Lesson: “How is your life like an alligator's life?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Esther from the Mystery Science Team. When I was a kid, I had a friend named Sydney. Sydney and I have something unusual in common. We're the same age. This might not sound all that special at first because you probably have lots of friends your age, but Sydney and I aren't just the same number of years old. We are exactly the same age. That's because Sydney and I were born in the same year on the very same day. We're birthday buddies. Every year on my birthday when I saw Sydney at school, I'd say happy birthday. And she'd say happy birthday back. Even now, many years later, I always try to remember to send Sydney a message on my birthday, wishing her a happy birthday too. Maybe you already know someone who is your birthday buddy, but even if you've never met another person born on the same day you were, don't worry. You definitely have a birthday buddy out there somewhere. Actually, you don't have *a* birthday buddy. You have thousands of birthday buddies. Here's the thing: There are around 358,000 babies born every single day. On the day you were born, there were other babies born in Australia and Nigeria and Sweden and El Salvador and India and Canada. Babies starting their lives halfway across the globe. And maybe even babies in the crib right next to you. You are birthday buddies with all those people all around the world. And those are just your human birthday buddies. We might not always think of it this way, but humans are actually animals, and all animals are born, which means they all have birthdays. As you were snoozing in your crib on

your very first day of life, imagine what else was happening at the same moment. Maybe somewhere in China, this tiny pink creature, a newborn panda, was taking her first nap cuddled up with her panda mom. Maybe these alligators were poking their heads out of their eggs in a nest deep in a Texas swamp. Maybe this tiny caterpillar was hatching on a milkweed leaf in Mexico. All around you, all kinds of creatures were being born. Your birthday buddies might include kittens, puppies, horses, wolf spiders, scorpions, rattlesnakes, stump-tailed macaques, mole rats, axolotls, octopuses, parrots, penguins, and more. So many animals. Millions of birthday buddies. You and your birthday buddies all started your lives at the same time. But then what? A lot has changed since that day. You've certainly changed a lot since you were born. Think about it. What's your favorite thing you can do now that you couldn't do as a newborn baby?

EXPLORATION VIDEO 2

I don't know what you picked, but I'm sure you can think of plenty you can do as a kid that you couldn't do as a baby, from eating ice cream to telling stories to playing soccer. And you don't look like a baby anymore either. You've grown bigger, stronger and you've got a lot more teeth now. But what about your birthday buddies? What happened to them as they got older? Let's check on your birthday buddy panda. She looks different, doesn't she? When she was a newborn baby, she looked like a tiny pink eraser—only a few inches long—but now as a cub, she looks like a mini version of her mom. She can walk and is even learning to climb trees. Some animals, like pandas, grow the way humans do, a little bit at a time, but other animals are different. Your birthday buddy alligators, for example, could swim on their very first day of life, while your birthday buddy panda is only just learning to eat bamboo shoots as a cub. Your birthday buddy alligators could catch food on their own from day one. As babies, they mostly

caught little stuff like bugs, but now, as young alligators, they can catch and chomp bigger food like crabs, birds, and even big fish. And alligators grow fast too, about a foot long every year. If you grew as fast as an alligator, you'd be taller than the tallest players in the NBA by the time you were eight years old. But what about your birthday buddy caterpillars? Just like an alligator, these caterpillars know how to move around and find food, even as newly hatched babies. This is what they look like when they grow a little older. As young caterpillars, they're still doing pretty much the same thing they were doing as baby caterpillars—crawling around and munching on milkweed leaves. But the caterpillars look a little different now. They're bigger with a bright stripy pattern that wasn't as clear before. From babies to kids, you and your birthday buddies all grew and changed, but you still look and act at least a little bit similar to your baby selves. So what happens next? Which birthday buddy do you think will change the most as they grow into an adult?

EXPLORATION VIDEO 3

When your birthday buddy caterpillar grew, at first, she just became a bigger and more colorful caterpillar. But next, she'll turn into this, what's called a chrysalis. A chrysalis doesn't look anything like a caterpillar. It doesn't even look like it's alive. And as you might already know, that's not the last time your birthday buddy caterpillar will make a huge change, either. When she grows into an adult, she'll transform into a monarch butterfly. Some animals, like caterpillars, undergo huge transformations as they grow up, which makes adults unrecognizable from what they were as babies. We call this transformation *metamorphosis*. For humans, growing into adults is not that dramatic. Like, for example, this is me as a baby on my first birthday. And this is me as a kid. And this is me now, a fully grown adult. You can probably still tell it's me in all three pictures. And you can definitely tell I'm still a human being. But I wonder

how our other birthday buddies have changed. Let's check in on our alligator. She's all grown up now. Actually, she's huge, almost 10 feet long. But other than her size, she doesn't look all that different as a fully grown adult than she did as a baby. She was born with most of the same traits she has now, like her sharp teeth, big jaws, and scaly skin. But there's something other than how she looks that changed after she became an adult. Look who's there, right there on her back. It's a bunch of baby alligators. Our birthday buddy alligator grew up and had babies. And check this out. Here's our birthday buddy panda, now an adult caring for her own twin baby pandas. And if we go back to visit our birthday buddy caterpillar, now a fully grown monarch butterfly, look, those tiny yellow dots on the leaf are eggs. She's laid eggs on a milkweed plant, just like her mom did before her. Those eggs will one day hatch into new caterpillars. As adults, animals can become parents. From a sea turtle burying her eggs in the sand to this bird building a nest for her chicks to a person buying diapers for his newborn, these adults are preparing for a whole new set of babies to arrive. So, at this point, let's think back. You've watched your birthday buddies change from babies to kids to adults to parents. Each animal has a very different life story with many changes along the way. When scientists study animals, they're careful to track the changes each animal goes through over the course of their life, the important events in their life story. And you probably have ways you record the big events in your life story, too. Imagine you want to draw a picture that shows how you've changed since you were born. What would you draw?

ACTIVITY INTRODUCTION VIDEO

In today's activity, we're going to create a picture that shows the life stories of some of your birthday buddies. You'll start with a line like this. It's what people call a timeline. It's marked with a number for each passing year. If you were making your personal timeline and telling your own

life story, you could start at zero, the moment you were born, and then you could talk about your first birthday, your second birthday, and all the way up to however old you are now. You already know about your own life, so you don't really need a timeline for that. You've learned a little bit about the lives of pandas, alligators, and butterflies, so we'll use our timeline to explore the lives of four more birthday buddies: a squirrel, an ostrich, a frog, and a beetle. Using a timeline makes it easier to compare the lives of these animals and see how their lives are different and how they are the same. I'll show you how to get started, step by step.

ACTIVITY STEP 1

Find a partner. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

The first two birthday buddies you'll look at are a squirrel and an ostrich. There are many ways a squirrel is very different from an ostrich. Discuss with your partner.

ACTIVITY STEP 3

You probably came up with many ways these animals are different. Here's a tougher question. There are ways that a squirrel and an ostrich are the same. Discuss with your partner.

ACTIVITY STEP 4

You and your partner will be making timelines for four different animals. First, get your supplies.

ACTIVITY STEP 5

Get your Birthday Buddies Animal Cards. Have one person cut the Animal Card sheet in half by cutting on the dark line, like this. Then, each of you take half and cut along these dark lines. You'll end up with four animal cards.

ACTIVITY STEP 6

Find the cards for the ostrich and the squirrel. Set the other cards aside for now. You will add one of these animals to your timeline. Your partner will add the other animal to their timeline. Decide who will add the ostrich and who will add the squirrel. I'll set a timer to give you 30 seconds to decide. Time’s up. Go to the next step.

ACTIVITY STEP 7

Now, both of you cut along all the dotted lines on your animal cards. You'll cut out your animal's name, and some important events in your animal's life.

ACTIVITY STEP 8

Get your Birthday Buddies Timeline. You'll glue the name of your animal where it says, "Birthday Buddy #1." To keep the glue off your table, use a scrap piece of paper, like this. Your timeline will look like this when you're done.

ACTIVITY STEP 9

Look at the boxes from your animal card. Find the one marked with a zero. That's when your animal was born. Match up the zero on the box and the zero on the timeline. Glue the box in place, like this. When you're done, the timeline will look like this.

ACTIVITY STEP 10

On the timeline, one marks your animal's first birthday, two marks their second birthday, and so on. Match numbers on the other boxes from your animal card with numbers on the timeline. Glue the boxes in place. If your birthday buddy is an ostrich, you'll have one extra box. Don't worry—we'll get to that in the next step. When you're done, the timeline will look like this.

ACTIVITY STEP 11

The timeline shows 10 birthdays. Squirrels live for about 10 years, so the squirrel's last birthday fits on your timeline. But ostriches can live for 70 years. Discuss with your partner.

ACTIVITY STEP 12

Here's what we thought. To fit 70 birthdays on your timeline, you'll have to make it seven times longer, like this. That's a lot of paper. So we suggest you just glue the ostrich's arrow down like this. The arrow points to where 70 would be if we made the timeline longer.

ACTIVITY STEP 13

Now you can see some important events in your animal's life. Taking turns, tell the story of your animal's life to your partner. Start with what happens at zero. Then move from one event to the next. Make sure you and your partner both tell your animals' stories.

ACTIVITY STEP 14

Now that you've told your animal's life story and listened to the life story of your partner's animal, let's think about what's different in the life stories of these two animals. Discuss with your partner.

ACTIVITY STEP 15

Here are some of the things we noticed. Ostrich babies hatch from eggs and squirrels don't. Ostriches take much longer to grow up and have babies, and ostriches live a lot longer than squirrels.

ACTIVITY STEP 16

Now let's look for ways that the life stories of the ostrich and the squirrel are the same. Look at the events in the lives of these two animals. Discuss with your partner.

ACTIVITY STEP 17

Here's what we noticed. Both animals start their lives. They are born. Both animals get bigger and bigger as they grow from babies to adults. Both animals can have babies of their own when they grow up. And both eventually reach their last birthday.

ACTIVITY STEP 18

It's time to explore the lives of even more birthday buddies. Get your other animal cards. Let's see how the life stories of these animals compare to the ostrich and the squirrel. Decide who will add the bullfrog to their timeline and who will add the Hercules beetle. I'll set a timer to give you 30 seconds to decide. Okay, time's up. Go to the next step.

ACTIVITY STEP 19

Cut along all the dotted lines on your animal card. Glue the name of your animal where it says, "Birthday Buddy #2."

ACTIVITY STEP 20

Look at the boxes from the animal card for birthday buddy number two. Match numbers on the boxes for birthday buddy number two with numbers on the timeline. Glue the boxes in place, like this. When you're done, the timeline will look like this.

ACTIVITY STEP 21

Take turns telling the life stories of the animals you and your partner added, the bullfrog and the Hercules beetle. Start with what happens at zero. Then move from one event to the next. Make sure you and your partner both tell your animal's life story.

ACTIVITY STEP 22

You can probably see lots of differences in the life stories of the four animals on your timelines, but instead of looking for differences, look for events that are the same in the life stories of all four animals. Discuss.

WRAP-UP VIDEO 1

You probably noticed that your birthday buddies' life stories are different from each other in many ways. Some, like ostriches, lay eggs. Others don't. Some animals, like squirrels, have just a few babies at a time. Others have many. A bullfrog can lay as many as 12,000 eggs at one time. Some look like mini versions of their parents as babies. Others don't. Hercules beetle larvae look like worms—so different from the big, spiky creatures they'll grow into. And bullfrog tadpoles look more like little fish than frogs before they transition into adults. Still, there are some things that all animal life stories have in common. The life of every animal has a start—we call this birth—and an end—we call this death. Between that, all animals grow and many have babies. Those stages take different amounts of time for different animals. When you turned one year old, you were still a baby with many years of growing left ahead of you. But by one year old, a squirrel was fully grown. By age three, you'd grown a bit, but you were still a little kid. Meanwhile, a Hercules beetle lives their entire life, from birth to death, in only three years. Still, whether they live fast or slow, those four stages—birth, growing, having babies, and death—are things every kind of animal goes through, from butterflies to bullfrogs. But I wonder, if we know all the butterflies and bullfrogs alive today will one day die, how do we know that butterflies and bullfrogs will exist in the future? Will they? What do you think?

WRAP-UP VIDEO 2

I don't know what you answered, but if you thought that animals will exist in the future, maybe you thought that this has something to do with babies. Remember our birthday buddy caterpillar from earlier who grew into a Monarch butterfly? Monarch butterflies don't live very long. Your birthday buddy butterfly probably only lived for about six weeks. That means that by your first birthday, your birthday buddy monarch butterfly had already reached the end of her life and died a long time ago. But just because she died, that doesn't mean that all monarch butterflies stopped existing. During her life, your birthday buddy butterfly had babies. Maybe as many as 300 of them. And over time, her babies grew up, became adults, and had babies of their own. Those babies went on to grow up and have babies of their own, who one day had babies of their own, and on and on and on. By the time you turned one year old, your birthday buddy monarch butterfly probably had hundreds or even thousands of children, grandchildren, great-grandchildren, and great-great-grandchildren. At your age now, there might be millions of butterflies flying around who are all related back to your original birthday buddy butterfly. And stories of other animals continue this way too. Take a look at your timeline again. Find a spot where one of your animals has babies. What happens to those babies? How could you add to your timeline to show what happens to those babies after they are born?

WRAP-UP VIDEO 3

There are different ways you can show what will happen to your birthday buddies' babies as time goes on. Here's what we did first. We added another timeline for the baby squirrels below, like this, showing how they grew up from babies to adult squirrels. But then we had a problem because eventually, those squirrels had babies of their own. So we had to add another timeline

to show how those babies grew up and then another timeline for their babies. By this point, our timeline was getting pretty long and we still weren't done. We could go on adding timelines for each new set of babies for maybe forever. There has to be an easier way to show what's going on here. In today's activity, you saw that all kinds of animals go through the same four stages in their lives—birth, growth, having babies, and death. And you probably also noticed that animals move through these stages in the same order. Adults don't become babies again and animals don't come back to life once they've died. But even though each individual animal is only born once, grows up once, becomes old enough to have babies once, and dies once, with each new set of babies born, those four stages repeat again and again. Adults have babies who grow, then have babies of their own, and those babies grow up and have babies of their own, and so on. Scientists call these stages that happen again and again a *life cycle*, a circle of life that keeps going around and around. On your timeline, you might show this cycle by drawing an arrow to show how an animal's story repeats itself from babies to growth to babies again. Even though every animal's life will eventually end, the life cycle continues with each new set of babies born, starting this cycle from the beginning and continuing it on. With each birthday, you and your birthday buddies are adding a bit more of your life story to this big ongoing cycle of life. Have fun, and stay curious.