mystery science

Grades K-5
Mini-Lesson: “How are pencils made?”

VIDEO TRANSCRIPT

VIDEO 1

Hold on one second. I’ve just got to finish writing this down. Hi, it's Doug! Okay, this is probably the biggest pencil you've ever seen, and I don't normally use a pencil this big. But I do like to use pencils instead of pens whenever I write things.

Someone named Emiliano has a question about pencils. Let's give him a call now.

[Video Call]
- Hi, Doug!
- Hi, Emiliano!
- I have a question for you. How are pencils made?
- That's a great question.

Pencils are everywhere around us today. You probably have one near you right now. But pencils haven't been around forever. Have you ever thought about this? What did people use to write with before there were pencils?

Now, don't let your mind go to things like pens, or crayons, or markers. I'm talking about a time before any of these things were invented, too. How did people use to write? Well, one way that

many people used to write was with one of these—it's a large feather, it's called a quill, and people would dip that into a jar of ink.

You might have heard of this before. Now, to me, it actually sounds kind of fun to write that way. And it can be. People still occasionally write with these just for fun. But why did people stop using them? Well, think about it. Can you see any problems you might run into if you use a feather and a jar of ink to write?

VIDEO 2

Well, imagine you've got a jar of ink sitting there on your desk. You reach over to dip the feather in the ink jar, and whoops, you drip some ink on the page. Or worse yet, what if you accidentally tip over the ink jar and spill it everywhere?

To get around this problem, some people thought, well, instead of using a liquid like ink, why not write with something solid? For example, people had known for a long time that if you take a piece of wood and you burn it—it's what we call charcoal. It's actually pretty good at writing. Not only does charcoal not spill, but it's also pretty easy to carry around.

Charcoal does have some other problems, though. It turns out it leaves your hands covered in black soot. And even worse, it's soft and crumbly. Even if you had gloves on when you used it, you'd still get lots of little bits of it all over your paper.

Well, enter the pencil. It's funny to think of a pencil as something that had to be invented, but it did. Everything about a pencil has been carefully chosen by someone to solve some of these problems I'm telling you about.

You see, you've got this solid writing material there. So, unlike ink, it won't spill. But it's encased inside of a piece of wood. So, unlike charcoal when you go to write, it won't get all over your fingers. In fact, that stuff inside a pencil—it's even better than charcoal.

The stuff inside it, you hear people call it *lead*. It's actually a material called *graphite*. It's similar to charcoal, but it's not as crumbly, so it doesn't leave little pieces all over your paper.

We don't know for sure who invented the pencil. But whoever did it must have been really clever. I mean, think about it. Look at this picture of a bunch of unsharpened pencils. How do they get the graphite inside of the wood like that? I mean, what do they do? Do they carve these long pieces of wood and then drill a tiny hole through the middle?

It turns out, the secret is to make a sandwich. Not a sandwich you eat, but a sandwich made of wood. This person is showing how some of the first pencils were made. Instead of two slabs of bread, he's got two slabs of wood. And he's applying glue to them.

Then he takes a flat piece of graphite, and he puts it in between the two pieces of wood. He presses the top layer on that. And now he's got a type of pencil. So that's what the first pencils looked like. A flat piece of graphite sandwiched between two slabs of wood. You just sharpen it with a knife.

Now, pencils today look very different. But they're still made the same way. If you look closely at an unsharpened pencil, you can see they're still sandwiches of wood and graphite. Have you ever noticed how some pencils look like they have a little line through them? That's because two pieces of wood were glued together. And you can see where they meet.

Now, today most pencils are made by machines in factories, like this. They start with flat pieces of wood. Each piece will be made into many pencils. Saws carve grooves into each piece of wood, then glue is squirted into the grooves.

Next, it's time to glue in the pencil graphite. Here is where the graphite comes in. And as it goes around, the machine drops it into the grooves on each piece of wood. Then another piece of wood flips on top, creating the pencil sandwich. Finally, saws cut apart all the individual pencils.

So in summary, the invention of the pencil solved many of the problems with writing, like ink spilling or charcoal making a mess.

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