

Earth's Changing Surface

Lesson 6a: Use and Apply

Grade 2	Length of lesson: 42 minutes	Placement of lesson in unit: 6a 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 explain how landforms change 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 sometimes 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 types of landforms, including bodies of water, 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.		
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 (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 13 as a model.

Lesson 6a General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
8 min	Link to previous lessons: The teacher engages students in reviewing key science ideas from previous lessons.	<ul style="list-style-type: none"> The land hasn't always looked the way it does today. It's always changing. Some changes happen very slowly and can't be seen. Other changes happen very quickly and can be observed. Earth's surface has many types of landforms that can differ from one place to another. In some places, landforms like mountains, hills, or plateaus rise above Earth's surface. In other places, valleys and canyons cut deep into the surface. Flowing water is one process that can change landforms by carrying rocks and soil from one place to another.
1 min	Lesson focus question: The teacher introduces the focus question, <i>Can we explain how landforms change in our area?</i>	
8 min	Setup for activity: The teacher sets up a use-and-apply challenge in which students will use everything they've learned about landforms to explain whether they think cliffs along a coastline are changing.	<ul style="list-style-type: none"> The surface of Earth has many types of landforms that are always changing. Sometimes they change quickly, and sometimes they change very slowly. One of the processes that can change landforms is flowing water.
8 min	Activity: Using science ideas they've been learning about, students develop written explanations for whether they think cliffs along a coastline are changing, and if so, what is causing the changes.	
10 min	Follow-up to activity: Students share their ideas and evidence for solving the use-and-apply challenge, and the teacher records them on a class table.	
6 min	Synthesize/summarize today's lesson: Students summarize why they think the cliffs along a coastline will stay the same or change over time.	<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 that can differ from one place to another. In some places, landforms like mountains, hills, or plateaus rise above Earth's surface. In other places, valleys and canyons cut into the surface. Flowing water is one process that can change landforms by carrying rocks and soil from one place to another.
1 min	Link to next lesson: The teacher announces that in the final lesson of the unit, students will predict and explain what will happen in another landform challenge.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
8 min	<p>Link to Previous Lessons</p> <p>Synopsis: The teacher engages students in reviewing key science ideas from previous lessons.</p> <p>Main science idea(s):</p> <ul style="list-style-type: none"> The land hasn't always looked the way it does today. It's always changing. Some changes happen very slowly and can't be seen. Other changes happen very quickly and can be observed. Earth's surface has many types of landforms that can differ from one place to another. In some places, landforms like mountains, hills, or plateaus rise above Earth's surface. In other places, valleys and canyons cut deep into the surface. Flowing water is one process that can change 	Engage students in making connections by synthesizing and summarizing key science ideas.	<p>Show slides 1 and 2.</p> <p>We've learned quite a bit about landforms over the past week, haven't we?</p> <p>Who would like to share something we learned in this unit on Earth's changing surface?</p> <p>ELL support: Have ELL students share their ideas with a partner first (shared-language, if possible) so they can practice articulating something they've learned.</p> <p>NOTE TO TEACHER: <i>During this review, record on chart paper what students have learned over the past five lessons. Then follow up by asking for evidence from the lessons.</i></p> <p>What else did we learn about?</p>	<p>We learned about landforms like mountains, hills, and rivers.</p> <p>We used a relief map.</p> <p>It has bumps and dips in it to show different kinds of landforms.</p> <p>We learned about how the Colorado River carved out the Grand Canyon.</p> <p>We went on a</p>	<p>How did we learn about those landforms? What special map did we use?</p> <p>How is a relief map different from a regular map?</p> <p>How did we learn about that?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
	landforms by carrying rocks and soil from one place to another.		<p>Show slide 3.</p> <p>So we know that Earth’s surface has many types of landforms. What landforms do you see on this slide?</p> <p>What types of landforms do we have in our area?</p> <p>Show slide 4.</p> <p>We also learned that landforms in one place can be different from landforms in another place. What helped us identify landforms in different places?</p>	<p>Google tour of the canyon.</p> <p>Mountains.</p> <p>The Grand Canyon!</p> <p>A plain.</p> <p>We have mountains, and it’s flat, too. We don’t have much water, but we have beaches and cliffs and stuff.</p> <p>A relief map of the United States.</p> <p>We saw that some places have mountains, and other places have</p>	<p>What did we see on the relief map?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>Show slide 5.</p> <p>From our investigations, we know that landforms change over time. Who can give me an example of a landform that's changing?</p>	<p>plains or lots of lakes.</p> <p>It was really flat!</p> <p>It was raised up and bumpy.</p> <p>There were dips and low places.</p> <p>The Grand Canyon is getting bigger and bigger.</p> <p>The Colorado River carries rocks and soil out of the</p>	<p>What was it like on our relief map where there were plains?</p> <p>What was it like on the map where there were mountains or hills?</p> <p>What was it like where there were valleys or canyons?</p> <p>What do you mean by "bigger and bigger"?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>Who can give me another example of a landform that's changing over time?</p> <p>Any other examples of how landforms change?</p>	<p>canyon, and that makes it deeper.</p> <p>Because one of the clues on our Grand Canyon tour said it's 2 centimeters deeper than it was 50 years ago.</p> <p>The Mississippi River delta.</p> <p>The Mississippi River carries rock and soil down to the ocean and dumps them there. As more dirt piles up, the delta gets bigger.</p> <p>Landslides and floods can change the land.</p> <p>The water moves the land from one place to another.</p>	<p>How do you know the canyon is getting deeper?</p> <p>How is this landform changing?</p> <p>How does that happen?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>Show slide 7.</p> <p>So we know that landforms change and that changes can happen quickly or slowly, but what causes landforms to change? What evidence do we have?</p> <p>Any other ideas about what causes landforms to change?</p> <p>Wow! You've really learned a lot about landforms in this unit!</p>	<p>minutes.</p> <p>Rivers can cause canyons and deltas to change.</p> <p>The Colorado River carries rocks and soil out of the canyon to Lake Mead.</p> <p>The Mississippi River carries dirt to the Gulf of Mexico and makes the delta bigger.</p> <p>We learned that heavy rain can cause landslides.</p> <p>Floods can change the land.</p>	<p>What evidence do you have?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
1 min	<p>Lesson Focus Question</p> <p>Synopsis: The teacher introduces the focus question, <i>Can we explain how landforms change in our area?</i></p>	Set the purpose with a <u>focus question</u> or goal statement.	<p>Show slide 8.</p> <p>Today we'll think about the focus question, <i>Can we explain how landforms change 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>		
8 min	<p>Setup for Activity</p> <p>Synopsis: The teacher sets up a use-and-apply challenge in which students will use everything they've learned about landforms to explain whether they think cliffs along a coastline are changing.</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 they change quickly, and sometimes 	Ask questions to elicit student ideas and predictions.	<p>Show slide 9.</p> <p>Do you think we can use what we know about landforms to explain how landforms are changing right here where we live?</p> <p>Have you ever seen any evidence that the land is changing here in Pomona or nearby, even if the changes are kind of small?</p>	<p>Well, they have mudslides near here, right?</p> <p>They show that land</p>	<p>And how do you think the mudslides show that the land is changing?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
	they change very slowly. One of the processes that can change landforms is flowing water.	Summarize key science ideas.	<p>Show slide 10.</p> <p>Let's review the key science ideas we've been learning about this week:</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>NOTE TO TEACHER: <i>You might want</i></p>	<p>can break away from a hill or mountain and slide down to the bottom.</p> <p>Heavy rain could move the dirt and rocks and make them slide down the hills.</p>	<p>What do you think might cause the mudslides?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
		<p>Highlight key science ideas and focus question throughout.</p>	<p><i>to write these science ideas on the board or on chart paper for students to refer to throughout the lesson. For each idea, asks students, “What evidence did we find to support this idea?”</i></p> <p>Show slide 11.</p> <p>This picture shows some landforms we haven’t talked about yet. Can someone tell me what kind of landform this is? [<i>Point to the beach.</i>]</p> <p>ELL support: It might to review what landforms are, including bodies of water, and differentiate them from things people make and things that grow on the land. Encourage ELL students to refer to the landforms and descriptions posted on the word wall throughout this discussion.</p> <p>That’s right! The sandy area in the picture is called a <i>beach</i>. Beaches are landforms that are found near oceans, lakes, and rivers. They’re made of sand and other small pieces of soil and rock that water has washed away.</p> <p>Now what landform is this? [<i>Point to the cliff.</i>]</p>	<p>That’s a beach!</p> <p>That’s a cliff!</p>	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
		<p>Make explicit links between science ideas and activities before the activity.</p>	<p>How would you describe a cliff?</p> <p>That’s right! A cliff is a steep vertical or up-and-down slope that’s found along the coast by the ocean, in the mountains, or along rivers.</p> <p>The picture on this slide shows a line of cliffs by the coast because we can see the ocean and a beach, right?</p> <p>ELL support: Provide ELL students with visual references for the words <i>vertical</i> and <i>slope</i>.</p> <p>Today you’ll work with a partner to explain what you think is happening to the cliffs in this photo.</p> <p>NOTE TO TEACHER: <i>Divide the class into pairs and distribute handout 6.1 (Landform Challenge, Part 1) to each pair.</i></p>	<p>It’s a big drop-off!</p> <p>It’s a steep slope.</p>	<p>So would you say it’s a flat slope or a steep slope? <i>[Show the difference with hand gestures.]</i></p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
8 min	<p>Activity</p> <p>Synopsis: Using science ideas they've been learning about, students develop written explanations for whether they think cliffs along a coastline are changing, and if so, what is causing the changes.</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 they change quickly, and sometimes they change very slowly. One of the processes that can change landforms is flowing water. 	<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 slide 12.</p> <p>Let's begin our landform challenge! In this challenge, you and your partner will decide whether you think the cliffs in the photo are changing, and if so, what might be causing the changes.</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 why the cliffs in the picture look the way they do. Then answer the questions on the handout:</p> <ul style="list-style-type: none"> Do you think the cliffs are changing or staying the same? Why or why not? If changes are happening, what do you think is causing them? <p>When you and your partner have finished writing down your ideas and evidence, decide who will present them to the class.</p> <p>ELL support: Encourage ELL students 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>		

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>NOTE TO TEACHER: Give pairs about 6 minutes to discuss the questions on the handout and write down their ideas and evidence. Students can use their notes and handouts from previous lessons as resources for this challenge.</p>		
10 min	<p>Follow-Up to Activity</p> <p>Synopsis: Students share their ideas and evidence for solving the use-and-apply challenge, and the teacher records them 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 they change quickly, and sometimes they change very slowly. One of the processes that can change landforms is flowing water. 	<p>Engage students in making connections by synthesizing and summarizing key science ideas.</p> <p>Make explicit links between science ideas and activities after the activity.</p>	<p>Show slide 13.</p> <p>Now let’s hear how you solved our landform challenge. Let’s have a representative from each pair present your answers to the handout questions. As you share your ideas and evidence, I’ll record them on a 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 whether the cliffs are changing, and if so, what may be causing the changes.</p> <p>NOTE TO TEACHER: Record students’ ideas and evidence during the presentations on the data table you created in advance (“Let’s Share Our Ideas!”). (See Ahead of Time.) Write yes or no to indicate whether students think the cliffs are changing. Then include their reasons (under “Your Ideas”) and evidence (e.g., the sand on the beach looks like it came</p>		

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
		<p>Ask questions to probe student ideas and predictions.</p> <p>Ask questions to challenge student thinking.</p> <p>Engage students in communicating in scientific ways.</p>	<p><i>from the cliffs).</i></p> <p>So let's talk about the first question: <i>Do you think the cliffs are changing or staying the same? Why or why not? Who would like to share your ideas and evidence?</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>What do others think? Would you like to add anything?</p>	<p>We think the cliffs in the picture are changing because they look like they're crumbling and washing away.</p> <p>I think maybe the cliffs are falling and becoming part of the beach, because the sand is the same color as the cliffs.</p> <p>We think the cliffs are crumbling into the ocean.</p> <p>If they're made of sand and dry out,</p>	<p>Can you point to the part of the picture that shows the cliffs washing away? What do you mean by that?</p> <p>Why do you think the cliffs are crumbling?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>Now let's hear your ideas for answering the second question: <i>If changes are happening, what do you think is causing them?</i></p> <p>ELL support: Listen carefully to ELL students as they share their ideas and note any surprising statements or confusion. Ask probe questions to make their thinking visible.</p>	<p>they'll fall apart.</p> <p>We think that maybe water is causing the cliffs to change.</p> <p>Well, the cliffs are like a landslide.</p> <p>The land is breaking apart and falling to the beach.</p> <p>Rain? Or maybe the ocean.</p>	<p>Can you see that happening in the photo? Show me where.</p> <p>Say more about water. Why do you think it's causing the cliffs to change?</p> <p>How so?</p> <p>What do you think is causing the land to break apart?</p> <p>What about the ocean would cause the cliffs to break apart? What part of the ocean would touch the cliffs?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			<p>Does anyone else have any ideas about what might be causing the changes?</p> <p>Show slide 14.</p> <p>Now let’s see what we have on our data table so far.</p> <p>Most of us think the cliffs are changing because the sand on the beach looks like it came from the cliffs. We also think the cliffs may 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>Does everyone think that all of these explanations are possible based on our evidence?</p> <p>Does anyone disagree?</p>	<p>Maybe the waves can reach the cliffs at high tide?</p> <p>Yes!</p> <p>I still think the cliffs are drying out and crumbling, too.</p>	<p>What makes you</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
		Engage students in using and applying new science ideas in a variety of ways and contexts.	<p>Great thinking, everyone! It looks like we all agree that the cliffs are changing, and that several things might be causing these changes, such as ocean waves hitting the cliffs and the cliffs drying out and crumbling. We also think pieces of the cliffs might be breaking off and falling onto the beach, where they become part of the sand.</p> <p>Show slide 15.</p> <p>Do you think the cliffs will keep changing or stay the way they look right now? Why do you think so?</p>	<p>I think the waves will keep hitting the cliffs, and they'll keep falling into the ocean.</p> <p>The Colorado River keeps washing soil and rocks out of the Grand Canyon, so I think the ocean waves could keep washing away the</p>	<p>think that?</p> <p>Why do you think that might happen? Do you have any evidence?</p>

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
			Does anyone else have a different idea?	cliffs and piling sand on the beach. It might take a really long time. Maybe as long as it took the Mississippi River to make the delta.	How long do you think it might take until all the cliffs are washed away?
6 min	<p>Synthesize/Summarize Today's Lesson</p> <p>Synopsis: Students summarize why they think the cliffs along a coastline will stay the same or change over time.</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 	<p>Summarize key science ideas.</p> <p>Highlight key science ideas and focus question throughout.</p> <p>Engage students in making connections by</p>	<p>Show slide 16.</p> <p>Today we used the science ideas we've been learning about this week to explain whether we think the cliffs along the coast are changing and what might be causing those changes.</p> <p>Let's revisit our focus question, <i>Can we explain how landforms change in our area?</i></p> <p>Before we end our lesson, I'd like you to write an answer in your notebooks. Support your ideas with evidence from today's landform challenge.</p> <p>ELL support: Allow ELL students to talk</p>		

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
	<p>observable.</p> <ul style="list-style-type: none"> • There are many types of landforms that can differ from one place to another. In some places, landforms like mountains, hills, or plateaus rise above Earth’s surface. In other places, valleys and canyons cut into the surface. • Flowing water is one process that can change landforms by carrying rocks and soil from one place to another. 	<p>synthesizing and summarizing key science ideas.</p>	<p>about their ideas with a partner before writing them down. Encourage them to use the visual resources available to them, including the word wall.</p> <p>Whole-class share-out: Who would like to share your ideas?</p>		
1 min	<p>Link to Next Lesson</p> <p>Synopsis: The teacher announces that in the final lesson of the unit, students will predict and explain what will happen in another landform challenge.</p>		<p>Show slide 17.</p> <p>In our final lesson of this unit on Earth’s changing surface, we’ll use everything we’ve learned to predict and explain what will happen in another landform challenge.</p>		