



**Connecticut  
Alternate  
Science  
Assessment**

# Grade 11 Performance Tasks

## Earth Science

Storyline 1: Earth Systems

Storyline 2: Natural Resources





Connecticut  
Alternate  
Science  
Assessment

# Earth Science

## Storyline 1: Earth Systems

Grade 11 Performance Task





**Earth Science**

**Storyline 1: Earth Systems  
Grade 11 Performance Task**

**Guiding Questions:** How does energy from the sun influence climates on Earth? How does water affect the land?

<b>Grade 11</b>			
<b>NGSS Learning Progressions</b>	<b>NGSS Standard Performance Expectations</b>	<b>Connecticut Alternate Science Essence Statements</b>	<b>Core Extensions</b>
ESS2.D Weather and Climate	HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth’s systems results in change in climate.	CTAS-HS-ESS2-4 Use a model to describe how the sun’s energy and its distribution on Earth influence climate.	<ol style="list-style-type: none"> <li>1. Using a model, describe the sun’s warming effect on the Earth. (CTAS-HS-ESS2-4)</li> <li>2. Use a model to describe the cause-and-effect relationship between the sun and the climate in different areas on the Earth (i.e., polar regions vs. regions near the equator). (CTAS-HS-ESS2-4)</li> </ol>
ESS2.C The Roles of Water in Earth’s Surface Processes	HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	CTAS-HS-ESS2-5 Use the results of an investigation to show the effects of flowing water (erosion) and freezing water (mechanical weathering) on the Earth’s surface.	<ol style="list-style-type: none"> <li>3. Given a model, describe the cause and effect relationship between the amount of energy from the sun and the seasons on Earth. (CTAS-HS-ESS2-4)</li> <li>4. Make an observation of change to Earth materials after water has flowed through. (CTAS-HS-ESS2-5)</li> <li>5. Using the results of an investigation, make an observation and use data to draw a conclusion about how flowing water affects Earth materials. (CTAS-HS-ESS2-5)</li> <li>6. From an investigation, identify the independent variable (the variable purposely changed) and a variable that was held constant. (CTAS-HS-ESS2-5)</li> </ol>



**Grade 11**

<b>Grade 11</b>			
<b>NGSS Learning Progressions</b>	<b>NGSS Standard Performance Expectations</b>	<b>Connecticut Alternate Science Essence Statements</b>	<b>Core Extensions</b>
			7. Based on observations, make a claim about the relationship between water temperature and the physical change of an object (e.g., water freezing in cracks causes rocks to break into pieces or leads to potholes in roads). (CTAS-HS-ESS2-5)
Appropriate Vocabulary	Cause-and-effect relationships, independent variable, constant, physical change, climate, stream table, tilt, direct, equator, depth, width, sun, rain, wind, snow, ice, warmer, daytime, nighttime, melt, pothole, energy, North America, winter, summer, water flow, precipitation, temperature		



**Earth Science**  
**Storyline 1: Earth Systems**  
**Grade 11 Performance Task**

General Overview:

The sun affects people on Earth daily. It is the major source of our heat and light. Changes in Earth’s position relative to the sun affects the amount of daylight we experience and the temperature of the air around us. The movement of water on Earth constantly changes the Earth materials we have, including soil, rocks, streams, and even our roads! Students will explore some of the ways that water affects the materials around us.

List of Materials Needed:

*Teacher-Provided Resources:*

**ACTIVITY 4**

Use Activity 4 Resource 1: Teacher Directions for Stream Table Setup Diagram to set up the investigation prior to the administration of this activity. **Teacher must set up and test the investigation prior to introducing the investigation to the student.** Teacher-Provided Resources include:

- Desk/Table
- 2 Shallow Pans (e.g., Cookie Sheet, Plastic Tub)
- 1 Textbook
- Sand
- Rocks
- Pebbles
- Three Equal Bottles or Cups of Water

*Instructions for Preparing Materials:*

Teachers must collect all relevant materials prior to the administration of each activity. The Card, Sentence Strip, and Strip Resources will need to be cut out. Resources are listed according to the Resource Identifier, which appears on the back of each Resource. The Resources needed for the administration of each activity are listed according to these Resource Identifiers in the Teacher Notes section of each activity.

*List of Resources:*

- Activity 1 Resource 1a: Day Poster
- Activity 1 Resource 1b: Night Poster
- Activity 1 Resource 2: Cards 2a – 2c
  - Card 2a – rain
  - Card 2b – sun
  - Card 2c – wind
- Activity 2 Resource 1: North America in Winter Poster

- Activity 2 Resource 2: Cards 2a – 2c
  - Card 2a – Place 1
  - Card 2b – Place 2
  - Card 2c – Place 3
- Activity 3 Resource 1: North America in Summer Poster
- Activity 3 Resource 2: North America in Winter Poster
- Activity 3 Resource 3: Card 3a and Card 3b
  - Card 3a – summer
  - Card 3b – winter
- Activity 3 Resource 4: Sentence Strips 4a – 4c
  - Sentence Strip 4a – sun closer to Earth
  - Sentence Strip 4b – North America more direct sunlight
  - Sentence Strip 4c – equator closer to Connecticut
- Activity 4 Resource 1a: Teacher Directions for Stream Table Setup Diagram 1
- Activity 4 Resource 1b: Side-View of the Stream Table Setup Diagram 2
- Activity 4 Resource 2: Cards 2a – 2c
  - Card 2a – sand
  - Card 2b – pebbles
  - Card 2c – rocks
- Activity 4 Resource 3: Cards 3a – 3c
  - Card 3a – top
  - Card 3b – side
  - Card 3c – bottom
- Activity 5 Resource 1: Slow Flow of Water in Stream Table Poster
- Activity 5 Resource 2: Fast Flow of Water in Stream Table Poster
- Activity 5 Resource 3: Cards 3a – 3c
  - Card 3a – wider
  - Card 3b – thinner
  - Card 3c – the same
- Activity 5 Resource 4: Stream Table Data Table Poster
- Activity 5 Resource 5: Sentence Strips 5a – 5c
  - Sentence Strip 5a – width
  - Sentence Strip 5b – depth
  - Sentence Strip 5c – temperature
- Activity 6 Resource 1: Slow Flow of Water in Stream Table Poster
- Activity 6 Resource 2: Fast Flow of Water in Stream Table Poster
- Activity 6 Resource 3: Independent Variable and Constant Poster
- Activity 6 Resource 4: Strips 4a – 4c
  - Strip 4a – amount
  - Strip 4b – speed
  - Strip 4c – width



- Activity 7 Resource 1a: Pothole Before Winter Poster
- Activity 7 Resource 1b: Pothole After Winter Poster
- Activity 7 Resource 2: Pothole Data Table Poster
- Activity 7 Resource 3: Sentence Strips 3a – 3c
  - Sentence Strip 3a – bigger
  - Sentence Strip 3b – smaller
  - Sentence Strip 3c – same
- Activity 7 Resource 4: Sentence Strips 4a – 4c
  - Sentence Strip 4a – snow
  - Sentence Strip 4b – ice
  - Sentence Strip 4c – rain

## ACTIVITY 1

**Essence Statement:** CTAS-HS-ESS2-4 Use a model to describe how the sun’s energy and its distribution on Earth influence climate.

**Core Extension 1:** Using a model, describe the sun’s warming effect on the Earth. (CTAS-HS-ESS2-4)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1a: Day Poster
- Activity 1 Resource 1b: Night Poster
- Activity 1 Resource 2: Cards 2a – 2c
  - Card 2a – rain
  - Card 2b – sun
  - Card 2c – wind

*Prior to the administration of this activity, teacher may cut apart Resource 1a: Day Poster and Resource 1b: Night Poster.*

### Steps to Follow:

1. **SAY** “In this activity, we are going to talk about the differences between day and night.”

2. Display Resource 1a: Day Poster for the student.

3. Indicate Resource 1a.

**SAY** “This is a picture of an ice cream cone during the daytime. At noon, the temperature is 95 degrees (*indicate thermometer*). The ice cream melts quickly at noon.”

4. Display Resource 1b: Night Poster for the student.

5. Indicate Resource 1b.

**SAY** “This is another picture of an ice cream cone during the nighttime. At 8 o’clock at night, the temperature is 70 degrees (*indicate thermometer*). The ice cream melts slowly at 8 o’clock at night.”

6. **ASK** “When is it warmer? In the daytime (*indicate Resource 1a*) or in the nighttime (*indicate Resource 1b*)?”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

8. Indicate Resource 1a.

**SAY** “It is warmer during the daytime.”

9. 

<b>ASK</b>	“Why is it warmer during the daytime?”
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10. Provide Resource 2: Cards 2a – 2c to the student. Indicate and describe each Card.
- a. Indicate Card 2a.
- |            |                                      |
|------------|--------------------------------------|
| <b>SAY</b> | “because there is more <b>rain</b> ” |
|------------|--------------------------------------|
- b. Indicate Card 2b.
- |            |                                     |
|------------|-------------------------------------|
| <b>SAY</b> | “because there is more <b>sun</b> ” |
|------------|-------------------------------------|
- c. Indicate Card 2c.
- |            |                                      |
|------------|--------------------------------------|
| <b>SAY</b> | “because there is more <b>wind</b> ” |
|------------|--------------------------------------|
11. 

<b>ASK AGAIN</b>	“Why is it warmer during the daytime?”
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12. 

Allow student to respond and record response.
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13. Indicate Card 2b.
- |            |  |
|------------|--|
| <b>SAY</b> | “It is warmer during the daytime because there is more <b>sun.</b> ” |
|------------|--|
14. 

<b>SAY</b>	“We are now finished with this activity.”
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### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, indicate Resource 1a.

<b>SAY</b>	"It is warmer during the daytime."
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2. **ASK** "Why is it warmer during the daytime?"

3. Provide Resource 2: Cards 2a – 2c to the student. Indicate and describe each Card.

- a. Indicate Card 2a.

<b>SAY</b>	"because there is more <b>rain</b> "
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- b. Indicate Card 2b.

<b>SAY</b>	"because there is more <b>sun</b> "
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- c. Indicate Card 2c.

<b>SAY</b>	"because there is more <b>wind</b> "
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4. **ASK** "Why is it warmer during the daytime?"

**AGAIN**

5. Allow student to respond and record response.

6. Indicate Card 2b.

<b>SAY</b>	"It is warmer during the daytime because there is more <b>sun</b> ."
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7. **SAY** "We are now finished with this activity."

#### Correct answers are as follows:

1. When is it warmer? In the daytime or in the nighttime?
  - a. Resource 1a – It is warmer during the daytime.
2. Why is it warmer during the daytime?
  - a. Card 2b – sun



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that it is warmer during the daytime (Resource 1a); <b>and</b></li><li>is unable to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li>is able to identify that it is warmer during the daytime (Resource 1a); <b>and</b></li><li>is unable to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that it is warmer during the daytime (Resource 1a); <b>and</b></li><li><b>after scaffolding</b>, is able to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to identify that it is warmer during the daytime (Resource 1a); <b>and</b></li><li>is able to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 2

**Essence Statement:** CTAS-HS-ESS2-4 Use a model to describe how the sun’s energy and its distribution on Earth influence climate.

**Core Extension 2:** Use a model to describe the cause-and-effect relationship between the sun and the climate in different areas on the Earth (i.e., polar regions vs. regions near the equator). (CTAS-HS-ESS2-4)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: North America in Winter Poster
- Activity 2 Resource 2: Cards 2a – 2c
  - Card 2a – Place 1
  - Card 2b – Place 2
  - Card 2c – Place 3

### Steps to Follow:

1. **SAY** “In this activity, we are going to use a model to describe the cause-and-effect relationship between the sun and the climate in different areas on the Earth.”

2. Display Resource 1: North America in Winter Poster for the student.

3. Indicate Resource 1.

**SAY** “This is a model of Earth (*indicate the Earth*). North America is tilted away from the sun during the winter. This is the equator (*indicate the equator*). It is hot at the equator because the equator gets the most direct light from the sun. Here are three numbered places (*indicate 1, 2, and 3*).”

4. **ASK** “Which place will have the most amount of daylight during the winter?”

5. Provide Resource 2: Cards 2a – 2c to the student. Indicate and read each Card.

a. Indicate Card 2a.

**SAY** “Place 1”

b. Indicate Card 2b.

**SAY** “Place 2”

c. Indicate Card 2c.

**SAY** “Place 3”

6. **ASK AGAIN** “Which place will have the most amount of daylight during the winter?”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. Indicate Card 2c.
- |            |  |
|------------|--|
| <b>SAY</b> | “Place 3 is the area that will have the most amount of daylight during the winter because it is near the equator.” |
|------------|--|
9. **ASK** “Which place will have the coldest temperatures during the winter?”
10. Provide remaining Resource 2a: Card 2a and Card 2b to the student. Indicate and read each remaining Card.
- a. Indicate Card 2a.
- |            |           |
|------------|-----------|
| <b>SAY</b> | “Place 1” |
|------------|-----------|
- b. Indicate Card 2b.
- |            |           |
|------------|-----------|
| <b>SAY</b> | “Place 2” |
|------------|-----------|
11. **ASK AGAIN** “Which place will have the coldest temperatures during the winter?”
12. Allow student to respond and record response.
13. Indicate Card 2a.
- |            |   |
|------------|---|
| <b>SAY</b> | “Place 1 will have the coldest temperatures during the winter because it receives the least direct light from the sun.” |
|------------|---|
14. **SAY** “We are now finished with this activity.”



## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 2c.

<b>SAY</b>	“Place 3 is the area that will have the most amount of daylight during the winter because it is near the equator.”
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2. **ASK** “Which place will have the coldest temperatures during the winter?”

3. Provide remaining Resource 2a: Card 2a and Card 2b to the student. Indicate and read each remaining Card.

- a. Indicate Card 2a.

<b>SAY</b>	“Place 1”
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- b. Indicate Card 2b.

<b>SAY</b>	“Place 2”
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4. **ASK AGAIN** “Which place will have the coldest temperatures during the winter?”

5. Allow student to respond and record response.

6. Indicate Card 2a.

<b>SAY</b>	“Place 1 will have the coldest temperatures during the winter because it receives the least direct light from the sun.”
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7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. Which area will have the most amount of daylight during the winter?
  - a. Card 2c – Place 3
2. Which area will have the coldest temperatures during the winter?
  - a. Card 2a – Place 1





Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify Place 3 (Card 2c) as the area that will have the most amount of daylight during the winter; <b>and</b></li><li>is unable to identify Place 1 (Card 2a) as the area that will have the coldest temperatures during the winter.</li></ul>	<p>The student <b>does not</b> demonstrate understanding.</p>	0
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify Place 3 (Card 2c) as the area that will have the most amount of daylight during the winter; <b>and</b></li><li>is unable to identify Place 1 (Card 2a) as the area that will have the coldest temperatures during the winter.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify Place 3 (Card 2c) as the area that will have the most amount of daylight during the winter; <b>and</b></li><li><b>after scaffolding</b>, is able to identify Place 1 (Card 2a) as the area that will have the coldest temperatures during the winter.</li></ul>	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	1
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify Place 3 (Card 2c) as the area that will have the most amount of daylight during the winter; <b>and</b></li><li>is able to identify Place 1 (Card 2a) as the area that will have the coldest temperatures during the winter.</li></ul>	<p>The student demonstrates understanding independently without scaffolding.</p>	2

### ACTIVITY 3

**Essence Statement:** CTAS-HS-ESS2-4 Use a model to describe how the sun’s energy and its distribution on Earth influence climate.

**Core Extension 3:** Given a model, describe the cause and effect relationship between the amount of energy from the sun and the seasons on Earth. (CTAS-HS-ESS2-4)

**Teacher Notes:**

Collect the following resources for this activity:

- Activity 3 Resource 1: North America in Summer Poster
- Activity 3 Resource 2: North America in Winter Poster
- Activity 3 Resource 3: Card 3a and Card 3b
  - Card 3a – summer
  - Card 3b – winter
- Activity 3 Resource 4: Sentence Strips 4a – 4c
  - Sentence Strip 4a – sun closer to Earth
  - Sentence Strip 4b – North America more direct sunlight
  - Sentence Strip 4c – equator closer to Connecticut

**Steps to Follow:**

1. 

<b>SAY</b>	“In this activity, we are going to talk about the cause-and-effect relationship between the amount of energy from the sun and the seasons on Earth.”
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2. Display Resource 1: North America in Summer Poster for the student.
3. Indicate Resource 1.
 

<b>SAY</b>	“The position of the sun in the sky is different in the summer and in the winter. During the summer, North America is tilted toward the sun. Connecticut is marked with the red X ( <i>indicate red X</i> ).”
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4. Display North America in Winter Poster for the student next to Resource 1.
5. Indicate Resource 2.
 

<b>SAY</b>	“This is North America in the winter. During the winter, North America is tilted away from the sun. Connecticut is marked with the red X ( <i>indicate red X</i> ).”
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6. 

<b>ASK</b>	“During which season will Connecticut receive the most heat energy from the sun?”
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7. Provide Resource 3: Card 3a and Card 3b to the student. Indicate and read each Card.
  - a. Indicate Card 3a.
 

<b>SAY</b>	“summer”
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  - b. Indicate Card 3b.
 

<b>SAY</b>	“winter”
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8. **ASK AGAIN** “During which season will Connecticut receive the most heat energy from the sun?”

9. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

10. Indicate Card 3a.

**SAY** “Connecticut will receive the most heat energy from the sun during the **summer.**”

11. **ASK** “Why does Connecticut receive the most heat energy from the sun during the summer?”

12. Provide Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 4a.

**SAY** “The sun is closer to the Earth during the summer.”

b. Indicate Sentence Strip 4b.

**SAY** “North America gets more direct sunlight during the summer.”

c. Indicate Sentence Strip 4c.

**SAY** “The equator moves closer to Connecticut during the summer.”

13. **ASK AGAIN** “Why does Connecticut receive the most heat energy from the sun during the summer?”

14. Allow student to respond and record response.

15. Indicate Sentence Strip 4b.

**SAY** “Connecticut receives the most heat energy from the sun during the summer because North America gets more direct sunlight during the summer.”

16. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 3a.

<b>SAY</b>	“Connecticut will receive the most heat energy from the sun during the summer.”
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2. **ASK** “Why does Connecticut receive the most heat energy from the sun during the summer?”

3. Provide Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.

- a. Indicate Sentence Strip 4a.

<b>SAY</b>	“The sun is closer to the Earth during the summer.”
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- b. Indicate Sentence Strip 4b.

<b>SAY</b>	“North America gets more direct sunlight during the summer.”
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- c. Indicate Sentence Strip 4c.

<b>SAY</b>	“The equator moves closer to Connecticut during the summer.”
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4. **ASK AGAIN** “Why does Connecticut receive the most heat energy from the sun during the summer?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 4b.

<b>SAY</b>	“Connecticut receives the most heat energy from the sun during the summer because North America gets more direct sunlight during the summer.”
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7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. During which season will Connecticut receive the most heat energy from the sun?
  - a. Card 3a – summer
2. Why does Connecticut receive the most heat energy from the sun during the summer?
  - a. Sentence Strip 4b – North America gets more direct sunlight during the summer.



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); <b>and</b></li><li>is unable to identify that Connecticut receives more heat energy from the sun during the summer because North America gets more direct sunlight during the summer (Sentence Strip 4b).</li></ul>	<p>The student <b>does not</b> demonstrate understanding.</p>	0
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); <b>and</b></li><li>is unable to identify that Connecticut receives more heat energy from the sun during the summer because North America gets more direct sunlight during the summer (Sentence Strip 4b).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); <b>and</b></li><li><b>after scaffolding</b>, is able to identify that Connecticut receives more heat energy from the sun during the summer because North America gets more direct sunlight during the summer (Sentence Strip 4b).</li></ul>	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	1
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); <b>and</b></li><li>is able to identify that Connecticut receives more heat energy from the sun during the summer because North America gets more direct sunlight during the summer (Sentence Strip 4b).</li></ul>	<p>The student demonstrates understanding independently without scaffolding.</p>	2

## ACTIVITY 4

**Essence Statement:** CTAS-HS-ESS2-5 Use the results of an investigation to show the effects of flowing water (erosion) and freezing water (mechanical weathering) on the Earth’s surface.

**Core Extension 4:** Make an observation of change to Earth materials after water has flowed through. (CTAS-HS-ESS2-5)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1a: Teacher Directions for Stream Table Setup Diagram 1
- Activity 4 Resource 1b: Side-View of the Stream Table Setup Diagram 2
- Activity 4 Resource 2: Cards 2a – 2c
  - Card 2a – sand
  - Card 2b – pebbles
  - Card 2c – rocks
- Activity 4 Resource 3: Cards 3a – 3c
  - Card 3a – top
  - Card 3b – side
  - Card 3c – bottom

### Teacher-Provided Resources:

Use Resource 1a and Resource 1b: Teacher Directions for Stream Table Setup Diagram to set up the investigation prior to the administration of this activity. **Teacher must set up and test the investigation prior to introducing the investigation to the student.** Teacher-Provided Resources include:

- Desk/Table
- 2 Shallow Pans (e.g., Cookie Sheet, Plastic Tub)
- 1 Textbook
- Sand
- Rocks
- Pebbles
- 3 Equal Bottles or Cups of Water

### Steps to Follow:

1. **SAY** “In this activity, we are going to use a stream table to see how Earth materials change after water has flowed through.”

2. Display the prepared stream table for the student.

3. Indicate the stream table.

**SAY** “This is a pan (*indicate the pan*). This pan represents a part of a stream that is flowing downhill. Here are three piles of Earth materials that are found in streams (*indicate different piles*): rocks, pebbles, and sand. The water in these bottles represent the water in the stream (*indicate each bottle of water*). Watch what happens when water is poured out on each material.”

4. Using a different water bottle for each pile of material, squeeze out the water with the same amount of pressure above each pile of material. Slowly pour contents of each bottle over each material, making sure the sand pile has enough of a water flow to move.

5. Indicate the stream table.

<b>SAY</b>	“The water represents the water in a stream as it moves along, hitting these materials.”
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6. **ASK** “Which of these materials was affected the most by the flowing water in the stream?”

7. Provide Resource 2: Cards 2a – 2c to the student. Indicate and read each Card.

a. Indicate Card 2a.

<b>SAY</b>	“sand”
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b. Indicate Card 2b.

<b>SAY</b>	pebbles
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c. Indicate Card 2c.

<b>SAY</b>	“rocks”
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8. **ASK AGAIN** “Which of these materials was affected the most by the flowing water in the stream?”

9. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

10. Indicate Card 2a.

<b>SAY</b>	“The <b>sand</b> was most affected by the flow of water in the stream.”
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11. **ASK** “How did the water affect the sand?”

12. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

a. Indicate Card 3a.

<b>SAY</b>	“Sand moved towards the <b>top</b> .”
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b. Indicate Card 3b.

<b>SAY</b>	“All of the sand <b>stayed in place</b> .”
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c. Indicate Card 3c.

<b>SAY</b>	“Sand moved towards the <b>bottom.</b> ”
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13. **ASK  
AGAIN** “How did the water affect the sand?”

14. Allow student to respond and record response.

15. Indicate Card 3c.

<b>SAY</b>	“Sand moved towards the <b>bottom.</b> ”
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16. **SAY** “We are now finished with this activity.”



## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 2a.

<b>SAY</b>	"The <b>sand</b> was most affected by the flow of water in the stream."
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2. **ASK** "How did the water affect the sand?"

3. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

- a. Indicate Card 3a.

<b>SAY</b>	"Sand moved towards the <b>top</b> ."
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- b. Indicate Card 3b.

<b>SAY</b>	"All of the sand <b>stayed in place</b> ."
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- c. Indicate Card 3c.

<b>SAY</b>	"Sand moved towards the <b>bottom</b> ."
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4. **ASK** "How did the water affect the sand?"

<b>AGAIN</b>	
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5. Allow student to respond and record response.

6. Indicate Card 3c.

<b>SAY</b>	"Sand moved towards the <b>bottom</b> ."
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7. **SAY** "We are now finished with this activity."

### Correct answers are as follows:

1. Which of these materials was affected the most by the flowing water in the stream?
  - a. Card 2a – sand
2. How did the water affect the sand?
  - a. Card 3c – Sand moved towards the **bottom**.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that the sand (Card 2a) was most affected by the flow of water in the stream; <b>and</b></li><li>is unable to identify that sand moved towards the bottom (Card 3c).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li>is able to identify that the sand (Card 2a) was most affected by the flow of water in the stream; <b>and</b></li><li>is unable to identify that sand moved towards the bottom (Card 3c).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that the sand (Card 2a) was most affected by the flow of water in the stream; <b>and</b></li><li><b>after scaffolding</b>, is able to identify that sand moved towards the bottom (Card 3c).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to identify that the sand (Card 2a) was most affected by the flow of water in the stream; <b>and</b></li><li>is able to identify that sand moved towards the bottom (Card 3c).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 5

**Essence Statement:** CTAS-HS-ESS2-5 Use the results of an investigation to show the effects of flowing water (erosion) and freezing water (mechanical weathering) on the Earth’s surface.

**Core Extension 5:** Using the results of an investigation, make an observation and use data to draw a conclusion about how flowing water affects Earth materials. (CTAS-HS-ESS2-5)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Slow Flow of Water in Stream Table Poster
- Activity 5 Resource 2: Fast Flow of Water in Stream Table Poster
- Activity 5 Resource 3: Cards 3a – 3c
  - Card 3a – wider
  - Card 3b – thinner
  - Card 3c – the same
- Activity 5 Resource 4: Stream Table Data Table Poster
- Activity 5 Resource 5: Sentence Strips 5a – 5c
  - Sentence Strip 5a – width
  - Sentence Strip 5b – depth
  - Sentence Strip 5c – temperature

### Steps to Follow:

1. **SAY** “A stream table is a model of a real stream. In this activity, we are going to use models of a stream table to see how the flow of water affects Earth’s materials.”

2. Display Resource 1: Slow Flow of Water in Stream Table Poster for the student.

3. Indicate Resource 1.

**SAY** “This picture shows what a stream looks like with a slow flow of water.”

4. Display Resource 2: Fast Flow of Water in Stream Table Poster for the student.

5. Indicate Resource 2.

**SAY** “This picture shows what a stream looks like with a fast flow of water.”

6. **ASK** “How has the stream changed from the first picture (*indicate Resource 1*) to the second picture (*indicate Resource 2*)? Has the stream become wider, thinner, or stayed the same?”

7. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

a. Indicate Card 3a.

**SAY** “wider”

b. Indicate Card 3b.

<b>SAY</b>	“thinner”
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c. Indicate Card 3c.

<b>SAY</b>	“the same”
------------	------------

8. **ASK AGAIN** “Has the stream become wider, thinner, or stayed the same?”

9. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

10. Indicate Card 3a.

<b>SAY</b>	“The stream has become <b>wider</b> .”
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11. Display Resource 4: Stream Table Data Table Poster for the student.

12. Indicate Resource 4.

<b>SAY</b>	“A student conducted an investigation and measured characteristics of the same stream before and after the fast flow of water. The student recorded their data in this data table titled ‘ <b>Stream Table Data</b> ’ ( <i>indicate Resource 4</i> ). This data table includes ‘ <b>Characteristics</b> ’ of the same stream ( <i>indicate ‘Characteristics’ column</i> ) ‘ <b>Before</b> ’ the fast flow of water ( <i>indicate ‘Before’ column</i> ) and ‘ <b>After</b> ’ the fast flow of water ( <i>indicate ‘After’ column</i> ). The width of the stream before was one inch and after was three inches ( <i>indicate first row of data</i> ). The depth of the stream before was two inches and after was three inches ( <i>indicate second row of data</i> ). The temperature of the stream before was 73 degrees and after was 70 degrees ( <i>indicate third row of data</i> ).”
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13. **ASK** “Based on the results of this investigation, which statement describes how the stream has changed?”

14. Provide Resource 5: Sentence Strips 5a – 5c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 5a.

<b>SAY</b>	“The width of the stream increased.”
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b. Indicate Sentence Strip 5b.

<b>SAY</b>	“The depth of the stream decreased.”
------------	--------------------------------------

c. Indicate Sentence Strip 5c.

<b>SAY</b>	“The temperature of the stream stayed the same.”
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15. **ASK AGAIN** “Based on the results of this investigation, which statement describes how the stream has changed?”

16. Allow student to respond and record response.

17. Indicate Sentence Strip 5a.

**SAY** “The width of the stream increased.”

18. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 3a.

<b>SAY</b>	"The stream has become <b>wider</b> ."
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2. Display Resource 4: Stream Table Data Table Poster for the student.

3. Indicate Resource 4.

<b>SAY</b>	"A student conducted an investigation and measured characteristics of the same stream before and after the fast flow of water. The student recorded their data in this data table titled ' <b>Stream Table Data</b> ' ( <i>indicate Resource 4</i> ). This data table includes ' <b>Characteristics</b> ' of the same stream ( <i>indicate '<b>Characteristics</b>' column</i> ) ' <b>Before</b> ' the fast flow of water ( <i>indicate '<b>Before</b>' column</i> ) and ' <b>After</b> ' the fast flow of water ( <i>indicate '<b>After</b>' column</i> ). The width of the stream before was one inch and after was three inches ( <i>indicate first row of data</i> ). The depth of the stream before was two inches and after was three inches ( <i>indicate second row of data</i> ). The temperature of the stream before was 73 degrees and after was 70 degrees ( <i>indicate third row of data</i> )."
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4. **ASK** "Based on the results of this investigation, which statement describes how the stream has changed?"

5. Provide Resource 5: Sentence Strips 5a – 5c to the student. Indicate and read each Sentence Strip.

- a. Indicate Sentence Strip 5a.

<b>SAY</b>	"The width of the stream increased."
------------	--------------------------------------

- b. Indicate Sentence Strip 5b.

<b>SAY</b>	"The depth of the stream decreased."
------------	--------------------------------------

- c. Indicate Sentence Strip 5c.

<b>SAY</b>	"The temperature of the stream stayed the same."
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6. **ASK AGAIN** "Based on the results of this investigation, which statement describes how the stream has changed?"

7. Allow student to respond and record response.

8. Indicate Sentence Strip 5a.

<b>SAY</b>	"The width of the stream increased."
------------	--------------------------------------

9. **SAY** "We are now finished with this activity."

**Correct answers are as follows:**

1. How has the stream changed from the first picture to the second picture?
  - a. Card 3a – wider
2. Based on the results of this investigation, which statement describes how the stream has changed?
  - a. Sentence Strip 5a – The width of the stream increased.

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> <li>• gives NO response.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; <b>and</b></li> <li>• is unable to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a).</li> </ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"> <li>• is able to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; <b>and</b></li> <li>• is unable to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a).</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; <b>and</b></li> <li>• <b>after scaffolding</b>, is able to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a).</li> </ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> <li>• is able to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; <b>and</b></li> <li>• is able to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a).</li> </ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 6

**Essence Statement:** CTAS-HS-ESS2-5 Use the results of an investigation to show the effects of flowing water (erosion) and freezing water (mechanical weathering) on the Earth’s surface.

**Core Extension 6:** From an investigation, identify the independent variable (the variable purposely changed) and a variable that was held constant. (CTAS-HS-ESS2-5)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 6 Resource 1: *Use Activity 5 Resource 1: Slow Flow of Water in Stream Table Poster*
- Activity 6 Resource 2: *Use Activity 5 Resource 1: Fast Flow of Water in Stream Table Poster*
- Activity 6 Resource 3: Independent Variable and Constant Poster
- Activity 6 Resource 4: Strips 4a – 4c
  - Strip 4a – amount
  - Strip 4b – speed
  - Strip 4c – width

### Steps to Follow:

1. 

<b>SAY</b>	“In this activity, we are going to look at the stream table investigation again to identify the independent variable and the constant.”
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2. Display Resource 1: Slow Flow of Water in Stream Table Poster for the student.
3. Indicate Resource 1.
 

<b>SAY</b>	“This is the stream table with slow flowing water.”
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4. Display Resource 2: Fast Flow of Water in Stream Table Poster for the student.
5. Indicate Resource 2.
 

<b>SAY</b>	“This is the stream table with fast flowing water.”
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6. 

<b>SAY</b>	“In a scientific investigation, the variable being tested is changed on purpose. This is also called the independent variable. Other variables that are not being tested should be held constant or remain the same. This makes for a fair test.”
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7. Display Resource 3: Independent Variable and Constant Poster for the student.
8. Indicate Resource 3.
 

<b>SAY</b>	“These are the boxes for the parts of the stream table investigation. The top box says, ‘ <b>Independent Variable</b> ’. This is what ‘ <b>changed</b> ’ on purpose in the investigation ( <i>indicate top box</i> ). The bottom box says ‘ <b>Constant</b> ’. This is what ‘ <b>remained the same</b> ’ ( <i>indicate bottom box</i> ).”
------------	---
9. 

<b>ASK</b>	“Which of variable in the investigation should be placed in the ‘ <b>Independent Variable</b> ’ box?”
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10. Provide Resource 4: Strips 4a – 4c to the student. Indicate and read each Strip.

a. Indicate Strip 4a.

<b>SAY</b>	“amount of sand in the table”
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b. Indicate Strip 4b.

<b>SAY</b>	“speed of water flow”
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c. Indicate Strip 4c.

<b>SAY</b>	“the width of the stream”
------------	---------------------------

11. **ASK AGAIN** “Which of variable in the investigation should be placed in the ‘**Independent Variable**’ box?”

12. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

13. Indicate Strip 4b and Resource 3.

<b>SAY</b>	“The speed of water flow is the independent variable, or what was changed on purpose. Let’s place Strip 4b in the ‘ <b>Independent Variable</b> ’ box.”
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14. *Assist the student in placing Strip 4b in the ‘**Independent Variable**’ box if necessary.*

15. **ASK** “Which variable in investigation should be placed in the ‘**Constant**’ box?”

16. Provide remaining Resource 4: Strip 4a and Strip 4c to the student. Indicate and read each remaining Strip.

a. Indicate Strip 4a.

<b>SAY</b>	“amount of sand in the table”
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b. Indicate Strip 4c.

<b>SAY</b>	“the width of the stream”
------------	---------------------------

17. **ASK AGAIN** “Which variable in investigation should be placed in the ‘**Constant**’ box?”

18. Allow student to respond and record response.

19. Indicate Strip 4a and Resource 3.

<b>SAY</b>	“The amount of sand in the table is the constant, or what remained the same. Let’s place Strip 4a in the ‘ <b>Constant</b> ’ box.”
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20. *Assist the student in placing Strip 4a in the ‘**Constant**’ box if necessary.*

21. **SAY** “We are now finished with this activity.”

### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, indicate Strip 4b and Resource 3.

**SAY** “The speed of water flow is the independent variable, or what was changed on purpose. Let’s place Strip 4b in the ‘**Independent Variable**’ box.”

2. *Assist the student in placing Strip 4b in the ‘**Independent Variable**’ box if necessary.*

3. **ASK** “Which variable in investigation should be placed in the ‘**Constant**’ box?”

4. Provide remaining Resource 4: Strip 4a and Strip 4c to the student. Indicate and read each remaining Strip.

- a. Indicate Strip 4a.

**SAY** “amount of sand in the table”

- b. Indicate Strip 4c.

**SAY** “the width of the stream”

5. **ASK AGAIN** “Which variable in investigation should be placed in the ‘**Constant**’ box?”

6. Allow student to respond and record response.

7. Indicate Strip 4a and Resource 3.

**SAY** “The amount of sand in the table is the constant, or what remained the same. Let’s place Strip 4a in the ‘**Constant**’ box.”

8. *Assist the student in placing Strip 4a in the ‘**Constant**’ box if necessary.*

9. **SAY** “We are now finished with this activity.”

#### Correct answers are as follows:

1. Which of part of the investigation should be placed in the ‘**Independent Variable**’ box?
  - a. Strip 4b – speed of water flow
2. Which of part of the investigation should be placed in the ‘**Constant**’ box?
  - a. Strip 4a – amount of sand in the table



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the independent variable (Strip 4b); <b>and</b></li><li>is unable to identify the constant (Strip 4a).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li>is able to identify the independent variable (Strip 4b); <b>and</b></li><li>is unable to identify the constant (Strip 4a).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the independent variable (Strip 4b); <b>and</b></li><li><b>after scaffolding</b>, is able to identify the constant (Strip 4a).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to identify the independent variable (Strip 4b); <b>and</b></li><li>is able to identify the constant (Strip 4a).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 7

**Essence Statement:** CTAS-HS-ESS2-5 Use the results of an investigation to show the effects of flowing water (erosion) and freezing water (mechanical weathering) on the Earth’s surface.

**Core Extension 7:** Based on observations, make a claim about the relationship between water temperature and the physical change of an object (e.g., water freezing in cracks causes rocks to break into pieces or leads to potholes in roads). (CTAS-HS-ESS2-5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 7 Resource 1a: Pothole Before Winter Poster
- Activity 7 Resource 1b: Pothole After Winter Poster
- Activity 7 Resource 2: Pothole Data Table Poster
- Activity 7 Resource 3: Sentence Strips 3a – 3c
  - Sentence Strip 3a – bigger
  - Sentence Strip 3b – smaller
  - Sentence Strip 3c – same
- Activity 7 Resource 4: Sentence Strips 4a – 4c
  - Sentence Strip 4a – snow
  - Sentence Strip 4b – ice
  - Sentence Strip 4c – rain

**Steps to Follow:**

1. **SAY** “In this activity, we are going to talk about the size of a pothole before and after winter.”

2. Display Resource 1a: Pothole Before Winter Poster for the student.

3. Indicate Resource 1a.

**SAY** “This picture shows a small hole in a road, called a pothole (*indicate the pothole*). When it rains, the pothole fills up with water.”

4. Display Resource 1b: Pothole After Winter Poster for the student.

5. Indicate Resource 1b.

**SAY** “During the winter, the temperature gets very cold and the water in the pothole freezes. This event happens several times throughout the winter. After winter is over, the pothole is much bigger (*indicate the pothole*).”

6. Display Resource 2: Pothole Data Table Poster for the student.

7. Indicate Resource 2.

<b>SAY</b>	“This is a data table used to collect measurements of the pothole in different conditions ( <i>indicate ‘Condition’ column</i> ). Measurements of each condition were taken before winter ( <i>indicate ‘Before Winter’ column</i> ), during winter ( <i>indicate ‘During Winter’ column</i> ), and after winter ( <i>indicate ‘After Winter’ column</i> ). The pothole width was 1 inch before winter, was 12 inches during winter, and was 24 inches after winter ( <i>indicate third row</i> ). The temperature was 60 degrees before winter, was 0 degrees during winter, and was 60 degrees after winter ( <i>indicate first row</i> ). The precipitation was rain before winter, snow and ice during winter, and rain after winter ( <i>indicate second row</i> ).”
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8. **ASK** “What statement best describes how the pothole is different after winter?”

9. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 3a.

<b>SAY</b>	“The pothole got bigger.”
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b. Indicate Sentence Strip 3b.

<b>SAY</b>	“The pothole got smaller.”
------------	----------------------------

c. Indicate Sentence Strip 3c.

<b>SAY</b>	“The pothole stayed the same.”
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10. **ASK AGAIN** “What statement best describes how the pothole is different after winter?”

11. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

12. Indicate Sentence Strip 3a.

<b>SAY</b>	“After winter, the pothole got bigger.”
------------	---

13. **ASK** “Why did the size of the pothole change?”

14. Provide Resource 4: Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 4a.

<b>SAY</b>	“Snow caused the size of the pothole to stay the same.”
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b. Indicate Sentence Strip 4b.

<b>SAY</b>	“Ice caused the size of the pothole to get bigger.”
------------	---

c. Indicate Sentence Strip 4c.

<b>SAY</b>	“Rain caused the size of the pothole to get smaller.”
------------	---

15. **ASK  
AGAIN** “Why did the size of the pothole change?”

16. Allow student to respond and record response.

17. Indicate Sentence Strip 4b.

<b>SAY</b>	“Ice caused the size of the pothole to get bigger.”
------------	---

18. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Sentence Strip 3a.

<b>SAY</b>	“After winter, the pothole got bigger.”
------------	---

2. **ASK** “Why did the size of the pothole change?”

3. Provide Resource 4: Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.

- a. Indicate Sentence Strip 4a.

<b>SAY</b>	“Snow caused the size of the pothole to stay the same.”
------------	---

- b. Indicate Sentence Strip 4b.

<b>SAY</b>	“Ice caused the size of the pothole to get bigger.”
------------	---

- c. Indicate Sentence Strip 4c.

<b>SAY</b>	“Rain caused the size of the pothole to get smaller.”
------------	---

4. **ASK** “Why did the size of the pothole change?”

<b>ASK</b> <b>AGAIN</b>	
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5. Allow student to respond and record response.

6. Indicate Sentence Strip 4b.

<b>SAY</b>	“Ice caused the size of the pothole to get bigger.”
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7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. What statement best describes how the pothole is different after winter?
  - a. Sentence Strip 3a – The pothole got bigger.
2. Why did the size of the pothole change?
  - a. Sentence Strip 4b – Ice caused the size of the pothole to get bigger.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that the pothole got bigger after winter (Sentence Strip 3a); <b>and</b></li><li>is unable to identify that ice caused the size of the pothole to get bigger (Sentence Strip 4b).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li>is able to identify that the pothole got bigger after winter (Sentence Strip 3a); <b>and</b></li><li>is unable to identify that ice caused the size of the pothole to get bigger (Sentence Strip 4b).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify that the pothole got bigger after winter (Sentence Strip 3a); <b>and</b></li><li><b>after scaffolding</b>, is able to identify that ice caused the size of the pothole to get bigger (Sentence Strip 4b).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to correctly identify the pothole got bigger after winter (Sentence Strip 3a); <b>and</b></li><li>is able to identify that ice caused the size of the pothole to get bigger (Sentence Strip 4b).</li></ul>	The student demonstrates understanding independently without scaffolding.	2





Connecticut  
Alternate  
Science  
Assessment

# Earth Science

## Storyline 2: Natural Resources

Grade 11 Performance Task





**Earth Science**

**Storyline 2: Natural Resources  
Grade 11 Performance Task**

**Guiding Questions:** How does the availability of natural resources influence human activities? How does the relationship between natural resources and human activity impact the environment?

		<b>Grade 11</b>		
<b>NGSS Learning Progression</b>	<b>NGSS Standard Performance Expectations</b>	<b>Connecticut Alternate Science Essence Statements</b>	<b>Core Extensions</b>	
ESS3.C Human Impacts on Earth Systems	HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	CTAS-HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources influences human activity.	<ol style="list-style-type: none"> <li>From a picture, identify one natural resource (e.g., fresh water, land, fossil fuels) that affects human activity. (CTAS-HS-ESS3-1)</li> <li>Complete a causal-chain (e.g., flow chart) explaining how the availability of a natural resource (e.g., fresh water, land, fossil fuels) may affect human activity. (CTAS-HS-ESS3-1)</li> <li>Construct an explanation based on provided evidence (e.g., pictures) of how the availability of a natural resource (e.g., fresh water, land, fossil fuels) affects human activity. (CTAS-HS-ESS3-1)</li> <li>Identify evidence supporting a cause-and-effect relationship between the availability of a natural resource (e.g., fresh water, land, fossil fuels) and human activity. (CTAS-HS-ESS3-1)</li> <li>From a simple diagram, describe how electricity can be produced from flowing water (e.g., hydroelectric power). (CTAS-HS-ESS3-4)</li> <li>Using a simple diagram, identify the impact of a change (e.g., increasing the amount of water that</li> </ol>	
	HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*	CTAS-HS-ESS3-4 Evaluate a technological solution (e.g., energy generated from water, wind, or the sun) that reduces impacts of human activities on the environment.*		
	HS-ESS3-3 Create a computer simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	CTAS-HS-ESS3-3 Analyze data to show the relationship between the management of a natural resource and the population of organisms living in an environment.		

Connecticut Alternate Science Assessment

**Earth Science**

Storyline 2: Natural Resources  
Grade 11 Performance Task

			<p>flows through a dam) in the design of a system used to generate electricity from flowing water. (CTAS-HS-ESS3-4)</p> <p>7. From provided information, compare and/or contrast the use of two sources of electricity (e.g., hydroelectric power and fossil fuels). (CTAS-HS-ESS3-4)</p> <p>8. Identify two possible effects on an ecosystem of building a dam to produce hydroelectric power. (CTAS-HS-ESS3-3)</p> <p>9. Analyze population data to describe changes in the populations of organisms before and after a dam is built. (CTAS-HS-ESS3-3)</p>
Appropriate Vocabulary	Natural resource, fresh water, electricity, population, organism, precipitation, pollution, hydroelectric power, dam, generator, turbine, types of energy (e.g., wind, solar), fossil fuels, evaporation, rainfall, crops		

**\* Indicates a NGSS Standard Performance Expectation or Connecticut Alternate Science Essence Statement that incorporates engineering design.**



**Earth Science**  
**Storyline 2: Natural Resources**  
**Grade 11 Performance Task**

General Overview:

Water is one of Earth’s most precious natural resources. In this activity, students will show the relationships humans have with water, including how the availability of water affects the actions of humans. In addition, students will evaluate what is needed to produce hydroelectricity and discuss its benefits and consequences.

List of Materials Needed:

*Teacher-Provided Resources:*

There are no Teacher-Provided Resources required for this Performance Task.

*Instructions for Preparing Materials:*

Teachers must collect all relevant materials prior to the administration of each activity. The Card, Sentence Strip, and Strip Resources will need to be cut out. Resources are listed according to the Resource Identifier, which appears on the back of each Resource. The Resources needed for the administration of each activity are listed according to these Resource Identifiers in the Teacher Notes section of each activity.

*List of Resources:*

- Activity 1 Resource 1: Fresh Water Lake Poster
- Activity 1 Resource 2: Cards 2a – 2d
  - Card 2a – fresh water
  - Card 2b – sail boat
  - Card 2c – flying kite
  - Card 2d – sand pail
- Activity 2 Resource 1: Flow Chart 1 Poster
- Activity 2 Resource 2: Flow Chart 2 Poster
- Activity 2 Resource 3: Cards 3a – 3d
  - Card 3a – low water level
  - Card 3b – high water level
  - Card 3c – a lot of people
  - Card 3d – no people
- Activity 3 Resource 1a: Plenty of Precipitation Poster
- Activity 3 Resource 1b: No Precipitation Poster
- Activity 3 Resource 2: Strips 2a – 2d
  - Strip 2a – heavy rain
  - Strip 2b – light rain
  - Strip 2c – strong wind
  - Strip 2d – no wind

- Activity 3 Resource 3: Strips 3a – 3c
  - Strip 3a – less water/less food
  - Strip 3b – less water/more food
  - Strip 3c – no effect
- Activity 4 Resource 1: Average Rainfall Graph Poster
- Activity 4 Resource 2: Amount of Corn Crops Graph Poster
- Activity 4 Resource 3: Sentence Strips 3a – 3d
  - Sentence Strip 3a – 2010
  - Sentence Strip 3b – 2011
  - Sentence Strip 3c – 2012
  - Sentence Strip 3d – 2013
- Activity 5 Resource 1: Hydroelectric Dam Diagram Poster
- Activity 5 Resource 2: Strips 2a – 2c
  - Strip 2a – downhill
  - Strip 2b – still
  - Strip 2c – evaporating
- Activity 5 Resource 3: Cards 3a – 3c
  - Card 3a – wind
  - Card 3b – solar
  - Card 3c – electric
- Activity 6 Resource 1a: Slow Water Flow Poster
- Activity 6 Resource 1b: Fast Water Flow Poster
- Activity 6 Resource 2: Strips 2a – 2d
  - Strip 2a – high amount
  - Strip 2b – medium amount
  - Strip 2c – low amount
  - Strip 2d – no amount
- Activity 7 Resource 1: Comparing Sources of Electricity Data Table Poster
- Activity 7 Resource 2: Sentence Strips 2a – 2d
  - Sentence Strip 2a – less pollution than fossil fuels
  - Sentence Strip 2b – more pollution than fossil fuels
  - Sentence Strip 2c – costs less than fossil fuels
  - Sentence Strip 2d – costs more than fossil fuels
- Activity 7 Resource 3: Sentence Strips 3a – 3c
  - Sentence Strip 3a – hydroelectric power
  - Sentence Strip 3b – fossil fuels
  - Sentence Strip 3c – same amount

- Activity 8 Resource 1a: Before a Dam Poster
- Activity 8 Resource 1b: After a Dam Poster
- Activity 8 Resource 2: Effects of Building a Dam List Poster
- Activity 8 Resource 3: Sentence Strips 3a – 3d
  - Sentence Strip 3a – fewer fish
  - Sentence Strip 3b – more sunshine
  - Sentence Strip 3c – less water
  - Sentence Strip 3d – more trees
- Activity 9 Resource 1: Number of Salmon Graph Poster
- Activity 9 Resource 2: Cards 2a – 2c
  - Card 2a – increased
  - Card 2b – decreased
  - Card 2c – same
- Activity 9 Resource 3: Cards 3a – 3c
  - Card 3a – 3,000
  - Card 3b – 2,000
  - Card 3c – 1,000

## ACTIVITY 1

**Essence Statement:** CTAS-HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources influences human activity.

**Core Extension 1:** From a picture, identify one natural resource (e.g., fresh water, land, fossil fuels) that affects human activity. (CTAS-HS-ESS3-1)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Fresh Water Lake Poster
- Activity 1 Resource 2: Cards 2a – 2d
  - Card 2a – fresh water
  - Card 2b – sail boat
  - Card 2c – flying kite
  - Card 2d – sand pail

### Steps to Follow:

1. **SAY** “In this activity, we are going to talk about Earth’s natural resources. Natural resources come from the environment and are used by living things.”

2. Display Resource 1: Fresh Water Lake Poster for the student.

3. Indicate Resource 1.

**SAY** “This is a picture. This picture shows a fresh water lake with a boat on it. A man and a child are flying a kite near the lake. Two children are building a sand castle with shovels and pails on the shore of the lake.”

4. **ASK** “Which part of this picture shows a natural resource?”

5. Provide Resource 2: Cards 2a – 2d to the student. Indicate and read each Card.

a. Indicate Card 2a.

**SAY** “fresh water”

b. Indicate Card 2b.

**SAY** “sail boat”

c. Indicate Card 2c.

**SAY** “flying kite”

d. Indicate Card 2d.

**SAY** “sand pail”

6. **ASK** “Which part of this picture shows a natural resource?”

**AGAIN**



7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

8. Indicate Card 2a.

**SAY** “Fresh water is a natural resource that is shown in this picture.”

9. **SAY** “We are now finished with this activity.”

### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, remove the incorrect Card chosen by the student.

**SAY** “[Insert description of incorrect Card chosen by the student] is not a natural resource.”

1. **ASK** “Which part of this picture shows a natural resource?”

2. Provide remaining Resource 2: Cards 2a – 2d to the student. Indicate and read each remaining Card.

a. Indicate Card 2a.

**SAY** “fresh water”

b. Indicate Card 2b.

**SAY** “sail boat”

c. Indicate Card 2c.

**SAY** “flying kite”

d. Indicate Card 2d.

**SAY** “sand pail”

3. **ASK** “Which part of this picture shows a natural resource?”

**AGAIN**

4. Indicate Card 2a.

**SAY** “Fresh water is a natural resource that is shown in this picture.”

5. **SAY** “We are now finished with this activity.”



**The correct answer is as follows:**

1. Which part of this picture shows a natural resource?
  - a. Card 2a – fresh water

<b>Content Guidance</b>	<b>Rating</b>	<b>Score</b>
Student... <ul style="list-style-type: none"><li>• gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>• is unable to identify that fresh water is the natural resource that is shown in the picture (Card 2a).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li>• <b>after scaffolding</b>, is able to identify that fresh water is the natural resource that is shown in the picture (Card 2a).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>• is able to identify that fresh water is the natural resource that is shown in the picture (Card 2a).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 2

**Essence Statement:** CTAS-HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources influences human activity.

**Core Extension 2:** Complete a causal-chain (e.g., flow chart) explaining how the availability of a natural resource (e.g., fresh water, land, fossil fuels) may affect human activity. (CTAS-HS-ESS3-1)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Flow Chart 1 Poster
- Activity 2 Resource 2: Flow Chart 2 Poster
- Activity 2 Resource 3: Cards 3a – 3d
  - Card 3a – low water level
  - Card 3b – high water level
  - Card 3c – a lot of people
  - Card 3d – no people

### Steps to Follow:

1. 

<b>SAY</b>	“In this activity, we are going to use a flow chart with a series of events to complete a second, mostly blank, flow chart. Once completed, these flow charts will show the relationship between the availability of fresh water and its impact on human activity.”
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2. Display Resource 1: Flow Chart 1 Poster for the student.

3. Indicate Resource 1.

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|------------|---|
| <b>SAY</b> | “This is a flow chart. A lot of rain falls in an area ( <i>indicate the first box</i> ). This causes the water level in the lake to rise to a high level ( <i>indicate the second box</i> ). Because there is a lot of water available, there are a lot of people at the lake ( <i>indicate the third box</i> ).” |
|------------|---|

4. Display Resource 2: Flow Chart 2 Poster for the student.

5. Indicate Resource 2.

- |            |   |
|------------|---|
| <b>SAY</b> | “This is another flow chart. No rain falls in an area for a long time ( <i>indicate the first box</i> ).” |
|------------|---|

6. Indicate Resource 1 and Resource 2.

- |            |   |
|------------|---|
| <b>SAY</b> | “Let’s compare the first flow chart ( <i>indicate Resource 1</i> ) and the second flow chart ( <i>indicate Resource 2</i> ) to predict what will happen when no rain falls in an area for a long time.” |
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7. 

<b>ASK</b>	“Which picture should be placed in the second box of this flow chart?”
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8. Provide Resource 3: Cards 3a – 3d to the student. Indicate and describe each Card.

a. Indicate Card 3a.

<b>SAY</b>	“low water level in the lake”
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b. Indicate Card 3b.

<b>SAY</b>	“high water level in the lake”
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c. Indicate Card 3c.

<b>SAY</b>	“a lot of people at the lake”
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d. Indicate Card 3d.

<b>SAY</b>	“no people at the lake”
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9. **ASK AGAIN** “Which picture should be placed in the second box of this flow chart?”

10. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

11. Indicate Card 3a.

<b>SAY</b>	“After no rain falls, there will be a low water level in the lake.”
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12. Indicate Card 3a.

<b>SAY</b>	“Let’s place this picture in the second box of our flow chart.”
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13. *Assist the student in placing Card 3a in the second box of the Resource 2 flow chart if necessary.*

14. Indicate Resource 1 and Resource 2.

<b>SAY</b>	“Let’s compare the first flow chart ( <i>indicate Resource 1</i> ) and the second flow chart ( <i>indicate Resource 2</i> ) to predict what will happen when there is a low water level in the lake.”
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15. **ASK** “Which picture should be placed in the third box of this flow chart?”

16. Provide remaining Resource 3: Cards 3b – 3d to the student. Indicate and describe each remaining Card.

a. Indicate Card 3b.

<b>SAY</b>	“high water level in the lake”
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b. Indicate Card 3c.

<b>SAY</b>	“a lot of people at the lake”
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c. Indicate Card 3d.

<b>SAY</b>	“no people at the lake”
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17. **ASK AGAIN** “Which picture should be placed in the third box of this flow chart?”

18. Allow student to respond and record response.

19. Indicate Card 3d.

<b>SAY</b>	“After no rain falls, there will be a low level of water in the lake ( <i>indicate second box, completed with Card 3a</i> ). Because the level of water in the lake is low, there would be less water for people to use and there would be no people at the lake.”
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20. Indicate Card 3d.

<b>SAY</b>	“Let’s place this picture in the third box of our flow chart.”
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21. *Assist the student in placing Card 3d in the third box of the Resource 2 flow chart if necessary.*

22. **SAY** “We are now finished with this activity.”

### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 3a.

<b>SAY</b>	“After no rain falls, there will be a low water level in the lake.”
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2. Indicate Card 3a.

<b>SAY</b>	“Let’s place this picture in the second box of our flow chart.”
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3. *Assist the student in placing Card 3a in the second box of the Resource 2 flow chart if necessary.*

4. Indicate Resource 1 and Resource 2.

<b>SAY</b>	“Let’s compare the first flow chart ( <i>indicate Resource 1</i> ) and the second flow chart ( <i>indicate Resource 2</i> ) to predict what will happen when there is a low water level in the lake.”
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5. **ASK** “Which picture should be placed in the third box of this flow chart?”

6. Provide remaining Resource 3: Cards 3b – 3d to the student. Indicate and describe each remaining Card.

a. Indicate Card 3b.

<b>SAY</b>	“high water level in the lake”
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b. Indicate Card 3c.

<b>SAY</b>	“a lot of people at the lake”
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c. Indicate Card 3d.

<b>SAY</b>	“no people at the lake”
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7. **ASK AGAIN** “Which picture should be placed in the third box of this flow chart?”

8. Allow student to respond and record response.

9. Indicate Card 3d.

<b>SAY</b>	“After no rain falls, there will be a low level of water in the lake ( <i>indicate second box, completed with Card 3a</i> ). Because the level of water in the lake is low, there would be less water for people to use and there would be no people at the lake.”
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10. Indicate Card 3d.

<b>SAY</b>	“Let’s place this picture in the third box of our flow chart.”
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11. *Assist the student in placing Card 3d in the third box of the Resource 2 flow chart if necessary.*

12. **SAY** “We are now finished with this activity.”

**Correct answers are as follows:**

1. Which picture should be placed in the second box of this flow chart?
  - a. Card 3a – low water level in the lake
2. Which picture should be placed in the third box of this flow chart?
  - a. Card 3d – no people at the lake



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the picture to be placed in the second box of the flow chart (Card 3a);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li>is unable to identify the picture to be placed in the third box of the flow chart (Card 3d).</li></ul>	<p>The student <b>does not</b> demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify the picture to be placed in the second box of the flow chart (Card 3a);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li>is unable to identify the picture to be placed in the third box of the flow chart (Card 3d).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the picture to be placed in the second box of the flow chart (Card 3a);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li><b>after scaffolding</b>, is able to identify the picture to be placed in the third box of the flow chart (Card 3d).</li></ul>	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify the picture to be placed in the second box of the flow chart (Card 3a);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li>is able to identify the picture to be placed in the third box of the flow chart (Card 3d).</li></ul>	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

### ACTIVITY 3

**Essence Statement:** CTAS-HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources influences human activity.

**Core Extension 3:** Construct an explanation based on provided evidence (e.g., pictures) of how the availability of a natural resource (e.g., fresh water, land, fossil fuels) affects human activity. (CTAS-HS-ESS3-1)

**Teacher Notes:**

Collect the following resources for this activity:

- Activity 3 Resource 1a: Plenty of Precipitation Poster
- Activity 3 Resource 1b: No Precipitation Poster
- Activity 3 Resource 2: Strips 2a – 2d
  - Strip 2a – heavy rain
  - Strip 2b – light rain
  - Strip 2c – strong wind
  - Strip 2d – no wind
- Activity 3 Resource 3: Strips 3a – 3c
  - Strip 3a – less water/less food
  - Strip 3b – less water/more food
  - Strip 3c – no effect

**Steps to Follow:**

1. **SAY** “In this activity, we are going to talk about how the availability of a natural resource affects corn crops.”

2. Display Resource 1a: Plenty of Precipitation Poster for the student.

3. Indicate Resource 1a.

**SAY** “This is a picture. This picture shows a pond with a high level of water next to the corn crops. The corn crops are green and tall.”

4. Display Resource 1b: No Precipitation Poster for the student.

5. Indicate Resource 1b.

**SAY** “This is another picture. This picture shows a pond with a low level of water next to the corn crops. The corn crops are brown and wilted.”

6. **ASK** “What may have caused the corn crops to turn brown and wilt?”

7. Provide Resource 2: Strips 2a – 2d to the student. Indicate and read each Strip.

a. Indicate Strip 2a.

**SAY** “heavy rain”

b. Indicate Strip 2b.

**SAY** “light rain”



c. Indicate Strip 2c.

<b>SAY</b>	“strong wind”
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d. Indicate Strip 2d.

<b>SAY</b>	“no wind”
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8. **ASK AGAIN** “What may have caused the corn crops to turn brown and wilt?”

9. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

10. Indicate Strip 2b.

<b>SAY</b>	“The corn crops may have turned brown and wilted because only light rain has fallen.”
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11. **ASK** “How does the amount of water available for the corn crops affect humans?”

12. Provide Resource 3: Strips 3a – 3c to the student. Indicate and read each Strip.

a. Indicate Strip 3a.

<b>SAY</b>	“less water equals less food”
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b. Indicate Strip 3b.

<b>SAY</b>	“less water equals more food”
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c. Indicate Strip 3c.

<b>SAY</b>	“the amount of water has no effect on food”
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13. **ASK AGAIN** “How does the amount of water available for the corn crops affect humans?”

14. Allow student to respond and record response.

15. Indicate Strip 3a.

<b>SAY</b>	“Less water for the corn crops equals less food for humans.”
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16. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Strip 2b.

<b>SAY</b>	“The corn crops may have turned brown and wilted because only light rain has fallen.”
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2. **ASK** “How does the amount of water available for the corn crops affect humans?”

3. Provide Resource 3: Strips 3a – 3c to the student. Indicate and read each Strip.

- a. Indicate Strip 3a.

<b>SAY</b>	“less water equals less food”
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- b. Indicate Strip 3b.

<b>SAY</b>	“less water equals more food”
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- c. Indicate Strip 3c.

<b>SAY</b>	“the amount of water has no effect on food”
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4. **ASK AGAIN** “How does the amount of water available for the corn crops affect humans?”

5. Allow student to respond and record response.

6. Indicate Strip 3a.

<b>SAY</b>	“Less water for the corn crops equals less food for humans.”
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7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. What may have caused the corn crops to turn brown and wilt?
  - a. Strip 2b – light rain
2. How does the amount of water available for the corn crops affect humans?
  - a. Strip 3a – less water equals less food



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify what caused the corn crops to turn brown and wilt (Strip 2b); <b>and</b></li><li>is unable to identify how the amount of water available for the corn crops affects humans (Strip 3a).</li></ul>	<p>The student <b>does not</b> demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify what caused the corn crops to turn brown and wilt (Strip 2b); <b>and</b></li><li>is unable to identify how the amount of water available for the corn crops affects humans (Strip 3a).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify what caused the corn crops to turn brown and wilt (Strip 2b); <b>and</b></li><li><b>after scaffolding</b>, is able to identify how the amount of water available for the corn crops affects humans (Strip 3a).</li></ul>	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify what caused the corn crops to turn brown and wilt (Strip 2b); <b>and</b></li><li>is able to identify how the amount of water available for the corn crops affects humans (Strip 3a).</li></ul>	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

## ACTIVITY 4

**Essence Statement:** CTAS-HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources influences human activity.

**Core Extension 4:** Identify evidence supporting a cause-and-effect relationship between the availability of a natural resource (e.g., fresh water, land, fossil fuels) and human activity. (CTAS-HS-ESS3-1)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Average Rainfall Graph Poster
- Activity 4 Resource 2: Amount of Corn Crops Graph Poster
- Activity 4 Resource 3: Sentence Strips 3a – 3d
  - Sentence Strip 3a – 2010
  - Sentence Strip 3b – 2011
  - Sentence Strip 3c – 2012
  - Sentence Strip 3d – 2013

### Steps to Follow:

1. **SAY** “In this activity, we are going to compare the amount of rainfall and the amount of corn crops produced over four years.”

2. Display Resource 1: Average Rainfall Graph Poster for the student.

3. Indicate Resource 1.

**SAY** “This is a graph. It shows the average rainfall in inches for an area over four different years. The graph is titled ‘**Average Rainfall Over Four Years**’. The y-axis is labeled ‘**Inches of Rain**’ (*indicate y-axis*). The x-axis is labeled ‘**Year**’ (*indicate x-axis*). The first bar of the graph shows a rainfall of 50 inches in year 2010 (*indicate first bar*). The second bar of the graph shows a rainfall of 60 inches in year 2011 (*indicate second bar*). The third bar of the graph shows a rainfall of 30 inches in year 2012 (*indicate third bar*). The fourth bar of the graph shows a rainfall of 50 inches in year 2013 (*indicate fourth bar*).”

4. Display Resource 2: Amount of Corn Crops Graph Poster for the student.

5. Indicate Resource 2.

<b>SAY</b>	“This is another graph. It shows the average amount of corn crops grown in same area during the same four years. The graph is titled ‘ <b>Amount of Corn Crops Produced Over Four Years.</b> ’ The y-axis is labeled ‘ <b>Amount of Corn Produced</b> ’ ( <i>indicate y-axis</i> ). The x-axis is labeled ‘ <b>Year</b> ’ ( <i>indicate x-axis</i> ). Each bar is made up of a picture of a corn plant that represents 1,000 corn crops. The first bar of the graph shows 4,000 corn crops were grown in year 2010 ( <i>indicate first bar</i> ). The second bar of the graph shows 5,000 corn crops were grown in year 2011 ( <i>indicate second bar</i> ). The third bar of the graph shows 2,000 corn crops were grown in year 2012 ( <i>indicate third bar</i> ). The fourth bar of the graph shows 4,000 corn crops were grown in year 2013 ( <i>indicate fourth bar</i> ).”
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6. **ASK** “What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?”

7. Provide Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 3a.

<b>SAY</b>	“In 2010, there was high rainfall and few corn crops.”
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b. Indicate Sentence Strip 3b.

<b>SAY</b>	“In 2011, there was low rainfall and few corn crops.”
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c. Indicate Sentence Strip 3c.

<b>SAY</b>	“In 2012, there was low rainfall and few corn crops.”
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d. Indicate Sentence Strip 3d.

<b>SAY</b>	“In 2013, there was high rainfall and few corn crops.”
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8. **ASK AGAIN** “What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?”

9. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

10. Indicate Sentence Strip 3c.

<b>SAY</b>	“In 2012, there was low rainfall and few corn crops.”
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11. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, remove the incorrect Sentence Strip chosen by the student.

<b>SAY</b>	"[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer."
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2. **ASK** "What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?"

3. Provide remaining Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each remaining Sentence Strip.

- a. Indicate Sentence Strip 3a.

<b>SAY</b>	"In 2010, there was high rainfall and few corn crops."
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- b. Indicate Sentence Strip 3b.

<b>SAY</b>	"In 2011, there was low rainfall and few corn crops."
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- c. Indicate Sentence Strip 3c.

<b>SAY</b>	"In 2012, there was low rainfall and few corn crops."
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- d. Indicate Sentence Strip 3d.

<b>SAY</b>	"In 2013, there was high rainfall and few corn crops."
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4. **ASK AGAIN** "What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?"

5. Allow student to respond and record response.

6. Indicate Sentence Strip 3c.

<b>SAY</b>	"In 2012, there was low rainfall and few corn crops."
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7. **SAY** "We are now finished with this activity."

### The correct answer is as follows:

1. What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?
  - a. Sentence Strip 3c – In 2012, there was low rainfall and few corn crops.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the evidence that shows how the amount of rainfall affects the amount of corn crops that are grown (Sentence Strip 3c).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li><b>after scaffolding</b>, is able to identify the evidence that shows how the amount of rainfall affects the amount of corn crops that are grown (Sentence Strip 3c).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to identify the evidence that shows how the amount of rainfall affects the amount of corn crops that are grown (Sentence Strip 3c).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 5

**Essence Statement:** CTAS-HS-ESS3-4 Evaluate a technological solution (e.g., energy generated from water, wind, or the sun) that reduces impacts of human activities on the environment.\*

**Core Extension 5:** From a simple diagram, describe how electricity can be produced from flowing water (e.g., hydroelectric power). (CTAS-HS-ESS3-4)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Hydroelectric Dam Diagram Poster
- Activity 5 Resource 2: Strips 2a – 2c
  - Strip 2a – downhill
  - Strip 2b – still
  - Strip 2c – evaporating
- Activity 5 Resource 3: Cards 3a – 3c
  - Card 3a – wind
  - Card 3b – solar
  - Card 3c – electric

### Steps to Follow:

1. **SAY** “In this activity, we will talk about how hydroelectric dams produce energy.”

2. Display Resource 1: Hydroelectric Dam Diagram Poster for the student.

3. Indicate Resource 1.

**SAY** “This poster shows a diagram of a hydroelectric dam. In this hydroelectric dam, water flows from the dam to the turbine (*trace from Dam to Turbine*). The turbine spins and moves the generator (*trace from Turbine to Generator; indicate Turbine pop-out*). The generator turns the energy into usable power.”

4. **ASK** “What is the first step that is needed to produce power with water in this diagram?”

5. Provide Resource 2: Strips 2a – 2c to the student. Indicate and read each Strip.

a. Indicate Strip 2a.

**SAY** “water flowing downhill”

b. Indicate Strip 2b.

**SAY** “water sitting very still”

c. Indicate Strip 2c.

**SAY** “water evaporating in the air”

6. **ASK AGAIN** “What is the first step that is needed to produce power with water in this diagram?”



7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. Indicate Strip 2a.
- |            |  |
|------------|--|
| <b>SAY</b> | “Water flowing downhill is the first step that is needed to produce power with water in this diagram.” |
|------------|--|
9. **ASK** “What form of energy does the generator produce?”
10. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.
- a. Indicate Card 3a.
- |            |        |
|------------|--------|
| <b>SAY</b> | “wind” |
|------------|--------|
- b. Indicate Card 3b.
- |            |         |
|------------|---------|
| <b>SAY</b> | “solar” |
|------------|---------|
- c. Indicate Card 3c.
- |            |            |
|------------|------------|
| <b>SAY</b> | “electric” |
|------------|------------|
11. **ASK AGAIN** “What form of energy does the generator produce?”
12. Allow student to respond and record response.
13. Indicate Card 3c.
- |            |   |
|------------|---|
| <b>SAY</b> | “The generator produces electric energy from the spinning turbine.” |
|------------|---|
14. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Strip 2a.

<b>SAY</b>	“Water flowing downhill is the first step that is needed to produce power with water in this diagram.”
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2. **ASK** “What form of energy does the generator produce?”

3. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

- a. Indicate Card 3a.

<b>SAY</b>	“wind”
------------	--------

- b. Indicate Card 3b.

<b>SAY</b>	“solar”
------------	---------

- c. Indicate Card 3c.

<b>SAY</b>	“electric”
------------	------------

4. **ASK AGAIN** “What form of energy does the generator produce?”

5. Allow student to respond and record response.

6. Indicate Card 3c.

<b>SAY</b>	“The generator produces electric energy from the spinning turbine.”
------------	---

7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. What is the first step that is needed to produce power with water in this diagram?
  - a. Strip 2a – water flowing downhill
2. What form of energy does the generator produce?
  - a. Card 3c – electric



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); <b>and</b></li><li>is unable to identify that the generator produces electric energy from the spinning turbine (Card 3c).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); <b>and</b></li><li>is unable to identify that the generator produces electric energy from the spinning turbine (Card 3c).</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); <b>and</b></li><li><b>after scaffolding</b>, is able to identify that the generator produces electric energy from the spinning turbine (Card 3c).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); <b>and</b></li><li>is able to identify that the generator produces electric energy from the spinning turbine (Card 3c).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 6

**Essence Statement:** CTAS-HS-ESS3-4 Evaluate a technological solution (e.g., energy generated from water, wind, or the sun) that reduces impacts of human activities on the environment.\*

**Core Extension 6:** Using a simple diagram, identify the impact of a change (e.g., increasing the amount of water that flows through a dam) in the design of a system used to generate electricity from flowing water. (CTAS-HS-ESS3-4)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 6 Resource 1a: Slow Water Flow Poster
- Activity 6 Resource 1b: Fast Water Flow Poster
- Activity 6 Resource 2: Strips 2a – 2d
  - Strip 2a – high amount
  - Strip 2b – medium amount
  - Strip 2c – low amount
  - Strip 2d – no amount

### Steps to Follow:

1. **SAY** “In this activity, we are going to talk about the relationship between the amount and speed of water that flows through the hydroelectric dam and the amount of electricity that is produced.”

2. Display Resource 1a: Slow Water Flow Poster for the student.

3. Indicate Resource 1a.

**SAY** “Here is a diagram. This diagram is titled ‘**Slow Water Flow**’. This diagram shows a small amount of slow-moving water that is released from a dam. This causes the turbine to turn slowly. Electricity is produced by the slow-moving water. The amount of electricity produced is shown by the three lightbulbs. Only one lightbulb is lit up (*indicate the lit lightbulb*).”

4. Display Resource 1b: Fast Water Flow Poster for the student.

5. Indicate Resource 1b.

**SAY** “Here is another diagram. This diagram is titled ‘**Fast Water Flow**’. This diagram shows a large amount of fast-moving water that is released from a dam. This causes the turbine to turn quickly. Electricity is produced by the fast-moving water. The amount of electricity produced is shown by the three lightbulbs. All three lightbulbs are lit up (*indicate the lit lightbulbs*).”

6. **SAY** “There is a relationship between the amount and speed of moving water and the amount of electricity produced.”

7. **ASK** “What amount of electricity is produced by a large amount of fast-moving water?”
8. Provide Resource 2: Strips 2a – 2d to the student. Indicate and read each Strip.
- a. Indicate Strip 2a.
- SAY** “high amount of electricity”
- b. Indicate Strip 2b.
- SAY** “medium amount of electricity”
- c. Indicate Strip 2c.
- SAY** “low amount of electricity”
- d. Indicate Strip 2d.
- SAY** “no amount of electricity”
9. **ASK AGAIN** “What amount of electricity is produced by a large amount of fast-moving water?”
10. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
11. Indicate Strip 2a.
- SAY** “A high amount of electricity is produced by the large amount of fast-moving water.”
12. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, remove the incorrect Strip chosen by the student.

<b>SAY</b>	"[Insert description of incorrect Strip chosen by the student] is not the correct answer."
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2. **ASK** "What amount of electricity is produced by a large amount of fast-moving water?"

3. Provide remaining Resource 2: Strips 2a – 2d to the student. Indicate and read each remaining Strip.

- a. Indicate Strip 2a.

<b>SAY</b>	"high amount of electricity"
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- b. Indicate Strip 2b.

<b>SAY</b>	"medium amount of electricity"
------------	--------------------------------

- c. Indicate Strip 2c.

<b>SAY</b>	"low amount of electricity"
------------	-----------------------------

- d. Indicate Strip 2d.

<b>SAY</b>	"no amount of electricity"
------------	----------------------------

4. **ASK AGAIN** "What amount of electricity is produced by a large amount of fast-moving water?"

5. Allow student to respond and record response.

6. Indicate Strip 2a.

<b>SAY</b>	"A high amount of electricity is produced by the large amount of fast-moving water."
------------	--

7. **SAY** "We are now finished with this activity."

### The correct answer is as follows:

1. What amount of electricity is produced by a large amount of fast-moving water?
  - a. Strip 2a – high amount of electricity



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).</li></ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"><li><b>after scaffolding</b>, is able to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).</li></ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"><li>is able to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).</li></ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 7

**Essence Statement:** CTAS-HS-ESS3-4 Evaluate a technological solution (e.g., energy generated from water, wind, or the sun) that reduces impacts of human activities on the environment.\*

**Core Extension 7:** From provided information, compare and/or contrast the use of two sources of electricity (e.g., hydroelectric power and fossil fuels). (CTAS-HS-ESS3-4)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 7 Resource 1: Comparing Sources of Electricity Data Table Poster
- Activity 7 Resource 2: Sentence Strips 2a – 2d
  - Sentence Strip 2a – less pollution than fossil fuels
  - Sentence Strip 2b – more pollution than fossil fuels
  - Sentence Strip 2c – costs less than fossil fuels
  - Sentence Strip 2d – costs more than fossil fuels
- Activity 7 Resource 3: Sentence Strips 3a – 3c
  - Sentence Strip 3a – hydroelectric power
  - Sentence Strip 3b – fossil fuels
  - Sentence Strip 3c – same amount

### Steps to Follow:

1. 

<b>SAY</b>	“In this activity, we are going to compare two sources of electricity – hydroelectric power and fossil fuels such as coal and oil.”
------------	---
2. Display Resource 1: Comparing Sources of Electricity Data Table Poster for the student.
3. Indicate Resource 1.
 

<b>SAY</b>	“This is a data table titled ‘ <b>Comparing Sources of Electricity</b> ’. This table compares three characteristics of two sources of electricity: hydroelectric power and fossil fuels. The first characteristic is: ‘ <b>Air Pollution Produced</b> ’ ( <i>indicate first row</i> ), Hydroelectric Power: None, Fossil Fuels: Carbon Monoxide, Carbon Dioxide, Nitrogen Oxide. The second characteristic is ‘ <b>Cost Per Unit of Energy</b> ’ ( <i>indicate second row</i> ), Hydroelectric Power: About 1 Dollar, Fossil Fuels: About 2 Dollars. The third characteristic is ‘ <b>Amount of Electricity Produced in the United States</b> ’ ( <i>indicate third row</i> ), Hydroelectric Power: 10 Percent, Fossil Fuels: 67 Percent.”
------------	--
4. 

<b>ASK</b>	“Which two statements describe the differences between hydroelectric power and fossil fuels? Choose two statements that are correct based on the data table.”
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5. Provide Resource 2: Sentence Strips 2a – 2d to the student. Indicate and read each Sentence Strip.



a. Indicate Sentence Strip 2a.

<b>SAY</b>	“Hydroelectric power produces less pollution than fossil fuels.”
------------	--

b. Indicate Sentence Strip 2b.

<b>SAY</b>	“Hydroelectric power produces more pollution than fossil fuels.”
------------	--

c. Indicate Sentence Strip 2c.

<b>SAY</b>	“Hydroelectric power costs less than fossil fuels.”
------------	---

d. Indicate Sentence Strip 2d.

<b>SAY</b>	“Hydroelectric power costs more than fossil fuels.”
------------	---

6. **ASK AGAIN** “Which two statements describe the differences between hydroelectric power and fossil fuels? Choose two statements that are correct based on the data table.”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

8. Indicate Sentence Strip 2a and Sentence Strip 2c.

<b>SAY</b>	“Hydroelectric power produces less pollution than fossil fuels. Hydroelectric power costs less than fossil fuels.”
------------	--

9. **ASK** “Which statement describes the amount of electricity produced in the United States by the two electricity sources?”

10. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 3a.

<b>SAY</b>	“More electricity is produced from hydroelectric power in the United States.”
------------	---

b. Indicate Sentence Strip 3b.

<b>SAY</b>	“More electricity is produced from fossil fuels in the United States.”
------------	--

c. Indicate Sentence Strip 3c.

<b>SAY</b>	“Hydroelectric power and fossil fuels produce the same amount of electricity in the United States.”
------------	---

11. **ASK AGAIN** “Which statement describes the amount of electricity produced in the United States by the two electricity sources?”

12. Allow student to respond and record response.

13. Indicate Sentence Strip 3b.

**SAY** “More electricity is produced from fossil fuels in the United States.”

14. **SAY** “We are now finished with this activity.”

### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, indicate Sentence Strip 2a and Sentence Strip 2c.

**SAY** “Hydroelectric power produces less pollution than fossil fuels. Hydroelectric power costs less than fossil fuels.”

2. **ASK** “Which statement describes the amount of electricity produced in the United States by the two electricity sources?”

3. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 3a.

**SAY** “More electricity is produced from hydroelectric power in the United States.”

b. Indicate Sentence Strip 3b.

**SAY** “More electricity is produced from fossil fuels in the United States.”

c. Indicate Sentence Strip 3c.

**SAY** “Hydroelectric power and fossil fuels produce the same amount of electricity in the United States.”

4. **ASK AGAIN** “Which statement describes the amount of electricity produced in the United States by the two electricity sources?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 3b.

**SAY** “More electricity is produced from fossil fuels in the United States.”

**Correct answers are as follows:**

1. Which two statements describe the differences between hydroelectric power and fossil fuels? Choose two statements that are correct based on the data table.
  - a. Sentence Strip 2a – Hydroelectric power produces less pollution than fossil fuels.

**AND**

  - b. Sentence Strip 2c – Hydroelectric power costs less than fossil fuels.
2. Which statement describes the amount of electricity produced in the United States by the two electricity sources?
  - a. Sentence Strip 3b – More electricity is produced from fossil fuels in the United States.

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> <li>• gives NO response.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a <b>and</b> Sentence Strip 2c); <b>and</b></li> <li>• is unable to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b).</li> </ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"> <li>• is able to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a <b>and</b> Sentence Strip 2c); <b>and</b></li> <li>• is unable to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b).</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a <b>and</b> Sentence Strip 2c); <b>and</b></li> <li>• <b>after scaffolding</b>, is able to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b).</li> </ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> <li>• is able to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a <b>and</b> Sentence Strip 2c); <b>and</b></li> <li>• is able to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b).</li> </ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 8

**Essence Statement:** CTAS-HS-ESS3-3 Analyze data to show the relationship between the management of a natural resource and the population of organisms living in an environment.

**Core Extension 8:** Identify two possible effects on an ecosystem of building a dam to produce hydroelectric power. (CTAS-HS-ESS3-3)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 8 Resource 1a: Before a Dam Poster
- Activity 8 Resource 1b: After a Dam Poster
- Activity 8 Resource 2: Effects of Building a Dam List Poster
- Activity 8 Resource 3: Sentence Strips 3a – 3d
  - Sentence Strip 3a – fewer fish
  - Sentence Strip 3b – more sunshine
  - Sentence Strip 3c – less water
  - Sentence Strip 3d – more trees

### Steps to Follow:

1. **SAY** “In this activity, we are going to talk about a river ecosystem before and after a dam used to produce hydroelectric power is built.”

2. Display Resource 1a: Before a Dam Poster for the student.

3. Indicate Resource 1a.

**SAY** “This is a picture of a river ecosystem before a dam was built. In the river, there are many salmon jumping upstream (*indicate salmon*). There are lots of trees (*indicate trees*). The water in the river is moving quickly. It is sunny (*indicate sun*).”

4. Display Resource 1b: After a Dam Poster for the student.

5. Indicate Resource 1b.

**SAY** “This is a picture of the same river ecosystem after a dam was built (*indicate the dam*). In the river, there is one salmon jumping upstream (*indicate one salmon*). There are fewer trees (*indicate trees*). The water in the river below the dam is moving slowly. It is sunny (*indicate sun*).”

6. Display Resource 2: Effects of Building a Dam List Poster for the student.

7. Indicate Resource 2.

**SAY** “This is a list that we are going to fill out. This list is titled ‘**Effects of Building a Dam List**’. Building a dam can have negative effects on the local environment.”

8. **ASK** “What is one negative effect that building a dam can have on the environment?”
9. Provide Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 3a.
- SAY** “There are fewer fish in the river.”
- b. Indicate Sentence Strip 3b.
- SAY** “There is more sunshine in the sky.”
- c. Indicate Sentence Strip 3c.
- SAY** “There is less water below the dam.”
- d. Indicate Sentence Strip 3d.
- SAY** “There are more trees by the shore.”
10. **ASK AGAIN** “What is one negative effect that building a dam can have on the environment?”
11. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
12. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.
13. **ASK** “What is another negative effect that building a dam can have on the environment?”
14. Provide remaining Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each remaining Sentence Strip.
- a. Indicate Sentence Strip 3a.
- SAY** “There are fewer fish in the river.”
- b. Indicate Sentence Strip 3b.
- SAY** “There is more sunshine in the sky.”
- c. Indicate Sentence Strip 3c.
- SAY** “There is less water below the dam.”
- d. Indicate Sentence Strip 3d.
- SAY** “There are more trees by the shore.”

15. **ASK AGAIN** “What is another negative effect that building a dam can have on the environment?”
16. Allow student to respond and record response.
17. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.
18. **SAY** “We are now finished with this activity.”

### Scoring Guidance and Scaffolding

#### Scaffolding:

1. After student makes first incorrect attempt, remove the incorrect Sentence Strip chosen by the student.
 

<b>SAY</b>	“[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer.”
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1. **ASK** “What is a negative effect that building a dam can have on the environment?”
2. Provide remaining Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each remaining Sentence Strip.
  - a. Indicate Sentence Strip 3a.
 

<b>SAY</b>	“There are fewer fish in the river.”
------------	--------------------------------------
  - b. Indicate Sentence Strip 3b.
 

<b>SAY</b>	“There is more sunshine in the sky.”
------------	--------------------------------------
  - c. Indicate Sentence Strip 3c.
 

<b>SAY</b>	“There is less water below the dam.”
------------	--------------------------------------
  - d. Indicate Sentence Strip 3d.
 

<b>SAY</b>	“There are more trees by the shore.”
------------	--------------------------------------
3. **ASK AGAIN** “What is a negative effect that building a dam can have on the environment?”
4. Allow student to respond and record response.
5. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.

6. 

<b>SAY</b>	“We are now finished with this activity.”
------------	---

**Correct answers are as follows:**

1. What is one negative effect that building a dam can have on the environment?
  - a. Sentence Strip 3a – There are fewer fish in the river.

**OR**

  - b. Sentence Strip 3c – There is less water below the dam.
2. What is another negative effect that building a dam can have on the environment?
  - a. Sentence Strip 3a – There are fewer fish in the river.

**OR**

  - b. Sentence Strip 3c – There is less water below the dam.

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> <li>• gives NO response.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to identify either negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c).</li> </ul>	The student <b>does not</b> demonstrate understanding.	0
Student... <ul style="list-style-type: none"> <li>• is able to identify one negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c);</li> </ul> <p style="text-align: center;"><b>and</b></p> <ul style="list-style-type: none"> <li>• is unable to identify another negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c).</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• is unable to identify one negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c);</li> </ul> <p style="text-align: center;"><b>and</b></p> <ul style="list-style-type: none"> <li>• <b>after scaffolding</b>, is able to identify a negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c).</li> </ul>	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> <li>• is able to identify both negative effects that building a dam can have on the environment (Sentence Strip 3a and Sentence Strip 3c).</li> </ul>	The student demonstrates understanding independently without scaffolding.	2

## ACTIVITY 9

**Essence Statement:** CTAS-HS-ESS3-3 Analyze data to show the relationship between the management of a natural resource and the population of organisms living in an environment.

**Core Extension 9:** Analyze population data to describe changes in the populations of organisms before and after a dam is built. (CTAS-HS-ESS3-3)

### Teacher Notes:

Collect the following resources for this activity:

- Activity 9 Resource 1: Number of Salmon Graph Poster
- Activity 9 Resource 2: Cards 2a – 2c
  - Card 2a – increased
  - Card 2b – decreased
  - Card 2c – same
- Activity 9 Resource 3: Cards 3a – 3c
  - Card 3a – 3,000
  - Card 3b – 2,000
  - Card 3c – 1,000

### Steps to Follow:

1. **SAY** “In this activity, we are going to talk about the number of salmon in a river below a dam both before the dam was built and during the first four years after the dam was built.”

2. Display Resource 1: Number of Salmon Graph Poster for the student.

3. Indicate Resource 1.

**SAY** “This is a graph titled ‘**Number of Salmon in the River Below the Dam**’ (*indicate title*). This graph shows the number of salmon in a river below a dam both before the dam was built and during the first four years after the dam was built.”

4. **ASK** “What happened to the number of salmon in the river below the dam after the dam was built?”

5. Provide Resource 2: Cards 2a – 2c to the student. Indicate and read each Card.

a. Indicate Card 2a.

**SAY** “increased”

b. Indicate Card 2b.

**SAY** “decreased”

c. Indicate Card 2c.

**SAY** “stayed the same”



6. **ASK AGAIN** “What happened to the number of salmon in the river below the dam after the dam was built?”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

8. Indicate Card 2b.

**SAY** “The number of salmon in the river below the dam decreased after the dam was built.”

9. **ASK** “What is the most likely prediction of the number of salmon in the river below the dam in Year 5?”

10. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

a. Indicate Card 3a.

**SAY** “3,000”

b. Indicate Card 3b.

**SAY** “2,000”

c. Indicate Card 3c.

**SAY** “1,000”

11. **ASK AGAIN** “What is the most likely prediction of the number of salmon in the river below the dam in Year 5?”

12. Allow student to respond and record response.

13. Indicate Card 3c.

**SAY** “There will most likely be 1,000 salmon in the river below the dam in Year 5.”

14. **SAY** “We are now finished with this activity.”

## Scoring Guidance and Scaffolding

### Scaffolding:

1. After student makes first incorrect attempt, indicate Card 2b.

<b>SAY</b>	“The number of salmon in the river below the dam decreased after the dam was built.”
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2. **ASK** “What is the most likely prediction of the number of salmon in the river below the dam in Year 5?”

3. Provide Resource 3: Cards 3a – 3c to the student. Indicate and read each Card.

- a. Indicate Card 3a.

<b>SAY</b>	“3,000”
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- b. Indicate Card 3b.

<b>SAY</b>	“2,000”
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- c. Indicate Card 3c.

<b>SAY</b>	“1,000”
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4. **ASK AGAIN** “What is the most likely prediction of the number of salmon in the river below the dam in Year 5?”

5. Allow student to respond and record response.

6. Indicate Card 3c.

<b>SAY</b>	“There will most likely be 1,000 salmon in the river below the dam in Year 5.”
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7. **SAY** “We are now finished with this activity.”

### Correct answers are as follows:

1. What happened to the number of salmon in the river below the dam after the dam was built?
  - a. Card 2b – decreased
2. What is the most likely prediction of the number of salmon in the river below the dam in Year 5?
  - a. Card 3c – 1,000



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"><li>gives NO response.</li></ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify what happened to the number of salmon in the river below the dam after the dam was built (Card 2b);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li>is unable to predict the number of salmon in the river below the dam in Year 5 (Card 3c).</li></ul>	<p>The student <b>does not</b> demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify what happened to the number of salmon in the river below the dam after the dam was built (Card 2b);</li></ul> <p><b>and</b></p> <p>is unable to predict the number of salmon in the river below the dam in Year 5 (Card 3c).</p> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"><li>is unable to identify what happened to the number of salmon in the river below the dam after the dam was built (Card 2b);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li><b>after scaffolding</b>, is able to predict the number of salmon in the river below the dam in Year 5 (Card 3c).</li></ul>	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none"><li>is able to identify what happened to the number of salmon in the river below the dam after the dam was built (Card 2b);</li></ul> <p><b>and</b></p> <ul style="list-style-type: none"><li>is able to predict the number of salmon in the river below the dam in Year 5 (Card 3c).</li></ul>	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

