mystery science

Grades K-5
Mini-Lesson: “How do phones work?”

VIDEO TRANSCRIPT

VIDEO 1

[Video Call]

- Hi, Doug!

- Hi, Hannah!

- I have a question for you. How do phones work?

- That's a great question.

Phones are so great. You can talk to your friends with them. You can play games on them. There are even phones for dogs to call their owners when they're feeling lonely. Or have you seen this phone? It's as big as a house, and it actually works. You just need a crane to help you pick it up when you want to make a phone call. But phones haven't always been around. Have you ever wondered how did people talk to friends who were really far away, before phones were invented? What do you think?

VIDEO 2

Well, thousands of years ago, some people used puffs of smoke, like from campfires, to talk to friends and family who were far away. For example, if one of your siblings went over to their friend's place, one puff of smoke might mean, "Hey, dinner's ready. It's time to come home." And

maybe two puffs of smoke might mean, "You better hurry home because you got chores to do." Now, why would people stop sending messages this way? Well, for one, a message like this doesn't go very far, you have to live close enough to someone where you could actually see their smoke signal. Like imagine you wanted to send a message to your grandma who lives on the other side of a mountain, she'd probably never see your message, especially if there was bad weather, So you could send a letter, like by horse or by train, but that would take some time. your grandma might have to wait days before finding out what you wanted to tell her, maybe even weeks or months if she lived really far away. That's the kind of problem most people had before there were phones. There just wasn't a good way to send messages quickly or far away, there had to be a better way, but how could it be invented? Well, eventually, people started discovering more about electricity. They discovered that electricity could travel along a wire and it could travel really fast. So could messages be sent using electricity? With the invention of a device called the telegraph, inventors figured out that they could, instead of using puffs of smoke, the telegraph sent puffs of electricity along a wire. These puffs or pulses of electricity were made into a code that people could read at the other end. Now, if you had a long enough wire, you could send a message to anyone anywhere immediately, but the telegraph wasn't perfect, you could only send pulses of electricity in a code, not words, so if you didn't know how to read the code, you wouldn't be able to understand the message. It also meant you couldn't send too long of a message, you usually had to keep it short. It was around the time of the telegraph that a lot of inventors started thinking about this problem. Wouldn't it be amazing if we could send our voices directly along a wire instead of just pulses of electricity, but how—how could you do that? Could you get a long piece of wire and yell into the end of it? I mean, that's not going to work. What some inventors realized is that you could turn sound into electricity. All sounds whether it's dogs barking, bees buzzing, or even your favorite song, all these sounds

are made when something moves back and forth really fast, it's made by vibrations. Like watch these guitar strings, in this video, you can actually see the strings vibrating. Your voice is made by vibrations too, you can feel this for yourself, simply hold two fingers up to your neck and say, "Hey world, I'm awesome!" Do you feel that buzzing on your neck? You're feeling the vibrations made by two small flaps of skin inside your throat. When you talk, the sound vibrations you make travel through the air to the ears of the person you're talking to. The problem is sound vibrations don't travel very far through the air, that's why you have to yell when a friend is far away, but electricity can travel really far and this is where the phone comes in. One inventor, Alexander Graham Bell, knew that if he could turn our voice vibrations into electricity, he could send our voices along a wire, but first, he needed something to catch the voice vibrations when a person talked, he decided to use a long tube that looked kind of like an ice cream cone. This cone was attached to a pin and a battery when a person talked into the cone, it shook the pin in the same way our voice vibrations shake, the vibrating pin would then tap the battery, turning the voice vibrations into pulses of electricity, kind of like the puffs of smoke in smoke signals, the pulses would then travel through a wire to a cone at the other end, that cone would catch the electric pulses and turn them back into sound. And that's how the phone was born, imagine that. Now, say you wanted to talk to your friend who lives on the other side of town from you, all you would have to do is run a wire between your two houses, then the two of you could pick up this device and talk to each other anytime you wanted. You might think, "Whoa, that sounds awesome!" But keep in mind, in the time since the original phones, scientists and inventors have come up with cell phones or smartphones phones, phones that don't even need to be attached to a wire. If kids from back when telephones were first invented knew about the kinds of phones we have today, they'd think that was unreal, they'd wonder, "How is that even possible, no wire?" But our cell phones today, aren't that different than the very first kind of phone, the

biggest difference really is just that we figured out a way to send sound vibrations through the air without wires. So in summary, the invention of the telephone solved a lot of the problems of how to send messages. By turning sound vibrations into electricity, messages could be sent really far away along a wire. As long as you had a telephone and the wire was long enough, you could talk to someone no matter where they lived. That's all for this week's question. Thanks, Hannah, for asking it!