Lesson: “How do you identify a mysterious fruit?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hey, it's Esther from the Mystery Science team. There's a farm stand near where I live that I sometimes visit to buy fruits and vegetables. Depending on the season, they sell different things, and I look forward to finding out what new fruits and veggies will be for sale each week. But one time, I showed up at the farm stand and saw a fruit I had never seen before. It looked like this. One look and this mystery fruit immediately became my new favorite. I mean, look at it. It's amazing. It's bright yellow with long twisty ends. It's almost shaped like a squid. What's not to love? I had to know more about this mystery fruit. What was it? Where did it come from? And how was I supposed to cook with it? If you've seen one of these fruits before, maybe you already know the answers to some of these questions, but I didn't even know the name of this kind of fruit. How was I supposed to know what to do with it? I decided to look around the farm stand and see if I could find any other fruits or veggies that were similar to my mystery fruit. There were two that stood out to me right away, lemons and bananas. They're both bright yellow just like the mystery fruit. That yellow color is something we can easily observe about these fruits. It's a trait. But lots of things have this trait. Sunflowers are yellow, some butterflies are yellow, and some frogs are yellow. But would you say that this mystery fruit has many traits in common with this frog? Definitely not, right? Yellow color is just about the only trait these two

have in common. So let's observe a little closer. Besides color, what other traits does the mystery fruit have in common with this lemon? How about this bunch of bananas?

EXPLORATION VIDEO 2

So what traits does our mystery fruit have in common with these lemons and bananas? Like a banana, the mystery fruit is long and pointed at the ends. This lemon, on the other hand, is a really different shape. But if you look closely, you can see that the lemon and the mystery fruit are similar in another way. See how the mystery fruit has this glossy peel with tiny bumps in it? The texture of the lemon is actually really similar. But if you slice the mystery fruit and the lemon open, their insides look pretty different. The inside of the lemon is yellow and juicy, while the mystery fruit is white all the way through. And when we slice the banana open, it looks more like the mystery fruit, pale yellow or white. But see how the inside of this banana is easy to smash? Look what happens when we try the same thing with the mystery fruit. It doesn't work. It's solid all the way through. So, the mystery fruit has some traits in common with both lemons and bananas, but not others. There are so many different traits to observe here. Color, texture, shape, and more. It's hard to know what to pay attention to. If we're going to figure out what the mystery fruit is, we need more evidence. It might help to consider not just what these fruits look like now, but where they came from. Okay, yeah, they came from the fruit stand. I mean, before that. Before these fruits came to the fruit stand, they grew on a farm. You probably already know that all fruits come from plants, and the same kind of fruit comes from the same kind of plants. Lemons come from lemon trees like these. Bananas grow on banana plants like these. And this is a picture of the plant our mystery fruit grew on. Let's call it a mystery fruit tree. Besides the fruits they grow, what other traits can we observe about these plants? I wonder what you think.

ACTIVITY INTRODUCTION VIDEO

In today's activity, we're going to play a game called Fruit Market Mysteries. To help you figure out if our mystery fruit should be grouped with a banana or a lemon, you're going to practice using your observation skills, carefully examining the traits of different plants that you'd find at a fruit market. First, we'll show you the outside of three different fruits. You'll examine their traits and take a guess about which two you think should be grouped together. Then we'll show you the insides of those same fruits, plus their leaves and their flowers. Every trait these plants have in common is a clue or a piece of evidence that they belong in a group together. The more evidence you can find, the better your guess will be. Then you and your partner will get a set of fruit cards and play a matching card game. Your challenge is to sort these cards into groups based on all the evidence of the traits they have in common. Can you figure out all the fruit groups? We'll show you how to get started step by step.

ACTIVITY STEP 1

Get your supplies. You'll get more supplies later. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

For this activity, you'll work with a partner, someone to share your ideas with as you play the game.

ACTIVITY STEP 3

Okay, let's start with Round 1. Examine the traits of these three fruits: a cherry, a plum, and a grape. In real life, these fruits are very different sizes, but we'll zoom in close so we can see each one clearly. Which two fruits would you group together at the market? Why do you think that? Circle your guesses for Question 1 on your worksheet.

ACTIVITY STEP 4

Now look at the fruit's insides, leaves, and flowers. You're looking for two fruits with the most traits in common. Discuss your observations with your partner. Does this change which two fruits you would group together? It's okay if you change your mind. When scientists gather more evidence, they sometimes change their minds too.

ACTIVITY STEP 5

Discuss. Which two fruits would you group together? Why do you think that? Then answer Question 2 on your worksheet.

ACTIVITY STEP 6

Okay, time for Round 2. This round is a little bit harder. Examine the traits of these three fruits, a cucumber, a lemon, and a dosakai. Which two fruits would you group together? Why do you think that? Circle your guesses for Question 3 on your worksheet.

ACTIVITY STEP 7

Now look at the fruit's insides, leaves, and flowers. You're looking for the two fruits with the most traits in common. Discuss your observations with your partner.

ACTIVITY STEP 8

Discuss. Which two fruits would you group together? Why do you think that? Then answer Question 4 on your worksheet.

ACTIVITY STEP 9

Which two fruits are related to each other? Answer number one on your worksheet.

ACTIVITY STEP 10

Now look at the fruit's insides, leaves, and flowers. You're looking for the two fruits with the most traits in common. Discuss with your partner.

ACTIVITY STEP 11

Discuss: which two fruits would you group together? Why do you think that? Then answer Question 6 on your worksheet.

ACTIVITY STEP 12

Now that you've practiced your observation skills, you and your partner are going to work together to sort a lot more fruits into groups. Get the rest of your supplies.

ACTIVITY STEP 13

You and your partner should each take a page and then cut along all the dotted lines so that you have a set of cards.

ACTIVITY STEP 14

Lay out all of the cards on the desk between you and your partner. Work with your partner and examine all your cards carefully. Compare their leaves, flowers, outsides, and insides. Then try to sort your cards into five groups. The groups don't have to be equal. Some will have two cards, and some may have five cards. You and your partner may not agree on everything right away, and that's okay. You'll have to convince your partner using evidence.

ACTIVITY STEP 16

Discuss. Which fruits did you put in a group together? Why did you sort them that way?

WRAP-UP VIDEO 1

Here were the groups we found. Apples and pears are really different shapes on the outside. But on the inside, the star shaped patterns of seeds is so similar. Their leaves look similar too, and so do their flowers. These traits are all evidence that these two go in a group. Grouping cucumbers, burr gherkins, and horned melons together made sense when we saw a similar seed pattern on their insides, but we weren't sure until we noticed the other traits they shared, like their flowers or their bumpy outer skin. The toughest for me were these two, cranberries and blueberries. But because they had similar outsides and similar bunched up flower petals, we guess that these two belonged in a group. Similarly, if you saw just a kumquat next to a

grapefruit, you might not think that they're very alike. But if you look closely, you'll see that they share the same bumpy outer peel, similar flowers, similar leaves, and more. And they also share those traits with oranges and lemons. And one of my favorite surprises was that even though cherries taste and look so different from peaches, on the inside, you can see they both have one big pit in the middle like this. And when we look at the other parts of these plants, we see even more traits in common, like their small flowers with five round petals. Some of these fruits might already be familiar to you, and some might be fruits you've never seen or tasted before. Even if you didn't know much about a fruit on its own, by comparing it to other fruits, you could figure out which group it belonged in. One trait alone wasn't enough to group fruits together. But the more traits they had in common, the more evidence we had that they belonged in the same fruit group. So if we could group even unfamiliar fruits together by traits, could doing the same thing help us learn more about our mystery fruit from before? Let's take one more look at the mystery fruit. Take a close look at its outside, inside, leaves, and flowers. Now take another look at the groups you made with your cards during the activity. Which group would you place the mystery fruit into? What evidence do you have that it belongs there?

WRAP-UP VIDEO 2

From a distance, the mystery fruit looks so different from a kumquat, and it's a totally different color from an orange, and it doesn't have a juicy inside like this lemon. But when we look closer at all these fruits' traits and compare other parts of the plants they come from, we see that these plants actually have many traits in common. They all have a waxy, bumpy outer peel. They all have similar tiny white flowers. They all have pointed leaves, and more. It turns out the mystery fruit is called a Buddha's hand. It's called that because its twisty ends look like fingers. But even if you had no idea what this plant was called, its traits give you enough evidence to know this

fruit is part of the group that includes lemons, oranges, kumquats, and grapefruits. This fruit group has its own name too. It's called citrus. Many different kinds of citrus grow in many different places throughout the world. But no matter where you find a citrus fruit or how unfamiliar the fruit looks at first glance, once you start looking closely, you'll notice all the traits it has in common with other citrus. We see these similar traits show up again and again in citrus. It's a pattern. But why do these patterns of traits happen? To answer that question, it might help to think about where these traits come from in the first place. You probably know that animals are born from other animals, their parents. Those parents also had parents, and those parents had parents, and those parents had parents, and so on. Baby animals usually grow up to look a lot like their parents. This baby kangaroo will grow up to look a lot like her mother kangaroo. The mother kangaroo probably looks a lot like what her mother looks like, who probably looks like what her mother kangaroo looked like, and so on. It might seem strange to think about it this way, but plants also have parents. Each new baby plant grows from parts of an adult plant, a parent plant. That parent plant once grew from its parent plant and that parent plant came from another parent plant and so on. And just like animals, baby plants usually grow up to look a lot like the plants they came from. A baby lemon plant will likely grow up to look a lot like its parent lemon tree. They'll grow similar fruits, similar leaves, similar flowers, similar everything. And that parent lemon tree probably looks similar to its parent plant, which probably looks similar to its parent plant. Another way to say this, plants inherit their traits from their parents. So if a plant has a particular trait like bright yellow color or round shape or bumpy peel, it's likely that plant inherited that trait from a parent who inherited it from its parent, who inherited it from its parent, and so on. Patterns of inherited traits can tell us a lot about living things and the groups they're part of. It can show us everything from what a kangaroo's great-great-great-great grandparents might have looked like to how a Buddha's hand ended up so different and so similar to a

kumquat. There's a lot more to explore about inherited traits. In the meantime, next time you find a fruit you've never tried before or you come across a new flower in your local park, take a close look at the traits you notice. Do any traits remind you of any other plants you already know? There are thousands and thousands of different plants around the world. But even if you can't identify exactly what a plant is, you can still figure out so much just by taking a close look at its traits. Have fun and stay curious.