mystery science

Grades K-5
Mini-Lesson: “What's at the end of a rainbow?”

VIDEO TRANSCRIPT

VIDEO 1

Hey, it's Esther! I'm a huge fan of rainbows. I try to get a picture whenever I see one in the sky. I saw this rainbow on a road trip. Aren't these puffy clouds awesome? And I saw this rainbow over the lake near my house, just as the sun was setting behind me. Someone named Lucy is curious about rainbows. Let's give Lucy a call now.

[Video Call]

- Hi, Esther.
- Hi, Lucy.
- I have a question for you. What's at the end of a rainbow?
- That's a great question.

It reminds me of a story I've heard about magical folks called leprechauns. Legend says that they use rainbows to mark where they hide pots of gold. If you can reach the end of a rainbow, you get to keep the leprechaun's gold. Sounds simple enough, right? You just need to go to the spot where a rainbow ends, like here by this tree. Then the leprechaun's gold is yours. But if you've ever tried this, you've probably discovered there's a trick. Watch what happens as we start moving towards this rainbow. I can see the tree getting closer and closer, but do you notice something strange? The rainbow doesn't seem to end there anymore. Now, it looks like it ends

over here instead. Let's watch that again. The end of the rainbow starts here, but then it ends up somewhere else. Is this some kind of leprechaun magic? Why doesn't this rainbow stay in one place? To figure out what's going on here, it might help to think about what you know about rainbows. We don't see rainbows in the sky all the time, and maybe you know a bit about the best time to look for one. What needs to happen to see a rainbow like this?

VIDEO 2

I'm not sure how you answered, but maybe you said that when a rainbow like this happens, it has something to do with sunlight and rain, and you're right on track. One of the best times to see a rainbow is when the sun is shining behind you in in fairly clear skies. But in front of you, there's rain, or mist if a storm is just ending. Either way, there are lots of little drops of water in the air. Imagine stepping into a scene like that. As the sun shines, the sunlight hits hundreds of raindrops and bounces off at a specific angle to reach your eyes, kind of like this. When that happens, you end up seeing this, a rainbow. Exactly why you see one big rainbow is complicated. The important thing to know is that what you're seeing is really sunlight that's bouncing off of hundreds of raindrops and into your eyes. But not every single raindrop is going to make the rainbow you see. This time, notice which raindrops bounce light into your eyes to make a rainbow. See that? It's these raindrops farther in front of you. That's why when you see a rainbow, it looks like it's farther in front of you too. Now, let's imagine that you move forward to a different spot. Sunlight is still bouncing off of the raindrops and sending a rainbow into your eyes. But check out which ones it is now. It's these raindrops farther ahead. These are different raindrops than before. When you were back here, these raindrops did the bouncing. But in both places, it's raindrops farther in front of you that bounce rainbow light to your eyes. And because the raindrops are in the distance, the rainbow you see looks like it's in the distance too. The

same thing is happening in this video. At the start, it's the raindrops farther ahead bouncing sunlight to your eyes. So you see a rainbow in the distance near this tree. Then you start moving forward. As you move, there are different raindrops in front of you, and it's always the raindrops farther in front that bounce rainbow light to your eyes. That's why the rainbows still look far away. This is what makes the story of the leprechaun so sneaky. You can keep the gold if you reach the rainbow's end, but getting there is basically impossible. When you try to get closer, the rainbow still appears in the distance. So in summary, when you see a rainbow like this, you are really seeing sunlight bouncing off of hundreds of raindrops and into your eyes. When you try to get closer, it's always raindrops farther in front of you that bounce rainbow light into your eyes. That's why the rainbow still looks far away even when you reach the place where its end seemed to be before. Since we can't reach the end of a rainbow, we can't really say what's there. But how amazing is it to know that every single rainbow you see in the sky is a unique combination of raindrops and sunlight hitting your eyes at that exact moment. So, really, you never see the same rainbow twice. There's lots more to discover about rainbows, including how those bright colors are made. If you're curious, we have another lesson you can watch along with a hands-on activity for making rainbows. That's all for this week's question. Thanks, Lucy, for asking it.