Lesson: “What will a baby plant look like when it grows up?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hey, it's Esther from the Mystery Science Team. A while back, I decided to grow some plants in my garden. So I went to the store and bought three different packets of seeds. When you buy seeds, they come in little envelopes called packets, like this. A picture of the kind of plant that will grow from the seeds is on the packet. I like colorful flowers, so I bought seeds of two of the brightest flowers I could find, geraniums and sunflowers. But I also bought seeds to grow a pumpkin. In October, when my pumpkin grew big and round, I would carve it into a jack-o’-lantern. I had a whole plan. I took my seeds home and planted each one in a little pot with plenty of soil. I wrote little signs so I'd know which seed was in each pot. I carried the pots outside to sit in the sun and carefully watered them each day. The seeds had everything they needed, and they soon started to sprout into baby plants. Scientists call baby plants *seedlings*. Just like baby humans grow bigger and bigger until they become adult humans, baby plant seedlings grow bigger and bigger until they become adult plants. I was excited to watch my seedlings grow. But a few days later, when I went to check on my seedlings, I realized I had a problem. When I'd watered my plants, the signs I'd made for the pots had washed off. I couldn't remember which seed I'd put in which pot. Now at first, this might not seem like a very big deal. So what. I didn't know which plant was which. What did it matter? My seedlings were all still healthy and growing in their pots. And it's true, while my plants were still tiny seedlings, it didn't

really matter which was which. But as the plants grew, I knew this would become a bigger and bigger problem. See, I planted a geranium, a sunflower, and a pumpkin. When those plants grow into adult plants, they look really different from each other. Take a look for yourself. What's different about this adult geranium, this adult sunflower, and this adult pumpkin plant?

EXPLORATION VIDEO 2

There are lots of differences between these three adult plants. For one thing, they have different colors. These pumpkin plants have orange pumpkins. These geranium flowers are red and pink, while the sunflowers are bright yellow. But maybe one of the biggest differences is size. All the seedlings start out small, but the adult plants are very different sizes. These geraniums aren't very tall, but these sunflowers can grow to be taller than a person. And while these pumpkin plants don't grow very tall, their vines can grow very long, sprawling in every direction. Different-sized plants need different things to stay healthy as they grow. A geranium can probably live its whole life from seedling to adult plant in a clay pot, but a pumpkin plant will need much more space to grow long, twisty vines. And remember, I was hoping the pumpkin plant in my garden would grow into a pumpkin I could carve into a jack-o'-lantern. A huge pumpkin isn't going to fit into a little clay pot. That would be like you trying to fit into the shoes you wore when you were a baby. Before the pumpkin seedling grew too much more, I had to replant it somewhere with lots of room around it. Before I planted my seeds, I prepared three spaces in my garden. I prepared a wide garden bed with lots of empty space around it, a narrow space next to a tall fence, and a small clay pot. My plan was to replant each seedling in a spot where it had all the room it needed to grow big. Where do you think I should plant each seedling? Which is the best spot for the pumpkin plant? Which is the best spot for the geranium? Which is the best spot for the sunflower?

EXPLORATION VIDEO 3

At this point, any of my tiny seedlings would fit in any of the spots in my garden. But I knew once they grew into adult plants, they would be really different sizes. I needed to plant the pumpkin in the wide garden bed with plenty of room around it to grow long vines. I needed to plant the sunflower in the narrow space where it had lots of space to grow tall. And I needed to plant the geranium in the snug clay pot. If I accidentally planted the pumpkin in the tiny pot, it wouldn't have the room it needed to grow into a healthy adult. Each plant needed its right spot. So I needed to figure out which seedling is which before any of the plants grew too big for their pots. But how could I figure out which of my seedlings would grow up into a tiny geranium and which would grow into a huge pumpkin plant? To figure out what these seedlings will look like when they grow big, it might help to look more closely at what they look like while they're still small. Scientists call looking closely at something *observing*. Plants, even young ones like these, have more than one part. Some parts we can't see right now, like the roots growing under the ground, but other parts we can see. All of these seedlings have a stem growing out of the ground and leaves growing out of the stem. Different kinds of plants have different kinds of leaves. Some are thin, spiky needles. Others are broad and flat. Some are shaped like hearts. Others are shaped more like circles or triangles. Some have zigzag edges, some have smooth edges. Some have one point, some have three or more. The bigger a seedling grows, the more its leaves look like the leaves it will have as an adult plant. Let's try observing the leaves of an adult sunflower. Look closely at this leaf. Come up with as many different words as you can to describe it.

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to help sort out my mixed-up plants. Your goal is to find the plant that will grow into a pumpkin. In three little pots, I planted seeds for three different plants. A geranium plant that will grow beautiful flowers, a sunflower plant that will grow taller than I am, and a pumpkin plant that will grow a pumpkin that I can make into a jack-o'-lantern. The seeds grew, and now I have three seedlings. These little plants are too young to have flowers or pumpkins on them yet, but somehow, I have to figure out which one of these tiny plants is a pumpkin plant so I can plant that one where it has lots of room to grow. I saved the packets that the seeds came in. Each seed packet has a picture that shows what the adult plant will look like. To figure out which plant is which, you will compare each seedling to the pictures of the adult plants. You'll look for clues that tell you what each little plant will grow up to be. When you figure out which little plant is which, I can plant my garden. But you need to act fast. I need to plant those seedlings before they get too big for their pots. Are you ready? I'll show you how to get started, step by step.

ACTIVITY STEP 1

For this activity, you'll work with a partner. You and your partner will share ideas. Once everyone has been matched with a partner, click the arrow on the right.

ACTIVITY STEP 2

Get your supplies.

ACTIVITY STEP 3

Here are my three seedlings. Look at them carefully. It's up to you to figure out which of these will grow into a pumpkin plant. Discuss. How are these seedlings different from each other?

ACTIVITY STEP 4

There are many small differences between these seedlings. One big difference is the shape of the leaves. When you are trying to figure out which plant is which, the shape of the leaves is an important clue. Go to the next step to take a closer look at the leaves.

ACTIVITY STEP 5

Let's look at the leaves of the seedlings side by side. One of these leaves is a really different shape from the other two. Discuss. Which leaf is really different from the others? What's different about it?

ACTIVITY STEP 6

The leaves of Seedling 2 are kind of roundish with a point at one end. They're very different from the leaves of Seedlings 1 and 3. Let's see if Seedling 2’s leaves can tell us what it will be when it grows up. Go to the next step to find out.

ACTIVITY STEP 7

Get your Look for Clues worksheet. Look at the pictures of all three seedlings when they've grown. Compare the leaves on the adult plants to the leaves on Seedling 2. Discuss. Which plant has leaves that match the leaves on Seedling 2?

EXPLORATION VIDEO 4

These leaves didn't look like the leaves on the adult pumpkin or the adult geranium, but they did look a lot like the leaves on the adult sunflower. That told us that this was the sunflower seedling. I think we figured it out. But what about these other seedlings, Seedling 1 and Seedling 3? Their leaves look a lot alike. You need more clues. What else could help? Well, what if we looked at a different part of the seedlings? What if we looked at their stems? Stems are the part of a plant that the leaves grow out of. Different kinds of plants have different kinds of stems. Some plants have stems that grow straight up and down, but other stems are bendy, like this, or even curly, like this one. Take a look at the stems on this adult sunflower, adult geranium and adult pumpkin. What looks the same? What looks different?

ACTIVITY STEP 8

The sunflower plant has leaves that look like the leaves on Seedling 2. The leaves on the other two seedlings look very different. That's a clue that Seedling 2 will grow up to be a sunflower. On your worksheet, write 2 by the sunflower. Color the picture of the sunflower to show that you figured out which seedling is the sunflower.

ACTIVITY STEP 9

You figured out that Seedling 2 is the sunflower. So the pumpkin plant that you're looking for is either Seedling 1 or Seedling 3, but the leaves of these two plants are close to the same shape. To find the pumpkin plant, you need more clues. Discuss. What else could help you figure out which seedling is which? Any ideas?

ACTIVITY STEP 10

Watch how the three seedlings change as they grow. When we compared leaves we decided that Seedling 2 is a sunflower. Now let's compare the stems of the seedlings with the stems of the adult plants on your worksheet. Discuss. Look at the stem of Seedling 2. Does it look like the stem of a sunflower? Why or why not?

ACTIVITY STEP 11

Seedling 2 has a straight stem, just like a sunflower. That plus the leaves make us feel sure that Seedling 2 is a sunflower. It even looks like it's starting to grow a flower on top. Now, let's look for clues to help us find the pumpkin plant. Discuss. Look at the stems of Seedling 1 and Seedling 3. How are they different from each other?

ACTIVITY STEP 12

The stem of Seedling 3 bends to the side. It also has curls growing from it. The stem of Seedling 1 grows straight up, and it has no curls. Compare the stem of Seedling 1 to the adult plants on your worksheet. Discuss. What plant do you think Seedling 1 will be when it's fully grown? Why do you think that?

ACTIVITY STEP 13

Three clues tell you Seedling 1 is a geranium. It has leaves like a geranium, a straight stem, and no curls on its stem. Write 1 by the geranium on your worksheet. Color the picture on your worksheet to show that you figured out which seedling is the geranium.

ACTIVITY STEP 14

Now for the last plant, you've probably guessed that seedling 3 is a pumpkin plant since that's the only plant left. But scientists don't just guess. They look at the clues. Compare Seedling 3 with the pictures on your worksheet. Discuss. What clues tell you that seedling 3 is a pumpkin?

ACTIVITY STEP 15

Seedling 3 has a stem that bends to the side, curls growing from its stem, and leaves like the pumpkin plant. Those three clues tell you that you found the pumpkin seedling. On the worksheet, write 3 by the pumpkin plant. Color the plant to show that you found the pumpkin plant.

ACTIVITY STEP 16

Congratulations! You did a great job figuring out which plant is which by looking at the leaves and stems. But adult plants have more than leaves and stems. Discuss. What new parts might grow from these plants as they keep getting bigger? Hint: check out your Look for Clues worksheet for ideas.

WRAP-UP VIDEO

Let's take a look at what happened as the seedlings kept growing in the garden. We thought this seedling was a sunflower because both the seedling and adult sunflower have leaves shaped like this and a straight stem. So I planted this seedling in the tall, narrow space. Over time, this seedling kept growing straight and tall. It grew even taller than the fence behind it. Eventually, the bud on the end of the stem bloomed into a sunflower. We were right! But what about the other two plants? We thought this seedling was the geranium because both the seedling and an adult geranium have leaves shaped like this and a straight stem. I planted this seedling in the small clay pot. As it grew, this seedling didn't get nearly as tall as the sunflower. Eventually, it grew small pink flowers. The geranium! We got this one right, too. But what about the seedling we thought was a pumpkin? This seedling had leaves that looked like this, a stem that twisted to the side, and little curls growing out from it. So I planted this seedling in the wide garden bed. As the seedling grew, its vines twisted even more, stretching and curling across the ground in every direction. As the plant got bigger, it also grew these yellow flowers. Wait, hang on. Didn't we think this was supposed to be a pumpkin plant? What are these yellow flowers doing here? Did we get this one wrong? But let's keep watching. Under the right conditions, look what happens to these flowers. They transform into pumpkins. All pumpkins start out as flowers. They only later grow into the big, round, orange things we recognize. When a pumpkin grows big enough, you can cut it off the vine and carve it to make a jack-o'-lantern. We got them all right! We were able to figure out what all three of our seedlings would look like as adult plants just by observing the seedlings closely. The young seedlings didn't look exactly the same as the adult plants they became, but they looked enough alike that we could figure out which one was which. And this isn't just true for geraniums, sunflowers, and pumpkins. All seedlings look a little bit like the

plants they'll grow into one day. It's incredible to think that something as tiny as this seedling can grow into this huge monster plant with big pumpkins. But as any gardener knows, sometimes great things come from small beginnings. By looking closely, you can see the great big future even in this tiny seedling. Keep an eye out for the growing plants around you, and stay curious.