mystery science

Lesson: “Why does it get cold in winter?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Doug. Last winter, I traveled to Northern Canada, where my sister and her family live. It gets so cold up there that it starts to snow in the fall, and then by the end of winter, the snow has piled up so deep that I could do this for fun. Check it out. Lots of places in the world get cold in the wintertime. In some places, it even snows. And yet, think about it, just a few months before that in the exact same place, it was hot outside. You were wearing shorts or t-shirts. You might've gone swimming. Maybe you went to the beach or you had a picnic outside. In just a few short months, the weather changes a lot. It goes from hot to cold, and back to hot. That seems strange. Let's think about what could make things cool off or warm up.

EXPLORATION VIDEO 2

When you're too cold, the best place to sit is in the sun. The sunshine will help warm you up. If you're too hot, the best place to sit is in the shade. Without the Sun shining on you, you can cool down. Sunshine warms you up. Sunshine also warms up the planet we live on, the planet Earth. The Sun is where Earth gets all of its light and warmth. So, to figure out why it's cold in winter and hot in summer, it makes sense to pay attention to the Sun. Now, you know it's dangerous to look directly at the Sun in real life, but what I'm about to show you is just a video, it's totally safe to look at. So, check this out. See if you can find any clues about why it might get cold in winter.

This is a sped-up view of what you'd see if you were to sit in one place and watch the Sun all day long. Let's watch it again. Here, you can see the Sun rises in the morning, gets to a high point, and then starts to set in the evening. If you were to draw a line, it's like this. The Sun makes a giant arc across the sky. But now, this was during the summertime. Now watch the Sun in wintertime. Okay, let's see it one more time. Do you notice any difference?

EXPLORATION VIDEO 3

Well, you might have noticed a difference in how high up the Sun goes in the sky. In the summer, the Sun gets much higher overhead. In the winter, the Sun is lower in the sky than it is in the summer. Think about how the sun feels when it's high up in the sky. In the summertime, with the Sun up higher, it's sending light rays directly down on you. Like, think about if you're at the pool on a hot summer day. You've probably felt the sun beating straight down on you. When it's shining straight down on you like that, you get hot. But in winter, the Sun is lower in the sky. The sunlight is not beating straight down on you anymore. It's more sideways. Without all that heat beating straight down on us, it can't get hot outside, so it's cold. Maybe you will also notice that the Sun spends more time in the sky in the summer than it does in the winter. Summer days are longer than winter days. More sunshine means more warmth. In summary, the Sun warms up the Earth. In the summer, the Sun is high in the sky and the days are longer. There's more sunlight and that warms things up. In the winter, there's less sunlight and the weather cools off.

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to help solve a sticky mystery. Last summer, Leo and Noah went on a camping trip and something very strange happened. At first, everything seemed normal. They parked their cars at the camp site and set up their tents. Then, they unpacked the food

that they brought, and that's when they noticed something strange. They both brought chocolate and marshmallows, so they could make a special dessert. In Noah's car, all the marshmallows and all the chocolate had melted. It was a gooey mess, but in Leo's car, the marshmallows and chocolate were just fine. They hadn't melted at all. Weird! So, that's the mystery you are going to solve: the mystery of the melting marshmallows. We want to know why the marshmallows melted in one car, but not the other. We'll figure it out together, step by step.

ACTIVITY STEP 1

To solve the mystery, you need to look for clues. Let's start by looking at the two cars. Discuss.

ACTIVITY STEP 2

Here's what we noticed. Noah's car is in the sun and Leo's car is in the shade. Discuss.

ACTIVITY STEP 3

Here's what we think. Sunlight warms things up, so Noah's car got hot because it was in the sun. Leo's car stayed cool because it was in the shade. Discuss.

ACTIVITY STEP 4

To find out if Leo's car would get hot in the sun, Leo and Noah traded parking places. Now Leo's car is in the sun. Discuss.

ACTIVITY STEP 5

Leo and Noah decided to put marshmallows and chocolate in both cars. Then they could compare what happened in the sun and in the shade. Discuss.

ACTIVITY STEP 6

After one hour, Noah and Leo checked the car in the sun. To see if the marshmallow had melted, they tried the Squish Test. Noah squeezed the marshmallow to see if it would squish. Watch this. It's easy to squish the marshmallow flat. The marshmallow and chocolate melted in the sunny car.

ACTIVITY STEP 7

Then Noah and Leo checked the car in the shade. Once again, they tried the Squish Test—watch this. Noah squeezed the marshmallow, but as soon as he stopped squeezing, the marshmallow bounced back. The chocolate didn't melt in the shaded car, and neither did the marshmallow.

ACTIVITY STEP 8

The marshmallow from the hot car made a treat that's called a s'more. Usually, people roast marshmallows in the fire to make s'mores. Noah and Leo have invented a new way to make s'mores. Can you think of other melty treats you can invent using the warmth of the Sun?

ACTIVITY STEP 9

You solved the melty mystery. Noah's marshmallows melted because his car was in the sun. The Sun heats things up and warms the Earth. It also warms up marshmallows. Have fun, and stay curious.