mystery science

Lesson: “What do dogs and pigeons have in common?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Jay from the Mystery Science team! The other day, I was at the park, and I stopped to watch some dogs play. It's always cool to see all the different kinds of dogs. There was a fluffy sheepdog, a wrinkly pug, a tiny chihuahua, and a Saint Bernard who towered over everyone. It made me think of another park where people go to watch animals. It's a park in San Juan, Puerto Rico, called Parque de las Palomas, or in English, Pigeon's Park. You can see how it got its name. Lots and lots of pigeons hang out here. Now, I'm not sure how you feel about pigeons. Some people think they're annoying and try to shoo them away. Still, in many cities, they're the most common bird you'll see. And believe it or not, pigeons can be fascinating. That's why so many people come to this park. It's where I discovered how fun it can be to watch pigeons strut around on the ground and swirl through the sky. The first time I went there, the flock of pigeons looked like a gray blur to me. The pigeons seemed nearly identical to each other. But after a while, I started to notice differences. And maybe you can too. Take a moment to look closely at the pigeons’ traits. That's something you can observe about a living thing. What differences can you notice in these pigeons’ traits?

EXPLORATION VIDEO 2

A lot of these pigeons are gray, but when you look closely, they're not all the same gray. There's light gray, and really dark gray, and everything in between. And you probably spotted some that aren't gray at all. There are pigeons with reddish brown feathers and pigeons with white feathers. Some have stripes on their wings, while others are speckled with spots. And look at this one's neck. It's got a rainbow shimmer that shifts from purple to green. I gotta say, pigeons can be beautiful. And there's so much variety to their looks. A pigeon's feathers can have so many different colors and patterns. When animals of the same kind have different traits, that's called variation. Of course, there are other animals with lots of variety, like those dogs I saw, but I knew those were different breeds. You probably know some dog breeds too, like bulldogs with wide, flat faces or Dalmatians with black spots. Each breed has its own particular traits. So I wondered, if pigeons can be brown or speckled or all these other variations, could there be different breeds of pigeons? Well, I did some research and I found something that blew my mind. Check it out. This is a pigeon. And so is this, and these, and this. These are all pigeons that people raise as pets, just like dogs. It seems incredible that this and this are both pigeons. They look so different. But then again, a chihuahua and a great dane look super different too. And I know those are both dogs. It turns out that just like there are different breeds of dogs, there are different breeds of pigeons. Some people call these fancy breeds, and I totally get why. I mean, just imagine seeing these pigeons at your local park or a pigeon with curly feathers like this breed or one with a giant fanned out tail. I've never seen pigeons at the park that look like these. Instead, I see pigeons like these two. They live in my local park and they made their nest there. They laid eggs that hatched and the babies grew up into adult pigeons. Let's look at this pigeon family altogether. I put the parents up here and they'll show a plus sign between

them, so we can remember that they have babies together. The lines down here will remind us that these are their babies. Only now, they're all grown up, so we'll call them their offspring. You can probably see that these offspring have things in common with their parents, which makes sense. You already know that baby animals usually grow up to look a lot like their parents. But take another look at the pigeon offspring. Maybe you've noticed that these offspring don't look exactly alike. Can you find some traits that look more like one parent and some traits that look more like the other parent?

EXPLORATION VIDEO 3

Offspring get traits from their parents. We say they inherit traits. For example, all four of these pigeon offspring spring inherited shiny, colorful neck feathers. That's a trait both parents have. But the patterns on the offspring's wings are different. Maybe you noticed that one has striped wings like this parent, while these three have spotted wings like the other parent. These pigeons inherited traits from the same two parents, but they didn't grow up to look exactly alike. There are differences in their traits. You can see that with this dog too. Some people call this a puggle because its parents are a pug and a beagle. This puggle doesn't look exactly like either parent, but you can see how it inherited traits from both parents. For instance, the shape of its body is more like a beagle's, while its wrinkly face is more like a pug's. And you can probably spot other traits that it inherited too. So what about those fancy pigeons we saw before? They have really big differences in their traits compared to a typical park pigeon. Do you think these park pigeons could have offspring that grow up to look like this fancy pigeon?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you'll explore the mystery of the Fancy Pigeons. You've seen that pigeons can have lots of little differences in their traits. You've also seen that pigeon babies grow up to have very similar traits to their parents. But can a pigeon that looks like this have babies that look like this? You might say, no way! That's ridiculous! But then where do these fancy pigeon breeds come from? To help you explore this question, you'll meet Charlie, who has a flock of pet pigeons. Charlie's pets look like this, but she would love to have fancy pigeons that look like this. Maybe, somehow, Charlie can have a fancy flock of her own someday. Your job is to examine the pigeons in Charlie's flock. You'll carefully observe their traits and find as many similarities and differences as you can. Next, you'll examine their pigeon babies or offspring, matching them back up with their parents. Then you'll use what you observe to figure out how to get more baby pigeons with certain traits, like fancy feathers. Can you help Charlie get a future pet pigeon with the fanciest feathers? We'll show you how to get started step by step.

ACTIVITY STEP 1

In today's activity, you'll work with a partner. Decide who will be Trait Tracker and who will be Similarity Sleuth. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Get your supplies.

ACTIVITY STEP 3

Find the Pigeon Cards page, and one of you cut along the thick black line. Then, Sleuth, you cut out the four parent cards by cutting along the dotted lines. Keep them separate from the offspring cards. And Tracker, you cut out the eight offspring cards by cutting along all the dotted lines. Once you're done cutting, you can move the offspring cards off to the side for now.

ACTIVITY STEP 4

It's time to meet Charlie's pet pigeons. Sleuth, put the four parent cards, Sonic and Stardust, Tango and Toto, on the desk in front of you. Then work with your partner to carefully observe the traits of these pet pigeons. Discuss: What differences do you notice in their traits? Try to find as many as you can.

ACTIVITY STEP 5

For the rest of the activity, Tracker, you'll be in charge of the Tango and Toto pigeon family. So, write your name at the top of this worksheet. Then glue the Tango and Toto cards into the top 2 boxes. Use your glue stick to put some glue in each box, and then lay each card on top and press down to make sure they stick to the page like this. Sleuth, you'll be in charge of the Sonic and Stardust Pigeon family. So, write your name at the top of this worksheet, then glue the Sonic and Stardust cards into the top 2 boxes like this.

ACTIVITY STEP 6

Tango and Toto had four babies together, and Sonic and Stardust had four babies together.

The babies hatched from their eggs, and slowly, all their feathers grew in. Now they look like this. But, uh-oh! Charlie can't remember which pigeons are Tango and Toto's offspring and which are Sonic and Stardust's offspring. But not to worry. She realizes that she can figure it out by studying their traits. Tracker: get the stack of offspring cards and lay them all out on your desk like this.

ACTIVITY STEP 7

Work with your partner to carefully examine the traits of these pigeons. Try to figure out which four offspring should be matched with Tango and Toto, and which four offspring should be matched with Sonic and Stardust. Remember, offspring can sometimes look more like one parent and sometimes look more like the other. If you're not sure about some, that's okay. Try your best. We'll discuss it more in the next step. I'll set a timer for three minutes in case that's helpful. Time's up. When you're ready to move on, click the arrow.

ACTIVITY STEP 8a

Here are some things we noticed. Some offspring can look very similar to their parents. For example, Honey has traits that are very similar to Stardust. So, we thought it was likely that Honey is in the Sonic and Stardust family. A few of the offspring were tricky to match with their parents. For example, Cookie has head feathers like Tango, but they look a bit different. So we looked to see if there were other traits they had in common. We noticed that Cookie also has the same wing color as Tango, so we decided that Cookie is most likely in the Tango and Toto family. Does this give you any new ideas about how to sort the pigeon offspring? Take another minute to review how you sorted your pigeon cards with your partner. Make your final choices

about which offspring belong to which parents. Remember to look at all the traits to help you decide.

ACTIVITY STEP 8b

Here's what we said. After looking closely at Tango and Toto's traits, we decided their offspring were probably Cookie, Echo, Flash, and Bubbles. And we decided Sonic and Stardust's offspring were likely Honey, Doodle, Grumpy, and Ace. Take a moment to check your pigeon families and move any to make sure that they look like this.

ACTIVITY STEP 9

Now that you've reunited the pigeon offspring with their parents, let's add them to their family worksheets. Sleuth: Glue all of Sonic and Stardust's offspring into the boxes underneath their parents. Tracker: Glue all of Tango and Toto's offspring into the boxes underneath their parents like this.

ACTIVITY STEP 10

As a class, discuss question 1 on the worksheets. What traits helped you match the offspring to the parents in each family? After discussing, Tracker, you'll write down answers for the Tango and Toto family on your worksheet. Sleuth, you'll write down answers for the Sonic and Stardust family on your worksheet.

ACTIVITY STEP 11

As a class, discuss question 2 on the worksheets. What differences do you notice among the traits of the siblings in each family? Then write down answers for your pigeon family.

ACTIVITY STEP 12

As a class, discuss question 3 on the worksheets. How are the traits in the Sonic and Stardust family different from the traits in the Tango and Toto family? Then write down your answers.

ACTIVITY STEP 13

Charlie's friend brought a new pet pigeon to join her flock. This is Sable. Sable is going to have babies with one of Charlie's other pigeons. If Charlie wants those babies to have lots of foot feathers, which of these pigeons should Charlie choose to be the other parent? Why do you think that? Discuss with your partner.

ACTIVITY STEP 14

Charlie thought Doodle would be most likely to have offspring with more foot feathers because out of all these pigeons, Doodle has the most foot feathers. Sable and Doodle had two babies together. Once those babies hatched and their feathers grew in, this is what they looked like. Their names are Inky and Jellybean. Since Sonic and Stardust are Doodle's parents, that makes them Inky and Jellybean's grandparents. Examine the pigeons' traits closely and discuss What do you notice about the foot feathers of Inky and Jellybean compared to their parents, Sable and Doodle? What do you notice about the foot feathers of Inky and Jellybean compared to their grandparents, Sonic and Stardust?

ACTIVITY STEP 15

Charlie's other friend has a pet pigeon that is joining her flock too. This is Topaz. If Charlie wants Topaz to have babies with lots of head feathers, which of these pigeons should Charlie choose to be the other parent? Why do you think that? Discuss with your partner.

ACTIVITY STEP 16

Charlie thought Cookie would be most likely to have offspring with more head feathers. Because out of all these pigeons, Cookie has the most head feathers. Topaz and Cookie had babies together. Once those babies hatched and their feathers grew in, this is what they looked like. Their names are Kiwi and Lollipop. Two of their grandparents are Tango and Toto. Examine the pigeons' traits closely and discuss. What do you notice about the head feathers of Kiwi and Lollipop compared to their parents, Topaz and Cookie? What do you notice about the head feathers of Kiwi and Lollipop compared to their grandparents, Tango and Toto?

WRAP-UP VIDEO 1

In the activity, Charlie started with four pet pigeons. You looked closely at their traits and spotted some small differences, like the feathers that stick up on the back of Tango's head. That's a trait called a crest. Two of Tango's offspring inherited this crest trait, but you noticed that their crests weren't exactly alike. Cookie's crest is a bit bigger and fluffier. It isn't exactly like Tango's or its sibling Echo's. That's something we see again and again with living things. Offspring aren't exact copies of their parents, and they aren't exactly like their siblings either. Living things inherit traits and they have variations in their traits. You saw that again when Cookie had babies. This time, both parents have crests and both offspring inherited the crest trait. And because offspring

also have variations in their traits, one pigeon, Lollipop, has a crest that is even bigger than its parents' crests. Imagine if Charlie and all her other friends with pet pigeons kept choosing the ones with the biggest, fluffiest crest to have babies together because they want more babies to inherit that fancy crest trait. Eventually, some of Charlie's pigeons could have crest traits that look like this. Remember how we started with Tango's tiny crest? Now, years later, Tango has a great-great-great-great grandchild with a crest that is way fancier. Maybe you can start to see how fancy pigeon breeds like these got their looks. When humans choose certain traits, like a crest, so that they're passed down from parents to offspring, that's called artificial selection. Each breed of pigeon has specific traits that were artificially selected by people over many, many years. Take a moment to compare these three pet pigeons. Which traits do you think people selected for in each of these pigeon breeds?

WRAP-UP VIDEO 2

Maybe you noticed this breed's extra big, fanned out tail, and guess that people selected a trait like having the most tail feathers. Pigeons usually have 12 tail feathers, but there are natural variations. Some have a few extra. And after many, many years of pigeons with the most tail feathers having babies together and passing on their traits, eventually, you have breeds with 40 tail feathers instead of the usual 12. Then there's this breed. Maybe you guessed that its look comes from selecting pigeons with extra feathery feet to be parents, like you saw in the activity with Doodle, Sable, and their offspring. And with this breed, pigeons with the longest legs were selected over many, many years. You saw how this pigeon inherited its traits passed down from its great-great-great grandparents and from its great-great-great-great grandparents. And if we went back in time, even farther, so far back, it's more great-great-greats than I can say, we would get to the ancient relatives or ancestors of today's pigeons. We don't have photos of what

these ancient ancestors look like, but there is art that may show them. Like this painting made over 3,000 years ago in Egypt. And scientists think that they looked a lot like these modern-day birds. Now, you might be thinking, those look like pigeons. And it's true. Those ancient ancestors probably had traits that look a lot like some pigeons today. Traits like gray feathers and wings with dark stripes. They probably didn't have extremely long legs or huge fluffy crests, but they did have small variations. Those small variations happen naturally. It's those small variations that make the extreme variations we see in pigeon breeds possible. This doesn't just apply to pigeon breeds. Remember how dog breeds have such different looks? The same process you just saw for pet pigeons helps explain why dogs have extreme variations too. If we went back in time from a dog to its parents, and its grandparents, and its great grandparents, over too many great-great-greats to say, we could meet the ancient ancestors of dogs. Scientists think they probably looked like this. Looks a lot like a wolf, right? Well, scientists think that a kind of ancient wolf was the ancestor of today's dogs. Okay. I have to admit, it's hard to imagine going from this to this. And it's incredible to think that ancient wolves are related to chihuahuas and bulldogs and golden retrievers and all these other breeds that look so different. But now that you know a little more about pigeons and artificial selection, maybe you have some ideas about how this could be. What do you think? How could all these different dog breeds have great, great, too many greats to say grandparents that are ancient wolves?

WRAP-UP VIDEO 3

These dog breeds look so different. So how is it that they could all be related to ancient wolves? To figure this out, think about what you saw with Charlie's original four pigeons. They had small variations in their traits, like a tiny crest and a few foot feathers. Those ancient wolf ancestors had small variations in their traits too. Some ancient wolves might have been smaller than

others, or bigger than others, or had shaggier fur, or lighter fur, or bigger ears. Let's say people selected two of the furriest ancient wolves to have pups together. Those ancient wolf pups inherit traits from their parents, and the pups have variations in their traits too. A few might be even furrier than their parents. Then, time passes. As traits and their variations get passed down from parents to offspring over years and years and years of artificial selection, eventually, we have dogs inheriting a trait like being extra, extra furry. And people in the past selected lots of other traits too, traits that give dog breeds today their particular look, like being extra, extra small, or spotted, or wrinkly. So, pet pigeons and dogs actually have a lot in common. When we talk about different breeds, we're actually talking about a long history of traits being selected by people. It's unlikely you'll see a pigeon like this at your local park. But while you might not see traits like huge, fluffy crests or extra feathery feet, you can definitely spot smaller variations. You just need to look closely. And that's true for all kinds of animals in nature. For instance, every zebra has a unique pattern of stripes and some flamingos grow to be a bit taller or shorter than others. So the next time you're at the park, keep an eye out for those variations. You might spot some extreme variations that come from years and years of artificial selection by people, and you'll definitely find variations happening in nature. They're just a little harder to notice at first. It's natural variations that make artificial selection possible. Have fun and stay curious.