Lesson: “What if all the ants disappeared?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hey. It's Esther from the Mystery Science team. Last summer, I went to a picnic at the park. My friends laid down some blankets and we set out our favorite snacks.The sun was shining, the birds were singing, and pretty soon, the ants were everywhere. They crawled all over the picnic blankets in search of food. My friend groaned and said, "Don't you wish all the ants would just disappear?"She was joking mostly but it got me thinking.What would happen if all the ants at my local park really did just poof disappear? Would it be a big deal? I mean, ants are teeny tiny. Maybe we wouldn't even notice if they were gone. Then again, there sure are a lot of them. I'm curious what you think. Would it be a big deal if all the ants in a park went away?

EXPLORATION VIDEO 2

As I stood there thinking about a park without ants, I noticed a robin nearby. It kept poking its beak into the ground. Watching more closely, I realized it was eating something and that something was ants. I guess at least one animal would miss the ants if they disappeared. To a robin, ants are food. I can show they're connected with an arrow like this. And to an ant, my picnic crumbs are food. And so are things like seeds from the grass in the park. The grass, an ant, and a robin are all connected by what they eat and by what eats them. Looking around the park, I realized other living things there are connected in this way too. Like the squirrel eating

acorns from an oak tree or the butterfly drinking nectar from flowers. That's food for them. And those butterflies better watch out because they're food to a frog. When you talk about all the living things in a place and how they're connected to each other, you can call that an ecosystem. Food is one way that living things are connected in an ecosystem. Like how the flowers are connected to the butterflies in this park, and the butterflies are connected to the frogs. Ecosystems also include the nonliving parts of a place. So the rocks in the flower bed are part of the park ecosystem too, and so is the water in the frog's pond. The ecosystem in this park is just one of the many ecosystems in places all over the world with all different kinds of plants and animals. And check out the word ecosystem. The eco part means the environment. And then there's this part, system. A system is a group of things that work together and affect each other. For instance, a system you're probably familiar with is a bike. It's got individual parts like handlebars, a seat, pedals, and wheels, and those parts work together when you ride. They're a system. If one part breaks or goes missing, like, woah, no more wheels, then the system doesn't work the same way. An ecosystem is all the parts of an environment that work together and affect each other. If my local park suddenly had no flowers, it would affect the butterflies that depend on them for food. Like a bike, an ecosystem doesn't work the same way if a part goes missing. And an ecosystem can have many parts. You already saw that this ecosystem has flowers, butterflies, frogs, squirrels, oak trees, grass, robins, and, of course, the ants. But my local park is also home to salamanders and spiders. It's where clover plants thrive. Earthworms live underground there, and raccoons come out at night. Even hawks visit this park and coyotes too. Each of these living things is part of my local park's ecosystem. And since they're part of an eco ecosystem, they must be connected to each other in some way. We already found some connections like grass, ants, and robins, and flowers, butterflies, and frogs, but what about all these other plants and animals? What are some ways they might be connected?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to play a card game called Eat or Be Eaten. Each card in the game has a picture of an animal or plant that might live in a city park. You may have seen these animals and plants before, but you may not have thought much about what they eat or what eats them. When an animal or plant is connected to another living thing through the food they eat, we call that a food chain. Each of the food chains you make is a model or a simplified version of the ways these animals and plants are connected to one another in a real ecosystem. In the game, you'll make food chains by setting cards side by side. Here's an example. The beetle card tells you that they eat caterpillars. So you can put the caterpillar card to the left of the beetle to feed the beetle. “Feed me!” Beetles and caterpillars are now linked in this very short food chain.And you can add a lot more links to this food chain. By reading the caterpillar card, you'll find out that they eat rotting wood like this log. So you can feed the caterpillar by putting the log to its left like this. “Feed me!” And if you find a card that eats beetles like this raccoon card, you can place it here to create another link. Your goal is to make as many food chains as you can. Once you've played the game, you'll use your model food chains to figure out what would happen if all the ants did just suddenly disappear. We'll show you how to play the game step by step.

ACTIVITY STEP 1

You'll play the game in a group of four. Groups of two or three can also work. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Get your supplies.

ACTIVITY STEP 3

Make sure you have all five card sheets. Give each person in your group one sheet. Then cut along the dotted lines to make a set of cards, like this. Whoever is done first can help cut out the remaining cards.

ACTIVITY STEP 4

One person, mix up the cards, then put them in a stack face down like this.

ACTIVITY STEP 5

Let's walk through the first few turns together so you know how to play the game. We're going to show the game being played with two people even though you might be playing with three or four people. The first player takes a card and reads the whole card aloud. The text on each card tells you what the animal eats. In this example, beetles eat caterpillars, snails, and earthworms. Even if it's not your card, it's important to listen carefully because later in the game, you might be able to steal a card. We'll show you how stealing works in a few steps. Once the first player reads the card aloud, they put the card face up in front of them like this. The rest of the group should do this now. Taking turns, everyone draw one card and read each card aloud, then go to the next step.

ACTIVITY STEP 6

Okay. Now let's walk through the second turn to see how to make food chains. The first player takes another card and reads the whole card aloud. If one of your cards says that it eats the plant or animal on your other card, you can make a food chain by putting the cards right next to each other, like this. Or if you get a card that doesn't form a food chain with your other card, you can put that card in a separate row on your desk, like this. Okay. Everyone in your group should do this now. Taking turns, draw one more card and make sure to read each aloud and see if you can make a food chain. Once everyone has two cards, go to the next step.

ACTIVITY STEP 7

Now the game gets interesting. On the rest of your turns, you have two choices. You can either pick a card from the center stack or you can steal a card from another player. But you can only steal a card if it's not in a food chain yet and only if you can use it to make a food chain with your other cards. For example, you can steal this frog card because it eats beetles and you can use it in a food chain. But if another player has a card you want, like this mouse that eats beetles, well, that mouse is already in a food chain, so you can't steal it. Okay. So with that in mind, each player take one more turn now, either stealing a card from any other player, if you can, or drawing a new card.

ACTIVITY STEP 8

The goal of the game is to make as many food chains as you can. At the end of the game, you'll get bonus points for any food chains that are four cards or longer. So here are a few tips to help you make longer food chains. One tip is you can rearrange your cards whenever you want. For

example, you might find ways to put cards in the middle of a food chain. Like, since this raccoon eats frogs and since this frog card says that it eats beetles, you can put the frog card here. You can even split this chain into two chains to try to make two longer food chains. Another tip is to think carefully about the cards to look for hidden connections. For example, the cricket card says they eat leaves. The oak tree has leaves. That means the cricket can get food from this oak tree. If you need a reminder of these tips, check your rule sheet. Now go to the next step for your final instructions.

ACTIVITY STEP 9

Keep taking turns and make as many food chains as you can. When you run out of cards, the game is over. But when the game ends, don't clean up just yet. Keep all of your cards in front of you so you can calculate your score to see who wins and discuss the connections you made. Okay. Go ahead and finish playing the game.

ACTIVITY STEP 10

Now that the game is over, let's figure out your score using your Food Chain Finale worksheet. For each food chain, you get one point for each card. If there are four or more cards in a chain, then you add two bonus points. So for example, this food chain has five cards, so that's five points. It's longer than four cards, so it also gets two bonus points. This food chain has three cards, so that's three points. It's not long enough to get bonus points. This card isn't in a food chain, so I don't get to count it at all. When I add up my points, my final score is ten. Go ahead and add up your score now. Whoever has the most points wins the game. Make sure to keep all of your food chains on your desk for the next few steps.

ACTIVITY STEP 11

Now that you've figured out who won the game, let's use your food chain models to help us understand more about how these plants and animals are connected. Look at the longest food chain that you made in the game. Then, complete question two on your Food Chain Finale worksheet by writing in the names of all of the plants and animals that are in that food chain. We've given you five spaces, but your food chain might be shorter or longer, and that's okay.

ACTIVITY STEP 12

As a class, share some of the longest food chains that you made. Compare these food chains to one another and discuss. How are the longest food chains different? How are the longest food chains similar?

ACTIVITY STEP 13

Look for the ant card in your game. If it's in a food chain, look at the plants and animals that it's connected to. Discuss. Which plants and animals are in food chains with ants? What would happen to the food chains if all the ants suddenly disappeared? Then answer questions three and four on your worksheet.

ACTIVITY STEP 14

As you discovered in the game, the ants can be connected to many different plants and animals through food chains, like this, or this, or this. And those plants and animals can also be connected to other animals, and those animals can also be connected to even more animals.

Discuss. Is there a way you could combine all of your food chains to show all the connections in this ecosystem? What would that look like?

WRAP-UP VIDEO 1

In the Eat or Be Eaten game, you uncovered connections between the plants and animals in a park's ecosystem. Some may have even surprised you. I never thought about a rotting log as food, but to a pill bug, that's dinner. And who would have guessed that a tiny grass seed and a big hawk are connected? But a grass seed is eaten by an ant, then the ant gets eaten by a jumping spider, the spider gets eaten by a lizard, and finally, the lizard gets eaten by a hawk. That's a pretty long chain. But at the end of the game, you thought about ways to combine chains into something even bigger. Like check this out. These three chains all include ants. You can take all the things from these chains that ants eat and connect them to just one ant card like this. And you can connect the ant to animals that eat it like this. Then, you can connect those animals to the animals that eat them, like this. Next, you can show what else these animals eat, like how the hawk will also eat robins, salamanders, and lizards. You can add those connections and way more. And from there, you can bring in other plants and animals from the game, like the rabbit, by connecting it to things it eats and the things that eat it. By combining food chains, you end up with something that looks like this. Some people think it looks a bit like a spider's web with the way the connections crisscross in all directions. So it's called a food web. Like a food chain, a food web is a model, but it shows even more of the connections between plants and animals in a real ecosystem. This food web shows just a small part of a park's ecosystem. And if you look at other ecosystems with other plants and animals, you'll find that connections between what things eat and what gets eaten are important everywhere, which makes sense. You already know that all animals need to eat food to survive. They literally die without it. But

what is it about food that makes it so important? Why do animals need it? I wonder what you think. What do animals get from food?

WRAP-UP VIDEO 2

So what do animals get from food? Maybe you said that animals get energy from food. Energy to do things like fly, crawl, and swim. That's definitely true. And maybe you've also heard that food helps animals grow. For instance, these tiny hawk chicks have big appetites. They need to be brought food every few hours. And eventually, that food helps them grow from fluffy chicks to fierce flyers. But how? Well, if you were building a house with blocks and wanted to make it bigger, you'd need more blocks. Right? You'd need more of what your house is made of. In science terms, we can also say that this house is made of matter. Maybe you've heard that word before. Matter is anything that takes up space and has weight. Like how each block takes up space and has weight. They're made of matter. And the baby hawk certainly takes up space and has weight. So a hawk is made of matter too. To make its body bigger, a baby hawk needs more matter and it has to get that matter from somewhere.But instead of stacking on another block, animals get matter from the food they eat, like the meat a hawk eats. With each bite, the chick takes in matter. The same matter the meat meat was made of gets rearranged to become part of the hawk's feathers, its beak and the rest of its body. It's kind of like with your block house, how you could take it apart and use the same blocks to build something else like a truck. A hawk gets matter to build its body by eating meat. And the meat comes from animals, like this lizard, which is also a living growing thing. That means a lizard needs to get matter to build its body too. So where does a lizard get matter from? To figure this out, take a look at a food chain from earlier. You already know that it shows what these animals eat and what eats them. But a food chain is also a model that shows where animals get matter. Each arrow represents the

direction that the matter moves. This arrow shows that the matter from the lizard goes on to become part of the hawk when it eats the lizard. See if you can work backward from the lizard. Where does each animal in this food chain get its matter from? Where did the matter start out?

WRAP-UP VIDEO 3

You know that the hawk gets matter to build its body by eating the lizard. And going through the food chain, you can see that the lizard gets matter to build its body by eating the spider. The spider gets matter by eating the ants, and the ant gets matter to build its body by eating seeds from the grass because plants are made of matter too. Now, a hawk can't survive by eating grass seeds. It can't get the matter it needs that way, but an ant can. And the same matter that an ant gets from the grass seeds moves through this food chain from animal to animal getting rearranged each time along the way, all the way to the hawk. So matter from the grass does eventually become part of the hawk's body. It just takes a few steps to get there. Like a food chain, the arrows in a food web show how matter moves through an ecosystem. Matter from these plants goes to the ants, then that matter goes to animals that eat the ants and onto the animals that eat those animals. But if all the ants disappeared, matter wouldn't get passed along in the same way. This system would be missing an important part. It's like if a bicycle was missing its wheels, and ants aren't the only important part. Let's say a different part of the ecosystem disappeared, like the hawk. No hawks means they're not there to eat the rabbits. So now more rabbits survive. Having more and more rabbits is going to change the system. Imagine if a bike had more and more wheels. Rabbits eat plants. So what if there are so many rabbits, they eat up all the park's plants? That would affect other animals that get matter from plants. They might not have enough to eat. And that would affect the animals that usually eat those animals too. It would definitely change how matter moves through this ecosystem. As you

played the game, you may have noticed that a lot of your food chains started with a plant or parts of plants like these. And even if you ended up with no plant cards, there's always a way to connect a plant to the start of any chain. The arrows in these food chains show that matter moves from plants to animals. This food web shows that too. See how all the arrows start at the plants and point away from them? Matter seems to move from plants to animals in this ecosystem. In fact, scientists have a word for most of the animals in this part of a food web. They call them consumers because they consume or eat other living things. That's how they get matter. Plants don't do that. But that makes me wonder, where do plants get their matter from? Just like animals, plants are living things that need matter to grow bigger and stay healthy. To go from tiny to towering, an oak tree needs more matter to build its trunk and branches. And it needs to get more matter from somewhere. But where? And how does matter get into a tree if it doesn't eat? There's a mystery here. There must be part of this system that we haven't identified yet. And that is something you'll uncover in a future lesson. Until then, look for connections in the ecosystems around you. Think about what plants and animals live there, what they eat, and then what eats them. And does anything eat that? Keep making connections and stay curious.