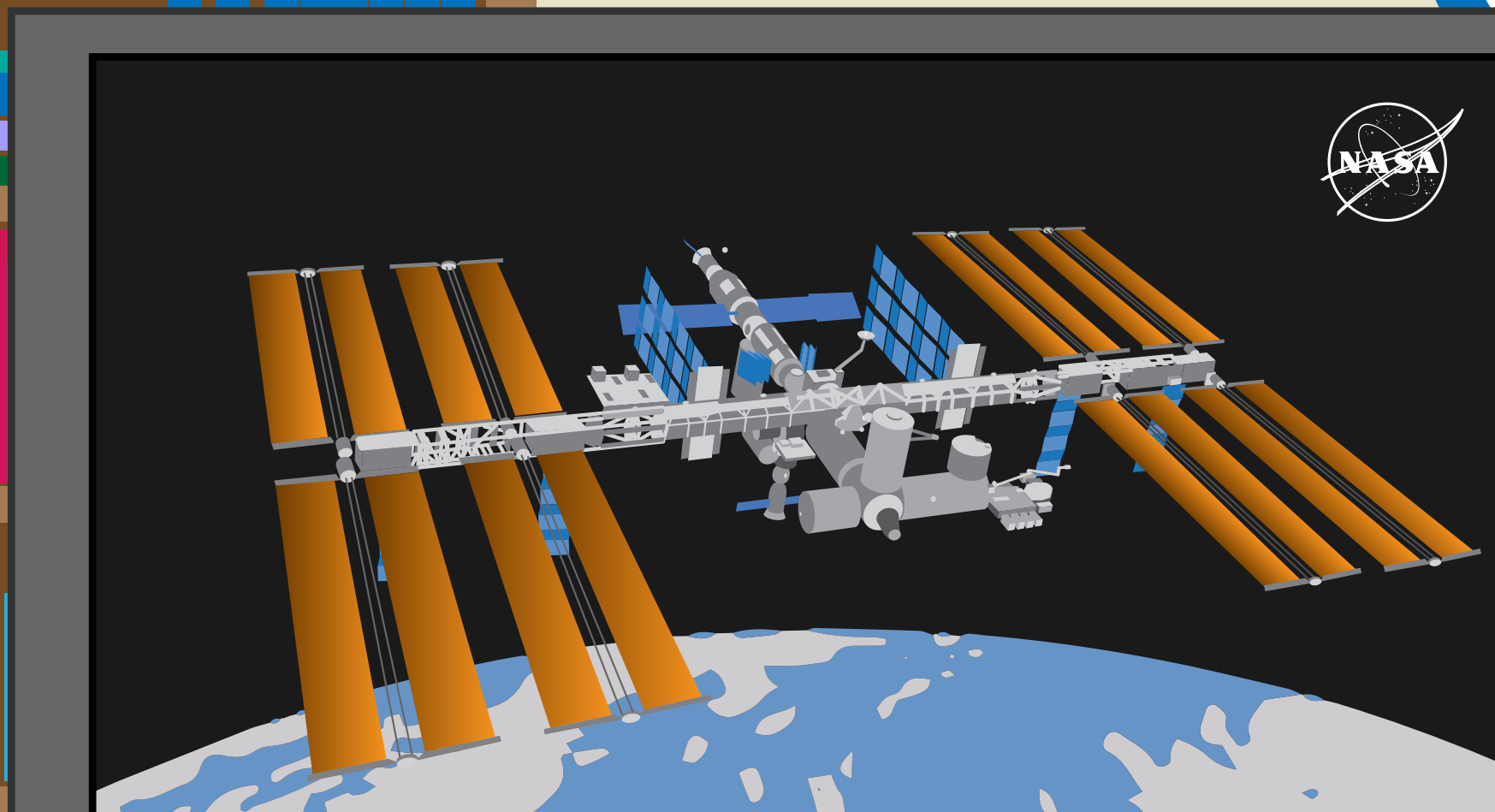
Stella chimed in, “So when we all jumped up in the air, we were pulled back to the ground by gravity?”

“That’s right, Stella!” Mr. Armstrong went on to tell the students, “Gravity is everywhere, even in space. It just might not always feel as strong as what we experience here on Earth.”

Orion scratched his head. “But, if there is always the invisible force of gravity pulling things together, even in space, why was the astronaut on the space station floating?”

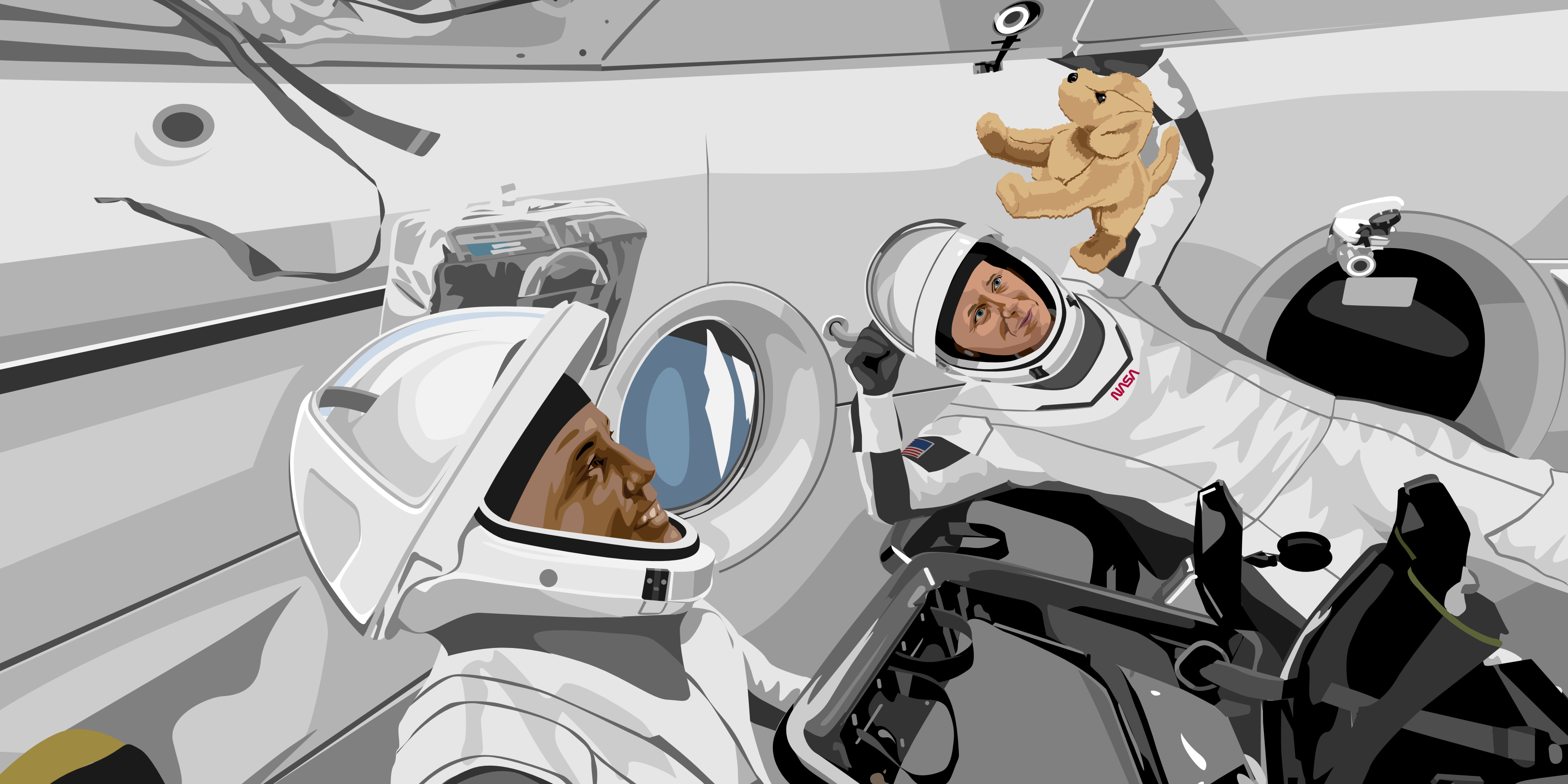


“Another excellent question,” Mr. Armstrong exclaimed. “The environment on the space station in orbit is referred to as a microgravity environment. Although gravity still pulls astronauts and the space station toward Earth, the amount they feel is ‘micro’ – or very small – compared to gravity here on Earth. The astronauts and the space station are falling, just like you fell after you jumped up, but the astronauts and the space station are constantly falling around Earth together.”



“But if they’re falling,” Aurora interjected, “why don’t they ever hit the ground?”

“Well,” Mr. Armstrong explained, “it’s because the rockets that launch spacecraft and astronauts give them just the right speed, direction and height above Earth that as they travel forward, and gravity pulls downward, a curved path is created. That path is called an orbit, and an Earth orbit circles the Earth but never hits it.”



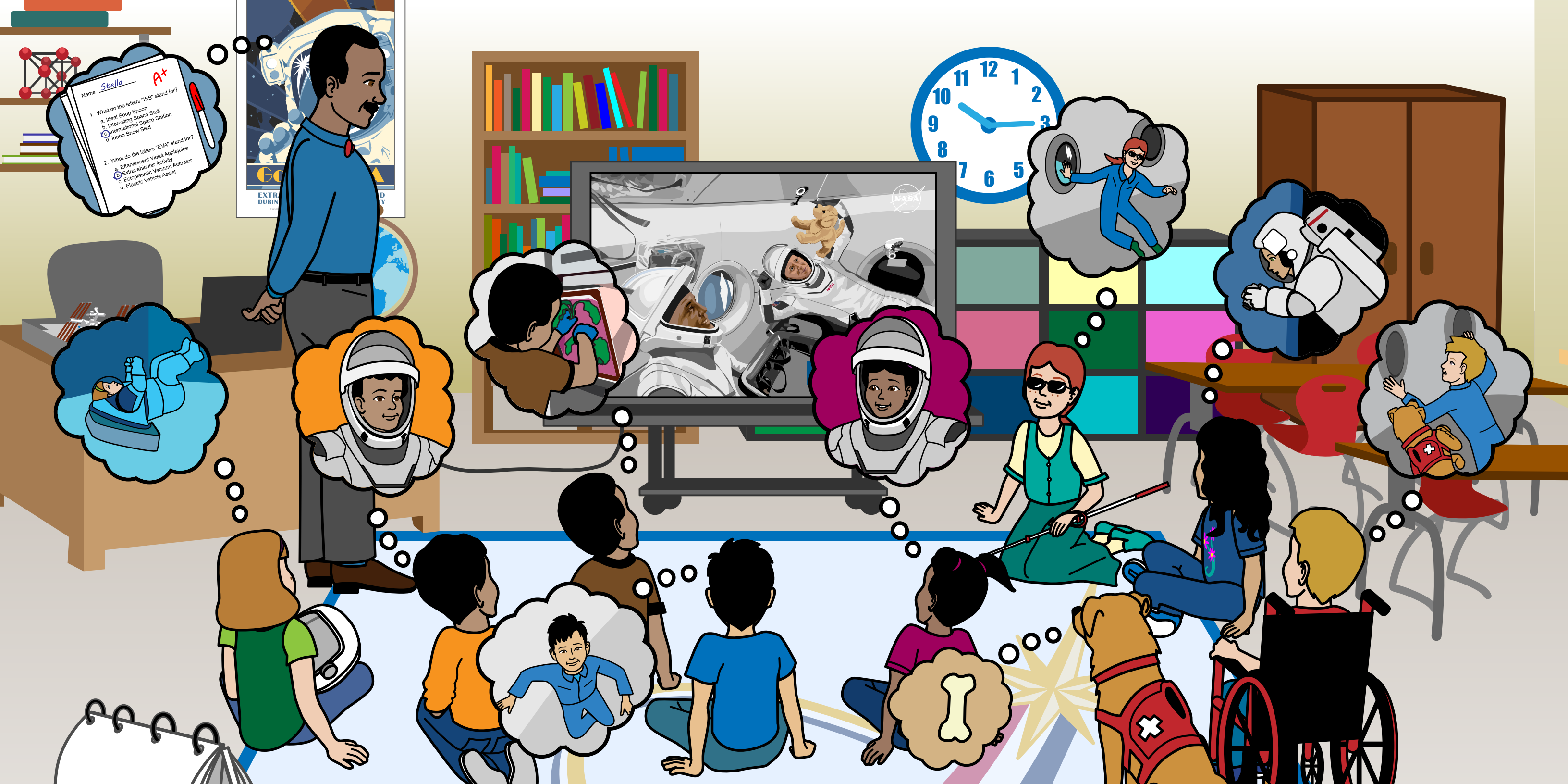
“Now that we know a little more about the science behind microgravity in orbit, let’s check out another clip,” Mr. Armstrong suggested as he pressed play.

This time, the video showed astronauts in the Commercial Crew vehicle after launch. Mr. Armstrong explained that the astronauts launched a few minutes before the video began and were inside the capsule of the spacecraft. “Keep your eyes on the small stuffed dog toy in the astronaut’s lap,” he said eagerly.

Moments later, the stuffed dog toy began to float around the astronauts. The astronauts left their seats and began floating too.

“They’re all floating! They must be in orbit!” Leo exclaimed.

The class joined in with cheers of excitement as they watched the stuffed animal and astronauts move around inside the spacecraft.

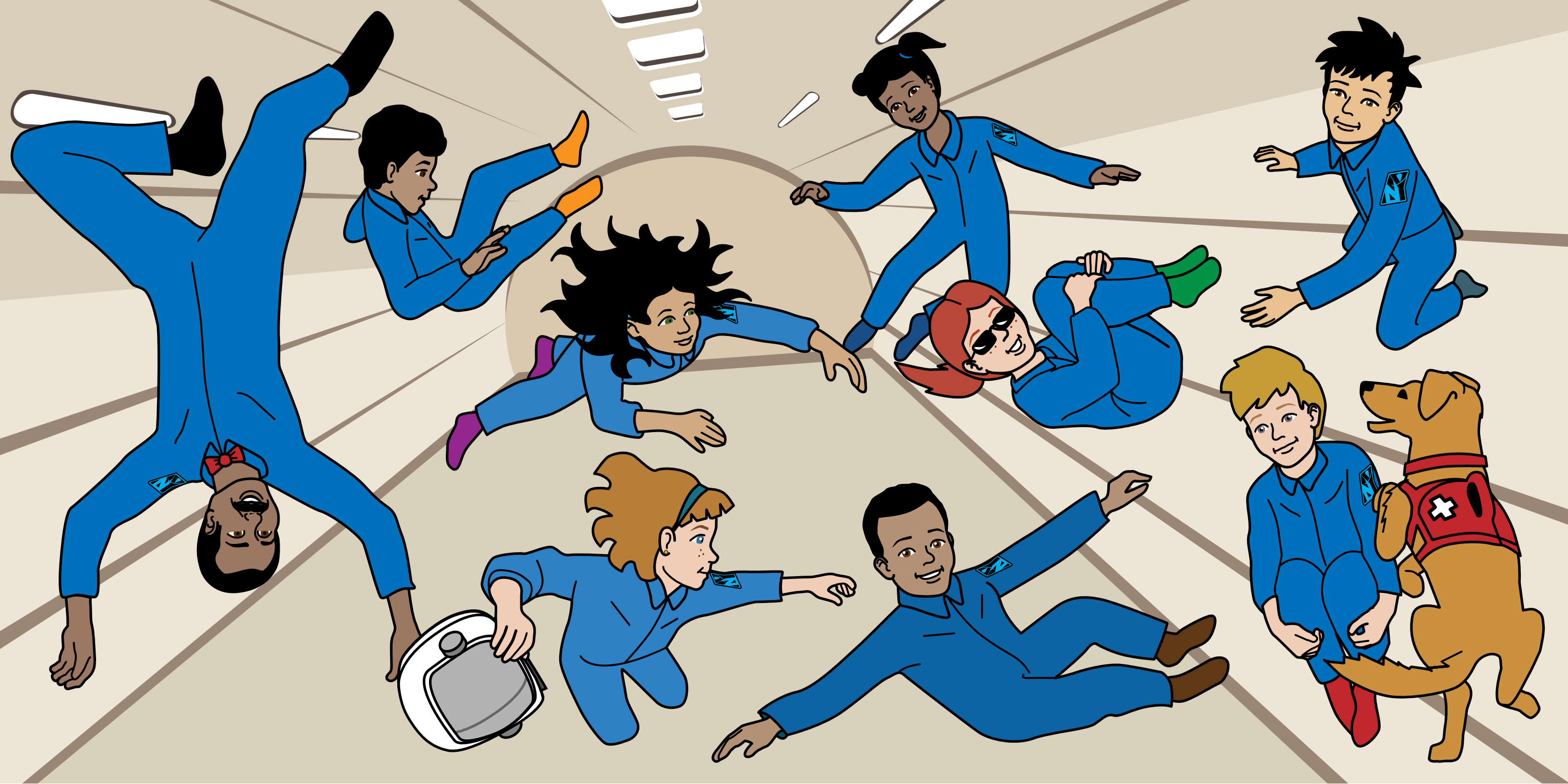


“I bet living and working in space is hard, and much different than it is here on Earth,” Leo stated.

“You are right, Leo,” Mr. Armstrong said. “Not only do astronauts feel different in microgravity, they can experience and observe different things about their experiments in microgravity too, which is why so much time and training goes into preparing astronauts for living and working in space!”

“I think we will need a lot of practice and training before we become astronauts. You can guarantee I will be practicing flips underwater in the pool this summer!” Stella added.

All of the Astro-Not-Yets, still excited by the day’s lesson, began to imagine what it would be like to experience microgravity for the first time.



“I can’t wait to see the wonderful astronauts each of you will become,” Mr. Armstrong said with a smile. “Maybe someday you will be reading to a class from the space station, or maybe even the Moon!”



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