mystery science

Grades K-5
Mini-Lesson + Activity: “Are butterflies the only animals that start out as caterpillars?”

VIDEO TRANSCRIPT

MINI-LESSON VIDEO 1

[Video Call]

- Hi, Doug!

- Hi, Sumayya!

- I have a question for you. Are butterflies the only animals that start out as caterpillars?

- Ooh, that's a great question.

But rather than me answer it, I'm going to let my friend, Jeremiah, take this one. Jeremiah is a teacher who knows a lot about this subject. Let's give Jeremiah a call now.

[Video Call]

- Hi Doug. I hear you have a question for me.

- I do. Sumayya is wondering, "Are butterflies the only animals that start out as caterpillars?"

- I would love to answer that question.

Once, when I was living in Japan, I had an experience with butterflies that I will never forget. My students and I were on a camping trip in a place called Nada. As we hiked to our campsite, we began to notice these strange, little things hanging everywhere, from trees and bushes, and even large rocks. Even our tents were covered with them, even the inside of the tents. At first, I wanted to run back, and out of the woods as fast as I could. But when I looked at my students' faces, I realized that they were looking for me to be brave and tell them what to do. After all, I was the teacher. So we ignored them as best we could and we went to sleep. The next morning, we noticed one of the strange things wriggling about, then suddenly it burst open and a large insect crawled out. At first, I was worried it was going to be like a scene from a scary movie. That is, until its majestic wings began to spread. Before long, it became a beautiful butterfly and it flitted away. Now, these little things hanging everywhere, they were what you might know as a cocoon. Or to be exact, since these were butterflies and not moths, scientists would call them chrysalis. By the end of our camping trip, our entire campsite was filled with butterflies. It was truly an experience that I will never forget. Just weeks before, this is what they had looked like. They were caterpillars, the baby form of a butterfly. But then the caterpillars created a chrysalis, and a few weeks later, poof, almost like magic, they emerged as a totally different-looking creature—a butterfly! I mean, it was almost like they were shape-shifting, like Maui does in the movie "Moana." Think about it for a second. Can you think of any other animal that can totally change like that?

MINI-LESSON VIDEO 2

As you thought about this, you may have realized that when a lot of animals are born, they pretty much look like mini-adults. Look at this turtle. It has eyes, a nose, it even has a shell. It pretty much looks like a mini adult turtle. And check out this baby horse—it's got four legs, a mane, a tail. Except for being smaller, it looks exactly like a mini grownup horse. So are butterflies truly one of a kind? Are they the only animals that seem to shape-shift like this? Well, actually no. It may be surprising to hear that there are a lot of animals that do. Like have you ever seen one of these? This alligator-looking insect may look unfamiliar to you as a baby but I bet you'll recognize it as an adult. Can you guess what it is? Let's watch how it changes and find out. Can you guess what it is? It's a ladybug—a type of beetle. Ladybug babies look nothing like the beetles they'll become when they're adults. When animals completely change like this, it's called metamorphosis and butterflies and ladybugs aren't the only animals that do this. In fact, a lot of insects totally look different when they're babies. Like, check this out. Goliath beetle—one of the largest insects on Earth. This is what it looks like as an adult and this is what it looks like when it's a baby. Doesn't it look like a worm? In fact, instead of being called caterpillars, many beetle babies are sometimes called mealworms. When it's time to turn into an adult, they bury themselves deep underground. After three weeks, they climb out as adult beetles. So there are lots of insects that seem to shape-shift. But what about other animals, like bigger ones? Are there any of those? There are. Have you ever seen these swimming in a pond? Though they kind of look like tiny round fish, these animals aren't fish at all. You may know what they are already. They're tadpoles. Tadpoles spend most of their time underwater. After a few weeks, the tadpoles grow back legs. And then they grow front legs and then pretty soon, their tail disappears and then pop out of the water as adult frogs. And frogs aren't the only animals that

do that. Check this out. They look really similar to frogs to me. But what are they? They're salamanders. When salamanders are babies, they look really similar to frog tadpoles. Here's a trick to tell them apart though. During metamorphosis, a frog tadpole will grow its back legs first. Then its front legs. But a salamander tadpole does just the opposite. It will grow its front legs first, then its back legs. That's how you can tell it's going to grow up to be a salamander and not a frog. So in the animal world, some types of animals have babies that really just look like mini adults but plenty of animals have babies that are born looking completely different from how they'll look as adults. Baby adults that can completely change like this are so special that scientists have given them their own name—larva. We call a baby animal a larva if it has a totally different shape or form than what it will look like when it's an adult. Caterpillars are the classic example of a larva that lots of people know. They're the larvae of butterflies. But beetles, frogs, salamanders—all start out in life as larvae and seem to shape-shift into something totally different when they're adults. That's all for this week's question. Thanks, Sumayya for asking it. Now, after this video's done playing, my friends and I here at Mystery Science have created a special activity where you'll observe what happens to caterpillars as they grow bigger and bigger and bigger. You'll also create a card for someone special with your very hungry caterpillar. You can do this activity in a group or all by yourself. I hope you'll try it. There are mysteries all around us, stay curious, and see you next week!

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to explore the world through the eyes of a hungry little caterpillar. Caterpillars are tiny eating machines. All that eating helps the caterpillar grow and grow and grow. As you explore, you'll also make a card where you'll create your very own caterpillar that

grows. This card can be for anyone special in your life who has helped you grow. If you want to extend this activity, we'll also explore what surprising things happen after a caterpillar has stopped growing. We'll show you how to get started, step by step.

ACTIVITY STEP 1

Get your supplies. You need a few sheets of paper, a pencil, and something to color with. When you’re done with this step, click the arrow on the right.

ACTIVITY STEP

Let’s start by making your card. First, line up the corners of the paper and then fold it in half, like this. Once that’s done, you can use your fingernail to make a good crease.

ACTIVITY STEP 3

Now you need to make a few other folds for your card. Open your card and bring one of the outer edges to the center fold you made. Press down and then use your fingernail to make a good crease. Repeat this on the other side. It should look like this when you’re done.

ACTIVITY STEP 4

Okay, here are the final folds for your card. Take the inner edge of your paper until it meets the outside and then fold it, like this. Repeat this on the other side. You’ll use these folds later to show how your caterpillar gets bigger and bigger, and bigger. Make sure to close the paper so that you’re seeing the front of the card. It should look like this when you’re done.

ACTIVITY STEP 5

It’s time to start your caterpillar adventure. First, you need to figure out where caterpillars come from. Look carefully at this photo of a mother butterfly. What do you notice? Where do you think caterpillars come from?

ACTIVITY STEP 6

Here’s what we noticed: We noticed that a mother butterfly lays an egg on a leaf. A few days later, a teeny-tiny caterpillar will hatch from the egg. Once they hatch from the egg caterpillars need to start eating right away. Discuss. What do you think a hungry caterpillar will eat as its very first meal?

ACTIVITY STEP 7

Here’s what we think: A caterpillar needs to eat right away so it will eat anything that’s very close to it after it hatches. So it might start eating the leaf of the plant that it's on, or maybe even the leftover shell of its own egg.

ACTIVITY STEP 8

In a moment you’ll draw a caterpillar on your card. But before you start drawing take a look at three real caterpillars. Noticing what is the same and what is different about them can help you draw them. Discuss. What do you notice that is the same about these caterpillars? What do you notice that is different?

ACTIVITY STEP 9

Decide who you'll give your card to and write their name near the top of the card. Then, leave some space in the middle, you'll add a message here later. Now, near the bottom of your card, draw a tiny caterpillar. Even though they come in all sorts of colors and patterns, the basic shape of all caterpillars is similar. You can start with a shape that looks like kind of a tiny hotdog. Then, you can add antennae, spines, and all sorts of colors. We've shown you some here for inspiration, but you can use whatever colors and patterns you like. Feel free to get creative. I'll set a timer for 3 minutes in case it's helpful.

ACTIVITY STEP 10

As a caterpillar eats and eats, it grows bigger and bigger. Watch carefully to see what happens to a caterpillar as it grows. Then discuss. How is this different from the way you grow?

ACTIVITY STEP 11

Here's what we noticed: We observed the caterpillar eating and eating and eating. When it took a break from eating, it looks like it sheds its skin completely. The caterpillar molts. It reminds us of how a snake sheds its skin.

ACTIVITY STEP 12

Let's add a larger caterpillar after it molts to the inside of your card. Here's an easy way to do it. Open the card, like this, holding down the flaps on either side. First, draw a half circle on one flap, like this. Then, draw another half circle on the other flap. Then, connect those half circles with two lines, like this. After a caterpillar molts and gets bigger it's easier to see its legs and

other parts. So if you want you can add those to your caterpillar, too. But we suggest you wait to color your larger caterpillar until it grows even bigger.

ACTIVITY STEP 13

Caterpillars will continue eating and growing and molting a few more times. Imagine that your hungry caterpillar is eating and molting. Now it's time to make your hungry caterpillar grow even bigger. Open the flaps on the sides of your card and connect the lines on either side so that you create one giant caterpillar, like this. Then, take a few minutes to color your caterpillar. I'll set a timer for 3 minutes in case it's helpful.

ACTIVITY STEP 14

You can complete your caterpillar card with a message to someone special to let them know you appreciate that they have helped you grow. Make sure to sign your name on the card so they know its from you. Younger students: Your growing caterpillar card is finished. Older students: if you have time and you're curious about what happens to a caterpillar after it's done growing, then go to the next step.

ACTIVITY STEP 15

When a caterpillar is done growing it molts one last time. But this molt is special. Watch this video closely and discuss. What do you notice? How is this different from the other times the caterpillar molted?

ACTIVITY STEP 16

So much changes when a caterpillar goes through its last molt. So we're not sure what you noticed, but here's what we noticed: We saw that the caterpillar sheds its skin but what is underneath looks completely different. The color and shape is so different it doesn't even look like a caterpillar anymore. Scientists call this a chrysalis.

ACTIVITY STEP 17

Throughout today's activity, you've observed how a mother butterfly will lay an egg on a leaf and how a tiny caterpillar will hatch from that egg. Eating and molting and growing, until eventually it molts into a chrysalis. Discuss. What do you predict will come out of the chrysalis? And what do you think it will look like?

ACTIVITY STEP 18

Do you have any ideas—what will come out of the chrysalis? We found a chrysalis and observed it carefully to see what would happen. Watch closely. This mother butterfly will soon lay some eggs on a leaf, and some tiny caterpillars will hatch and be ready to eat and grow. Have and stay curious!