Lesson: “Should you water a cactus?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

In the last Mystery, we solved the question, *Why do trees grow so tall?* We saw how trees are competing for light, and so have most of their leaves at the top of the canopy. The canopy is like a roof of leaves at the top of the forest. But we also saw how the canopy creates shade down on the forest floor, a huge zone of darkness. Because of this, you might think that we won't have any plants growing down in the darkness. Look closely, though. There are plants that grow on the forest floor, like this. It's not a tree at all, but a small plant called an orchid, growing on the forest floor in South America. There's hardly any light down here, so I thought I could help the poor thing out. I brought some orchids home and put them in direct sunlight, right beside a big window. That should help, right? Two weeks later, and now the leaves have turned yellow and the orchids are dying. What happened? Why are the orchids not doing well anymore?

EXPLORATION VIDEO 2

Orchids are a type of flowering plant that needs very little sunlight, less than other plants. They don't need nearly as much light as trees, so they're all right growing in the shade of the forest floor. In fact, they're more than all right. The forest floor is the perfect place for them because it's nice and dim down there under the canopy. And as you've now learned, orchids will eventually die if given too much light. Maybe you had heard of orchids before. There are so many different

kinds of orchids—30,000 different kinds. That's more different kinds of orchids than there are different kinds of birds in the world. You can usually tell an orchid from other flowers because orchids have really eye-catching flowers with big petals, like this. They almost look like the wings of a flying animal or the sails on a sailboat. This one's called a moth orchid. It has big, bright, purple-pink petals. Or, check this one out. It's one of the stranger-looking orchids. It's called the flying duck orchid. Can you see why it's called that? The shape of its petals really does make it look like a duck. See, here's the beak, here's the head, here are its wings. This thing is so strange. There's even one kind of orchid that we eat. Not the flower like you see here, but the seed pod of this orchid, and the seed pods look like this. These seed pods have a liquid that we squeeze out and use for flavoring. They're the seed pods of the vanilla orchid. So that's where vanilla flavor comes from. Orchids aren't the only plant that needs little sunlight. If we keep looking around in dim places, you can find other ones. Look at this forest floor. What do you see? It's covered with ferns. Ferns tend to like lots of water, but they don't like lots of sunlight, so you'll see them in shaded, wet places in the forest. You can always tell a fern by its leaves. They look a little bit like feathers. So, orchids and ferns are just two examples of what we call shade-loving plants, since they don't need lots of sunlight. If you go to a plant store, they usually have a whole section where you can buy shade-loving plants. And that's because these are great plants to keep indoors. Think about it—they're perfectly happy in the shade, they actually need little sunlight. When you get home today, look around your house. See if you can find any shade-loving plants. And you know, you can keep an eye out for them in your yard too. There are often shade-loving plants there. Or at the dentist's office. You see one? There it is. Really any kind of waiting room you can look for them. There's one, and there's one. See what shade-loving plants on the forest floor you can find in your life. So, not all plants need the same amount of light. It's helpful to stop and collect our thoughts. We know that all plants need

sunlight and all plants need water. Some plants need lots of sunlight, so I'll use this sun symbol to mean lots of sunlight. And as we just learned, other plants need only a little sunlight, so I'll use a smaller sun symbol here to mean little sunlight. But let's also think about how much water different plants need. The big raindrop symbol will mean lots of water and the smaller raindrop symbol will mean a little water. If you think about it then, there are four categories or boxes that we could put plants into in terms of what they need. Now, most plants are up in this category—they need lots of sunlight and lots of water. These are the plants we've learned about in earlier Mysteries, like grass. Remember your Grass Head? Almost all trees, and most flowers too. They need lots of sunlight and lots of water. But now, today, you just learned about plants that need plenty of water but only a little sunlight. Orchids are examples of plants that want little sunlight but plenty of water. And ferns, too, and all other plants that you can find that people keep in their houses. What about this box over here? Now, this might surprise you, but over in this category, there are almost no plants that want little sunlight and little water, so I'm actually going to put an X through this box. But now we have an empty square, this one up here. This would be a place to list plants that need lots of sunlight but little water. So, plants that are kind of like the opposite of orchids and ferns. Can you think of a plant, that would go here? Are there any plants that do well with little water but lots of sunlight?

EXPLORATION VIDEO 3

A place on Earth where there's almost no water, almost no rain, and yet lots of sunlight? It's the desert. Now, it's not that the desert gets zero rainfall. It's just that in the desert it doesn't rain that often, sometimes just a couple of times per year. That's what makes deserts so dry. Any plants living in the desert have to have ways of collecting and storing as much of the rainfall as possible since it hardly ever rains. Here's a very famous example of a desert plant. It's a cactus.

There are actually lots of different kinds of cactuses. They're all very good at collecting water. The cactus you see here is the second tallest kind of cactus in the world. It's a kind called the saguaro cactus, and it's located in Arizona, USA. The winner of the tallest cactus goes to the saguaro's close cousin, the elephant cactus of northern Mexico. You can see from this picture how it compares in size to a small truck. Now, if you've never had the chance to see a cactus up close, it's definitely something to put on your list. They're so strange and so cool to see. All desert cactuses have huge painful spines that are as sharp as needles. Whenever you see a cactus, notice also how big around they are. Cactuses are basically just big thick stems because they're storing all that water inside of them. Now, here's an experiment we can try. Since cactuses are so good at storing water, what would happen if you watered one every day? I went ahead and tried it. I bought a cactus at the store. I went home, and I watered this cactus every day instead of once every few weeks or months, like what would happen in the desert. What do you think will happen to my cactus if I water it every day?

EXPLORATION VIDEO 4

This was my cactus, which I watered every day. At first, things seemed fine, but I watered it day after day after day, and then things got worse. See what happened? The cactus actually burst open. It turns out, cactuses will die if you give them water every day. This is true for not just cactuses but other desert plants as well. Cactuses are the main desert plants found in North and South America. In deserts on other continents, like Africa, they don't have cactuses. They have different plants, like this one. It looks kind of like a cactus. It's thick, and it's got spines on it. This plant from the deserts of Africa is called aloe. See those thick leaves? That's where it stores its water. When you hear that desert plants store water inside of them, it's tempting to think of it like a water bottle or maybe like a water tower. If you cut one open, you'd maybe find a

pool of water in there. But let me show you. If we cut one open, we see that they're wet and juicy on the inside. It's more like a slimy, wet gel. So this is how desert plants store their water, as this slimy material, not as a pool of water. The slimy, wet gel that's inside of aloe, it's special. You might actually have rubbed some of it on your skin before because we sell it and use it as a type of medicine. It helps with the pain you get from a burn. If you ever get a burn, it feels like a relief to rub some aloe gel on there. It's very soothing. There's a chance you have a bottle of aloe gel at home. Ask your parents. Since we're talking about desert plants other than cactuses, I have to show you one of the weirdest. It lives in a small patch of desert on the island of Madagascar, off the coast of Africa. Unlike all the other ones, it's a tree. It's called the baobab tree, and just looking at it, you can tell what it has in common with other desert plants. Because the rain doesn't fall very often, the baobab stores its water in its trunk. See? Here are more baobab trees, an even clearer example. I told you these were weird looking. So, like most plants, desert plants need lots of sunlight. But, unlike most plants, desert plants only need a little water. To solve our mystery for today, should you water a cactus? Yes. Cactuses and other desert plants need water, but not as much water as most other plants. The bigger idea to understand from today's Mystery is that, even though all plants need sunlight and water, they don't all need them in the same amounts. To find out what a plant needs, look at where it lives in the wild. Some plants, like orchids and ferns, actually do better with less light than other plants, and so you find them growing in shaded areas in the wild. And some plants, like cactuses and aloe, actually do better with less water than other plants, and so you find them in dry places like the desert.

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to take a look at the Grass Head you made a week or so ago. After you made your Grass Head last time, you put it in one of three positions. It was either lying on its back, standing, or lying face-down. Based on that position, you made a prediction about which way the hair would grow. If you kept your Grass Head well watered, it should now have some green grass hair. Which way did the hair grow? Did it match your prediction? Get ready to find out. Plus, you may find some surprises. I'll walk you through what to do, step by step.

ACTIVITY STEP 1

Get your supplies.

ACTIVITY STEP 2

Discuss this question as a class.

ACTIVITY STEP 3

Discuss this question as a class.

ACTIVITY STEP 4

Finish your worksheet. Make sure you draw any surprises you see, like if it has a beard.

ACTIVITY STEP 5

If you have time, give your Grass Head a bit of style.

ACTIVITY STEP 6

Now, this is optional. Send photos of your finished Grass Heads to Mystery Science. We would love to see what you made!