mystery science

Grades K-5
Mini-Lesson: “How old is the Earth?”

VIDEO TRANSCRIPT

VIDEO 1

Hi, it's Doug! So behind where I live is this patch of dirt. I came out here recently after it had rained, and I noticed something lying on the ground. Right on top of the dirt was this round thing. I bent over and picked it up, then I cleaned it off. And that's when I realized that it was a nickel from the year 1927. It's almost 100 years old. It's not worth very much money, but it made me think about the fact that someone must have been standing in this exact spot nearly 100 years ago. Every place around us has been a place long before you or I were born.

Someone named Anthony has a question related to this. Let's give him a call now.

[Video Call]
- Hi, Doug!
- Hi, Anthony!
- I have a question for you. How old is the Earth?
- That's a great question.

Before we tackle the hard challenge of figuring out how old our entire planet is, think of something more familiar first. How do you know how old you are? Well, you know your birthday and you use a calendar to count each year as it goes by.

The problem is, this doesn't work for counting how many years old the Earth is, because the idea of counting years on a calendar isn't something we've always done. The calendar is something we invented, and we only started counting years once we invented it. In fact, looking at our calendar, you can see almost exactly how long we've been counting years—about 2,000 years of counting. That means there were lots of years before the invention of the calendar—years that nobody kept track of.

But what if I told you you don't need a calendar to keep track of years? There are other things you can find out in nature that keep track of years for us. You probably already even know about one of these things. Can you think of anything in nature that keeps track of years? Now would be a good time to pause the video and discuss.

VIDEO 2

Something like this—the rings inside a tree. Maybe you've heard about this before. Each ring inside a tree equals one year. You can count the rings inside a tree and find out how old that tree is. This works because as a tree grows, it creates a dark layer during late summer every year.

Unfortunately, trees only create rings as long as they're alive. The oldest living trees called, Bristlecone pines, have around 4,000 rings. So, that means Earth is at least 4,000 years old. But what if Earth is older than the oldest tree? And surely it is, right? Is there anything besides trees that leaves behind some kind of layer every year—something we could count?

There is—in rock. It's not quite as obvious as tree rings. But scientists realized that the solid ground under our feet contains layers. Rock, like this big section of sandstone, started out as sand that got carried by a stream and laid down in layers—slowly, one layer at a time. It doesn't always make nice, neat light and dark layers the way a tree does, but by figuring out how long it takes for a layer of sandstone to form, scientists can measure how thick this rock is and then get a sense of how long ago this section of rock started to form.

For example, say that it takes 100 years for this little one-inch section of sandstone to get laid down by a river. If there are 100 feet of rock here, then scientists can do some simple math and realize it took over 100,000 years just for this section of rock to form. By adding up all the different layers of rock on Earth, scientists started to realize that the Earth is much, much older than just thousands of years old. Just by looking at layers of rock, scientists became convinced that the Earth must be at least millions of years old, maybe even more.

Recently, scientists have discovered an even better way of figuring out how old the Earth might be. Using microscopes and advanced knowledge of something called radioactivity, scientists can break open rocks and find evidence that the Earth is even older than millions of years old. It's thousands of millions of years old, or in other words, billions. If you ask a scientist today, their current best estimate for the age of the Earth is 4,500 million years old, or 4.5. billion years. The subject of radioactivity is something you can choose to study in high school science.

So in summary, we think that the Earth has been around for at least 4,500 million years. We think this based on evidence or clues we get from rocks.

That's all for this week's question. Thanks, Anthony, for asking it!