mystery science

Grades K-5
Mini-Lesson: “How do we know the Earth is round?”

VIDEO TRANSCRIPT

VIDEO 1

Hi, it's Doug! Teachers have told you that the Earth is round, like a ball. Scientists have told us that the Earth is round. Astronauts who've been to the moon have told us that the Earth is round. They took pictures. And yet, when you walk outside, everything looks totally flat. What's the deal? Are teachers trying to trick us? Are the pictures from space fake? And is there any way to even know for yourself? I mean, unless you become an astronaut and go to space, it seems impossible to ever know this for yourself. Someone named Amalee has a question about the shape of the Earth. Let's give Amalee a call now.

[Video Call]

- Hi, Doug!

- Hi, Amalee!

- I have a question for you. How do we know the Earth is round?

- Ooh, that's a really interesting question.

Today, we have photographs of the Earth from space, but think about it, thousands of years ago, people had no idea what shape the Earth was. People in Ancient China thought the Earth was shaped like a giant cube. Over in Europe, the ancient Norse people thought the Earth was flat, like a pancake, and surrounded by water. The water was dark and deep, and they thought home

to a giant sea snake. Since ancient people had never seen pictures of the Earth, they just had to guess at what shape it was, and they were guessing wrong. Before I go on, though, I'm curious, besides pictures, are there any other ways to know that the Earth is round?

VIDEO 2

One of the first people to come up with the idea that the Earth was round was a person by the name of Pythagoras. He spent a lot of time looking up at the moon and wondered, could the Earth be a round sphere like the moon is? Later, when the telescope was invented, astronomers began to discover other round spheres in space, like Mars and Jupiter, and more and more people began to think, "Hey, if the moon and other planets are round, then the Earth must be round too." But just because the moon and Mars are round doesn't mean the Earth is round too. I mean, what if the Earth is different from other planets? That could be possible, right? It could be, but the shape of the moon and planets isn't the only reason people began thinking the Earth is round. A long time ago, astronomers began to notice something strange. Every once in a while, they could see a shadow on the moon. For hundreds of years, people wondered, what's going on up there? Some people even got scared when this happened. Was the moon being attacked by a giant creature, like a jaguar? Was this creature going to attack the Earth next? Eventually, astronomers figured out where the shadow was coming from. It was coming from the Earth. And the amazing thing was the shape of the Earth's shadow was round. Some of these ancient astronomers realized, wow, if the Earth's shadow is round, then the Earth itself must be round. Now, when this happens, it's what's called a lunar eclipse. It happens when the Earth moves between the moon and the Sun, and you don't need a telescope or binoculars to see one. In fact, if you know when to look for a lunar eclipse, you can see the Earth's round shadow

on the moon for yourself. A lunar eclipse happens every couple of years or so, but you don't need to wait until the next lunar eclipse in order to see for yourself that the Earth is round. There are other things you can notice too, like if you get a chance to visit any place where you can watch boats coming and going. Now, what could boats have anything to do with the Earth being round? Well, take a look at this ship. This is something people first noticed a long time ago. Every time a ship is sailing away from you, once it gets really far, it doesn't just look smaller and smaller until you can't see it anymore. It actually looks like the bottom of the ship disappears first, then the top. This might seem surprising, even weird, but it makes perfect sense if the Earth is round. Part of the ship is disappearing, because it's sailing over the round curve of the Earth, just like part of a friend would seem to disappear if she walked over the top of a round hill. If the Earth were flat, that wouldn't happen. Now you might not get to see a lunar eclipse for a while or see a ship coming or going towards the horizon. But there's still an even easier way to tell that the Earth is round. Have you ever done a video chat with a friend or family member who lives far away from you? Like someone who lives in another state or even another country? If you have, here's something to try to notice next time you talk to them. Ask them what time of day it is where they are. Have them show you a clock or better yet have them show you the view outside their window. It might be late at night for them while it's still daytime for you. Think about why that is. If the Earth were flat, then when the sun comes up, it'd be morning for everyone on Earth at the same time. And yet video chatting with far-away friends and family can show you that that's not the way it is. See, since the Earth is a sphere, we don't all see the sun at the same time. With a sphere, that means it's only daytime when your side of the Earth is facing the sun. When it's daytime for you, the other side of the Earth is in nighttime. So while you may be facing the sun and having breakfast in North America, kids on the other side of the sphere, like in Japan are already sound asleep. So in summary, when we look out in front of us,

the ground really does look flat. The idea that the Earth is round—it makes sense why it can be hard to believe. But don't just take someone's word for it. It's important to ask questions and try to understand things for yourself. There are a lot of different clues which can help you to know for yourself that the Earth is round. From lunar eclipses to ships, to video calls with far-away friends. That's all for this week's question. Thanks, Amalee, for asking it!