mystery science

Grades K-5
Mini-Lesson: “Why is snow white?”

VIDEO TRANSCRIPT

Hi, it's Doug! Do you get snow where you live? I live in California, where the only snow that we get is up in the mountains. But you can buy this stuff—it's fake snow. It's what they use in movies when they don't have real snow around, and it looks pretty real.

Someone named Hudaifah has a question about snow. Let's give him a call now.

[Video Call]
- Hi, Doug!
- Hi, Hudaifah!
- I have a question for you. Why is snow white?
- That's a great question.

Snow is *really* white, isn't it? You know, it's actually surprising that snow has a color at all. After all, snow is made of water. Water is totally clear. You can see right through it. So, if snow is made of water, why does it look white? Do you have any ideas?

Okay. You ready?

Well, you might know that each piece of snow, each snowflake, is a tiny piece of ice. Snow is made of water that's frozen. Maybe that has something to do with it. Ice can look white sometimes, right? But ice can also be clear, just like a glass of water. It would be helpful if we

could get a closer look at a snowflake. This person is taking a snowflake and putting it under a microscope; that way she can see what it looks like close up. Check it out. Look at that, this is what a snowflake looks like close up. Wow. Now you can see a snowflake is mostly clear. You can see right through it, just like a glass of water or a clear piece of ice. But is the entire snowflake clear? Do you see any parts that don't look clear? Notice here, here, here. These parts look more white, don't they? What is it about these parts that makes them look white? Well, if we could turn a snowflake on its side, like this, we would see that a snowflake isn't completely flat. It has bumps or edges all over it. Notice how the white parts of the snowflake are the parts that have those edges or bumps? But still, a snowflake is mostly clear. So why would snow look white? I mean, why doesn't snow look clear? Well, keep in mind when you're looking at a bunch of snow like this, you're looking at lots and lots of snowflakes all piling up. That means you're looking at a lot more of those edges. We can see the same thing with other clear materials, like this piece of glass. This is a helpful way to think about it. Just like a snowflake, this piece of glass is mostly clear. You can see through it. But notice how some of the edges look white. Well, now watch what happens as we pile up more and more pieces of glass on top of each other, just like snowflakes piling up. I'll speed things up a bit here. You see that? Look, it's starting to look a lot more white. This explains why a single snowflake looks mostly clear, but snow itself, which is made of lots of snowflakes, doesn't look clear anymore, it looks white. But why do the edges of each snowflake look white? Why not some other color? Well, what if I told you that snow isn't always white? Take a look at the snow here. What color would you say it is? It doesn't look white anymore. I would say it looks pink, and that's because you've got the pink light of the sunset shining on it. Or check this out. Here the snow looks orange from the orange light of these streetlamps. The edges of each snowflake aren't always white. It depends on the color of the light that's shining on them. So, why is snow white? Where

is there white light that's shining on snow? It's right here: the Sun. Sunlight is usually white, at least in the middle of the daytime. Now, I know you might think of sunlight as being yellow, like maybe when you draw a picture you color the Sun yellow. But in real life, have a look at this. When the Sun is high in the sky during the day, you see it's actually more white than it is yellow.

So, in summary, snowflakes are mostly clear, except for their bumps or edges. It's at the edges where it looks more white. When we're looking at snow, we're seeing lots of snowflakes all piled together so we're seeing all those edges. The reason the edges of each snowflake look white has to do with the color of the sunlight. Sunlight looks white when it's the middle of the day, so snow is white because the Sun is white. But if the Sun were blue or purple, then snow would look blue or purple too.

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