Variations in Plants and Animals
Lesson 5a: Trait Variations in Dandelions

Grade 1	**Length of lesson:** 37 minutes	**Placement of lesson in unit:** 5a of 5 lessons on variations in plants and animals
Unit central question: How do differences (variations) in plants or animals of the same kind help them survive so they can produce young (babies or seeds)?		**Lesson focus question:** How do differences (variations) in the traits of dandelions help them survive so they can produce young (seeds)?
Main learning goal: Variations in traits and the environment affect which plants or animals of the same kind survive long enough to produce young (seeds/babies), and thus which variations become more common in the next generation.		
Science content storyline: Plants or animals of the same kind have traits that can vary. Often, one variation in a trait, such as the smaller size of cottonwood-tree seeds, can help an individual plant or animal survive in its environment. Plants or animals with a particular trait variation are more likely to survive and live long enough to produce young (seeds or babies) if their environment provides what they need. The seeds or babies of those plants or animals are more likely to have the same trait variations as their parents; consequently, these variations become more common in the next generation of plants or animals. In other words, trait variations in plants or animals of the same kind that survive and produce young become more common over time.		
Ideal student response to the focus question: Many dandelions live in the grass. If someone mows the grass, the dandelions that have shorter stems are less likely to be mowed down. They have a better chance of surviving and producing seeds that will become new dandelion plants with short stems, too. This is an example of how differences (variations) in plants or animals of the same kind help some individuals survive in their environment so they can have babies (seeds).		

Preparation

Materials Needed • Student notebooks • Chart paper and markers • **Optional:** *A Dandelion's Life* by John Himmelman (from lesson 3a) **Student Handouts and Teacher Masters** • 5.1 What Will Happen to the Dandelions? (Teacher Master) • 5.2 What Will Happen to the Dandelions? (1 per pair) • 5.3 Which Dandelions Will Survive? (1 per student)	**Ahead of Time** • Review the content background document. • Prepare handout 5.1 (What Happens to the Dandelions?) for display on a document reader. • **ELL support:** Meet with ELL students in advance and introduce them to the lesson content, structure, materials, and activities so they know what's expected of them and can participate more fully in the lesson. Identify Tier 2 and 3 words in the lesson plan to review with students in advance, including *trait*, *variation*, *environment*, *survive*, and *survival*. Prepare visual resources for these words.

Lesson 5a General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
7 min	**Link to previous lesson:** The teacher engages students in reviewing what they learned about traits, variations, survival, and the environment from the cottonwood-seed investigation.	• Plants or animals of the same kind have traits that can vary. Often, one trait variation, such as the smaller size of cottonwood-tree seeds, can help individual plants or animals survive in their environment.
3 min	**Lesson focus question:** The teacher introduces the focus question, *How do differences (variations) in the traits of dandelions help them survive so they can produce young (seeds)?*	
2 min	**Setup for activity:** The teacher sets up a use-and-apply scenario in which students determine which variations in a trait will help dandelions survive in their environment.	• In a particular environment, some trait variations give certain plants or animals a survival advantage.
8 min	**Activity:** Working in pairs, students investigate which trait variations help dandelions survive in their environment so they can produce young (seeds). Then pairs share their ideas and reasoning with another pair of students.	• Plants or animals of the same kind with a trait variation that helps them survive are more likely to live long enough to produce young (seeds/babies). The seeds or babies of these plants or animals are more likely to have the same trait variations as their parents; consequently, these variations become more common in the next generation of plants or animals.
8 min	**Follow-up to activity:** Students share their ideas about trait variations in dandelions that help them survive and grow in their environment so they can produce the next generation of young (seeds).	
8 min	**Synthesize/summarize today's lesson:** The teacher reviews the focus question, and students use ideas about traits, variations, survival, and the environment to answer it.	• Some trait variations, such as the smaller size of cottonwood-tree seeds and short stems in dandelions, can help individual plants or animals of the same kind survive in their environment long enough to produce young (seeds/babies). The seeds or babies of these plants or animals are more likely to have the same trait variations as their parents; consequently, these variations become more common in the next generation.
1 min	**Link to next lesson:** The teacher foreshadows the next lesson in which students investigate trait variations and survival in giraffes.	

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7 min	**Link to Previous Lesson** **Synopsis:** The teacher engages students in reviewing what they learned about traits, variations, survival, and the environment from the cottonwood-seed investigation. **Main science idea(s):** • Plants or animals of the same kind have traits that can vary. Often, one trait variation, such as the smaller size of cottonwood-tree seeds, can help individual plants or animals survive in their environment.	Make explicit links between science ideas and activities.	**Show slides 1 and 2.** In our last lesson, we investigated variations in a trait of cottonwood-tree seeds. What trait did we look at? **NOTE TO TEACHER:** *Because students will apply what they've learned about traits and variations in this lesson, make sure they can connect these ideas to previous investigations and use the science vocabulary in context. Also make sure they can describe how different environments affect whether cottonwood seeds can survive and grow.* **ELL support:** During this review, encourage ELL students to listen and respond to each other's ideas. Look for connections between students' ideas and science ideas. As students share their ideas, note any confusion or surprising statements to address later. What were the variations in this trait? What happened to the cottonwood-tree seeds when the wind blew them? Who can tell me what the three environments were?	The size of cottonwood seeds. We looked at the trait of size in cottonwood seeds. Big and small. The variations in the size of the cottonwood-tree seeds were big and small. The wind carried the seeds away from the trees.	Can you use the word *trait* in your answer? Can you use the word *variations* in your answer?

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				The parking lot. The pond. The field.	
			How far were these environments from the cottonwood trees?	The parking lot was closest to the trees, the field was farthest from the trees, and the pond was in the middle.	
			Show slide 4. When the wind blew the seeds away, where did the smaller seeds land?	Most of the smaller seeds landed in the open field.	
			Where did the bigger seeds land?	Most of the bigger seeds landed closer to the tree in the parking lot.	
			Do you think the smaller seeds have a better chance of surviving in the field? Why or why not?	Yes, because the smaller seeds will get more space to grow in the field. And they'll get more sunlight and rain, too.	
			Do you think the bigger seeds have a better chance of surviving in the parking lot? Why or why not?	No. The parking lot	

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				isn't a good place for seeds because it's too hard for them to grow.	Tell me why it's too hard for the seeds to grow in the parking lot.
				There's no dirt for them to grow in.	
			What about the seeds that landed in the pond? Do you think they'll survive?	No. Seeds can't grow in ponds.	Why do you think the seeds can't grow in ponds?
				Because they need soil to grow.	
			Which environment do you think is best for the seeds? Why?	The field is the best environment for the seeds because it has more space for them to grow, and they get more sunlight and rain.	Why are all of these things important for the seeds to survive?
			If the smaller seeds survive and grow into new cottonwood trees, do you think you'd see big seeds or small seeds on the new trees?	I think the new trees would have small seeds.	Why do you think the new cottonwood trees

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			What do you think will happen to the bigger cottonwood seeds? Do you think they'll survive and make new cottonwood trees with big seeds?	No. I think the bigger seeds will die because they landed on the parking lot, and it's too hard for them to grow.	would have small seeds?
			Show slide 5. Now let's talk about what happened when the environments changed.		
			Where are the environments in this new picture?	The field is closest to the trees, the pond is farthest from the trees, and the parking lot is in the middle.	
			Where did the big and small seeds land this time?	The bigger seeds landed in the field, and the smaller seeds landed in the pond. And some big and small seeds landed in the parking lot in the middle.	
			Do you think the bigger seeds are more likely to survive this time? Why?	Yes, I think the bigger seeds will survive because they landed in the field	

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				this time.	Why do you think the bigger seeds have a better chance of surviving in the field?
				Because the field has dirt, and seeds need dirt to grow.	Do you think the field will get enough sun and rain for the bigger seeds to grow?
			Do you think the smaller seeds are more likely to survive in the pond?	No, because there's no dirt in the pond.	
				I think the seeds could survive in the pond because there's mud on the bottom, and they'd get all the sunlight and water they need.	Any other ideas?
			Show slide 6.		
		Summarize key science ideas.	So last time we learned that smaller cottonwood seeds have a better chance of surviving because the wind blows them farther away from the trees than the larger seeds. But the environment where they land is important too. If the environment has what the seeds need to grow, like soil, sunlight, and rain, they have a better chance of surviving. So both variation in a trait and the		

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			environment are important for seeds to survive and grow. Today we'll look at dandelions in a city park and see what happens to their seeds.		
3 min	**Lesson Focus Question** **Synopsis:** The teacher introduces the focus question, *How do differences (variations) in the traits of dandelions help them survive so they can produce young (seeds)?*	Set the purpose with a focus question or goal statement.	**Show slide 7.** Our focus question for today's lesson is *How do differences (variations) in dandelions help them to survive so they can produce young (seeds)?* Write this question in your science notebooks and draw a box around it. **NOTE TO TEACHER:** *Write the focus question on the board for students to refer to throughout the lesson.* Have you seen any dandelions or dandelion seeds in your neighborhood? **NOTE TO TEACHER:** *Give students a few minutes to share what they know about dandelions from experience.* What do you know about dandelion seeds? What do they look like?	We have a lot of dandelions in our backyard! They're white and fluffy like cottonwood seeds. The wind can blow the seeds away. I can blow the seeds	

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				away too!	
2 min	**Setup for Activity** **Synopsis:** The teacher sets up a use-and-apply scenario in which students determine which variations in a trait will help dandelions survive in their environment. **Main science idea(s):** • In a particular environment, some trait variations give certain plants or animals a survival advantage.	Make explicit links between science ideas and activities **before** the activity.	**Show slide 8.** Today you'll work with a partner to solve a mystery about dandelions in a city park. These dandelions show variations in a trait, and it's your job to figure out which variation will help the dandelions survive in the park. To solve this mystery, you'll need to use all of the ideas we've been talking about in this unit. And you'll need to use our science words: • Trait • Variations • Survive • Environment **ELL support:** Provide visual resources for these vocabulary words. Now let's learn more about these dandelions.		
8 min	**Activity** **Synopsis:** Working in pairs, students investigate which trait variations help dandelions survive in their environment so they can produce young (seeds). Then pairs share their ideas and reasoning with another pair of students.	Make explicit links between science ideas and activities	**NOTE TO TEACHER:** *Distribute handout 5.2, (What Will Happen to the Dandelions?) and then tell students the following story about the dandelions on the handout.* **Show slide 9.** Look at the first picture on your handouts and listen carefully as I tell you a little story about the dandelions.		

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	Main science idea(s): • Plants or animals of the same kind with a trait variation that helps them survive are more likely to live long enough to produce young (seeds/babies). The seeds or babies of those plants or animals are more likely to have the same trait variation as their parents; consequently, that variation becomes more common in the next generation of plants or animals.	**during** the activity. Engage students in using and applying new science ideas in a variety of ways and contexts.	It's summertime, and the grass in the city park is getting very high. It's time to mow! Dandelions are also growing in the tall grass. Some of the dandelions have very long stems, and some of them have very short stems. **Show slide 10.** What do you think will happen to the dandelions when the lawn mower mows down the grass? **ELL support:** Make sure ELL students know what a lawn mower is and how it works. **Turn and Talk:** First, you'll talk about this question with an elbow partner. Then you and your partner will draw two pictures on your handout to show what you think will happen to the dandelions in the park. Look at the labels for the last two boxes on the handout. In box 3, you'll draw a picture showing which of the dandelions make new seeds. **ELL support:** The directions for this activity are intentionally vague, so ELL students may not understand what is being asked of them. Give them an opportunity to practice completing the handout during the lesson preview so they know what to do and can participate more fully in the lesson. It might also be helpful to tell students that they're comparing what happens to the tall and short dandelions when the lawn mower cuts down some of them. In box 4, you'll draw what you think the dandelions will look like in the park next year.		

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			You'll have 5 minutes to finish your drawings. Then, I'll ask you to share your drawings with another pair of students and explain your ideas. **ELL support:** Give ELL students an opportunity to work with a shared-language partner so they can practice sharing their ideas in both their home languages and English. **NOTE TO TEACHER:** *The directions for this use-and-apply activity are intentionally vague to assess what students understand about how variations in a plant can affect survival. Box 1 sets up the scenario and shows variations in the stem-length trait (long stems versus short stems). Make sure that students notice the difference in dandelion height. Box 1 also introduces the action—mowing the grass—that sets the chain of events in motion. The visual in box 2 shows students the height that the grass will be cut (above the short dandelion plants but below the flowers of the taller dandelion plants).* *Don't discuss what's going to happen to the tall or short dandelions plants when the grass is cut. Students will figure out what they want to draw in the last two boxes based on the labels. If they get stuck, encourage them to use the science ideas from previous investigations that they've been learning about to help them figure out that the dandelions with short stems are more likely to survive the mowing and produce seeds that will result in the next generation of short-stemmed dandelions the following year.*		

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			Circulate around the room as pairs work on the task and ask questions to help them think about the trait variation in the dandelions that will give them a better chance of surviving in their environment. Challenge them to think about what they know about traits, variations, survival, and environments without leading them too much.  Listen to students' ideas. What's visible about student thinking? **Pairs work on the use-and-apply task.** Now that you've finished your drawings, I'd like you to share them with another pair of students at your table. Talk about your pictures and explain why you drew what you did.		
8 min	**Follow-Up to Activity** **Synopsis:** Students share their ideas about trait variations in dandelions that help them survive and grow in their environment so they can produce the next generation of young (seeds). **Main science idea(s):** • Plants or animals of the same kind with a trait variation that helps them survive are more likely to live long enough to produce young	Make explicit links between science ideas and activities **after** the activity. Engage students in analyzing and interpreting data and observations. Engage	**Show slide 11.** Let's talk about how you solved the mystery of the dandelions. **NOTE TO TEACHER:** *During this discussion, display students' drawings on a document reader. Help students make sense of the progression on the handout, from the dandelions that survived the mowing to these dandelions making new seeds that grow into new plants. Revisit* A Dandelion's Life *from lesson 3, if necessary.* **ELL support:** Make explicit connections between students' ideas and the science ideas and words they've been learning about in this unit.		

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	(seeds/babies). The seeds or babies of these plants or animals are more likely to have the same trait variations as their parents; consequently, these variations become more common in the next generation of plants or animals.	students in constructing explanations and arguments.	What dandelion trait did we investigate today? What variations in this trait did we look at? Which dandelions survived? Which dandelions are more likely to make seeds? **ELL support:** Be explicit about the definition of the words *more likely*, since ELL students are more familiar with the word *likes* and may think this expression refers to liking something.	The dandelion stems. Some stems are long, and some are short. It matters because the dandelions with the long stems got mowed down. The dandelions with the short stems survived. Because the mower didn't cut the grass that low. The dandelions with the short stems are more likely to make seeds.	Why do you think it matters that some stems are long and some are short. Aren't all the plants dandelions? Why do you think the shorter dandelions survived?

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			Show slide 12. What do you think will happen to the dandelion seeds that the shorter plants make? Do you think the seeds that blow away will survive and grow? If the seeds grow into new dandelion plants, what do you think the new plants will look like? So do you think we'll see more dandelions with long stems or short stems in this park next year? Which variation will we be more likely to see?	The wind will blow them away, and they'll land somewhere else. It depends on where they land. If they land in a place that has dirt, sun, and rain, they'll probably survive and grow. The new dandelions will have short stems too. Because the seeds came from plants with short stems. I think there will be more dandelions with short stems next year.	What do you mean by "it depends on where they land"? Why do you think the new dandelions will have short stems? Why do you think

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			Show slide 13. These pictures show what happened to the dandelions in the park. Do they match your drawings? How are these pictures like your drawings? How are they different from your drawings? **NOTE TO TEACHER:** *Display handout 5.1 (What Will Happen to the Dandelions?) in addition to the slide. Walk students through the scenario once again and emphasize how a particular variation in one trait can determine which plants or animals survive and which don't. Emphasize that the dandelions that survive are more likely to produce young (seeds) that will grow into new dandelions with similar variations in their traits.* **CONTENT NOTE:** *It's not necessarily true that the same place in the park would now only have smaller plants. If the taller dandelion plant put out new buds, which dandelions do fairly quickly after mowing, there might be taller plants in that space too. Mowing cut down the taller plant but didn't kill it, so that plant would put out more flowers and seeds during the summer, and those would grow the next year.*		that?
8 min	**Synthesize/Summarize Today's Lesson** **Synopsis:** The teacher	Highlight key science ideas	**Show slide 14.** The focus question we've been exploring today is *How do differences (variations) in the traits of*		

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	reviews the focus question, and students use ideas about traits, variations, survival, and the environment to answer it. **Main science idea(s):** • Some trait variations, such as the smaller size of cottonwood-tree seeds and short stems in dandelions, can help individual plants or animals of the same kind survive in their environment long enough to produce young (seeds/babies). The seeds or babies of these plants or animals are more likely to have the same trait variations as their parents; consequently, these variations become more common in the next generation.	and focus question throughout. Engage students in making connections by synthesizing and summarizing key science ideas. Ask questions to elicit	*dandelions help them survive so they can produce young (seeds)?* ***Embedded Assessment Task*** Before we end our lesson, let's summarize what we've learned in our dandelion investigation about traits, variations, survival, and the environment that can help us answer our focus question. **NOTE TO TEACHER:** *Distribute handout 5.3 (Which Dandelions Will Survive?) and walk students through the instructions.* Look at the dandelions on your handout. Which ones do you think will survive and make seeds that will survive and grow into new dandelion plants next year? Circle the dandelions you think will survive. Then underneath the pictures, write a sentence explaining why you think these dandelions will survive and make seeds that will grow into new plants. Use the science words on our word wall to help you write your sentence. **Show slide 15.** **Whole-class share-out:** Before we talk about which dandelions might survive and make seeds, let's look at the environment where they live. What is their environment like?	It's grassy.	Can you use the

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		student ideas and predictions. Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	**NOTE TO TEACHER:** *Encourage students to use the science words* trait*,* variations*,* survive*, and* environment *in their answers. Direct them to visual and language resources.* What do dandelion plants need to survive and grow? Do you think these plants have what they need to survive and grow in their environment? Why or why not? Now let's look at the dandelion plants? What do you observe about the plants? What do we call the features or characteristics that dandelions have in common?	The dandelions live in a grassy environment. They need dirt, sunlight, and rain. I think so, since they're in a grassy area and not in a parking lot or a pond. A parking lot doesn't have any dirt for them to grow in. The water will cover them up in a pond. They all have flowers. Traits.	word *environment* in your answer? Say more about the parking lot and pond. Why wouldn't the dandelions survive and grow in those environments?

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			What are some other traits they share?	They all have stems.	
			What do you observe about the dandelion stems? Are they exactly the same?	No. The stems are all different lengths.	How are the stems different?
				Some are long, and some are short.	
			What do we call the differences in a trait?	Variations.	
			So the dandelion stems have variations. Why does that matter?	Because a lawn mower can cut down the dandelions with longer stems.	
			What other variations do the dandelions have? Are the flowers exactly the same?	No. Some flowers are bigger than others.	
				The flowers are different shapes.	
			So which dandelion plants do you think will survive and make seeds that will fly away and grow into new dandelion plants next year?	I think the shorter dandelions will survive and make seeds.	Why do you think that?
				The lawn mower won't cut down the shorter plants, so	

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			Which variation in the stem trait is more likely to get passed on to the new dandelion plants?	they have a better chance of surviving. The new dandelions are more likely to have the short-stem variation.	Why do you think the new plants will have short stems?
1 min	**Link to Next Lesson** **Synopsis:** The teacher foreshadows the next lesson in which students investigate trait variations and survival in giraffes.	Summarize key science ideas. Link science ideas to other science ideas.	Today we explored variations in the stem trait of dandelion plants at a city park. From our investigation, we discovered that dandelions with shorter stems have a better chance of surviving because they're less likely to get mowed down. So this variation of a trait made a big difference in whether dandelions survived in their environment and went on to make seeds. **Show slide 16.** Next time, we'll look at animals we'd normally find at a zoo. Who can tell me what the animals in this picture are? That's right! In our next lesson, we'll investigate variations in one of their traits and see which variation helps them survive in the environment where they live.	Giraffes!	