Mystery science

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

VIDEO TRANSCRIPT

MINI-LESSON VIDEO 1

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?

MINI-LESSON VIDEO 2

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. Now, after this video is done playing, my friends and I here at Mystery Science have created a step by step activity that combines science with art. I hope you'll try it. Have fun, and stay curious.

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to create a snowflake that looks white, even though it's made of a material that you can see through. Your snowflake won't be made of real snow since that would melt and make a mess, so instead, you'll be using this as your snow. It's called wax paper, and notice how you can see through it, so you'll have to experiment to figure out how to make wax paper less transparent, or see-through. Then, after you experiment, you'll make your snowflake. I'll show you how to get started, step by step.

ACTIVITY STEP 1

If you're in a class, find a partner. If you aren't, that's okay; you can work alone. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Get your supplies.

ACTIVITY STEP 3

Write your name on your worksheet. Then, cut out the “Look here!” box with the snowman on it. You'll put it on your plate and lay a piece of wax paper on top. Notice how you can see through the wax paper?

ACTIVITY STEP 4

Talk with your partner about how you could change the sheet of wax paper so that it's less transparent. You can't add anything, but you can do anything else you like. Try out your ideas. If you get stumped, go to the next slide.

ACTIVITY STEP 5

Discuss. What did you try? What worked for you? Think about what you know about snow. Does that help you come up with other ideas to try?

ACTIVITY STEP 6

If you want to try your new ideas, take a minute to do that now.

ACTIVITY STEP 7

Here are some things we tried to make it less transparent. We crumpled the wax paper to make it bumpy, just like a snowflake is bumpy. And you can see, now you can't see through it as well. We also tried folding it. And you can see that that worked too. And then another thing we did was we tried cutting it into pieces to make a pile, just like snowflakes pile up. Any of these work to make it less transparent. But in today's activity, we're going to use the third way to make snowflakes. We're going to cut the wax paper into little pieces. Go to the next slide to get started.

ACTIVITY STEP 8

Okay, to cut little pieces of snow, here's an easy way to do it. Fold the wax paper so you have lots of layers. Then, once you've done that, go ahead and cut it, like this, to make what we call a fringe. It's a few straight lines side-by-side, close together, like this. Then what you do is you hold that over your plate and you cut across the fringe to get little pieces. Now, if you don't want to do it that way, that's fine. You can also tear the paper into pieces, or you can just figure out your own way to make little pieces.

ACTIVITY STEP 9

All right, now it's time to make a snowflake. Choose the snowflake design you want to use. Cut it out from your worksheet. And cut out your name too.

ACTIVITY STEP 10

You'll work with a partner to make a snowflake of your own. Choose who will be the first Snowflake Maker and who will be the Helper. Now, don't worry, you'll change jobs later so both of you get to make a snowflake.

ACTIVITY STEP 11

Snowflake Maker: put your snowflake on the extra plate. Helper: lay a piece of wax paper over the snowflake.

ACTIVITY STEP 12

Helper: hold the wax paper in place, like this, so that it doesn't slide. Snowflake Maker: test your glue bottle by squeezing a thin line of glue away from your snowflake, like this.

ACTIVITY STEP 13

Snowflake Maker: stick your name on the test line.

ACTIVITY STEP 14

Helper: keep holding the wax paper. Snowflake Maker: squeeze a thin line of glue on every dark line in the snowflake. Make sure all the lines connect, or else your snowflake might fall apart later.

ACTIVITY STEP 15

Snowflake Maker: sprinkle on the pieces of wax paper so that they completely cover the glue.

ACTIVITY STEP 16

Now you can trade jobs. Follow all the steps again to make another snowflake.

ACTIVITY STEP 17

You'll have to wait overnight for the glue to dry. When it's dry, carefully peel the wax paper off the back of the snowflake, like this. Hold one arm at a time and peel the wax paper off the back of just that arm. Go slowly until the whole snowflake is peeled off. If you want to hang your snowflake up, you can punch a hole in it and tie a string through that hole. Stay curious and have a great winter!