

Earth's Changing Surface

Lesson 6b: Use and Apply

Grade 2	Length of lesson: 37 minutes	Placement of lesson in unit: 6b of 6 two-part lessons on Earth's changing surface
Unit central questions: What does the surface of Earth look like? Does it ever change?		Lesson focus question: Can we predict and explain how landforms might be changing in our area?
Main learning goal: The surface of Earth has many types of landforms, including bodies of water, that are always changing. Sometimes changes happen quickly, and sometime they happen slowly. Flowing water is one process that can change landforms quickly or slowly over time.		
Science content storyline: The surface of Earth has many different types of landforms and bodies of water that are always changing. Sometimes they change quickly, and sometime they change slowly. Flowing water is one process that can change landforms quickly or slowly over time.		
Ideal student response to the focus question: Earth's surface has many types of landforms that look different in different places. These landforms can change over time. Sometimes the changes happen fast, but most of the time, the changes happen very slowly. Water is one thing that can change the land quickly or slowly over time.		
Preparation		
Materials Needed <ul style="list-style-type: none"> • Science notebooks • Chart paper and markers Student Handouts <ul style="list-style-type: none"> • 6.1 Landform Challenge, Part 1 (from lesson 6a) • 6.2 Landform Challenge, Part 2 (1 per pair) 		Ahead of Time <ul style="list-style-type: none"> • Review the content background document. • On chart paper or a Smart Board, create a data table titled "Let's Share Our Ideas!" Use the table on PPT slide 9 as a model.

Lesson 6b General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
4 min	Link to previous lessons: Students share what they learned from the landform challenge in the previous lesson.	<ul style="list-style-type: none"> Flowing water is one process that can change landforms by moving rocks and soil from one place to another. These changes can happen quickly or slowly over time.
1 min	Lesson focus question: The teacher introduces the focus question, <i>Can we predict and explain how landforms might be changing in our area?</i>	
5 min	Setup for activity: The teacher sets up a new use-and-apply challenge in which students will use everything they've learned about landforms to predict and explain what they think will happen to an eroding ocean cliff and the houses that sit along the edge.	
10 min	Activity: Using the science ideas they've learned, students predict and explain what they think will happen to an eroding ocean cliff and the houses that sit along the edge.	<ul style="list-style-type: none"> The surface of Earth has many types of landforms that are always changing. Sometimes changes happen quickly, and sometimes they happen slowly. Flowing water is one process that can change landforms quickly or slowly over time.
8 min	Follow-up to activity: The teacher reviews the ideas and evidence students shared for solving the challenge in the previous lesson. Then the teacher records students' ideas and evidence for the new challenge on a class table.	
8 min	Synthesize/summarize today's lesson: The teacher summarizes key science ideas from previous lessons. Then the teacher reviews the unit central questions, and students develop an answer using science ideas about landforms.	<ul style="list-style-type: none"> Earth's surface hasn't always looked the way it does today. It's always changing. Some changes happen very slowly and can't be seen, while other changes happen very quickly and are observable. There are many types of landforms. Some landforms, like mountains, rise high above Earth's surface, while others, like canyons, cut deep into the surface. Landforms in one place can differ from landforms in another place. Flowing water is one of the processes that can change landforms by carrying rocks and soil from one place to another.
1 min	Link to future lessons: The teacher links science ideas to future lessons.	

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4 min	<p>Link to Previous Lessons</p> <p>Synopsis: Students share what they learned from the landform challenge in the previous lesson.</p> <p>Main science ideas:</p> <ul style="list-style-type: none"> • Flowing water is one process that can change landforms by moving rocks and soil from one place to another. These changes can happen quickly or slowly over time. 	Engage students in making connections by synthesizing and summarizing key science ideas.	<p>Show slides 1 and 2.</p> <p>Let’s review our ideas and evidence from the landform challenge in our last lesson.</p> <p>What new landforms did we learn about?</p> <p>What do we think is causing the cliffs along the ocean to break apart and fall onto the beach?</p> <p>NOTE TO TEACHER: <i>During this review, display the ideas and evidence you recorded on chart paper during the previous lesson. Give students time to review their handouts and other resources from the previous lesson before they respond.</i></p> <p>Do you think these changes are happening quickly or slowly or maybe both?</p> <p>Do you think the cliffs will keep changing or stay the same in the future?</p>	<p>Cliffs.</p> <p>Beaches.</p> <p>We think the ocean waves are hitting the cliffs and making them break apart so they fall onto the beach.</p> <p>The sand on the beach is the same color as the cliffs.</p> <p>I think they’re happening a little at a time as the waves hit them and make them break apart.</p> <p>I think they could change fast if a big hurricane hits them.</p> <p>I think they’ll keep</p>	<p><i>Questions to ask during review:</i></p> <ul style="list-style-type: none"> • Why do you think so? • What evidence did we find for this idea? <p>What evidence do we have?</p>

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		Summarize key science ideas.	<p>Today we'll look at another cliff along a beach near the ocean and see if we can solve a new landform challenge.</p> <p>Show slide 3.</p> <p>First, let's review what we've learned about landforms in our unit on Earth's changing surface.</p> <ul style="list-style-type: none"> • Earth's surface has many types of landforms. • The landforms in one place can be different from the landforms in another place. • Landforms change over time. • Some changes happen very slowly, like when canyons or deltas form, and other changes happen quickly, 	<p>changing because the ocean waves will keep hitting them.</p> <p>I think they'll stay the same because the ocean is far away from the cliffs in the picture.</p> <p>Yes, unless there's a hurricane.</p>	<p>So you think the ocean will stay far away from the cliffs?</p>

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			<p>like during floods or landslides.</p> <ul style="list-style-type: none"> • Flowing water can change landforms by moving rocks and soil from one place to another. 		
1 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>Can we predict and explain how landforms might be changing in our area?</i></p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>Show slide 4.</p> <p>Our focus question last time was <i>Can we explain how landforms change in our area?</i></p> <p>Today we'll think about a slightly different question: <i>Can we predict and explain how landforms might be changing in our area?</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>		
5 min	<p>Setup for Activity</p> <p>Synopsis: The teacher sets up a new use-and-apply challenge in which students will use everything they've learned about landforms to predict and explain what they think will happen to an</p>		<p>Show slide 5.</p> <p>Have you ever been to a beach like the one in this picture from our last lesson?</p> <p>What was it like there? What did you see?</p>	<p>Yes, I've been to the beach with my family.</p> <p>I saw sand and big</p>	

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	eroding ocean cliff and the houses that sit along the edge.		<p>Did you see any cliffs like in our photo?</p> <p>Did you see any houses or other buildings near the beach or the cliffs?</p> <p>Show slide 6.</p> <p>Look at the top photo of houses along the edge of cliffs at the beach. What do you see in this picture? How is it the same as the bottom photo of cliffs along a beach? How is it different?</p>	<p>ocean waves.</p> <p>No, I didn't see any cliffs.</p> <p>Yes, there were some high cliffs on the beach.</p> <p>There was a snack shack on the beach where you can get things to eat.</p> <p>It was up against the cliffs but on the beach.</p> <p>I can see cliffs, a sandy beach, and the ocean in both photos.</p> <p>The cliffs in the top photo are a different color from the sand</p>	<p>Was it right on the beach or along the cliffs?</p>

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		<p>Make explicit links between science ideas and activities before the activity.</p>	<p>So the landforms in the top photo are like the ones in the bottom photo, aren't they? We see a cliff and a beach along the ocean, and we can see water and waves. But in the top photo, there are houses near the edge of the cliffs.</p> <p>In today's challenge, you'll work with your partners from last time to predict what you think might happen to these cliffs and the houses in the future.</p> <p>NOTE TO TEACHER: <i>Have students pair up with their partners from last time. Then distribute handout 6.2 (Landform Challenge, Part 2) to each pair.</i></p>	<p>on the beach.</p> <p>The cliffs in the top photo aren't as high as the cliffs in the bottom photo.</p> <p>There aren't any houses in the bottom photo.</p> <p>The cliffs in the top photo look like dirt, not sand or rock like in the bottom photo.</p>	

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10 min	<p>Activity</p> <p>Synopsis: Using the science ideas they've learned, students predict and explain what they think will happen to an eroding ocean cliff and the houses that sit along the edge.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The surface of Earth has many types of landforms that are always changing. Sometimes changes happen quickly, and sometimes they happen slowly. Flowing water is one process that can change landforms quickly or slowly over time. 	<p>Make explicit links between science ideas and activities during the activity.</p> <p>Engage students in using and applying new science ideas in a variety of ways and contexts.</p> <p>Engage students in constructing explanations and arguments.</p>	<p>Show slides 7 and 8.</p> <p>Are you ready for a new landform challenge?</p> <p>First, read the science ideas on the handout together. Then study the photo and read the questions.</p> <p>Share your ideas about what might happen to the cliffs over time and why you think so. Also talk about what you think will happen to the houses.</p> <p>Then answer the questions on your handouts:</p> <ul style="list-style-type: none"> What do you predict might happen to the cliffs over time? Why do you think so? What do you think might happen to the houses near the cliffs? Why do you think so? <p>Make sure to include evidence about landforms from previous lessons to support your ideas and predictions. When you and your partner have finished answering the questions, decide who will present your ideas and evidence to the class.</p> <p>ELL support: Encourage ELL students</p>		

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			<p>to add their own questions to the handout. It might also be helpful to have them write down their thoughts before discussing the questions with their partners.</p> <p>NOTE TO TEACHER: <i>Give pairs about 6 minutes to discuss the questions on the handout and write down their ideas and evidence.</i></p>		
8 min	<p>Follow-Up to Activity</p> <p>Synopsis: The teacher reviews the ideas and evidence students shared for solving the challenge in the previous lesson. Then the teacher records students' ideas and evidence for the new challenge on a class table.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The surface of Earth has many types of landforms that are always changing. Sometimes changes happen quickly, and sometimes they happen slowly. Flowing water is one process that can change landforms 	Engage students in making connections by synthesizing and summarizing key science ideas.	<p>Let's review the ideas and evidence we recorded on our class table last time.</p> <p>NOTE TO TEACHER: <i>Display the class table from the previous lesson during this review. Students may refer to their responses in handout 6.1 (Landform Challenge, Part 1).</i></p> <p>So in our previous lesson, most of us thought the cliffs in the picture were changing because the sand on the beach looked like the cliffs. We also thought the cliffs might be breaking off and becoming part of the sand on the beach.</p> <p>Someone also suggested that ocean waves might be hitting the cliffs and causing them to break apart.</p> <p>Do you have any other ideas to add?</p>		


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	quickly or slowly over time.	<p>Engage students in constructing explanations and arguments.</p> <p>Make explicit links between science ideas and activities after the activity.</p> <p>Ask questions to probe student ideas and predictions.</p> <p>Ask questions to challenge student thinking.</p>	<p>Show slide 9.</p> <p>Now let’s hear how you solved today’s landform challenge. As one member of each pair presents their ideas and evidence for answering the handout questions, I’ll record them on a new class data table.</p> <p>Then we’ll look at all of our ideas and evidence and see if we can agree as a class about what might happen to the cliffs and houses in our photo.</p> <p>NOTE TO TEACHER: <i>Record students’ ideas and evidence during the presentations on the new data table you created in advance (“Let’s Share Our Ideas!”). (See Ahead of Time.)</i></p> <p>So let’s hear your ideas for the first set of questions on the handout: <i>What do you predict might happen to the cliffs over time? Why do you think so?</i></p> <p>NOTE TO TEACHER: <i>During the presentations, ask probe questions to clarify students’ thinking and challenge students to support their ideas with evidence. Encourage other students to agree or disagree, add on, or ask questions.</i></p>	<p>We think that the cliffs we keep breaking off and falling onto the beach.</p> <p>Because the waves will roll in from the ocean during high tide and keep</p>	<p>And why do you think that?</p>

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		<p>Engage students in communicating in scientific ways.</p> <p>Engage students in using and applying new science ideas in a variety of ways and contexts.</p>	<p>Does anyone have another idea to share?</p> <p>Now let's hear your ideas for the second set of questions: <i>What do you think might happen to the houses near the cliffs? Why do you think so?</i></p>	<p>wearing them away.</p> <p>If there's a storm or hurricane, the waves might hit the cliffs harder and break away more land. There might even be a flood that would cause a landslide.</p> <p>We know from our investigations that water can move rocks and dirt from one place to another. The same thing happens when rain causes landslides. So I think the ocean could break apart the cliffs and even cause landslides.</p> <p>We think that when more of the cliffs break apart, the houses will fall onto the beach too.</p>	<p>Why do you think that?</p> <p>What's your evidence?</p>

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			<p>Does anyone else have a different prediction?</p> <p>If you think the cliffs will keep wearing away, and the houses will eventually fall onto the beach, how long do you think that might take?</p> <p>Do we have any evidence from other lessons about water wearing away rocks and soil over a long time?</p>	<p>We don't think the ocean will reach the cliffs, so the houses will be safe.</p> <p>Because it's far away from the cliffs in the picture.</p> <p>Maybe a year.</p> <p>Yes, we saw how long it took the Colorado River to carry soil and rocks out the canyon, so it could take a long time for the cliff to wear away.</p> <p>Yes. The Mississippi River carries soil and</p>	<p>Why do you think the ocean won't reach the cliffs?</p> <p>Do you think it might take longer for the ocean to wear away the cliffs?</p>

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			<p>What could help us predict what will happen to the cliffs and houses over time?</p> <p>Those are really good ideas about how we could gather evidence to support our predictions and explanations.</p> <p>Show slide 10.</p> <p>Let's review what we recorded on our class data table.</p> <p>It looks like most of us think the ocean waves will keep wearing away the cliffs over time, and eventually, the houses will fall onto the beach.</p> <p>Does everyone agree with these predictions based on our evidence?</p> <p>Does anyone disagree?</p>	<p>rocks all the way to the delta, but it takes a long time.</p> <p>We could take pictures every year and see how much the cliffs are wearing away. We could also measure how far the houses are from the cliffs each year.</p> <p>Yes!</p> <p>I still think that the ocean won't reach</p>	

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				the cliffs because it's too far away. So the houses should be safe.	
8 min	<p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: The teacher summarizes key science ideas from previous lessons. Then the teacher reviews the unit central questions, and students develop an answer using science ideas about landforms.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> • Earth's surface hasn't always looked the way it does today. It's always changing. Some changes happen very slowly and can't be seen, while other changes happen very quickly and are observable. • There are many types of landforms. Some landforms, like mountains, rise high above Earth's surface, 	<p>Summarize key science ideas.</p> <p>Highlight key science ideas and focus question throughout.</p>	<p>Show slide 11.</p> <p>We've learned a lot this week about landforms. Let's review the key science ideas we've learned about.</p> <ul style="list-style-type: none"> • Earth's surface has many types of landforms. • The landforms in one place can be different from the landforms in another place. • Landforms change over time. • Some changes happen very slowly, like when canyons or deltas form, and other changes happen quickly, like during floods or landslides. • Flowing water can change landforms by moving rocks and soil from one place to another. <p>Show slide 12.</p> <p>Our focus question for today was: <i>Can we predict and explain how landforms might be changing in our area?</i></p> <p>Answer this question in your science notebooks using evidence from our</p>		

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	<p>while others, like canyons, cut deep into the surface. Landforms in one place can differ from landforms in another place.</p> <ul style="list-style-type: none"> • Flowing water is one of the processes that can change landforms by carrying rocks and soil from one place to another. 	<p>Engage students in making connections by synthesizing and summarizing key science ideas.</p>	<p>landform challenges to support your ideas.</p> <p>Whole-class share-out: So based on today’s challenge, do you think we can predict and explain how landforms might be changing in our area? Why or why not?</p> <p> <i>Embedded Assessment Task</i></p> <p>Show slide 13.</p> <p>Before we finish our unit, let’s revisit our unit central questions, <i>What does the surface of Earth look like? Does it ever change?</i></p> <p>Think about everything you’ve learned about Earth’s surface and landforms this week. Then write three or four sentences in your science notebooks that answer these questions. Make sure to include evidence from our investigations this week.</p> <p>NOTE TO TEACHER: <i>Make resources from the lessons (charts, handouts, relief maps, word wall, and other visual and language resources) available to students as they develop their answers to the unit</i></p>		

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			<i>central questions.</i>		
1 min	<p>Link to Future Lessons</p> <p>Synopsis: The teacher links science ideas to future lessons.</p>	Link science ideas to other science ideas.	<p>Show slide 14.</p> <p>We'll continue exploring Earth's changing surface in future lessons, so don't forget everything you've learned about landforms in this unit!</p> <p>NOTE TO TEACHER: <i>Consider transitioning from this unit to a unit that engages students in comparing different design solutions to mitigate the effects of wind and water on the land.</i></p> <p><i>This is NGSS performance expectation (2-ESS2-1): Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]</i></p> <p><i>Coastal erosion, as seen in today's landform challenge, is a particularly good example of the effects of wind and water on land that need to be mitigated.</i></p>		