Lesson: “Why are some places always hot?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Doug! I want to tell you a true story from my life. One winter day when I was 10 years old, my family and I drove to the airport near Chicago. That was near where I lived. We were there to pick someone up, someone that my father said would be living with us for an entire year. Her name was Shelly. She was an exchange student. That's someone who comes over from another country and lives with your family for a while. Shelly had flown all the way from a country in Africa. I'll never forget meeting her for that first time, because once we picked her up and got her outside the airport to our car, she was so excited. She looked all around us and shouted, "It's snow!" Shelly had only ever seen snow on television. She'd never actually seen it or touched it her entire life. I remember what she said. She goes, "Wow. It glitters." Then, before we could even say anything, Shelly ran straight for a big pile of snow, jumped in, and started rolling around in it. She stopped and looked up at us with really wide eyes and squealed, "Ah, it's so cold." I laughed, because to me, that was obvious. I'd seen snow every winter for my whole life. In fact, it would snow so much in wintertime that I would get sick of it. I'd be so ready for the warm days of summer to come back each year. But that evening, meeting Shelly for the first time, I learned that Shelly had grown up in a very different place than me. She was from the country of Zimbabwe in Africa. And not only had she never seen snow—in fact, it almost never even gets cold in Zimbabwe. It's always warm, even in the winter months. She told me that just

earlier that day, before she left Zimbabwe, she'd been wearing shorts and had been sweating because it was so hot and that her friends were going swimming. Now, imagine me over in Chicago. Now, here in winter, it'd be freezing cold for me. It would be months before I'd be able to go in a pool. And Shelly, here she said that she'd come from somewhere on Earth where it was so hot that she'd been sweating. Hm. I said to Shelly, "I wish I lived where you came from. That seems like the most amazing place ever—a place that's warm all year, in summer and in winter." Shelly smiled. She said, "Are you kidding me? I'm so excited that I get to now spend time living where you come from. I've always wanted to see snow my whole life." I never thought of the weather where I lived as being anything special. To me, it was just normal. And Shelly never thought of the weather where she lived as being anything special. To her, that was normal. Each of the places we were from were special to someone else—we just hadn't realized it because we hadn't left our areas. We were used to them. Now that I've studied science, I know that these areas are each part of what we call different *climates*—places on Earth where the weather always acts a certain way. For example, I lived in a climate where there are big seasonal differences. The summers are nice and warm, but the winters are cold and snowy. But Shelly lived in a climate where there are no seasonal differences. The summers are nice and warm, and the winters are nice and warm too. What about you? What's the climate like where you live? Is it more like where I grew up or where Shelly grew up? Or is it something even different from that?

ACTIVITY INTRODUCTION VIDEO

In this activity, you're gonna figure out where in the world it's hot, where it's cold, and everything in between. What are the different kinds of climates on Earth? And where can you find them? Here's the world map you'll use. We divided it into three sections. In the first section, you'll see

North and South America. In the middle section, there's Europe and Africa. And in the last section, you'll see Asia, Australia, and all those nearby islands. Each map also gets a part of Antarctica down at the bottom. For each section of the map, we'll give you a list of places that are on your map. Most of these places are cities. But there are also a few islands. You'll use this special climate decoder to figure out what climate each place has. Then, you'll color the zone that those cities are in. After you're done, you and your classmates will put three finished maps together and see if you can find a larger world pattern to where all the climate zones are located. Are you ready? I'll take you through the activity step by step.

ACTIVITY STEP 1

Find a partner to sit next to. You and your partner will be double-checking each other's work later. When you're done with this step, press the arrow on the right.

ACTIVITY STEP 2

Get your supplies. Each group will need these things.

ACTIVITY STEP 3

Color in the Climate Decoder. Use blue for cold temperatures, use yellow for warm temperatures, and use red for hot temperatures. Then, color the key at the bottom in the same way.

ACTIVITY STEP 4

You're going to figure out whether the summer and winter temperature of each city is cold, warm, or hot. And to make this easier, draw two lines between the top and bottom Climate Decoders. Use a ruler and connect the marks where the colors meet, like this.

ACTIVITY STEP 5

Let's do an example together. Look at winter for Antarctica. What color is that part of the Climate Decoder? Fill in the circle with that color.

ACTIVITY STEP 6

Let's finish the example now. Look at summer for Antarctica. What color is that part of the Climate Decoder? Fill in the circle with that color.

ACTIVITY STEP 7

Now do the other places. For each one, color winter and summer to match the Climate Decoder.

ACTIVITY STEP 8

Check your work with your partner. Fix anything that you disagree on.

ACTIVITY STEP 9

Now you can figure out the climate for each place, and color in the climate color. Find places where winter and summer are both blue, for cold. Then, fill in the climate color to match. Then, do the same for the red—hot places.

ACTIVITY STEP 10

Now look for where winters are blue—cold—and summers are red—hot. Fill in the climate color with purple.

ACTIVITY STEP 11

Now look for where winters are yellow—warm—and summers are red—hot. Fill in the climate color with orange.

ACTIVITY STEP 12

Check your work with your partner. Fix anything that you disagree on.

ACTIVITY STEP 13

Work with your partner to figure out what to color each circle on your map's Climate Key.

ACTIVITY STEP 14

On the map, find each place and color the land around it with the place's climate color. Stay inside the dotted lines.

ACTIVITY STEP 15

Now your teacher will collect three finished maps and put them together like this.

ACTIVITY STEP 16

Discuss these questions as a class.

ACTIVITY STEP 17

Discuss this question as a class.

ACTIVITY STEP 18

Discuss this question as a class. After you're done discussing, press the arrow on the right to watch the next video.

EXPLORATION VIDEO 2

By coloring in the temperatures of different places around the world, you've created a map of the world's climates. And by knowing about these four climates, you can understand why the places on Earth look and feel the way they do. Maybe you notice that the climates form a pattern, like this, stretching across the whole globe. This middle section right here, you might have called it the *hot zone*. You might already have known that the hottest places in the world are near the equator—that's the line on a globe that goes around the very middle of the earth. But if you look on a globe, you can actually see two other lines on either side of the equator. These are called the *tropic lines*. So, scientists prefer to use the word *tropical* to describe what it

feels like in this whole area, the area between these lines. This is the tropical climate zone. These are the places where it's hot all year long. If you live here or visit here, you never need a winter coat, even if it's the middle of the winter months. The reason it's so hot in the tropical zone has to do with how the sun shines on that middle section of the Earth. Let me explain. Imagine the Earth in outer space, like this. This part of the Earth here, the middle part, is the only place on Earth where the sun's beams shine straight at the ground without any slant. This heats up the ground in the middle of the Earth more than other places, making the middle zone on Earth have the hottest climate. That's why the middle of your map, the tropical zone, is hot all year long. Since the tropical zone is so hot, this also causes lots of water to evaporate, or rise up off the tropical lakes and oceans, which makes the air in the tropical climate zone feel very wet and humid. By afternoon, some of that hot, wet air has gotten high enough up into the sky that it gets cooled off. And so starts to fall back down to the ground again as rain. So when you visit somewhere in a tropical climate zone, you can expect not only hot weather, but also rain almost every day. You'll also see tons of lush, green plants growing everywhere all year long since they're so well-watered. Lots of rain, hot weather, tons of plants. Does this sound familiar? The tropical climate zone is home to the world's rain forests. So that just about covers the tropical climate zone. But now let's look at these parts of the world, the parts you colored blue on opposite ends of the Earth. Why are the opposite ends of the Earth the same climate? Well, let's think about the Earth in space again. Remember how I said that the middle of the Earth is really hot because the sunbeams hit it straight on? Well, at the top and bottom of the Earth, the sunbeams are always shining at a slant. They never shine straight at the ground. So the ground at these areas never gets warmed up very much. These areas are always cold, just like you drew on your map. So these zones are both extremely cold, or since this is where the north and south pole are, scientists call these the *polar climate zones*. The polar climates mostly look

white and snowy. They're home to the coldest places on earth. For example, summertime in Antarctica rarely gets above 9 degrees. That's summer. Now there are some differences between the North Pole and South Pole. For example, they have different animals. Polar bears only live in the North Pole area, or the Arctic. And penguins only live in the South Pole, or Antarctic. But notice that even polar bears and penguins have something in common. They're both chubby and fluffy. Do you see that? They have to be because of the cold polar climate that they live in. Any animals living in a polar climate have to have lots of fat in order to keep warm. That's why they look so chubby. So now we've covered the cold polar climate zone and the hot tropical climate zone. But what about these in-between ones? What kind of weather? What kind of plants? What kind of animals do you think that these areas have?

EXPLORATION VIDEO 3

So what about the in-between climates? What's it look like here? What does the weather feel like? Well, here's something kind of weird, actually. Many people don't know the name of this really big in-between climate. And yet, this is where most of the world's people live. This climate zone is called the *temperate climate*, and it includes huge parts of North America, Europe, and Asia. The temperate climate is the place that has warm summers but cold winters. In other words, if you live in a temperate climate zone, it's the only place where you can really notice a difference between each of the four seasons—winter, spring, summer, autumn. And, in fact, the kinds of plants and animals that live here have to be able to switch between warm summer weather and freezing cold winters. The temperate climate is where you find all these trees that drop their leaves before the winter comes. That's the autumn, or fall, season. By winter, the trees go completely bare. They won't grow or put leaves out until it's springtime again, when the warmth has returned. And many of the animals in the temperate zone also have a special way

of dealing with the switch from hot to cold. They go into hibernation—or sleep through the winter—like bears, snakes, toads, and chipmunks. In summertime, you can find these same animals roaming around outside, but every winter, they're all underground, sleeping away to escape the cold. OK, so that wraps up the temperate zone, the only climate zone with all four seasons. That just leaves this last zone, the climate that includes places like California, Florida, Madagascar, Spain, northern India, and Australia. If you've ever been to any of these places, or if you live there, then you know that they don't ever get very cold in winter. So they're definitely not temperate. But their wintertime isn't hot, either, so they're not really tropical. So it's the warm climate zone, or scientists call it the *mild climate*. Think of it as somewhere in between temperate and tropical. Florida is a good example. It's one of the most popular winter vacation spots in the United States since it has nice, warm winters. It's not too hot, it's not too cold—just nice and warm. Here you see someone golfing in their shorts in the Florida winter. But if you start comparing places in the mild zone, you'll notice something weird. We saw that this was Florida, but look at this scene from Arizona, which has the same warm winter climate as Florida. So what's going on? If these places are the same temperatures throughout the year, then why do they look so different?

WRAP-UP VIDEO

Why does Arizona look so different from Florida? The answer has to do with water. Even though these places have the same temperature, they don't get the same amount of rain. Scientists have a way of measuring how much rain each place on Earth gets. They leave out a container like this whenever it rains. It's called a rain gauge. And then they use a ruler to see how much rain fell. Florida gets about 50 inches of rain each year, which explains why Florida looks so much greener than Arizona, and also why Florida is known for its lakes and swamps. Florida is

the place where alligators live. But a place like Arizona only gets 10 inches of rain a year. That's 40 inches less than Florida. That's almost nothing. With so little rain, Arizona is a desert. So climates aren't just about temperature. They're also about how much rain a place gets. That means that some of the places you colored on your climate map aren't actually those climates. There are a few places on Earth that are so dry, that get so little rain, that we give them their own fifth climate, the desert climate. You can see all the world's deserts here on this map. Now we only call a place a desert if it gets 10 inches of rain or less per year. If you want to make your climate maps complete, you'll need to color the deserts. You can find step by step instructions for that in the extras if you'd like to do that. There are desert climates on almost every continent. You can notice also how they're always located directly north and south of the tropical zone. You see that? I actually live not too far from a desert as an adult. I now live in San Francisco, California, in the USA. You can see that San Francisco is in the mild climate zone. We get about 24 inches of rain per year here, so we don't have swamps like Florida. But it's enough rain for plenty of big, leafy plants to grow. It looks nice and green here in San Francisco. Things start looking weird to me, though, if I travel just directly east, to Eastern California. The amount of rainfall gets less and less. And as I approach the places that get less than 10 inches of rain per year, the landscape around me starts to look really different. I enter the desert. It's not as green. There aren't as many plants here as there are where I live, and the plants that I do find have all these gnarly thorns and spikes and spines. Really crazy looking stuff. This one is a type of cactus called cholla, and you don't want to brush against it. It really hurts. Because the desert looks and feels so different than all the other places on Earth, that's why we say it's its own climate zone. It's not just the plants that are special in the desert. In order to survive, desert animals tend to have special kinds of traits, too. Here's one example. You know how some animals pant in order to keep cool? Well, animals don't want to pant in the desert, because

panting makes them thirsty. It's no good to always be really thirsty in a desert since there's not a lot of water there. So desert foxes don't pant to keep cool. Instead, they have really big ears that can give off heat. That way, they still keep cool, but not get as thirsty. Or, check out the ears of this guy. It's a desert rabbit. It's called a jackrabbit. It's the same idea. The rabbit's big ears help it give off heat so that it stays cool and won't be as thirsty. So now you know about all five major climates on Earth. There's polar, temperate, mild, tropical, and desert. Which ones have you been to? And which ones would you want to visit?