

Variation in Traits

Lesson 1a: The Same and Different

Grade 3	Length of lesson: 40 minutes	Placement of lesson in unit: 1a of 7 two-part lessons on variation in traits
Unit central question: Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?		Lesson focus question: How are living things of the same kind alike and different?
Main learning goal: The traits of individuals of the same kind of living thing can show variation.		
Science content storyline: Living things have traits that help us identify them. Among individuals of the same kind of living thing, some traits show variation and other traits don't. <i>Traits</i> are features or characteristics of an individual that may be visible or hidden. <i>Variations</i> are differences in traits among individuals of the same kind of living thing.		
Ideal student response to the focus question: Living things of the same kind, such as ladybugs, have many traits that are the same. For example, all ladybugs have six legs. But all ladybugs aren't exactly alike. Some of their traits are different, or show variation, like the number of spots they have.		

Preparation

<p>Materials Needed</p> <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers <p>Student Handouts</p> <ul style="list-style-type: none"> • 1.1 Ladybug Pictures (cut apart and laminated) (1 card per student) 	<p>Ahead of Time</p> <ul style="list-style-type: none"> • Read the content background document. • Cut apart the ladybug pictures and laminate them to create one photo card per student. • ELL support: Introduce ELL students to the lesson materials, structure, and content in advance so they understand what's expected of them and participate. If students aren't familiar with circle maps or bar-graph representations, explain their meanings and uses. Identify Tier 2 and 3 words in the lesson plan to introduce ahead of time, including <i>trait(s)</i>, <i>characteristics</i>, <i>variation(s)</i>, <i>vary</i>, <i>circle map</i>, <i>analyze</i>, and <i>bar graph</i>. Prepare visual resources (e.g., large-print words, word walls, posted images, examples of different body parts) that will help students learn new vocabulary terms. Some ELL students may not be familiar with ladybugs or what they're called in English. Consider keeping a box of ladybugs in the classroom for students to observe.
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Lesson 1a General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
4 min	Unit central question: The teacher introduces the unit central question, <i>Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?</i> Then the teacher elicits students' initial ideas for answering the question.	
3 min	Lesson focus question: The teacher introduces the focus question, <i>How are living things of the same kind alike and different?</i>	
10 min	Setup for activity: Students identify similarities and differences among the cats in photographs. Then the teacher creates a circle map of cat traits and introduces the term <i>trait</i> .	<ul style="list-style-type: none"> Living things have a variety of traits that help us identify them. Among individuals of the same kind of living thing, some traits show variation and others don't.
10 min	Activity: Students identify ladybug traits and observe similarities and differences among ladybugs in pictures. Then the teacher introduces the term <i>variation</i> .	<ul style="list-style-type: none"> Ladybugs have identifiable traits. Some of those traits show variation, such as color and the number of spots.
7 min	Follow-up to activity: Working in pairs, students create circle maps and record the ladybug traits and variations they observed.	<ul style="list-style-type: none"> Among individuals of the same kind of living thing, some traits show variation and others don't.
5 min	Synthesize/summarize today's lesson: Students synthesize their understandings of key science ideas about traits and variation by citing examples of cats and ladybugs they observed.	<ul style="list-style-type: none"> In living things of the same kind, some traits show variation.
1 min	Link to next lesson: The teacher announces that in the next lesson, students will gather data on one ladybug trait—the number of spots—and create a bar graph to analyze variations in that trait.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
4 min	<p>Unit Central Question</p> <p>Synopsis: The teacher introduces the unit central question, <i>Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?</i> Then the teacher elicits students' initial ideas for answering the question.</p>		<p>Show slides 1 and 2.</p> <p>What do you see in this picture?</p> <p>NOTE TO TEACHER: <i>Make sure students observe that there are baby mice in the picture and that the mice are in an environment where they live, such as the woods.</i></p> <p>Show slide 3.</p> <p>In this unit, we'll explore a central question that will guide our thinking: <i>Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?</i></p> <p>Write this question in your science notebooks and draw a double-lined box around it.</p> <p>NOTE TO TEACHER: <i>Write the unit central question on the board for students to refer to throughout the unit.</i></p>	<p>Mice.</p> <p>They're in a hole.</p> <p>That's where they live.</p> <p>There are <i>three</i> baby mice and the mother mouse.</p>	<p>Can you say more about the mice?</p> <p>Why do you think the mice are in a hole?</p> <p>Are all three baby mice alike?</p>

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		Ask questions to elicit student ideas and predictions.	<p>What are your initial ideas for answering this question?</p> <p>NOTE TO TEACHER: <i>Make sure students understand what the words equal chance and surviving mean. Record students' initial ideas on chart paper so you can revisit them at the end of the unit.</i></p>	<p>I think the mice have an equal chance of surviving because they all live in the same place.</p> <p>I don't think they have an equal chance of surviving because a snake might get one of them.</p> <p>I think there's an equal chance because all the mice are the same.</p>	<p>How does living in the same place affect whether they survive?</p> <p>Do you think there's an equal chance of the snake getting any of the mice, or is the snake more likely to pick a particular one?</p> <p>Tell us some of the ways the mice are the same. Are they different in any way?</p>

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			We'll come back to this question at the end of our unit, so let's begin gathering some information we can use to answer it.		
3 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>How are living things of the same kind alike and different?</i></p>	<p>Set the purpose with a <u>focus question</u> or goal statement.</p> <p>Ask questions to elicit student ideas and predictions.</p>	<p>Show slide 4.</p> <p>In each of the lessons in this unit, we'll focus on a specific question. Today's focus question is <i>How are living things of the same kind alike and different?</i></p> <p>Write this question in your science notebooks and draw a box around it.</p> <p>NOTE TO TEACHER: <i>Write the focus question on the board for students to refer to throughout the lesson.</i></p> <p>What do you think the phrase "living things of the same kind" means? Who can give me an example?</p> <p>NOTE TO TEACHER: <i>Ask for additional examples if this phrase seems to confuse students. To expand students' understandings of living things, you might also include examples of plants, reptiles, fish, insects, and other organisms that aren't mammals. But don't spend a lot of time on this, since students' understandings will expand as the unit progresses.</i></p>	<p>Like the baby mice, they're living things, and they're the same kind of thing.</p> <p>They're the same kind of animal. Mice aren't cats or rabbits. They're mice!</p>	<p>Say more about what you mean by "the same kind of thing."</p>

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			<p>Good example!</p> <p>Today, we'll explore some other living things of the same kind. I wonder what we'll find out!</p>		
10 min	<p>Setup for Activity</p> <p>Synopsis: Students identify similarities and differences among the cats in photographs. Then the teacher creates a circle map of cat traits and introduces the term <i>trait</i>.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Living things have a variety of traits that help us identify them. Among individuals of the same kind of living thing, some traits show variation and others don't. 	<p>Make explicit links between science ideas and activities before the activity.</p>	<p>Show slide 5.</p> <p>Would everyone agree that all of the living things in these pictures are cats? How do you know?</p> <p>NOTE TO TEACHER: <i>Draw a circle map on chart paper. In the outside circle, record the traits students list that help them identify the living creatures in the photos as cats. You'll complete the inner circle later.</i></p> <p>Several of you said that fur is one of the characteristics of the cats in the photos.</p> <p>Let's think about that characteristic for a minute. What differences do you notice in the cats' fur in these pictures or in other cats you've seen?</p> <p>NOTE TO TEACHER: <i>If students didn't include fur in their descriptions of the cats, choose another obvious trait</i></p>	<p>They all have whiskers.</p> <p>They have fur.</p> <p>They have pointy ears.</p> <p>They all have different-colored fur.</p>	<p>Do any other living things have whiskers?</p> <p>How is their fur alike and different?</p> <p>Are pointy ears the main feature that tells you this is a cat?</p>

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		<p>Highlight key science ideas and focus question throughout.</p>	<p><i>variation that students identified, such as eye color, nose color, unique markings, or hair length.</i></p> <p>Right! The fur of each cat is a different color. Fur color is an example of a <i>trait</i>.</p> <p>NOTE TO TEACHER: <i>Write the heading Traits in the middle of the circle map you drew on chart paper.</i></p> <p><i>Traits</i> are features or characteristics of living things of the same kind. A trait can be the way a living thing looks or the way it acts.</p> <p>Living things have many traits. The <i>combination</i> of traits is what makes each living thing unique. For example, many cats have gray fur, but if we describe a cat as having gray fur, yellow eyes, a short tail, a white area on its stomach, and white hair growing from its ears, we can narrow down which cat we're talking about.</p> <p>NOTE TO TEACHER: <i>Add these traits to the circle map. You might also have students copy the completed circle map into their notebooks.</i></p> <p>Let's think about some of the traits I listed on our circle map. Notice I didn't</p>		

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		Ask questions to elicit student ideas and predictions.	<p>say that the cat has eyes. I described the <i>color</i> of its eyes. Eye <i>color</i> is a trait, not eyes.</p> <p>Show slide 6.</p> <p>Write the definition of the word <i>traits</i> in your science notebooks. Then list an example of something that’s a trait and something that isn’t a trait.</p> <p>NOTE TO TEACHER: <i>Write the trait definition on the board or post it where students can see it. Highlight this definition throughout the lesson.</i></p> <p>Show slide 7.</p> <p>Our definition says that “living things” have traits, not just cats. That means a dog has traits too. What traits do dogs have?</p>	<p>They have fur.</p> <p>No. Fur <i>color</i> is a trait.</p> <p>Dogs have tails.</p>	<p>Does everyone agree that this is a trait?</p> <p>Can you list some examples of the fur-color traits that different dogs might have?</p> <p>Does that fit our</p>

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			So we know that cats and dogs have traits, but what about other living things?	No. The length of their tails is a trait.	definition of a trait?
10 min	<p>Activity</p> <p>Synopsis: Students identify ladybug traits and observe the similarities and differences among ladybugs in pictures. Then the teacher introduces the term <i>variation</i>.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Ladybugs have identifiable traits. Some of those traits show variation, such as color and the number of spots. 	<p>Ask questions to elicit student ideas and predictions.</p> <p>Make explicit</p>	<p>Show slide 8.</p> <p>What living thing do you see in this picture?</p> <p>NOTE TO TEACHER: <i>Students should be able to identify the insect in the picture as a ladybug.</i></p> <p>What are the traits of this ladybug?</p> <p>NOTE TO TEACHER: <i>Record on chart paper the characteristics students identify that are actually traits. Possible traits are the ladybug's wing color, the number of legs or spots it has, and its ability to fly.</i></p> <p>Do you think the ladybug has any traits we can't see in this picture? For example, are there things it can do that we can't see?</p> <p>Next, I'm going to give each of you a</p>	<p>A ladybug!</p> <p>It's red.</p> <p>It has spots.</p> <p>The color of its wings.</p> <p>The number of spots it has.</p> <p>It can fly.</p> <p>It can fly really fast!</p>	<p><i>For each response, ask this question:</i></p> <ul style="list-style-type: none"> Does this fit our definition of a trait?

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		<p>links between science ideas and activities during the activity.</p> <p>Select content representations and models matched to the learning goal and engage students in their use.</p>	<p>picture of a ladybug. First, look at the picture and see if it fits the traits we just listed.</p> <p>NOTE TO TEACHER: <i>Distribute the ladybug photos from handout 1.1 (Ladybug Pictures). Give each student one laminated card. Some cards will show the same ladybug. That's OK because students will make a bar graph in the next lesson that shows variations in the number of spots the ladybugs have. Some students will report the same number of spots even if they have different pictures.</i></p> <p>ELL support: Explicitly preview the bar-graph representations ELL students will use in lesson 1b.</p> <p>Do you agree that the living thing in your picture is a ladybug? How do you know?</p> <p>Show slide 9.</p> <p>Turn and Talk: Now turn to an elbow partner and compare your ladybug pictures. Which traits of <i>both</i> ladybugs are <i>alike</i>?</p> <p>NOTE TO TEACHER: <i>Give students 1 or 2 minutes to talk about the similar traits they observe. Then invite a few</i></p>		

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			<p><i>pairs to share their observations with the class.</i></p> <p>Whole-class share-out: Let’s hear a few of your observations about the ladybug traits that are alike.</p> <p>Show slide 10.</p> <p>Turn and Talk: Next, compare your ladybugs and talk about any <i>differences</i> you observe. Scientists call these differences <i>variations</i>.</p> <p><i>Variation</i> is a science idea that describes the differences in traits among living things of the same kind.</p> <p>Copy the definition on the slide into your science notebooks.</p> <p>NOTE TO TEACHER: <i>Introduce the term variation using the vocabulary strategy that is consistent with your classroom culture.</i></p> <p>Whole-class share-out: What</p>	<p>Both ladybugs have a round shape.</p> <p>They have spots on their wings.</p> <p>They both have six legs.</p>	

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			<p>differences, or variations, did you notice between your ladybugs?</p> <p>We'll use these ladybug cards again in the next lesson, so place them carefully in your science notebooks.</p>	<p>I thought all ladybugs were red, but they're not! They're different colors.</p> <p>One ladybug has a lot of spots, and the other one doesn't.</p> <p>One ladybug has spots on its head, but the other one doesn't.</p>	
7 min	<p>Follow-Up to Activity</p> <p>Synopsis: Working in pairs, students create circle maps and record the ladybug traits and variations they observed.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> Among individuals of the same kind of living thing, some traits show variation and others don't. 	<p>Make explicit links between science ideas and activities after the activity.</p> <p>Select content representations and models matched to the learning goal</p>	<p>Show slide 11.</p> <p>Let's show what we've learned so far about traits and variation.</p> <p>First, turn to a new page in your science notebooks and write the title Ladybugs at the top.</p> <p>Then draw two circle maps underneath the title. Use about half of the page for each circle map. In the center of one map, write the word <i>Traits</i>. In the center of the second map, write the word <i>Variation</i>.</p>		

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		<p>and engage students in their use.</p> <p>Ask questions to probe student ideas and predictions.</p>	<p>ELL support: Have ELL students practice making circle maps during the lesson preview to prepare them for this activity.</p> <p>Turn and Talk: Talk with your partner about the ladybug traits you observed during today’s activity; then fill in the outer circle of the Traits circle map.</p> <p>Then talk about the variation you observed in <i>one</i> of the ladybug traits and record this on the second circle map.</p> <p>We’ll share some of our circle maps at the beginning of the next lesson.</p> <p>NOTE TO TEACHER: <i>As needed, review the definition of traits and remind students that variation refers to differences in the traits of living things of the same kind. Circulate around the room during this activity and listen to pairs’ conversations. Ask questions to probe student thinking, but don’t correct their circle maps at this time. Instead, listen to students’ ideas and take notes on their current understandings of traits and variation.</i></p> <p><i>As you circulate around the room, identify one or two sets of circle maps</i></p>		

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			<p><i>that you think might challenge student thinking and/or ignite a lively discussion about traits and variation at the beginning of the next lesson.</i></p>		
5 min	<p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: Students synthesize their understandings of key science ideas about traits and variation by citing examples of cats and ladybugs they observed.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • In living things of the same kind, some traits show variation. 	<p>Highlight key science ideas and focus question throughout.</p> <p>Summarize key science ideas.</p> <p>Engage students in making connections by</p>	<p>Show slide 12.</p> <p>The focus question we've been thinking about today is <i>How are living things of the same kind alike and different?</i></p> <p>Show slide 13.</p> <p>Let's review the key science ideas and definitions we learned about in today's lesson.</p> <ul style="list-style-type: none"> • <i>Traits</i> are features or characteristics that identify living things of the same kind. • A trait can be the way a living thing looks or the way it acts. • <i>Variation</i> refers to the differences in traits among living things of the same kind. <p>Show slide 14.</p> <p>Now let's summarize what we've learned so far about traits and variation. Think about the traits we observed in cats and ladybugs in today's lesson.</p>		

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		synthesizing and summarizing key science ideas.	<p>Show slide 15.</p> <p>Then complete the tasks on the slide in your science notebooks.</p> <ul style="list-style-type: none"> • List one trait of a cat and two variations of that trait • List one trait of a ladybug and two variations of that trait <p>As resources, you may use our class circle map for the cats and the Trait and Variation circle maps for the ladybugs that you and your partner completed.</p> <p>ELL support: Preview this activity orally or in writing with ELL students.</p> <p>NOTE TO TEACHER: <i>If time allows, ask a few students to share the traits and variations they listed. If many lists are the same or similar, encourage students to think of additional traits and two variations of those traits.</i></p>		
1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the next lesson, students will gather data on one ladybug trait—the number of spots—and create a bar graph to</p>		<p>Show slide 16.</p> <p>In our next lesson, we'll gather data on one ladybug trait—the number of spots they have. Then we'll find out how scientists organize their data so they can identify patterns and analyze variations in a trait.</p>		

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	analyze variations in that trait.		<p>NOTE TO TEACHER: <i>Make sure to use the correct form of the word data throughout this lesson. Data is the plural form, and datum is the singular form. When referring to multiple datum, use the appropriate verb. “How do the data help us?” is the correct usage, not “How does the data help us?” Initially, using the proper form might not sound right, but you and your students will get used to it over time.</i></p>		