mystery science

Grades K-5
Mini-Lesson: “What is a supernova?”

VIDEO TRANSCRIPT

VIDEO 1

Hi, it's Danni! One time, I got to go on a trip to the country of Chile to visit something really cool. This building houses an incredibly powerful telescope. A telescope is a tool that scientists use to see things in outer space up close. This one area in Chile was famous for having lots of big powerful telescopes built there. And once the sun set, I knew why. I looked up and my view of the sky was so clear. Even without a telescope, I could see hundreds and hundreds of sparkling stars. It looked like the sky had been dusted with glitter. Someone named Tobi has a question that has to do with stars. Let's call Toby now.

[Video Call]

- Hi, Danni.
- Hi, Tobi.
- I have a question for you. What is a supernova?
- That's a great question.

To understand supernovas, we have to look at these, stars. Chances are you've seen stars in the night sky before. They're little dots of light and they rarely change. They're familiar, twinkly, peaceful. But check this out. Remember those powerful telescopes I was talking about earlier? Let's take a look at what the night sky looks like through a super powerful telescope. Amazing. Right? So many stars. Now, this is a sped up video, but pay attention to this spot right here.

Wait for it. Boom. Let's watch that again. See that? That's a supernova. Just imagine looking at the familiar peaceful stars when suddenly one of them does that. What's going on here? What is that star doing? To figure that out, we can start by thinking about a simpler question. What even are stars anyway? What are they made of? I wonder if you have any ideas.

VIDEO 2

When you look up at the night sky and see stars, the stars look pretty small and simple. But if you look at a star up close, you'd see something a lot more complicated. This is a photo of a star up close. It kinda looks like it's made of flames, right? Well, it's not exactly flames, but a star is super hot. Stars are huge bundles of very, very hot gases floating in outer space. The idea of a floating bundle of gases might seem unusual, but these are probably familiar to you already. The stuff inside a balloon that makes it float, that's a type of gas. The air, that's made up of gases. It's complicated, but basically, stars are made up of specific gases all bundled together in one spot. So okay. A star is a super hot, super bright bundle of gases, but how does that explode and become a supernova? That has to do with something you may have heard of called gravity. Gravity is a force that pulls on every single thing on earth. It's the reason things fall when you drop them. You might think of gravity as being something that pulls everything down, and that's basically right, but it's a little more complicated than that. Remember, earth is round. Gravity pulls you in toward the center of the earth. This matters for stars because earth is not the only place that has gravity. Stars also have gravity and they are also round. In a star, gravity pulls everything in toward the center of the star. You can think of this like a big smush. The gases the star is made of smashed together in the center of the star. Smashing together makes the gases heat up. That's why a star looks like it's made of flames. Gravity pulls everything in, but the heat from those super hot gases do the opposite. They push out. Most of

the time, the push of heat out and the pull of gravity in is pretty much even. It's balanced between push out and pull in. When it's like that, the star stays looking pretty much the same for a long time. But imagine, what would happen if the push became unbalanced? Like imagine the push of heat out became weaker or the pull of gravity in became stronger. If that happened, all those gases would get pulled further and further into the center. They get hotter and hotter and hotter. And sometimes when this happens, everything smashes together and gets so hot that, bang, the star explodes. And that's what a supernova is, a star exploding. The light from a supernova is so bright that it can outshine millions of other stars. Some are so bright and so big that people have seen them in the night sky for a few weeks, a few months, or even longer. Something this intense might seem like it would be rare, but it's not. Supernovas happen all the time. Scientists study a few hundred supernovas every year. So in summary, stars are big bundles of hot gases pulled together. When those gases becomes really really strong and the star explodes. That's called a supernova and they happen a lot. You might even get to spot a supernova in the night sky in your lifetime. There's so much going on in the night sky. Take a look and see what you can notice. That's all for this week's question. Thanks for asking, Tobi.