



**Connecticut
Alternate
Science
Assessment**

Grade 11 Performance Tasks

Earth Science

Storyline 1: Earth Systems

Storyline 2: Natural Resources

Life Science

Storyline 3: Living Organisms

Storyline 4: Healthy Ecosystems

Physical Science

Storyline 5: Forces and Motion

Storyline 6: Using Energy Every Day



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Earth Science

Storyline 1: Earth Systems

Storyline 2: Natural Resources



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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?

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
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"> 1. Using a model, describe the sun's warming effect on the Earth. (CTAS-HS-ESS2-4) 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) 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) 4. Make an observation of change to Earth materials after water has flowed through. (CTAS-HS-ESS2-5) 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) 6. From an investigation, identify the independent variable (the variable purposely changed) and a variable that was held constant. (CTAS-HS-ESS2-5)
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.	



NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
			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.”
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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 (<i>indicate thermometer</i>). The ice cream melts quickly at noon.”
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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 (<i>indicate thermometer</i>). The ice cream melts slowly at 8 o’clock at night.”
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6.

ASK	“When is it warmer? In the daytime (<i>indicate Resource 1a</i>) or in the nighttime (<i>indicate Resource 1b</i>)?”
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7.

	Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
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8. Indicate Resource 1a.

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

9.

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

ASK AGAIN	“Why is it warmer during the daytime?”
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12.

Allow student to respond and record response.

13. Indicate Card 2b.
- | | |
|------------|----------------------------------------------------------------------|
| SAY | “It is warmer during the daytime because there is more sun. ” |
|------------|----------------------------------------------------------------------|
14.

SAY	“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.

SAY	“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.

SAY	“because there is more rain ”
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- b. Indicate Card 2b.

SAY	“because there is more sun ”
------------	-------------------------------------

- c. Indicate Card 2c.

SAY	“because there is more wind ”
------------	--------------------------------------

4. **ASK AGAIN** “Why is it warmer during the daytime?”

5. Allow student to respond and record response.

6. Indicate Card 2b.

SAY	“It is warmer during the daytime because there is more sun. ”
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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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that it is warmer during the daytime (Resource 1a); andis unable to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify that it is warmer during the daytime (Resource 1a); andis unable to identify that the sun (Card 2b) is the reason why it is warmer during the daytime. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that it is warmer during the daytime (Resource 1a); andafter scaffolding, is able to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify that it is warmer during the daytime (Resource 1a); andis able to identify that the sun (Card 2b) is the reason why it is warmer during the daytime.	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.
- | | |
|------------|--------------------------------------------------------------------------------------------------------------------|
| SAY | “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.
- | | |
|------------|-----------|
| SAY | “Place 1” |
|------------|-----------|
- b. Indicate Card 2b.
- | | |
|------------|-----------|
| SAY | “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.
- | | |
|------------|-------------------------------------------------------------------------------------------------------------------------|
| SAY | “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.

SAY	“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.

SAY	“Place 1”
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- b. Indicate Card 2b.

SAY	“Place 2”
------------	-----------

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.

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

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

3. Indicate Resource 1.

SAY “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 (*indicate red X*).”

4. Display North America in Winter Poster for the student next to Resource 1.

5. Indicate Resource 2.

SAY “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 (*indicate red X*).”

6. **ASK** “During which season will Connecticut receive the most heat energy from the sun?”

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

a. Indicate Card 3a.

SAY “summer”

b. Indicate Card 3b.

SAY “winter”

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.

SAY	“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.

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

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.

SAY	“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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); andis 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).	<p>The student does not demonstrate understanding.</p>	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); andis 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). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); andafter scaffolding, 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).	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify that Connecticut will receive the most heat energy from the sun during the summer (Card 3a); andis 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).	<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.

SAY	“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.

SAY	“sand”
------------	--------

- b. Indicate Card 2b.

SAY	pebbles
------------	---------

- c. Indicate Card 2c.

SAY	“rocks”
------------	---------

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.

SAY	“The sand 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.

SAY	“Sand moved towards the top .”
------------	---------------------------------------

- b. Indicate Card 3b.

SAY	“All of the sand stayed in place .”
------------	--------------------------------------------



c. Indicate Card 3c.

SAY	“Sand moved towards the bottom. ”
------------	------------------------------------------

13. **ASK
AGAIN** “How did the water affect the sand?”

14. Allow student to respond and record response.

15. Indicate Card 3c.

SAY	“Sand moved towards the bottom. ”
------------	------------------------------------------

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



Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	"The sand was most affected by the flow of water in the stream."
------------	-------------------------------------------------------------------------

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.

SAY	"Sand moved towards the top ."
------------	---------------------------------------

- b. Indicate Card 3b.

SAY	"All of the sand stayed in place ."
------------	--------------------------------------------

- c. Indicate Card 3c.

SAY	"Sand moved towards the bottom ."
------------	------------------------------------------

4. **ASK** "How did the water affect the sand?"

AGAIN	
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5. Allow student to respond and record response.

6. Indicate Card 3c.

SAY	"Sand moved towards the bottom ."
------------	------------------------------------------

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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the sand (Card 2a) was most affected by the flow of water in the stream; andis unable to identify that sand moved towards the bottom (Card 3c).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify that the sand (Card 2a) was most affected by the flow of water in the stream; andis unable to identify that sand moved towards the bottom (Card 3c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the sand (Card 2a) was most affected by the flow of water in the stream; andafter scaffolding, is able to identify that sand moved towards the bottom (Card 3c).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify that the sand (Card 2a) was most affected by the flow of water in the stream; andis able to identify that sand moved towards the bottom (Card 3c).	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.

SAY	“thinner”
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c. Indicate Card 3c.

SAY	“the same”
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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.

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

12. Indicate Resource 4.

SAY	“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 ‘ Stream Table Data ’ (<i>indicate Resource 4</i>). This data table includes ‘ Characteristics ’ of the same stream (<i>indicate ‘Characteristics’ column</i>) ‘ Before ’ the fast flow of water (<i>indicate ‘Before’ column</i>) and ‘ After ’ 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.

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

b. Indicate Sentence Strip 5b.

SAY	“The depth of the stream decreased.”
------------	--------------------------------------

c. Indicate Sentence Strip 5c.

SAY	“The temperature of the stream stayed the same.”
------------	--------------------------------------------------



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.

SAY	“The stream has become wider .”
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2. Display Resource 4: Stream Table Data Table Poster for the student.

3. Indicate Resource 4.

SAY	“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 ‘ Stream Table Data ’ (<i>indicate Resource 4</i>). This data table includes ‘ Characteristics ’ of the same stream (<i>indicate ‘Characteristics’ column</i>) ‘ Before ’ the fast flow of water (<i>indicate ‘Before’ column</i>) and ‘ After ’ 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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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.

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

- b. Indicate Sentence Strip 5b.

SAY	“The depth of the stream decreased.”
------------	--------------------------------------

- c. Indicate Sentence Strip 5c.

SAY	“The temperature of the stream stayed the same.”
------------	--------------------------------------------------

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.

SAY	“The width of the stream increased.”
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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"> gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; and is unable to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> is able to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; and is unable to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; and after scaffolding, is able to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> is able to identify how the stream changed by becoming wider (Card 3a) from the first picture to the second picture; and is able to use the results of the investigation to identify that the width of the stream increased (Sentence Strip 5a). 	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.

SAY	“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.

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

SAY	“This is the stream table with fast flowing water.”
------------	-----------------------------------------------------
6.

SAY	“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.

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

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

a. Indicate Strip 4a.

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

SAY	“speed of water flow”
------------	-----------------------

c. Indicate Strip 4c.

SAY	“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.

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.”
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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.

SAY	“amount of sand in the table”
------------	-------------------------------

b. Indicate Strip 4c.

SAY	“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.

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.”
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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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the independent variable (Strip 4b); andis unable to identify the constant (Strip 4a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify the independent variable (Strip 4b); andis unable to identify the constant (Strip 4a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the independent variable (Strip 4b); andafter scaffolding, is able to identify the constant (Strip 4a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify the independent variable (Strip 4b); andis able to identify the constant (Strip 4a).	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.

SAY	“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.

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

SAY	“The pothole got smaller.”
------------	----------------------------

c. Indicate Sentence Strip 3c.

SAY	“The pothole stayed the same.”
------------	--------------------------------

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.

SAY	“After winter, the pothole got bigger.”
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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.

SAY	“Snow caused the size of the pothole to stay the same.”
------------	---------------------------------------------------------

b. Indicate Sentence Strip 4b.

SAY	“Ice caused the size of the pothole to get bigger.”
------------	-----------------------------------------------------

c. Indicate Sentence Strip 4c.

SAY	“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.

SAY	“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.

SAY	“After winter, the pothole got bigger.”
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2. **ASK** “Why did the size of the pothole change?”

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.

SAY	“Snow caused the size of the pothole to stay the same.”
------------	---------------------------------------------------------

- b. Indicate Sentence Strip 4b.

SAY	“Ice caused the size of the pothole to get bigger.”
------------	-----------------------------------------------------

- c. Indicate Sentence Strip 4c.

SAY	“Rain caused the size of the pothole to get smaller.”
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4. **ASK** “Why did the size of the pothole change?”

ASK AGAIN	“Why did the size of the pothole change?”
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5. Allow student to respond and record response.

	Allow student to respond and record response.
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6. Indicate Sentence Strip 4b.

SAY	“Ice caused the size of the pothole to get bigger.”
------------	-----------------------------------------------------

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

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



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?

NGSS Learning Progression	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
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"> 1. From a picture, identify one natural resource (e.g., fresh water, land, fossil fuels) that affects human activity. (CTAS-HS-ESS3-1) 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) 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) 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) 5. From a simple diagram, describe how electricity can be produced from flowing water (e.g., hydroelectric power). (CTAS-HS-ESS3-4) 6. Using a simple diagram, identify the impact of a change (e.g., increasing the amount of water that
	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.	

			<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 AGAIN** “Which part of this picture shows a natural resource?”

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

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">• gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that fresh water is the natural resource that is shown in the picture (Card 2a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">• after scaffolding, is able to identify that fresh water is the natural resource that is shown in the picture (Card 2a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">• is able to identify that fresh water is the natural resource that is shown in the picture (Card 2a).	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.

SAY	“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.”
------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2. Display Resource 1: Flow Chart 1 Poster for the student.

3. Indicate Resource 1.

- | | |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAY | “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.

- | | |
|------------|-----------------------------------------------------------------------------------------------------------|
| SAY | “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.

- | | |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAY | “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.” |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

7.

ASK	“Which picture should be placed in the second box of this flow chart?”
------------	------------------------------------------------------------------------

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

a. Indicate Card 3a.

SAY	“low water level in the lake”
------------	-------------------------------

b. Indicate Card 3b.

SAY	“high water level in the lake”
------------	--------------------------------

c. Indicate Card 3c.

SAY	“a lot of people at the lake”
------------	-------------------------------

d. Indicate Card 3d.

SAY	“no people at the lake”
------------	-------------------------

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.

SAY	“After no rain falls, there will be a low water level in the lake.”
------------	---------------------------------------------------------------------

12. Indicate Card 3a.

SAY	“Let’s place this picture in the second box of our flow chart.”
------------	-----------------------------------------------------------------

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.

SAY	“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.”
------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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.

SAY	“high water level in the lake”
------------	--------------------------------

b. Indicate Card 3c.

SAY	“a lot of people at the lake”
------------	-------------------------------

c. Indicate Card 3d.

SAY	“no people at the lake”
------------	-------------------------

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.

SAY	“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.”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

20. Indicate Card 3d.

SAY	“Let’s place this picture in the third box of our flow chart.”
------------	----------------------------------------------------------------

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.

SAY	“After no rain falls, there will be a low water level in the lake.”
------------	---------------------------------------------------------------------

2. Indicate Card 3a.

SAY	“Let’s place this picture in the second box of our flow chart.”
------------	-----------------------------------------------------------------

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.

SAY	“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.”
------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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.

SAY	“high water level in the lake”
------------	--------------------------------

b. Indicate Card 3c.

SAY	“a lot of people at the lake”
------------	-------------------------------

c. Indicate Card 3d.

SAY	“no people at the lake”
------------	-------------------------

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.

SAY	“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.”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

10. Indicate Card 3d.

SAY	“Let’s place this picture in the third box of our flow chart.”
------------	----------------------------------------------------------------

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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the picture to be placed in the second box of the flow chart (Card 3a); <p>and</p> <ul style="list-style-type: none">is unable to identify the picture to be placed in the third box of the flow chart (Card 3d).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">is able to identify the picture to be placed in the second box of the flow chart (Card 3a); <p>and</p> <ul style="list-style-type: none">is unable to identify the picture to be placed in the third box of the flow chart (Card 3d). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the picture to be placed in the second box of the flow chart (Card 3a); <p>and</p> <ul style="list-style-type: none">after scaffolding, is able to identify the picture to be placed in the third box of the flow chart (Card 3d).	<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">is able to identify the picture to be placed in the second box of the flow chart (Card 3a); <p>and</p> <ul style="list-style-type: none">is able to identify the picture to be placed in the third box of the flow chart (Card 3d).	<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.”
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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.”
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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.

SAY	“strong wind”
------------	---------------

d. Indicate Strip 2d.

SAY	“no wind”
------------	-----------

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.

SAY	“The corn crops may have turned brown and wilted because only light rain has fallen.”
------------	---------------------------------------------------------------------------------------

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.

SAY	“less water equals less food”
------------	-------------------------------

b. Indicate Strip 3b.

SAY	“less water equals more food”
------------	-------------------------------

c. Indicate Strip 3c.

SAY	“the amount of water has no effect on food”
------------	---------------------------------------------

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.

SAY	“Less water for the corn crops equals less food for humans.”
------------	--------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“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.

SAY	“less water equals less food”
------------	-------------------------------

- b. Indicate Strip 3b.

SAY	“less water equals more food”
------------	-------------------------------

- c. Indicate Strip 3c.

SAY	“the amount of water has no effect on food”
------------	---------------------------------------------

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.

SAY	“Less water for the corn crops equals less food for humans.”
------------	--------------------------------------------------------------

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

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.

SAY	“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 ‘ Amount of Corn Crops Produced Over Four Years. ’ The y-axis is labeled ‘ Amount of Corn Produced ’ (<i>indicate y-axis</i>). The x-axis is labeled ‘ Year ’ (<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.

SAY	“In 2010, there was high rainfall and few corn crops.”
------------	--------------------------------------------------------

b. Indicate Sentence Strip 3b.

SAY	“In 2011, there was low rainfall and few corn crops.”
------------	-------------------------------------------------------

c. Indicate Sentence Strip 3c.

SAY	“In 2012, there was low rainfall and few corn crops.”
------------	-------------------------------------------------------

d. Indicate Sentence Strip 3d.

SAY	“In 2013, there was high rainfall and few corn crops.”
------------	--------------------------------------------------------

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.

SAY	“In 2012, there was low rainfall and few corn crops.”
------------	-------------------------------------------------------

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.

SAY	"[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer."
------------	-----------------------------------------------------------------------------------------------------

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.

SAY	"In 2010, there was high rainfall and few corn crops."
------------	--------------------------------------------------------

- b. Indicate Sentence Strip 3b.

SAY	"In 2011, there was low rainfall and few corn crops."
------------	-------------------------------------------------------

- c. Indicate Sentence Strip 3c.

SAY	"In 2012, there was low rainfall and few corn crops."
------------	-------------------------------------------------------

- d. Indicate Sentence Strip 3d.

SAY	"In 2013, there was high rainfall and few corn crops."
------------	--------------------------------------------------------

4. **ASK** "What evidence in the graphs shows how the amount of rainfall affects the amount of corn crops that are grown?"
AGAIN

5. Allow student to respond and record response.

6. Indicate Sentence Strip 3c.

SAY	"In 2012, there was low rainfall and few corn crops."
------------	-------------------------------------------------------

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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">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).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">after scaffolding, 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).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">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).	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 (<i>trace from Dam to Turbine</i>). The turbine spins and moves the generator (<i>trace from Turbine to Generator; indicate Turbine pop-out</i>). The generator turns the energy into usable power.”
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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.
- | | |
|------------|--------------------------------------------------------------------------------------------------------|
| SAY | “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.
- | | |
|------------|--------|
| SAY | “wind” |
|------------|--------|
- b. Indicate Card 3b.
- | | |
|------------|---------|
| SAY | “solar” |
|------------|---------|
- c. Indicate Card 3c.
- | | |
|------------|------------|
| SAY | “electric” |
|------------|------------|
11. **ASK AGAIN** “What form of energy does the generator produce?”
12. Allow student to respond and record response.
13. Indicate Card 3c.
- | | |
|------------|---------------------------------------------------------------------|
| SAY | “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.

SAY	“Water flowing downhill is the first step that is needed to produce power with water in this diagram.”
------------	--------------------------------------------------------------------------------------------------------

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.

SAY	“wind”
------------	--------

- b. Indicate Card 3b.

SAY	“solar”
------------	---------

- c. Indicate Card 3c.

SAY	“electric”
------------	------------

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

ASK AGAIN	
----------------------------	--

5. Allow student to respond and record response.

6. Indicate Card 3c.

SAY	“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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); andis unable to identify that the generator produces electric energy from the spinning turbine (Card 3c).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); andis unable to identify that the generator produces electric energy from the spinning turbine (Card 3c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); andafter scaffolding, is able to identify that the generator produces electric energy from the spinning turbine (Card 3c).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify the first step that is needed to produce power in the diagram is water flowing downhill (Strip 2a); andis able to identify that the generator produces electric energy from the spinning turbine (Card 3c).	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.

SAY	"[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.

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

SAY	"medium amount of electricity"
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- c. Indicate Strip 2c.

SAY	"low amount of electricity"
------------	-----------------------------

- d. Indicate Strip 2d.

SAY	"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.

SAY	"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">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">after scaffolding, is able to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to describe the amount of electricity that is produced by a large amount of fast-moving water (Strip 2a).	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.

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

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

ASK	“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.

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

b. Indicate Sentence Strip 2b.

SAY	“Hydroelectric power produces more pollution than fossil fuels.”
------------	------------------------------------------------------------------

c. Indicate Sentence Strip 2c.

SAY	“Hydroelectric power costs less than fossil fuels.”
------------	-----------------------------------------------------

d. Indicate Sentence Strip 2d.

SAY	“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.

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

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

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"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a and Sentence Strip 2c); and • is unable to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • is able to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a and Sentence Strip 2c); and • is unable to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a and Sentence Strip 2c); and • after scaffolding, is able to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> • is able to describe two differences between hydroelectric power and fossil fuels (Sentence Strip 2a and Sentence Strip 2c); and • is able to describe the amount of electricity produced by the two electricity sources (Sentence Strip 3b). 	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.

SAY	“[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.

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.”
------------	--------------------------------------
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. **SAY** "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"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify either negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • is able to identify one negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c); <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • is unable to identify another negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify one negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c); <p style="text-align: center;">and</p> <ul style="list-style-type: none"> • after scaffolding, is able to identify a negative effect that building a dam can have on the environment (Sentence Strip 3a or Sentence Strip 3c). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> • is able to identify both negative effects that building a dam can have on the environment (Sentence Strip 3a and Sentence Strip 3c). 	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.

SAY	“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.

SAY	“3,000”
------------	---------

- b. Indicate Card 3b.

SAY	“2,000”
------------	---------

- c. Indicate Card 3c.

SAY	“1,000”
------------	---------

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.

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

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



**Connecticut
Alternate
Science
Assessment**

Grade 11 Performance Tasks

Life Science

Storyline 3: Living Organisms

Storyline 4: Healthy Ecosystems



Connecticut
Alternate
Science
Assessment

Life Science

Storyline 3: Living Organisms

Grade 11 Performance Task



Life Science
Storyline 3: Living Organisms
Grade 11 Performance Task

Guiding Questions: What are the organ systems and how are organ systems structured to promote survival? How does the human body maintain balance in order to survive? How are cells related to the complexity of an organism?

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
LS1.A Structure and Function	<p>HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>	<p>CTAS-HS-LS1-2 Use a model to show how the parts of a human organ system (e.g., nervous, muscular, circulatory, digestive, reproductive) and organ systems work together to perform functions.</p> <p>CTAS-HS-LS1-3 Use the results of an investigation as evidence that living systems respond to external change in order to maintain balance and survive.</p>	<ol style="list-style-type: none"> 1. Identify the basic function of one human organ system. (CTAS-HS-LS1-2) 2. Use a model to show how two organ systems work together to perform a function. (CTAS-HS-LS1-2) 3. Identify the human body system or system component and the way that it supports the human body (e.g., identify the system or organ that supports breathing, lungs/respiratory system). (CTAS-HS-LS1-2) 4. Use a model to relate the number of cells to the size of an organism. (CTAS-HS-LS1-4)
LS1.B Growth and Development of Organisms	<p>HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.</p>	<p>CTAS-HS-LS1-4 Use a model to show how cell changes (e.g., maintenance through division, differentiation, or multiplication) result in changes to the organism (e.g., growth, complexity).</p>	<ol style="list-style-type: none"> 5. Use a model to show that as the complexity of an organism increases, so does the number, type, and specialization of cells. (CTAS-HS-LS1-4) 6. Given an external change, identify the organism's response to the change increasing opportunities for survival (e.g., humans sweat to cool body when it is hot). (CTAS-HS-LS1-3)



NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
			7. Provided the results of an investigation, make a claim about the body's ability to maintain balance of a vital feature (i.e., temperature, heart rate, breathing rate). (CTAS-HS-LS1-3)
Appropriate Vocabulary	Organism, function, organ, organ system, survival, temperature, heart rate, breathing rate, cell, growth, waste, nutrients, absorbed, circulatory system, heart, artery, vein, absorbs, complexity, respiratory system, skeletal system, muscular system, bones, blood, complex		



Life Science
Storyline 3: Living Organisms
Grade 11 Performance Task

General Overview:

Students will complete a series of activities focused on human body systems, maintaining balance or homeostasis in the human body, and the complexity of organisms relative to their size. Students will identify the primary functions and relationships of human body systems. Students will evaluate the complexity of different organisms in terms of the number of cells. Students will investigate how the human body maintains balance or homeostasis given an external change and during exercise.

List of Materials Needed:

Teacher-Provided Resources:

There are no Teacher-Provided Resources that are 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: Parts of the Digestive System Poster
- Activity 1 Resource 2: Cards 2a – 2d
 - Card 2a – nutrients
 - Card 2b – blood
 - Card 2c – bones
 - Card 2d – organs
- Activity 2 Resource 1a: Skeletal System Poster
- Activity 2 Resource 1b: Muscular System Poster
- Activity 2 Resource 1c: Skeletal and Muscular Systems Working Together Poster
- Activity 2 Resource 2: Cards 2a – 2d
 - Card 2a – feel heat
 - Card 2b – smell flowers
 - Card 2c – think of ideas
 - Card 2d – raise a hand
- Activity 3 Resource 1: Respiratory System Poster
- Activity 3 Resource 2: Circulatory System Poster
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – breathing of air
 - Strip 3b – blood throughout the body
 - Strip 3c – food to be digested

Connecticut Alternate Science Assessment

Life Science

Storyline 3: Living Organisms

Grade 11 Performance Task

- Activity 4 Resource 1: Three Organisms Poster
- Activity 4 Resource 2: Cards 2a – 2c
 - Card 2a – dog
 - Card 2b – human
 - Card 2c – mouse
- Activity 5 Resource 1: Organisms Poster
- Activity 5 Resource 2: Cards 2a – 2c
 - Card 2a – Humans
 - Card 2b – Bacteria
 - Card 2c – Plants
- Activity 5 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – humans and plants more complex
 - Sentence Strip 3b – bacteria more complex
 - Sentence Strip 3c – plants as complex
- Activity 6 Resource 1: Cards 1a – 1d
 - Card 1a – winter
 - Card 1b – shiver
 - Card 1c – sweat
 - Card 1d – yawn
- Activity 7 Resource 1: Student Running Poster
- Activity 7 Resource 2: Heart Rate and Breathing Rate Before and During the Run Data Table Poster
- Activity 7 Resource 3: Strips 3a – 3c
 - Strip 3a – digest food
 - Strip 3b – breathe air
 - Strip 3c – pump blood

ACTIVITY 1

Essence Statement: CTAS-HS-LS1-2 Use a model to show how the parts of a human organ system (e.g., nervous, muscular, circulatory, digestive, reproductive) and organ systems work together to perform functions.

Core Extension 1: Identify the basic function of one human organ system. (CTAS-HS-LS1-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Parts of the Digestive System Poster
- Activity 1 Resource 2: Cards 2a – 2d
 - Card 2a – nutrients
 - Card 2b – blood
 - Card 2c – bones
 - Card 2d – organs

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about the digestive system.”
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2. Display Resource 1: Parts of the Digestive System Poster for the student.
3. Indicate Resource 1.

SAY	“Here is a picture that shows different parts of the digestive system. The main function of the digestive system is to change food into energy the body uses. The digestive process starts when you chew and swallow food in your mouth (<i>indicate mouth</i>). Then the food moves through the esophagus (<i>indicate esophagus</i>) to your stomach where it is broken down into smaller pieces (<i>indicate stomach</i>). Next, the smaller pieces move down through your small intestine (<i>indicate small intestine</i>). After the small intestine comes the large intestine (<i>indicate large intestine</i>), where things that the body does not need are collected. Finally, the unneeded waste is removed from the body through the anus (<i>indicate anus</i>).”
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4.

SAY	“The basic function of the digestive system is to change food into energy the body uses.”
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5.

ASK	“What does the digestive system do?”
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6. Provide Resource 2: Cards 2a – 2d to the student. Indicate and read each Card.
 - a. Indicate Card 2a.

SAY	“absorbs nutrients”
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 - b. Indicate Card 2b.

SAY	“absorbs blood”
------------	-----------------

c. Indicate Card 2c.

SAY	“absorbs bones”
------------	-----------------

d. Indicate Card 2d.

SAY	“absorbs organs”
------------	------------------

7. **ASK AGAIN** “What does the digestive system do?”

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

9. Indicate Card 2a.

SAY	“The digestive system absorbs nutrients from food.”
------------	-----------------------------------------------------

10. **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 the correct answer.”
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2. **ASK** “What does the digestive system do?”

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

a. Indicate Card 2a.

SAY	“absorbs nutrients”
------------	---------------------

b. Indicate Card 2b.

SAY	“absorbs blood”
------------	-----------------

c. Indicate Card 2c.

SAY	“absorbs bones”
------------	-----------------

d. Indicate Card 2d.

SAY	“absorbs organs”
------------	------------------

4. **ASK AGAIN** "What does the digestive system do?"
5. Allow student to respond and record response.
6. Indicate Card 2a.
- SAY** "The digestive system absorbs nutrients from food."
7. **SAY** "We are now finished with this activity."

The correct answer is as follows:

1. What does the digestive system do?
 - a. Card 2a – absorbs nutrients

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

ACTIVITY 2

Essence Statement: CTAS-HS-LS1-2 Use a model to show how the parts of a human organ system (e.g., nervous, muscular, circulatory, digestive, reproductive) and organ systems work together to perform functions.

Core Extension 2: Use a model to show how two organ systems work together to perform a function. (CTAS-HS-LS1-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1a: Skeletal System Poster
- Activity 2 Resource 1b: Muscular System Poster
- Activity 2 Resource 1c: Skeletal and Muscular Systems Working Together Poster
- Activity 2 Resource 2: Cards 2a – 2d
 - Card 2a – feel heat
 - Card 2b – smell flowers
 - Card 2c – think of ideas
 - Card 2d – raise a hand

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about the skeletal system and the muscular system. We will explore how these two systems work together.”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------
2. Display Resource 1a: Skeletal System Poster for the student.
3. Indicate Resource 1a.

SAY	“This is a picture of the ‘ Skeletal System ’. This picture shows the bones inside a person’s body (<i>indicate Skeletal System</i>). Bones support the shape of the body.”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
4. Display Resource 1b: Muscular System Poster for the student.
5. Indicate Resource 1b.

SAY	“This is a picture of the ‘ Muscular System ’. This picture shows the muscles inside the body (<i>indicate Muscular System</i>). Muscles extend and contract to help the body move.”
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6. Display Resource 1c: Skeletal and Muscular Systems Working Together Poster for the student.
7. Indicate Resource 1c.

SAY	“This picture shows the ‘ Skeletal and Muscular Systems Working Together ’.”
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8.

ASK	“When the skeletal and muscular systems work together, what can a person do?”
------------	-------------------------------------------------------------------------------
9. Provide Resource 2: Cards 2a – 2d to the student. Indicate and read each Card.

a. Indicate Card 2a.

SAY	“feel heat”
------------	-------------

b. Indicate Card 2b.

SAY	“smell flowers”
------------	-----------------

c. Indicate Card 2c.

SAY	“think of ideas”
------------	------------------

d. Indicate Card 2d.

SAY	“raise a hand”
------------	----------------

10. **ASK AGAIN** “When the skeletal and muscular systems work together, what can a person do?”

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

12. Indicate Card 2d.

SAY	“When the skeletal and muscular systems work together, a person can raise a hand.”
------------	------------------------------------------------------------------------------------

13. **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 the correct answer."
------------	-------------------------------------------------------------------------------------------

2. **ASK** "When the skeletal and muscular systems work together, what can a person do?"

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

- a. Indicate Card 2a.

SAY	"feel heat"
------------	-------------

- b. Indicate Card 2b.

SAY	"smell flowers"
------------	-----------------

- c. Indicate Card 2c.

SAY	"think of ideas"
------------	------------------

- d. Indicate Card 2d.

SAY	"raise a hand"
------------	----------------

4. **ASK AGAIN** "When the skeletal and muscular systems work together, what can a person do?"

5. Allow student to respond and record response.

6. Indicate Card 2d.

SAY	"When the skeletal and muscular systems work together, a person can raise a hand."
------------	------------------------------------------------------------------------------------

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

The correct answer is as follows:

1. When the skeletal and muscular systems work together, what can a person do?
 - a. Card 2d – raise a hand



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the skeletal and muscular systems allow people to raise a hand when they work together (Card 2d).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">after scaffolding, is able to identify that the skeletal and muscular systems allow people to raise a hand when they work together (Card 2d).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify that the skeletal and muscular systems allow people to raise a hand when they work together (Card 2d).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 3

Essence Statement: CTAS-HS-LS1-2 Use a model to show how the parts of a human organ system (e.g., nervous, muscular, circulatory, digestive, reproductive) and organ systems work together to perform functions.

Core Extension 3: Identify the human body system or system component and the way that it supports the human body (e.g., identify the system or organ that supports breathing, lungs/respiratory system). (CTAS-HS-LS1-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1: Respiratory System Poster
- Activity 3 Resource 2: Circulatory System Poster
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – breathing of air
 - Strip 3b – blood throughout the body
 - Strip 3c – food to be digested

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about the functions of different human body systems.”

2. Display Resource 1: Respiratory System Poster for the student.

3. Indicate Resource 1.

SAY “This is a model of the ‘**Respiratory System**’. The respiratory system includes the nose (*indicate nose*), mouth (*indicate mouth*), larynx (*indicate larynx*), trachea (*indicate trachea*), lungs (*indicate lungs*), and diaphragm (*indicate diaphragm*).”

4. Display Resource 2: Circulatory System Poster for the student.

5. Indicate Resource 2.

SAY “This is a model of the ‘**Circulatory System**’. The circulatory system includes the arteries (*indicate red artery*), the heart (*indicate heart*), and the veins (*indicate blue veins*).”

6. **ASK** “What is the main function of the respiratory system?”

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

a. Indicate Strip 3a.

SAY “support the breathing of air”

b. Indicate Strip 3b.

SAY	“move blood throughout the body”
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c. Indicate Strip 3c.

SAY	“take in food to be digested”
------------	-------------------------------

8. **ASK** “What is the main function of the respiratory system?”
AGAIN

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

10. Indicate Strip 3a.

SAY	“The main function of the respiratory system is to support the breathing of air.”
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11. **ASK** “What is the main function of the circulatory system?”

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

a. Indicate Strip 3a.

SAY	“support the breathing of air”
------------	--------------------------------

b. Indicate Strip 3b.

SAY	“move blood throughout the body”
------------	----------------------------------

c. Indicate Strip 3c.

SAY	“take in food to be digested”
------------	-------------------------------

13. **ASK** “What is the main function of the circulatory system?”
AGAIN

14. Allow student to respond and record response.

15. Indicate Strip 3b.

SAY	“The main function of the circulatory system is to move blood throughout the body.”
------------	-------------------------------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The main function of the respiratory system is to support the breathing of air.”
------------	-----------------------------------------------------------------------------------

2. **ASK** “What is the main function of the circulatory system?”

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

- a. Indicate Strip 3a.

SAY	“support the breathing of air”
------------	--------------------------------

- b. Indicate Strip 3b.

SAY	“move blood throughout the body”
------------	----------------------------------

- c. Indicate Strip 3c.

SAY	“take in food to be digested”
------------	-------------------------------

4. **ASK AGAIN** “What is the main function of the circulatory system?”

5. Allow student to respond and record response.

6. Indicate Strip 3b.

SAY	“The main function of the circulatory system is to move blood throughout the body.”
------------	-------------------------------------------------------------------------------------

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

Correct answers are as follows:

1. What is the main function of the respiratory system?
 - a. Strip 3a – support the breathing of air
2. What is the main function of the circulatory system?
 - a. Strip 3b – move blood throughout the body



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the main function of the respiratory system is to support the breathing of air (Strip 3a); andis unable to identify that the main function of the circulatory system is to move blood throughout the body (Strip 3b).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the main function of the respiratory system is to support the breathing of air (Strip 3a); andis unable to identify that the main function of the circulatory system is to move blood throughout the body (Strip 3b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the main function of the respiratory system is to support the breathing of air (Strip 3a); andafter scaffolding, is able to identify that the main function of the circulatory system is to move blood throughout the body (Strip 3b).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the main function of the respiratory system is to support the breathing of air (Strip 3a); andis able to identify to identify that the main function of the circulatory system is to move blood throughout the body (Strip 3b).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 4

Essence Statement: CTAS-HS-LS1-4 Use a model to show how cell changes (e.g., maintenance through division, differentiation, or multiplication) result in changes to the organism (e.g., growth, complexity).

Core Extension 4: Use a model to relate the number of cells to the size of an organism. (CTAS-HS-LS1-4)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Three Organisms Poster
- Activity 4 Resource 2: Cards 2a – 2c
 - Card 2a – dog
 - Card 2b – human
 - Card 2c – mouse

Steps to Follow:

1. **SAY** “In this activity, we are going to compare the number of cells in different living organisms. All living organisms are made of cells. Larger organisms have many more cells than smaller organisms.”

2. Display Resource 1: Three Organisms Poster for the student.

3. Indicate Resource 1.

SAY “We are going to compare three organisms: a dog (*indicate dog*), a human (*indicate human*), and a mouse (*indicate mouse*).”

4. **ASK** “Which organism is the largest?”

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

a. Indicate Card 2a.

SAY “dog”

b. Indicate Card 2b.

SAY “human”

c. Indicate Card 2c.

SAY “mouse”

6. **ASK AGAIN** “Which organism is the largest?”

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 human is the largest organism.”
------------	--------------------------------------

9. **ASK** “Which organism has the fewest number of cells?”

10. Provide remaining Resource 2: Card 2a and Card 2c to the student. Indicate and read each remaining Card.

a. Indicate Card 2a.

SAY	“dog”
------------	-------

b. Indicate Card 2c.

SAY	“mouse”
------------	---------

11. **ASK AGAIN** “Which organism has the fewest number of cells?”

12. Allow student to respond and record response.

13. Indicate Card 2c.

SAY	“The mouse has the fewest number of cells.”
------------	---------------------------------------------

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



Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The human is the largest organism.”
------------	--------------------------------------

2. **ASK** “Which organism has the fewest number of cells?”

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

- a. Indicate Card 2a.

SAY	“dog”
------------	-------

- b. Indicate Card 2c.

SAY	“mouse”
------------	---------

4. **ASK AGAIN** “Which organism has the fewest number of cells?”

5. Allow student to respond and record response.

6. Indicate Card 2c.

SAY	“The mouse has the fewest number of cells.”
------------	---------------------------------------------

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

Correct answers are as follows:

1. Which organism is the largest?
 - a. Card 2b – human
2. Which organism has the fewest number of cells?
 - a. Card 2c – mouse

On average, humans have 37 trillion cells and mice have 1.2 trillion cells.

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to determine that the human organism is the largest (Card 2b); and • is unable to determine that the mouse has the fewest number of cells (Card 2c). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • is able to determine that the human organism is the largest (Card 2b); and • is unable to determine that the mouse has the fewest number of cells (Card 2c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to determine that the human organism is the largest (Card 2b); and • after scaffolding, is able to determine that the mouse has the fewest number of cells (Card 2c). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> • is able to determine that the human organism is the largest (Card 2b); and • is able to determine that the mouse has the fewest number of cells (Card 2c). 	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 5

Essence Statement: CTAS-HS-LS1-4 Use a model to show how cell changes (e.g., maintenance through division, differentiation, or multiplication) results in changes to the organism (e.g., growth, complexity).

Core Extension 5: Use a model to show that as the complexity of an organism increases, so does the number, type, and specialization of cells. (CTAS-HS-LS1-4)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Organisms Poster
- Activity 5 Resource 2: Cards 2a – 2c
 - Card 2a – Humans
 - Card 2b – Bacteria
 - Card 2c – Plants
- Activity 5 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – humans and plants more complex
 - Sentence Strip 3b – bacteria more complex
 - Sentence Strip 3c – plants as complex

Steps to Follow:

1. **SAY** “In this activity, we are going to explore the number of different cell types that organisms have. There are many different types of organisms. Some organisms have different types of cells.”

2. Display Resource 1: Organisms Poster for the student.

3. Indicate Resource 1.

SAY “This picture shows three different organisms: humans, bacteria, and plants. Humans have many different types of cells to do many different types of jobs (*indicate Humans*) to help them survive. Bacteria have only one type of cell to do all of the jobs to survive (*indicate Bacteria*). Plants have more types of cells than bacteria to do the jobs plants need to survive (*indicate Plants*).”

4. **ASK** “Which of these organisms are the most complex and have the most types of cells?”

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

a. Indicate Card 2a.

SAY “Humans”

b. Indicate Card 2b.

SAY “Bacteria”

c. Indicate Card 2c.

SAY “Plants”

6. **ASK AGAIN** “Which of these organisms are the most complex and have the most types of cells?”

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

8. Indicate Card 2a.

SAY “Compared to plants and bacteria, humans are the most complex organism.”

9. **ASK** “Which statement about the complexity of these organisms is true?”

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

a. Indicate Sentence Strip 3a.

SAY “Humans and plants are more complex than bacteria.”

b. Indicate Sentence Strip 3b.

SAY “The bacteria are more complex than humans and plants.”

c. Indicate Sentence Strip 3c.

SAY “Plants are as complex as bacteria.”

11. **ASK AGAIN** “Which statement about the complexity of these organisms is true?”

12. Allow student to respond and record response.

13. Indicate Sentence Strip 3a.

SAY “Humans and plants are more complex than bacteria.”

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“Compared to plants and bacteria, humans are the most complex organism.”
------------	--------------------------------------------------------------------------

2. **ASK** “Which statement about the complexity of these organisms is true?”

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

- a. Indicate Sentence Strip 3a.

SAY	“Humans and plants are more complex than bacteria.”
------------	-----------------------------------------------------

- b. Indicate Sentence Strip 3b.

SAY	“The bacteria are more complex than humans and plants.”
------------	---------------------------------------------------------

- c. Indicate Sentence Strip 3c.

SAY	“Plants are as complex as bacteria.”
------------	--------------------------------------

4. **ASK AGAIN** “Which statement about the complexity of these organisms is true?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 3a.

SAY	“Humans and plants are more complex than bacteria.”
------------	-----------------------------------------------------

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

Correct answers are as follows:

1. Which of these organisms are the most complex and have the most types of cells?
 - a. Card 2a – Humans
2. Which statement about the complexity of these organisms is true?
 - a. Sentence Strip 3a – Humans and plants are more complex than bacteria.



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to compare organisms and identify that the most complex organisms are humans (Card 2a); andis unable to identify that humans and plants are more complex than bacteria. (Sentence Strip 3a).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to compare organisms and identify that the most complex organisms are humans (Card 2a); andis unable to identify that humans and plants are more complex than bacteria (Sentence Strip 3a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to compare organisms and identify that the most complex organisms are humans (Card 2a); andafter scaffolding, is able to identify that humans and plants are more complex than bacteria (Sentence Strip 3a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
<p>Student...</p> <ul style="list-style-type: none">is able to compare organisms and identify that the most complex organisms are humans (Card 2a); andis able to identify that humans and plants are more complex than bacteria (Sentence Strip 3a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 6

Essence Statement: CTAS-HS-LS1-3 Use the results of an investigation as evidence that living systems respond to external change in order to maintain balance and survive.

Core Extension 6: Given an external change, identify the organism’s response to the change increasing opportunities for survival (e.g., humans sweat to cool body when it is hot). (CTAS-HS-LS1-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 6 Resource 1: Cards 1a – 1d
 - Card 1a – winter
 - Card 1b – shiver
 - Card 1c – sweat
 - Card 1d – yawn

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how the human body responds to different temperatures.”

2. Display Resource 1: Card 1a to the student.

3. Indicate Card 1a.

SAY “Scientists have observed that humans respond differently to changes in temperature. In the winter, the temperature outside can drop several degrees and it may start to snow.”

4. **ASK** “How does the human body respond in the winter when the temperature is very cold?”

5. Provide Resource 1: Cards 1b – 1d to the student. Indicate and describe each Card.

a. Indicate Card 1b.

SAY “The human body begins to **shiver**.”

b. Indicate Card 1c.

SAY “The human body begins to **sweat**.”

c. Indicate Card 1d.

SAY “The human body begins to **yawn**.”

6. **ASK AGAIN** “How does the human body respond in the winter when the temperature is very cold?”

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

8. Indicate Card 1b.

SAY	“The human body begins to shiver when the temperature is very cold.”
------------	-----------------------------------------------------------------------------

9. **ASK** “How does the human body respond in the summer when the temperature is very hot?”

10. Provide remaining Resource 1: Card 1c and Card 1d to the student. Indicate and describe each remaining Card.

a. Indicate Card 1c.

SAY	“The human body begins to sweat .”
------------	-------------------------------------------

b. Indicate Card 1d.

SAY	“The human body begins to yawn .”
------------	------------------------------------------

11. **ASK AGAIN** “How does the human body respond in the summer when the temperature is very hot?”

12. Allow student to respond and record response.

13. Indicate Card 1c.

SAY	“The human body begins to sweat in the summer when the temperature is very hot.”
------------	-----------------------------------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The human body begins to shiver when the temperature is very cold.”
------------	-----------------------------------------------------------------------------

2. **ASK** “How does the human body respond in the summer when the temperature is very hot?”

3. Provide remaining Resource 1: Card 1c and Card 1d to the student. Indicate and describe each remaining Card.

- a. Indicate Card 1c.

SAY	“The human body begins to sweat .”
------------	-------------------------------------------

- b. Indicate Card 1d.

SAY	“The human body begins to yawn .”
------------	------------------------------------------

4. **ASK AGAIN** “How does the human body respond in the summer when the temperature is very hot?”

5. Allow student to respond and record response.

6. Indicate Card 1c.

SAY	“The human body begins to sweat in the summer when the temperature is very hot.”
------------	-----------------------------------------------------------------------------------------

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

Correct answers are as follows:

1. How does the human body respond in the winter when the temperature is very cold?
 - a. Card 1b – shiver
2. How does the human body respond in the summer when the temperature is very hot?
 - a. Card 1c – sweat



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the human body begins to shiver in the winter when the temperature is very cold (Card 1b); andis unable to identify that the human body begins to sweat in the summer when the temperature is very hot (Card 1c).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">is able to identify the human body begins to shiver in the winter when the temperature is very cold (Card 1b); andis unable to identify that the human body begins to sweat in the summer when the temperature is very hot (Card 1c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the human body begins to shiver in the winter when the temperature is very cold (Card 1b); andafter scaffolding, is able to identify that the human body begins to sweat in the summer when the temperature is very hot (Card 1c).	<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">is able to identify the human body begins to shiver in the winter when the temperature is very cold (Card 1b); andis able to identify that the human body begins to sweat in the summer when the temperature is very hot (Card 1c).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 7

Essence Statement: CTAS-HS-LS1-3 Use the results of an investigation as evidence that living systems respond to external change in order to maintain balance and survive.

Core Extension 7: Provided the results of an investigation, make a claim about the body’s ability to maintain balance of a vital feature (i.e., temperature, heart rate, breathing rate). (CTAS-HS-LS1-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 7 Resource 1: Student Running Poster
- Activity 7 Resource 2: Heart Rate and Breathing Rate Before and During the Run Data Table Poster
- Activity 7 Resource 3: Strips 3a – 3c
 - Strip 3a – digest food
 - Strip 3b – breathe air
 - Strip 3c – pump blood

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about measurements that a student took before and during a run. The student measured her heart rate and her breathing rate before and during the run.”
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2. Display Resource 1: Student Running Poster for the student.

3. Indicate Resource 1.

SAY	“This student is running around the track at her school.”
------------	-----------------------------------------------------------

4. Display Resource 2: Heart Rate and Breathing Rate Before and During the Run Data Table Poster for the student.

5. Indicate Resource 2.

SAY	“The student recorded her heart rate in this data table before and during her run. Before her run, the student’s heart rate was 60 beats per minute (<i>indicate ‘Heart Rate’ column before the run</i>). This is called a resting heart rate. During her run, the student’s heart rate increased to 120 beats per minute (<i>indicate ‘Heart Rate’ column during the run</i>). This is called an active heart rate.”
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6.

ASK	“Why does the student’s heart rate increase during her run?”
------------	--------------------------------------------------------------

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

- a. Indicate Strip 3a.

SAY	“to digest more food”
------------	-----------------------

b. Indicate Strip 3b.

SAY	“to breathe more air”
------------	-----------------------

c. Indicate Strip 3c.

SAY	“to pump more blood”
------------	----------------------

8. **ASK AGAIN** “Why does the student’s heart rate increase during her run?”

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

10. Indicate Strip 3c.

SAY	“The student’s heart rate increased during her run to pump more blood.”
------------	-------------------------------------------------------------------------

11. Indicate Resource 2.

SAY	“The student also recorded her breathing rate in this data table before and during her run. Before her run, the student’s breathing rate was 15 breaths per minute (<i>indicate ‘Breathing Rate’ column before the run</i>). This is called a resting breathing rate. During her run, the student’s breathing rate increased to 30 breaths per minute (<i>indicate ‘Breathing Rate’ column during the run</i>). This is called an active breathing rate.”
------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

12. **ASK** “Why does the student’s breathing rate increase during her run?”

13. Provide remaining Resource 3: Strip 3a and Strip 3b to the student. Indicate and read each remaining Strip.

a. Indicate Strip 3a.

SAY	“to digest more food”
------------	-----------------------

b. Indicate Strip 3b.

SAY	“to breathe more air”
------------	-----------------------

14. **ASK AGAIN** “Why does the student’s breathing rate increase during her run?”

15. Allow student to respond and record response.

16. Indicate Strip 3b.

SAY	“The student’s breathing rate increased during her run to breathe more air.”
------------	------------------------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The student’s heart rate increased during her run to pump more blood.”
------------	-------------------------------------------------------------------------

2. Indicate Resource 2.

SAY	“The student also recorded her breathing rate in this data table before and during her run. Before her run, the student’s breathing rate was 15 breaths per minute (<i>indicate ‘Breathing Rate’ column before the run</i>). This is called a resting breathing rate. During her run, the student’s breathing rate increased to 30 breaths per minute (<i>indicate ‘Breathing Rate’ column during the run</i>). This is called an active breathing rate.”
------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

3. **ASK** “Why does the student’s breathing rate increase during her run?”

4. Provide remaining Resource 3: Strip 3a and Strip 3b to the student. Indicate and read each remaining Strip.

a. Indicate Strip 3a.

SAY	“to digest more food”
------------	-----------------------

b. Indicate Strip 3b.

SAY	“to breathe more air”
------------	-----------------------

5. **ASK AGAIN** “Why does the student’s breathing rate increase during her run?”

6. Allow student to respond and record response.

7. Indicate Strip 3b.

SAY	“The student’s breathing rate increased during her run to breathe more air.”
------------	------------------------------------------------------------------------------

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

Correct answers are as follows:

1. Why does the student’s heart rate increase during her run?
 - a. Strip 3c – to pump more blood
2. Why does the student’s breathing rate increase during her run?
 - a. Strip 3b – to breathe more air

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify why the student’s heart rate increases during her run (Strip 3c); and • is unable to identify why the student’s breathing rate increases during her run (Strip 3b). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • is able to identify why the student’s heart rate increases during her run (Strip 3c); and • is unable to identify why the student’s breathing rate increases during her run (Strip 3b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify why the student’s heart rate increases during her run (Strip 3c); and • after scaffolding, is able to identify why the student’s breathing rate increases during her run (Strip 3b). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> • is able to identify why the student’s heart rate increases during her run (Strip 3c); and • is able to identify why the student’s breathing rate increases during her run (Strip 3b). 	The student demonstrates understanding independently without scaffolding.	2



Connecticut
Alternate
Science
Assessment

Life Science

Storyline 4: Healthy Ecosystems

Grade 11 Performance Task



Life Science

Storyline 4: Healthy Ecosystems

Grade 11 Performance Task

Guiding Questions: What factors limit populations in an ecosystem? How can humans design solutions that contribute to a healthier environment? How does group behavior, adaptation, natural selection, and environmental conditions impact the organisms’ ability to survive and reproduce?

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
LS2.A Interdependent Relationships in Ecosystems	HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	CTAS-HS-LS2-1 Use data to explain the factors that affect the limits on plant and animal populations in an ecosystem.	<ol style="list-style-type: none"> 1. Identify two factors that affect the limits on plant or animal populations in an ecosystem. (CTAS-HS-LS2-1) 2. Recognize a group behavior (e.g., flocking, hunting in a pack) in animals. (CTAS-HS-LS2-8) 3. Describe two effects of a human activity on the environment. (CTAS-HS-LS2-7) 4. Use data from a table or graph to explain how a factor limits a plant or animal population in an ecosystem. (CTAS-HS-LS2-1) 5. Given a solution for reducing human impact on the environment, identify a positive and negative aspect. (CTAS-HS-LS2-7) 6. Given a scenario, use evidence to show how a group behavior helps plants or animals survive and reproduce. (CTAS-HS-LS2-8)
LS2.C Ecosystem Dynamics, Functioning, and Resilience	<p>HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*</p> <p>HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce.</p>	<p>CTAS-HS-LS2-7 Evaluate a possible solution for reducing the impact of human activities on the environment, including plants and animals.*</p> <p>CTAS-HS-LS2-8 Use evidence to show how group behaviors help animals survive and reproduce.</p>	

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
LS4.C Adaptation	<p>HS-LS4-4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p> <p>HS-LS4-5 Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>	<p>CTAS-HS-LS4-4/5 Use evidence to explain how natural selection leads to adaptation, growth, and/or possible extinction of populations of organisms and/or species.</p>	<p>7. Given several traits, identify one that varies and is passed on to offspring within a population of organisms. (CTAS-HS-LS4-5)</p> <p>8. Given an environmental change, determine which physical adaptation would ensure the survival of a population. (CTAS-HS-LS4-4/5)</p> <p>9. Given a scenario, use a graph or table to identify a cause and effect relationship between natural selection and an adaptation. (CTAS-HS-LS4-4/5)</p>
Appropriate Vocabulary	Population, ecosystem, environment, limit, survival, trait, adaptation, positive, negative, alert, physical trait, shelter, predator, behavior, seed, beak, climate, offspring		

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



Life Science

Storyline 4: Healthy Ecosystems Grade 11 Performance Task

General Overview:

This performance task will focus on plant and animal populations in an ecosystem. In this performance task, students will investigate what factors affect the size of different populations that live in an area, how animals work in groups, and how they adapt over time. Students will also consider human impacts on the plants and animals in our environment.

List of Materials Needed:

Teacher-Provided Resources:

There are no Teacher-Provided Resources that are 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: Forest Ecosystem Poster
- Activity 1 Resource 2: Strips 2a – 2d
 - Strip 2a – food
 - Strip 2b – rocks
 - Strip 2c – wind
 - Strip 2d – water
- Activity 2 Resource 1: Strips 1a – 1c
 - Strip 1a – One Duck in Pond Poster
 - Strip 1b: Two Ducks in Pond Poster
 - Strip 1c: Ducks in V-Pattern Poster
- Activity 3 Resource 1: Healthy Forest Poster
- Activity 3 Resource 2: Unhealthy Forest Poster
- Activity 3 Resource 3: Sentence Strips 3a – 3d
 - Sentence Strip 3a – less food
 - Sentence Strip 3b – fewer trees
 - Sentence Strip 3c – less sunlight
 - Sentence Strip 3d – less rain water
- Activity 4 Resource 1: Birds and Trees in a Forest Data Table Poster
- Activity 4 Resource 2: Statement Poster

- Activity 4 Resource 3: Cards 3a – 3d
 - Card 3a – increased
 - Card 3b – increase
 - Card 3c – decreased
 - Card 3d – decrease
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – less shelter
 - Sentence Strip 4b – more water
 - Sentence Strip 4c – less sunlight
- Activity 5 Resource 1: Sentence Strips 1a – 1d
 - Sentence Strip 1a – birds/nest
 - Sentence Strip 1b – deer/grass
 - Sentence Strip 1c – deer/predators
 - Sentence Strip 1d – birds/hide
- Activity 6 Resource 1: Deer Behavior Poster
- Activity 6 Resource 2: Sentence Strips 2a – 2d
 - Sentence Strip 2a – field
 - Sentence Strip 2b – coyote
 - Sentence Strip 2c – foot
 - Sentence Strip 2d – tail
- Activity 7 Resource 1: Squirrel Poster
- Activity 7 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – grey
 - Sentence Strip 2b – tail
 - Sentence Strip 2c – tree
- Activity 8 Resource 1: Mild Forest Ecosystem Climate Poster
- Activity 8 Resource 2: Arctic Forest Ecosystem Climate Poster
- Activity 8 Resource 3: Strips 3a – 3d
 - Strip 3a – long ears
 - Strip 3b – wide paws
 - Strip 3c – webbed feet
 - Strip 3d – thick fur
- Activity 9 Resource 1: Bird Beaks Over Time Data Table Poster
- Activity 9 Resource 2: Sentence Strips 2a – 2d
 - Sentence Strip 2a – large
 - Sentence Strip 2b – small
 - Sentence Strip 2c – broken shells
 - Sentence Strip 2d – not grow

ACTIVITY 1

Essence Statement: CTAS-HS-LS2-1 Use data to explain the factors that affect the limits on plant and animal populations in an ecosystem.

Core Extension 1: Identify two factors that affect the limits on plant or animal populations in an ecosystem. (CTAS-HS-LS2-1)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Forest Ecosystem Poster
- Activity 1 Resource 2: Strips 2a – 2d
 - Strip 2a – food
 - Strip 2b – rocks
 - Strip 2c – wind
 - Strip 2d – water

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about deer in a forest ecosystem.”
------------	----------------------------------------------------------------------------
2. Display Resource 1: Forest Ecosystem Poster for the student.
3. Indicate Resource 1.

SAY	“This is a forest ecosystem. The forest has lots of trees, berry bushes, and green grass. The deer eat the grass and drink water from the stream. The wind blows through the forest.”
------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
4.

ASK	“What is one factor that affects the number of deer that can survive in the forest ecosystem?”
------------	------------------------------------------------------------------------------------------------
5. Provide Resource 2: Strips 2a – 2d to the student. Indicate and read each Strip.
 - a. Indicate Strip 2a.

SAY	“amount of food”
------------	------------------
 - b. Indicate Strip 2b.

SAY	“size of rocks”
------------	-----------------
 - c. Indicate Strip 2c.

SAY	“direction of wind”
------------	---------------------
 - d. Indicate Strip 2d.

SAY	“clean water”
------------	---------------
6.

ASK AGAIN	“What is one factor that affects the number of deer that can survive in the forest ecosystem?”
----------------------	------------------------------------------------------------------------------------------------

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. If the student chose a correct answer, reiterate the student's correct answer. Set chosen Strip aside.
9.

ASK	"What is another one factor that affects the number of deer that can survive in the forest ecosystem?"
------------	--------------------------------------------------------------------------------------------------------
10. Provide remaining Resource 2: Strips 2a – 2d to the student. Indicate and read each remaining Strip.
 - a. Indicate Strip 2a.

SAY	"amount of food"
------------	------------------
 - b. Indicate Strip 2b.

SAY	"size of rocks"
------------	-----------------
 - c. Indicate Strip 2c.

SAY	"direction of wind"
------------	---------------------
 - d. Indicate Strip 2d.

SAY	"clean water"
------------	---------------
11.

ASK AGAIN	"What is another one factor that affects the number of deer that can survive in the forest ecosystem?"
------------------	--------------------------------------------------------------------------------------------------------
12. Allow student to respond and record response.
13. If the student chose a correct answer, reiterate the student's correct answer. Set chosen Strip aside.
14.

SAY	"We are now finished with this activity."
------------	-------------------------------------------

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“Like people, deer need clean water to live. Clean water affects the size of the deer population in the forest ecosystem.”
------------	----------------------------------------------------------------------------------------------------------------------------

2. **ASK** “What is another one factor that affects the number of deer that can survive in the forest ecosystem?”

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

- a. Indicate Strip 2a.

SAY	“amount of food”
------------	------------------

- b. Indicate Strip 2b.

SAY	“size of rocks”
------------	-----------------

- c. Indicate Strip 2c.

SAY	“direction of wind”
------------	---------------------

4. **ASK AGAIN** “What is another one factor that affects the number of deer that can survive in the forest ecosystem?”

5. Allow student to respond and record response.

6. If the student chose a correct answer, reiterate the student’s correct answer. Set chosen Strip aside.

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

Correct answers are as follows:

1. What is one factor that affects the number of deer that can survive in the forest ecosystem?
 - a. Strip 2a – amount of food

OR

 - b. Strip 2d – clean water
2. What is another factor that affects the number of deer that can survive in the forest ecosystem?
 - a. Strip 2a – amount of food

OR

 - b. Strip 2d – clean water

Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"> gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify one factor that affects the size of the deer population in the forest ecosystem (Strip 2a); and is unable to identify another factor that affects the size of the deer population in the forest ecosystem (Strip 2d). 	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"> is able to identify one factor that affects the size of the deer population in the forest ecosystem (Strip 2a); and is unable to identify another factor that affects the size of the deer population in the forest ecosystem (Strip 2d). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify one factor that affects the size of the deer population in the forest ecosystem (Strip 2d); and after scaffolding, is able to identify another factor that affects the size of the deer population in the forest ecosystem (Strip 2a). 	<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"> is able to identify one factor that affects the size of the deer population in the forest ecosystem (Strip 2a); and is able to identify another factor that affects the size of the deer population in the forest ecosystem (Strip 2d). 	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 2

Essence Statement: CTAS-HS-LS2-8 Use evidence to show how group behaviors help animals survive and reproduce.

Core Extension 2: Recognize a group behavior (e.g., flocking, hunting in a pack) in animals. (CTAS-HS-LS2-8)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Strips 1a – 1c
 - Strip 1a – One Duck in Pond Poster
 - Strip 1b: Two Ducks in Pond Poster
 - Strip 1c: Ducks in V-Pattern Poster

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how ducks can participate in a group behavior to help the ducks to survive.”
2. **ASK** “Which picture shows a group behavior that helps the ducks survive?”
3. Provide Resource 1: Strips 1a – 1c to the student. Indicate and describe each Strip.
 - a. Indicate Strip 1a.

SAY	“This picture shows one duck sitting in a pond.”
------------	--------------------------------------------------
 - b. Indicate Strip 1b.

SAY	“This picture shows a duck sitting in a pond and another duck sitting on the grass beside the pond.”
------------	------------------------------------------------------------------------------------------------------
 - c. Indicate Strip 1c.

SAY	“This picture shows many ducks flying together in a V-pattern.”
------------	-----------------------------------------------------------------
4. **ASK AGAIN** “Which picture shows a group behavior that helps the ducks survive?”
5. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
6. Indicate Strip 1c.

SAY	“Many ducks flying together in a V-pattern shows a group behavior that helps the ducks to survive.”
------------	-----------------------------------------------------------------------------------------------------
7. **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.

SAY	"[Insert description of incorrect Strip chosen by the student] is not the correct answer."
------------	--------------------------------------------------------------------------------------------

2.

ASK	"Which picture shows a group behavior that helps the ducks survive?"
------------	----------------------------------------------------------------------

3. Provide remaining Strips 1a – 1c to the student. Indicate and describe each remaining Strip.

- a. Indicate Strip 1a.

SAY	"This picture shows one duck sitting in a pond."
------------	--------------------------------------------------

- b. Indicate Strip 1b.

SAY	"This picture shows a duck sitting in a pond and another duck sitting on the grass beside the pond."
------------	------------------------------------------------------------------------------------------------------

- c. Indicate Strip 1c.

SAY	"This picture shows many ducks flying together in a V-pattern."
------------	-----------------------------------------------------------------

4.

ASK AGAIN	"Which picture shows a group behavior that helps the ducks survive?"
----------------------	----------------------------------------------------------------------

5. Allow student to respond and record response.

6. Indicate Strip 1c.

SAY	"Many ducks flying together in a V-pattern shows a group behavior that helps the ducks to survive."
------------	-----------------------------------------------------------------------------------------------------

7.

SAY	"We are now finished with this activity."
------------	-------------------------------------------

The correct answer is as follows:

1. Which picture shows a group behavior that helps the ducks survive?
 - a. Strip 1c – Many ducks flying together in a V-pattern shows a group behavior that helps the ducks to survive.

The survival benefit of ducks flying in a V-pattern is to save energy by getting free uplifts from the duck before it. "It can save energy by mooching off the air flow created by its flock-mate... Birds at the back of the V-pattern have slower heart rates than those in the front and flapped less often."

Reference

Yong, E. (2016, January 26). *Birds That Fly in a V-Formation Use An Amazing Trick*. Retrieved January 25, 2018, from <http://phenomena.nationalgeographic.com/2014/01/15/birds-that-fly-in-a-v-formation-use-an-amazing-trick/>

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify the ducks participating in a group behavior for survival (Strip 1c). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • after scaffolding, is able to identify the ducks participating in a group behavior for survival (Strip 1c). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none"> • is able to identify the ducks participating in a group behavior for survival (Strip 1c). 	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 3

Essence Statement: CTAS-HS-LS2-7 Evaluate a possible solution for reducing the impact of human activities on the environment, including plants and animals.*

Core Extension 3: Describe two effects of a human activity on the environment. (CTAS-HS-LS2-7)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1: Healthy Forest Poster
- Activity 3 Resource 2: Unhealthy Forest Poster
- Activity 3 Resource 3: Sentence Strips 3a – 3d
 - Sentence Strip 3a – less food
 - Sentence Strip 3b – fewer trees
 - Sentence Strip 3c – less sunlight
 - Sentence Strip 3d – less rain water

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about deer that live in a forest.”
------------	----------------------------------------------------------------------------
2. Display Resource 1: Healthy Forest Poster for the student.
3. Display Resource 2: Unhealthy Forest Poster for the student.
4. Indicate Resource 1.

SAY	“In the forest, there are several deer, many trees, the grass is green, and there are plenty of berry bushes.”
------------	----------------------------------------------------------------------------------------------------------------
5. Indicate Resource 2.

SAY	“People came to cut down the trees in the same forest. Now the forest does not have many trees, there is only one deer, the grass is brown and damaged, and there are fewer berry bushes.”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
6.

ASK	“What is one way that humans cutting down the trees in the forest affect the plants and animals in the forest?”
------------	-----------------------------------------------------------------------------------------------------------------
7. Provide Resource 3: Sentence Strips 3a – 3d to the student. Indicate and read each Sentence Strip.
 - a. Indicate Sentence Strip 3a.

SAY	“There is less food for the deer to eat.”
------------	-------------------------------------------
 - b. Indicate Sentence Strip 3b.

SAY	“There are fewer trees for shelter.”
------------	--------------------------------------
 - c. Indicate Sentence Strip 3c.

SAY	“There is less sunlight reaching the forest floor.”
------------	-----------------------------------------------------

d. Indicate Sentence Strip 3d.

SAY	“There is less rain water for animals to drink.”
------------	--------------------------------------------------

8. **ASK AGAIN** “What is one way that humans cutting down the trees in the forest affect the plants and animals in the forest?”

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

10. If the student chose a correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.

11. **ASK** “What is another way that humans cutting down the trees in the forest affect the plants and animals in the forest?”

12. 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 is less food for the deer to eat.”
------------	-------------------------------------------

b. Indicate Sentence Strip 3b.

SAY	“There are fewer trees for shelter.”
------------	--------------------------------------

c. Indicate Sentence Strip 3c.

SAY	“There is less sunlight reaching the forest floor.”
------------	-----------------------------------------------------

d. Indicate Sentence Strip 3d.

SAY	“There is less rain water for animals to drink.”
------------	--------------------------------------------------

13. **ASK AGAIN** “What is another way that humans cutting down the trees in the forest affect the plants and animals in the forest?”

14. Allow student to respond and record response.

15. If the student chose a correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“If people cut down trees in a forest, there is less food for the deer to eat.”
------------	---------------------------------------------------------------------------------

2. **ASK** “What is another way that humans cutting down the trees in the forest affect the plants and animals in the forest?”

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

- a. Indicate Sentence Strip 3b.

SAY	“There are fewer trees for shelter.”
------------	--------------------------------------

- b. Indicate Sentence Strip 3c.

SAY	“There is less sunlight reaching the forest floor.”
------------	-----------------------------------------------------

- c. Indicate Sentence Strip 3d.

SAY	“There is less rain water for animals to drink.”
------------	--------------------------------------------------

4. **ASK AGAIN** “What is another way that humans cutting down the trees in the forest affect the plants and animals in the forest?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 3a.

SAY	“If people cut down trees in a forest, there are fewer trees for shelter.”
------------	----------------------------------------------------------------------------

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

Correct answers are as follows:

1. What is one way that humans cutting down the trees in the forest affect the plants and animals in the forest?

- a. Sentence Strip 3a – There is less food for the deer to eat.

OR

- b. Sentence Strip 3b – There are fewer trees for shelter.

2. What is another way that humans cutting down the trees in the forest affect the plants and animals in the forest?

- a. Sentence Strip 3a – There is less food for the deer to eat.

OR

- b. Sentence Strip 3b – There are fewer trees for shelter.



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify one way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b); <p>and</p> <ul style="list-style-type: none">is unable to identify another way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">is able to identify one way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b); <p>and</p> <ul style="list-style-type: none">is unable to identify another way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify one way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b); <p>and</p> <ul style="list-style-type: none">after scaffolding, is able to identify another way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3b).	<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">is able to identify one way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b); <p>and</p> <ul style="list-style-type: none">is able to identify another way that humans cutting down the trees affect the plants and animals in the forest (Sentence Strip 3a or Sentence Strip 3b).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 4

Essence Statement: CTAS-HS-LS2-1 Use data to explain the factors that affect the limits on plant and animal populations in an ecosystem.

Core Extension 4: Use data from a table or graph to explain how a factor limits a plant or animal population in an ecosystem. (CTAS-HS-LS2-1)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Birds and Trees in a Forest Data Table Poster
- Activity 4 Resource 2: Statement Poster
- Activity 4 Resource 3: Cards 3a – 3d
 - Card 3a – increased
 - Card 3b – increase
 - Card 3c – decreased
 - Card 3d – decrease
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – less shelter
 - Sentence Strip 4b – more water
 - Sentence Strip 4c – less sunlight

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about the number of trees and the number of birds in a forest”
------------	--------------------------------------------------------------------------------------------------------
2. Display Resource 1: Birds and Trees in a Forest Data Table Poster for the student.
3. Indicate Resource 1.

SAY	“Scientists study the number of trees and the number of birds in a part of a forest for two years. This data table shows the data that the scientists collected.”
------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------
4. Display Resource 2: Statement Poster for the student.
5. Indicate Resource 2.

SAY	“This is a statement about the data in the table. From Year 1 to Year 2, the number of trees 'blank' . This caused the number of birds to 'blank' .”
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------
6. Indicate Resource 1.

SAY	“Using the data in the table, let’s fill in the blanks in the statement using our ‘increase’ and ‘decrease’ Cards.”
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8. Provide Resource 3: Cards 3a – 3d to the student. Indicate and read each Card.
 - a. Indicate Card 3a.

SAY	“increased”
------------	-------------

b. Indicate Card 3b.

SAY	“increase”
------------	------------

c. Indicate Card 3c.

SAY	“decreased”
------------	-------------

d. Indicate Card 3d.

SAY	“decrease”
------------	------------

9. Indicate Resource 1.

SAY	“Using the data in the table, let’s fill in the blanks in the statement using our ‘increase’ and ‘decrease’ Cards. The statement is, ‘From Year 1 to Year 2, the number of trees ’blank’ . This caused the number of birds to ’blank’ .”
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10. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.

11. Indicate Resource 1 and read the completed statement to the student.

SAY	“From Year 1 to Year 2, the number of trees decreased (<i>indicate Card 3c</i>). This caused the number of birds to decrease (<i>indicate Card 3d</i>).”
------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

12. **ASK** “What impact does the number of trees in the forest have on the number of birds in the forest?”

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

a. Indicate Sentence Strip 4a.

SAY	“There is less shelter.”
------------	--------------------------

b. Indicate Sentence Strip 4b.

SAY	“There is more water.”
------------	------------------------

c. Indicate Sentence Strip 4c.

SAY	“There is less sunlight.”
------------	---------------------------

14. **ASK AGAIN** “What impact does the number of trees in the forest have on the number of birds in the forest?”

15. Allow student to respond and record response.

16. Indicate Sentence Strip 4a.

SAY	“There is less shelter.”
------------	--------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

1. After student makes first incorrect attempt, indicate Resource 1 and read the completed statement to the student.

SAY	“From Year 1 to Year 2, the number of trees decreased (<i>indicate Card 3c</i>). This caused the number of birds to decrease (<i>indicate Card 3d</i>).”
------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2. **ASK** “What impact does the number of trees in the forest have on the number of birds in the forest?”

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

a. Indicate Sentence Strip 4a.

SAY	“There is less shelter.”
------------	--------------------------

b. Indicate Sentence Strip 4b.

SAY	“There is more water.”
------------	------------------------

c. Indicate Sentence Strip 4c.

SAY	“There is less sunlight.”
------------	---------------------------

4. **ASK AGAIN** “What impact does the number of trees in the forest have on the number of birds in the forest?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 4a.

SAY	“There is less shelter.”
------------	--------------------------

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

Correct answers are as follows:

1. Using the data in the table, let's fill in the blanks in the statement using our 'increase' and 'decrease' Cards.
 - a. The statement should be filled with Card 3c and Card 3d out as follows: From Year 1 to Year 2, the number of trees **decreased**. This caused the number of birds to **decrease**.
2. What impact does the number of trees in the forest have on the number of birds in the forest?
 - a. Sentence Strip 4a – There is less shelter.

Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to correctly complete the first statement by filling in each blank with a decrease(d) card (Card 3c and Card 3d); and • is unable to identify that the number of trees in the forest impacts the number of birds in the forest because there is less shelter (Sentence Strip 4a). 	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"> • is able to correctly complete the first statement by filling in each blank with a decrease(d) card (Card 3c and Card 3d); and • is unable to identify that the number of trees in the forest impacts the number of birds in the forest because there is less shelter (Sentence Strip 4a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to correctly complete the first statement by filling in each blank with a decrease(d) card (Card 3c and Card 3d); and • after scaffolding, is able to identify that the number of trees in the forest impacts the number of birds in the forest because there is less shelter (Sentence Strip 4a). 	<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"> • is able to correctly complete the first statement by filling in each blank with a decrease(d) card (Card 3c and Card 3d); and • is able to identify that the number of trees in the forest impacts the number of birds in the forest because there is less shelter (Sentence Strip 4a). 	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 5

Essence Statement: CTAS-HS-LS2-7 Evaluate a possible solution for reducing the impact of human activities on the environment, including plants and animals.*

Core Extension 5: Given a solution for reducing human impact on the environment, identify a positive and negative aspect. (CTAS-HS-LS2-7)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Sentence Strips 1a – 1d
 - Sentence Strip 1a – birds/nest
 - Sentence Strip 1b – deer/grass
 - Sentence Strip 1c – deer/predators
 - Sentence Strip 1d – birds/hide

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about a forest. People have decided to plant new trees in the forest. The new trees have wider branches that do not allow the sunlight to reach the forest floor. The forest floor is shaded.”

2. **ASK** “What would be a **positive** impact on the forest environment if people decide to plant new trees in the forest?”

3. Provide Sentence Strips 1a – 1d to the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 1a.

SAY “Birds will have more places to build a nest.”

b. Indicate Sentence Strip 1b.

SAY “Deer will have less grass to eat.”

c. Indicate Sentence Strip 1c.

SAY “Deer will have more predators.”

d. Indicate Sentence Strip 1d.

SAY “Birds will have less places to hide.”

4. **ASK AGAIN** “What would be a **positive** impact on the forest environment if people decide to plant new trees in the forest?”

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

6. Indicate Sentence Strip 1a.

SAY	“Birds will have more places to build a nest because there will be more trees in the forest.”
------------	-----------------------------------------------------------------------------------------------

7. **ASK** “What would be a **negative** impact on the forest environment if people decide to plant new trees in the forest?”

8. Provide remaining Sentence Strips 1b – 1d to the student. Indicate and read each remaining Sentence Strip.

a. Indicate Sentence Strip 1b.

SAY	“Deer will have less grass to eat.”
------------	-------------------------------------

b. Indicate Sentence Strip 1c.

SAY	“Deer will have more predators.”
------------	----------------------------------

c. Indicate Sentence Strip 1d.

SAY	“Birds will have less places to hide.”
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9. **ASK AGAIN** “What would be a **negative** impact on the forest environment if people decide to plant new trees in the forest?”

10. Allow student to respond and record response.

11. Indicate Sentence Strip 1b.

SAY	“Deer will have less grass to eat because the grass does not grow well on the forest floor without sunlight.”
------------	---------------------------------------------------------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“Birds will have more places to build a nest because there will be more trees in the forest. This a positive impact on the forest environment.”
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2. **ASK** “What would be a **negative** impact on the forest environment if people decide to plant new trees in the forest?”

3. Provide remaining Sentence Strips 1b – 1d to the student. Indicate and read each remaining Sentence Strip.

- a. Indicate Sentence Strip 1b.

SAY	“Deer will have less grass to eat.”
------------	-------------------------------------

- b. Indicate Sentence Strip 1c.

SAY	“Deer will have more predators.”
------------	----------------------------------

- c. Indicate Sentence Strip 1d.

SAY	“Birds will have less places to hide.”
------------	----------------------------------------

4. **ASK AGAIN** “What would be a **negative** impact on the forest environment if people decide to plant new trees in the forest?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 1b.

SAY	“Deer will have less grass to eat because the grass does not grow well on the forest floor without sunlight.”
------------	---------------------------------------------------------------------------------------------------------------

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

Correct answers are as follows:

1. What would be a **positive** impact on the forest environment if people decide to plant new trees in the forest?
 - a. Sentence Strip 1a – Birds will have more places to build a nest.
2. What would be a **negative** impact on the forest environment if people decide to plant new trees in the forest?
 - a. Sentence Strip 1b – Deer will have less grass to eat.

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

ACTIVITY 6

Essence Statement: CTAS-HS-LS2-8 Use evidence to show how group behaviors help animals survive and reproduce.

Core Extension 6: Given a scenario, use evidence to show how a group behavior helps plants or animals survive and reproduce. (CTAS-HS-LS2-8)

Teacher Notes:

Collect the following resources for this activity:

- Activity 6 Resource 1: Deer Behavior Poster
- Activity 6 Resource 2: Sentence Strips 2a – 2d
 - Sentence Strip 2a – field
 - Sentence Strip 2b – coyote
 - Sentence Strip 2c – foot
 - Sentence Strip 2d – tail

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about how a group behavior of deer helps them to survive.”
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2. Display Resource 1: Deer Behavior Poster for the student.
3. Indicate Resource 1.

SAY	“Many deer eat food in a field. One deer sees the coyote. A deer raises its tail. The deer stomps its foot, and it makes a noise.”
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4.

ASK	“What is one behavior that alerts the group of deer to help them to survive?”
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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.

SAY	“The deer is in a field.”
------------	---------------------------
 - b. Indicate Sentence Strip 2b.

SAY	“The deer sees a coyote.”
------------	---------------------------
 - c. Indicate Sentence Strip 2c.

SAY	“The deer stomps its foot.”
------------	-----------------------------
 - d. Indicate Sentence Strip 2d.

SAY	“The deer raises its tail.”
------------	-----------------------------
6.

ASK AGAIN	“What is one behavior that alerts the group of deer to help them to survive?”
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7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. If the student chose the correct answer, reiterate the student's correct answer. Set chosen Sentence Strip aside.
9.

ASK	"What is another behavior that alerts the group of deer to help them to survive?"
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10. Provide remaining Resource 2: Sentence Strips 2a – 2d to the student. Indicate and read each remaining Sentence Strip.
 - a. Indicate Sentence Strip 2a.

SAY	"The deer is in a field."
------------	---------------------------
 - b. Indicate Sentence Strip 2b.

SAY	"The deer sees a coyote."
------------	---------------------------
 - c. Indicate Sentence Strip 2c.

SAY	"The deer stomps its foot."
------------	-----------------------------
 - d. Indicate Sentence Strip 2d.

SAY	"The deer raises its tail."
------------	-----------------------------
11.

ASK AGAIN	"What is another behavior that alerts the group of deer to help them to survive?"
------------------	-----------------------------------------------------------------------------------
12. Allow student to respond and record response.
13. If the student chose the correct answer, reiterate the student's correct answer. Set chosen Sentence Strip aside.
14.

SAY	"We are now finished with this activity."
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Scoring Guidance and Scaffolding

Scaffolding:

1. Indicate Sentence Strip 2c.

SAY	“The deer stomps its foot to warn the other deer that a coyote is nearby.”
------------	----------------------------------------------------------------------------

2.

ASK	“What is another behavior that alerts the group of deer to help them to survive?”
------------	-----------------------------------------------------------------------------------

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

SAY	“The deer is in a field.”
------------	---------------------------

 - b. Indicate Sentence Strip 2b.

SAY	“The deer sees a coyote.”
------------	---------------------------

 - c. Indicate Sentence Strip 2c.

SAY	“The deer stomps its foot.”
------------	-----------------------------

 - d. Indicate Sentence Strip 2d.

SAY	“The deer raises its tail.”
------------	-----------------------------

4.

ASK AGAIN	“What is another behavior that alerts the group of deer to help them to survive?”
------------------	-----------------------------------------------------------------------------------

5. Allow student to respond and record response.

6. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Sentence Strip aside.

7.

SAY	“We are now finished with this activity.”
------------	-------------------------------------------

Correct answers are as follows:

1. What is one behavior that alerts the group of deer to help them to survive?
 - a. Sentence Strip 2c – The deer stomps its foot.

OR

 - b. Sentence Strip 2d – The deer raises its tail.

2. What is another behavior that alerts the group of deer to help them to survive?
 - a. Sentence Strip 2c – The deer stomps its foot.

OR

 - b. Sentence Strip 2d – The deer raises its tail.

Seeing the coyote is not a way to alert the group of deer. Therefore, Sentence Strip 2b is not a correct option.



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify one behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d); andis unable to identify another behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">is able to identify one behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d); andis unable to identify another behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify one behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d); andafter scaffolding, is able to identify another behavior that alerts the group of deer to help them to survive (Sentence Strip 2d).	<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">is able to identify one behavior that alerts the group of deer to help them to survive (Sentence Strip 2c or Sentence Strip 2d); andis able to identify another behavior that helps the group of deer to survive (Sentence Strip 2c or Sentence Strip 2d).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 7

Essence Statement: CTAS-HS-LS4-4/5 Use evidence to explain how natural selection leads to adaptation, growth, and/or possible extinction of populations of organisms and/or species.

Core Extension 7: Given several traits, identify one that varies and is passed on to offspring within a population of organisms. (CTAS-HS-LS4-5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 7 Resource 1: Squirrel Poster
- Activity 7 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – grey
 - Sentence Strip 2b – tail
 - Sentence Strip 2c – tree

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about traits that describe a squirrel.”
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2. Display Resource 1: Squirrel Poster for the student.
3. Indicate Resource 1.

SAY	“This is a picture of a squirrel. There are a few traits that describe this squirrel: the squirrel has grey fur; the squirrel has an injured tail; and the squirrel lives in a tree.”
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4.

ASK	“Which is a physical trait that the squirrel can pass on to its offspring?”
------------	-----------------------------------------------------------------------------
5. Provide Resource 2: Sentence Strips 2a – 2c to the student. Indicate and read each Sentence Strip.
 - a. Indicate Sentence Strip 2a.

SAY	“This squirrel has grey fur.”
------------	-------------------------------
 - b. Indicate Sentence Strip 2b.

SAY	“This squirrel has an injured tail.”
------------	--------------------------------------
 - c. Indicate Sentence Strip 2c.

SAY	“This squirrel lives in a tree.”
------------	----------------------------------
6.

ASK AGAIN	“Which is a physical trait that the squirrel can pass on to its offspring?”
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7.

	Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
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8. Indicate Sentence Strip 2a.

SAY	“Grey fur is a physical trait that the squirrel can pass on to its offspring.”
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9. **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.

SAY	“[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer.”
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2. **ASK** “Which is a physical trait that the squirrel can pass on to its offspring?”

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

- a. Indicate Sentence Strip 2a.

SAY	“This squirrel has grey fur.”
------------	-------------------------------

- b. Indicate Sentence Strip 2b.

SAY	“This squirrel has an injured tail.”
------------	--------------------------------------

- c. Indicate Sentence Strip 2c.

SAY	“This squirrel lives in a tree.”
------------	----------------------------------

4. **ASK AGAIN** “Which is a physical trait that the squirrel can pass on to its offspring?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 2a.

SAY	“Grey fur is a physical trait that the squirrel can pass on to its offspring.”
------------	--------------------------------------------------------------------------------

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

The correct answer is as follows:

1. Which is a physical trait that the squirrel can pass on to its offspring?
a. Sentence Strip 2a – This squirrel has grey fur.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the physical trait that this squirrel can pass on to its offspring (Sentence Strip 2a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">after scaffolding, is able to identify the physical trait that this squirrel can pass on to its offspring (Sentence Strip 2a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify the physical trait that this squirrel can pass on to its offspring (Sentence Strip 2a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 8

Essence Statement: CTAS-HS-LS4-4/5 Use evidence to explain how natural selection leads to adaptation, growth, and/or possible extinction of populations of organisms and/or species.

Core Extension 8: Given an environmental change, determine which physical adaptation would ensure the survival of a population. (CTAS-HS-LS4-4/5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 8 Resource 1: Mild Forest Ecosystem Climate Poster
- Activity 8 Resource 2: Arctic Forest Ecosystem Climate Poster
- Activity 8 Resource 3: Strips 3a – 3d
 - Strip 3a – long ears
 - Strip 3b – wide paws
 - Strip 3c – webbed feet
 - Strip 3d – thick fur

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about animal adaptations. Animals have adaptations to live in certain ecosystems. Adaptations are traits in an animal that change so that they can survive in an ecosystem.”
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2. Display Resource 1: Mild Forest Ecosystem Climate Poster.

3. Indicate Resource 1.

SAY	“Long ago, an area was a mild forest ecosystem. This forest had tall redwood trees and ferns. This forest also had warmer temperatures and lots of rain.”
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4. Display Resource 2: Arctic Forest Ecosystem Climate Poster.

5. Indicate Resource 2.

SAY	“Over time, the climate changed in this forest ecosystem. This forest became very cold with much of the area covered with ice and snow. The animals that live in this forest have certain adaptations so they can survive the cold.”
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6.

ASK	“What is one animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”
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7. Provide Resource 3: Strips 3a – 3d to the student. Indicate and read each Strip.

- a. Indicate Strip 3a.

SAY	“long ears to give off heat”
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- b. Indicate Strip 3b.

SAY	“wide paws to walk on snow”
------------	-----------------------------

c. Indicate Strip 3c.

SAY	“webbed feet to swim”
------------	-----------------------

d. Indicate Strip 3d.

SAY	“thick fur to stay warm”
------------	--------------------------

8. **ASK AGAIN** “What is one animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”

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

10. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Strip aside.

11. **ASK** “What is another animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”

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

a. Indicate Strip 3a.

SAY	“long ears to give off heat”
------------	------------------------------

b. Indicate Strip 3b.

SAY	“wide paws to walk on snow”
------------	-----------------------------

c. Indicate Strip 3c.

SAY	“webbed feet to swim”
------------	-----------------------

d. Indicate Strip 3d.

SAY	“thick fur to stay warm”
------------	--------------------------

13. **ASK AGAIN** “What is another animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”

14. Allow student to respond and record response.

15. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Strip aside.

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“Some animals have wide paws to walk on snow.”
------------	------------------------------------------------

2. **ASK** “What is another animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”

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

- a. Indicate Strip 3a.

SAY	“long ears to give off heat”
------------	------------------------------

- b. Indicate Strip 3c.

SAY	“webbed feet to swim”
------------	-----------------------

- c. Indicate Strip 3d.

SAY	“thick fur to stay warm”
------------	--------------------------

4. **ASK AGAIN** “What is another animal adaptation that would help animals survive in this very cold climate in this forest ecosystem?”

5. Allow student to respond and record response.

6. If the student chose the correct answer, reiterate the student’s correct answer. Set chosen Strip aside.

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

Correct answers are as follows:

1. What is one animal adaptation that would help animals survive in this very cold climate in the forest ecosystem?
 - a. Strip 3b – wide paws to walk on snow

OR

 - b. Strip 3d – thick fur to stay warm
2. What is another animal adaptation that would help animals survive in this very cold climate in the forest ecosystem?
 - a. Strip 3b – wide paws to walk on snow

OR

 - b. Strip 3d – thick fur to stay warm



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to determine one animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d); andis unable to determine another animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">is able to determine one animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d); andis unable to determine another animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to determine one animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b); andafter scaffolding, is able to determine another animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3d).	<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">is able to determine one animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d); andis able to determine another animal adaptation that will help the animals to survive in a very cold climate in the forest ecosystem (Strip 3b or Strip 3d).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 9

Essence Statement: CTAS-HS-LS4-4/5 Use evidence to explain how natural selection leads to adaptation, growth, and/or possible extinction of populations of organisms and/or species.

Core Extension 9: Given a scenario, use a graph or table to identify a cause and effect relationship between natural selection and an adaptation. (CTAS-HS-LS4-4/5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 9 Resource 1: Bird Beaks Over Time Data Table Poster
- Activity 9 Resource 2: Sentence Strips 2a – 2d
 - Sentence Strip 2a – large
 - Sentence Strip 2b – small
 - Sentence Strip 2c – broken shells
 - Sentence Strip 2d – not grow

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about birds that live in a forest. In this forest, birds with larger beaks eat larger seeds and birds with smaller beaks eat smaller seeds. Over time, most of the birds in the forest have large beaks.”
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2. Display Resource 1: Bird Beaks Over Time Data Table Poster for the student.
3. Indicate Resource 1.

SAY	“This is a data table with the number of birds with large beaks and the number of birds with small beaks over time. The column headings are ‘ Time ’, ‘ Number of Birds with Large Beaks ’, and ‘ Number of Birds with Small Beaks ’.” Read each row of the data table. Say, “In Year 1, there were 100 birds with large beaks (<i>indicate data in the large beak column</i>) and 100 birds with small beaks (<i>indicate data in the small beak column</i>). In Year 10, there were 150 birds with large beaks (<i>indicate data in the large beak column</i>) and 50 birds with small beaks (<i>indicate data in the small beak column</i>). In Year 20, there were 175 birds with large beaks (<i>indicate data in the large beak column</i>) and 25 birds with small beaks (<i>indicate data in the small beak column</i>).”
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4.

ASK	“What is the most likely cause for the change in beak size over time?”
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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.

SAY	“Most of the seeds in the forest are large.”
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- b. Indicate Sentence Strip 2b.

SAY	“Most of the seeds in the forest are small.”
------------	----------------------------------------------

c. Indicate Sentence Strip 2c.

SAY	“Most of the seeds have broken shells.”
------------	-----------------------------------------

d. Indicate Sentence Strip 2d.

SAY	“Most of the seeds did not grow.”
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6. **ASK AGAIN** “What is the most likely cause for the change in beak size over time?”

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

8. Indicate Sentence Strip 2a.

SAY	“The most likely cause for the change in beak size over time is most of the seeds in the forest are large.”
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9. **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.

SAY	“[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer.”
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2. **ASK** “What is the most likely cause for the change in beak size over time?”

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

a. Indicate Sentence Strip 2a.

SAY	“Most of the seeds in the forest are large.”
------------	----------------------------------------------

b. Indicate Sentence Strip 2b.

SAY	“Most of the seeds in the forest are small.”
------------	----------------------------------------------

c. Indicate Sentence Strip 2c.

SAY	“Most of the seeds have broken shells.”
------------	-----------------------------------------

d. Indicate Sentence Strip 2d.

SAY	“Most of the seeds did not grow.”
------------	-----------------------------------

4. **ASK AGAIN** “What is the most likely cause for the change in beak size over time?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 2a.

SAY	“The most likely cause for the change in beak size over time is most of the seeds in the forest are large.”
------------	-------------------------------------------------------------------------------------------------------------

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

The correct answer is as follows:

1. What is the most likely cause for the change in beak size over time?
 - a. Sentence Strip 2a – Most of the seeds in the forest are large.

Content Guidance	Rating	Score
Student... <ul style="list-style-type: none"> • gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify the likely cause for the change in beak size over time (Sentence Strip 2a). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • after scaffolding, is able to identify the likely cause for the change in beak size over time (Sentence Strip 2a). 	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student <ul style="list-style-type: none"> • is able to identify the likely cause for the change in beak size over time (Sentence Strip 2a). 	The student demonstrates understanding independently without scaffolding.	2



**Connecticut
Alternate
Science
Assessment**

Grade 11 Performance Tasks

Physical Science

Storyline 5: Forces and Motion

Storyline 6: Using Energy Every Day

SC



Connecticut
Alternate
Science
Assessment

Physical Science

Storyline 5: Forces and Motion

Grade 11 Performance Task



Physical Science
Storyline 5: Forces and Motion
Grade 11 Performance Task

Guiding Questions: What factors cause an object to speed up or slow down? How can the force on an object be minimized during a collision to protect it?

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
PS2.A Forces and Motion	HS-PS2-1 Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	CTAS-HS-PS2-1 Use observations and/or data to support a claim that the net force on an object is equal to its mass multiplied by its acceleration.	<ol style="list-style-type: none"> 1. Compare the speed of two objects under different conditions. (CTAS-HS-PS2-1) 2. Compare the acceleration of objects (speeding up or slowing down) under different conditions. (CTAS-HS-PS2-1) 3. Use observation and/or data to support a claim that a greater force will cause an object in motion to speed up faster. (CTAS-HS-PS2-1) 4. Gather data to investigate the force on an object during a collision. (CTAS-HS-PS2-3) 5. Make and support a claim about the modification to a device and its effect on reducing the force during the collision. (CTAS-HS-PS2-3)
	HS-PS2-3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*	CTAS-HS-PS2-3 Test a device that minimizes the force on a common object during a collision.*	
Appropriate Vocabulary	Acceleration, conditions, force, Newtons, motion, collision, collide, device, cushioning, claim, mass, speed, ramp, steep		
*Indicates a NGSS Standard Performance Expectation or Connecticut Alternate Science Essence Statement that incorporates engineering design.			



Physical Science
Storyline 5: Forces and Motion
Grade 11 Performance Task

General Overview:

This performance task focuses on forces and motion in the context of skateboard ramps and colliding objects. Students will begin by considering the speed, acceleration, and forces in the context of a skateboarder going down a ramp. Students will then conduct a guided, hands-on investigation to test a device that minimizes the force on an object during a collision.

List of Materials Needed:

Teacher-Provided Resources:

ACTIVITY 4

Use the materials and instructions included in Activity 4 Resource 1 to set up the investigation according to the diagram included in Activity 4 Resource 2. **The investigation must be set up prior to the administration of the activity.** Teacher-Provided Resources include:

- Wall
- Scissors
- Masking Tape
- 1 Ping Pong Ball (or Other Type of Ball)
- 1 Roll of Strong Tape (e.g., Duct Tape or Packing Tape)
- 1 Roll of String
- 2 Sheets of Cushioning Material (e.g., Bubble Wrap or Cotton)
- Impact Safety Glasses (1 Each for Teacher and Student[s])
- Measuring Device (Meter Stick, Yard Stick, or Measuring Tape)*

*Best practice is to use metric measuring devices and units.

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: Skateboard Ramp 1 Poster
- Activity 1 Resource 2: Skateboard Ramp 2 Poster
- Activity 1 Resource 3: Card 3a and Card 3b
 - Card 3a – Ramp 1
 - Card 3b – Ramp 2
- Activity 1 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – steeper
 - Sentence Strip 4b – shorter
 - Sentence Strip 4c – wider
- Activity 2 Resource 1: Skateboard Half-Pipe Ramp Poster
- Activity 2 Resource 2: Cards 2a – 2c
 - Card 2a – Point A/Point B
 - Card 2b – Point B
 - Card 2c – Point B/Point C
- Activity 3 Resource 1: Skateboard Investigation Poster
- Activity 3 Resource 2: Skateboard Investigation Data Table Poster
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – Trial 1
 - Strip 3b – Trial 2
 - Strip 3c – same
- Activity 3 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – 20N; 3 m/sec
 - Sentence Strip 4b – 10N; 6 m/sec
 - Sentence Strip 4c – 20N; 6 m/sec
- Activity 4 Resource 1: Teacher Directions for Collision Investigation – Collision Investigation Materials
- Activity 4 Resource 2: Teacher Directions for Collision Investigation – Collision Investigation Diagram
- Activity 4 Resource 3: Collision Investigation 1 Observations Data Table
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – reduces force
 - Sentence Strip 4b – increases force
 - Sentence Strip 4c – does not change force
- Activity 5 Resource 1: Collision Investigation 2 Observations Data Table
- Activity 5 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – facial tissue
 - Sentence Strip 2b – paper towel
 - Sentence Strip 2c – clear tape

ACTIVITY 1

Essence Statement: CTAS-HS-PS2-1 Use observations and/or data to support a claim that the net force on an object is equal to its mass multiplied by its acceleration.

Core Extension 1: Compare the speed of two objects under different conditions. (CTAS-HS-PS2-1)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Skateboard Ramp 1 Poster
- Activity 1 Resource 2: Skateboard Ramp 2 Poster
- Activity 1 Resource 3: Card 3a and Card 3b
 - Card 3a – Ramp 1
 - Card 3b – Ramp 2
- Activity 1 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – steeper
 - Sentence Strip 4b – shorter
 - Sentence Strip 4c – wider

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how a skateboarder will travel at different speeds down two different ramps.”

2. Display Resource 1: Skateboard Ramp 1 Poster for the student.

3. Display Resource 2: Skateboard Ramp 2 Poster for the student.

4. Indicate Resource 1 and Resource 2.

SAY “The same skateboarder is shown at the top of Ramp 1 (*indicate Resource 1*) and Ramp 2 (*indicate Resource 2*). The skateboarder will ride his skateboard down each ramp.”

5. **ASK** “Will the skateboarder travel faster down Ramp 1 or down Ramp 2?”

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

a. Indicate Card 3a.

SAY “Ramp 1”

b. Indicate Card 3b.

SAY “Ramp 2”

7. **ASK AGAIN** “Will the skateboarder travel faster down Ramp 1 or down Ramp 2?”

8. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
9. Indicate Card 3b.
- | | |
|------------|----------------------------------------------------|
| SAY | “The skateboarder will travel faster down Ramp 2.” |
|------------|----------------------------------------------------|
10. **ASK** “Why will the skateboarder travel faster down Ramp 2?”
11. Provide Resource 4: Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 4a.
- | | |
|------------|----------------------|
| SAY | “Ramp 2 is steeper.” |
|------------|----------------------|
- b. Indicate Sentence Strip 4b.
- | | |
|------------|----------------------|
| SAY | “Ramp 2 is shorter.” |
|------------|----------------------|
- c. Indicate Sentence Strip 4c.
- | | |
|------------|--------------------|
| SAY | “Ramp 2 is wider.” |
|------------|--------------------|
12. **ASK AGAIN** “Why will the skateboarder travel faster down Ramp 2?”
13. Allow student to respond and record response.
14. Indicate Sentence Strip 4a.
- | | |
|------------|------------------------------------------------------------------------------|
| SAY | “The skateboarder will travel faster down Ramp 2 because Ramp 2 is steeper.” |
|------------|------------------------------------------------------------------------------|
15. **SAY** “We are now finished with this activity.”

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The skateboarder will travel faster down Ramp 2.”
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2. **ASK** “Why will the skateboarder travel faster down Ramp 2?”

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

- a. Indicate Sentence Strip 4a.

SAY	“Ramp 2 is steeper.”
------------	----------------------

- b. Indicate Sentence Strip 4b.

SAY	“Ramp 2 is shorter.”
------------	----------------------

- c. Indicate Sentence Strip 4c.

SAY	“Ramp 2 is wider.”
------------	--------------------

4. **ASK AGAIN** “Why will the skateboarder travel faster down Ramp 2?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 4a.

SAY	“The skateboarder will travel faster down Ramp 2 because Ramp 2 is steeper.”
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7. **SAY** “We are now finished with this activity.”

Correct answers are as follows:

1. Will the skateboarder travel faster down Ramp 1 or down Ramp 2?
 - a. Card 3b – Ramp 2
2. Why will the skateboarder travel faster down Ramp 2?
 - a. Sentence Strip 4a – Ramp 2 is steeper.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the skateboarder will travel faster down Ramp 2 (Card 3b); andis unable to describe that the skateboarder will travel faster on Ramp 2 because Ramp 2 is steeper (Sentence Strip 4a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify that the skateboarder will travel faster down Ramp 2 (Card 3b); andis unable to describe that the skateboarder will travel faster down Ramp 2 because Ramp 2 is steeper (Sentence Strip 4a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the skateboarder will travel faster down Ramp 2 (Card 3b); andafter scaffolding, is able to describe that the skateboarder will travel faster down Ramp 2 because Ramp 2 is steeper (Sentence Strip 4a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify that the skateboarder will travel faster down Ramp 2 (Card 3b); andis able to describe that the skateboarder will travel faster down Ramp 2 because Ramp 2 is steeper (Sentence Strip 4a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 2

Essence Statement: CTAS-HS-PS2-1 Use observations and/or data to support a claim that the net force on an object is equal to its mass multiplied by its acceleration.

Core Extension 2: Compare the acceleration of objects (speeding up or slowing down) under different conditions. (CTAS-HS-PS2-1)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Skateboard Half-Pipe Ramp Poster
- Activity 2 Resource 2: Cards 2a – 2c
 - Card 2a – Point A/Point B
 - Card 2b – Point B
 - Card 2c – Point B/Point C

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how, at different points on a half-pipe ramp, a skateboarder travels at different speeds.”

2. Display Resource 1: Skateboard Half-Pipe Ramp Poster for the student.

3. Indicate Resource 1.

SAY “Some ramps are curved (*trace finger along ramp shape*). This curved ramp is called a half-pipe ramp. A skateboarder rolls down a half-pipe ramp and travels across Point A, through Point B, and stops at Point C (*trace route on Resource 1 with finger*). The skateboarder travels across Points A, B, and C (*indicate Points A, B, and C*) at different speeds.”

4. **ASK** “Where on the half-pipe ramp is the skateboarder speeding up?”

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

a. Indicate Card 2a.

SAY “from Point A to Point B”

b. Indicate Card 2b.

SAY “at Point B”

c. Indicate Card 2c.

SAY “from Point B to Point C”

6. **ASK AGAIN** “Where on the half-pipe ramp is the skateboarder speeding up?”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. Indicate Card 2a.
- | | |
|------------|------------------------------------------------------------|
| SAY | “The skateboarder is speeding up from Point A to Point B.” |
|------------|------------------------------------------------------------|
9. **ASK** “Where on the half-pipe ramp is the skateboarder slowing down?”
10. Provide remaining Resource 2: Card 2b and Card 2c to the student. Indicate and read each remaining Card.
- a. Indicate Card 2b.
- | | |
|------------|--------------|
| SAY | “at Point B” |
|------------|--------------|
- b. Indicate Card 2c.
- | | |
|------------|---------------------------|
| SAY | “from Point B to Point C” |
|------------|---------------------------|
11. **ASK AGAIN** “Where on the half-pipe ramp is the skateboarder slowing down?”
12. Allow student to respond and record response.
13. Indicate Card 2c.
- | | |
|------------|-------------------------------------------------------------|
| SAY | “The skateboarder is slowing down from Point B to Point C.” |
|------------|-------------------------------------------------------------|
14. **SAY** “We are now finished with this activity.”



Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The skateboarder is speeding up from Point A to Point B.”
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2. **ASK** “Where on the half-pipe ramp is the skateboarder slowing down?”

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

- a. Indicate Card 2b.

SAY	“at Point B”
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- b. Indicate Card 2c.

SAY	“from Point B to Point C”
------------	---------------------------

4. **ASK AGAIN** “Where on the half-pipe ramp is the skateboarder slowing down?”

5. Allow student to respond and record response.

6. Indicate Card 2c.

SAY	“The skateboarder is slowing down from Point B to Point C.”
------------	-------------------------------------------------------------

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

Correct answers are as follows:

1. Where on the half-pipe ramp is the skateboarder speeding up?
 - a. Card 2a – from Point A to Point B
2. Where on the half-pipe ramp is the skateboarder slowing down?
 - a. Card 2c – from Point B to Point C



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response; <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the skateboarder is speeding up from Point A to Point B on the half-pipe ramp (Card 2a); andis unable to identify that the skateboarder is slowing down from Point B to Point C on the half-pipe ramp (Card 2c).	<p>The student does not demonstrate understanding.</p>	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the skateboarder is speeding up from Point A to Point B on the half-pipe ramp (Card 2a); andis unable to identify that the skateboarder is slowing down from Point B to Point C on the half-pipe ramp (Card 2c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the skateboarder is speeding up from Point A to Point B on the half-pipe ramp (Card 2a); andafter scaffolding, is able to identify that the skateboarder is slowing down from Point B to Point C on the half-pipe ramp (Card 2c).	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the skateboarder is speeding up from Point A to Point B on the half-pipe ramp (Card 2a); andis able to identify that the skateboarder is slowing down from Point B to Point C on the half-pipe ramp (Card 2c).	<p>The student demonstrates understanding independently without scaffolding.</p>	2

ACTIVITY 3

Essence Statement: CTAS-HS-PS2-1 Use observations and/or data to support a claim that the net force on an object is equal to its mass multiplied by its acceleration.

Core Extension 3: Use observation and/or data to support a claim that a greater force will cause an object in motion to speed up faster. (CTAS-HS-PS2-1)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1: Skateboard Investigation Poster
- Activity 3 Resource 2: Skateboard Investigation Data Table Poster
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – Trial 1
 - Strip 3b – Trial 2
 - Strip 3c – same
- Activity 3 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – 20N; 3 m/sec
 - Sentence Strip 4b – 10N; 6 m/sec
 - Sentence Strip 4c – 20N; 6 m/sec

Steps to Follow:

1. **SAY** “In this activity, we will talk about how a student investigates the relationship between motion and force. The student measured force in a unit called Newtons. The student measured speed in units of meters traveled per second.”

2. Display Resource 1: Skateboard Investigation Poster for the student.
3. Display Resource 2: Skateboard Investigation Data Table Poster for the student.
4. Indicate Resource 1.

SAY “A student investigates how pushing a skateboarder affects his motion at different points along a track. The points are labeled A (*indicate Point A*), B (*indicate Point B*), and C (*indicate Point C*).”

5. Indicate Resource 2.

SAY “The student records their observations in this data table titled ‘**Skateboard Investigation Data Table**’.”

6. Indicate Resource 1 and Resource 2.

SAY “In Trial 1, one student pushes the skateboarder with a small, constant force of 10 Newtons. The skateboarder’s speed is 1 meter per second at Point A, 2 meters per second at Point B, and 3 meters per second at Point C.”

7. Indicate Resource 1 and Resource 2.

SAY	“In Trial 2, the same student pushes the skateboarder with a large, constant force of 20 Newtons. The skateboarder’s speed is 2 meters per second at Point A, 4 meters per second at Point B, and 6 meters per second at Point C.”
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8. **ASK** “During which trial was the skateboarder speeding up faster?”

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

a. Indicate Strip 3a.

SAY	“Trial 1”
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b. Indicate Strip 3b.

SAY	“Trial 2”
------------	-----------

c. Indicate Strip 3c.

SAY	“same speed in both trials”
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10. **ASK AGAIN** “During which trial was the skateboarder speeding up faster?”

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

12. Indicate Strip 3b and Resource 2.

SAY	“Based on the data (<i>indicate Resource 2</i>) we can claim the skateboarder sped up faster during Trial 2 (<i>indicate Strip 3b</i>). In Trial 2, the skateboarder went 6 m/sec at Point C compared to 3 m/s in Trial 1. We can also claim that the faster speed was due to the greater force when pushing the skateboarder.”
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13. **ASK** “Which statement of data supports the claim that the skateboarder sped up faster **due to a greater force**?”

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

a. Indicate Sentence Strip 4a.

SAY	“With 20N of force, the speed at Point C was 3 m/sec.”
------------	--------------------------------------------------------

b. Indicate Sentence Strip 4b.

SAY	“With 10N of force, the speed at Point C was 6 m/sec.”
------------	--------------------------------------------------------

c. Indicate Sentence Strip 4c.

SAY	"With 20N of force, the speed at Point C was 6 m/sec."
------------	--------------------------------------------------------

15. **ASK AGAIN** "Which statement of data supports the claim that the skateboarder sped up faster **due to a greater force?**"

16. Allow student to respond and record response.

17. Indicate Sentence Strip 4c.

SAY	"With 20N of force, the speed at Point C was 6 m/sec."
------------	--------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

1. After student makes first incorrect attempt, indicate Strip 3b and Resource 2.

SAY	“Based on the data (<i>indicate Resource 2</i>) we can claim the skateboarder sped up faster during Trial 2 (<i>indicate Strip 3b</i>). In Trial 2, the skateboarder went 6 m/sec at Point C compared to 3 m/s in Trial 1. We can also claim that the faster speed was due to the greater force when pushing the skateboarder.”
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2. **ASK** “Which statement of data supports the claim that the skateboarder sped up faster **due to a greater force?**”

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

- a. Indicate Sentence Strip 4a.

SAY	“With 20N of force, the speed at Point C was 3 m/sec.”
------------	--------------------------------------------------------

- b. Indicate Sentence Strip 4b.

SAY	“With 10N of force, the speed at Point C was 6 m/sec.”
------------	--------------------------------------------------------

- c. Indicate Sentence Strip 4c.

SAY	“With 20N of force, the speed at Point C was 6 m/sec.”
------------	--------------------------------------------------------

4. **ASK AGAIN** “Which statement of data supports the claim that the skateboarder sped up faster **due to a greater force?**”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 4c.

SAY	“With 20N of force, the speed at Point C was 6 m/sec.” Say, “We are now finished with this activity.”
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7. **SAY** “We are now finished with this activity.”

Correct answers are as follows:

1. During which trial was the skateboarder speeding up faster?
 - a. Strip 3b – Trial 2
2. Which statement of data supports the claim that the skateboarder sped up faster **due to a greater force?**
 - a. Sentence Strip 4c – With 20N of force, the speed at Point C was 6 m/sec.

Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none"> gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify that the skateboarder speeds up faster during Trial 2 (Strip 3b); and is unable to interpret data in the table to support the claim that the skateboarded travels faster when pushed with a greater force (Sentence Strip 4c). 	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"> is able to identify that the skateboarder speeds up faster during Trial 2 (Strip 3b); and is unable to interpret data in the table to support the claim that the skateboarder travels faster when pushed with a greater force (Sentence Strip 4c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> is unable to identify that the skateboarder speeds up faster during Trial 2 (Strip 3b); and after scaffolding, is able to interpret data in the table to support the claim that the skateboarder travels faster when pushed with a greater force (Sentence Strip 4c). 	<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"> is able to identify that the skateboarder speeds up faster during Trial 2 (Strip 3b); and is able to interpret data in the table to support the claim that the skateboarder travels faster when pushed with a greater force (Sentence Strip 4c). 	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 4

Essence Statement: CTAS-HS-PS2-3 Test a device that minimizes the force on a common object during a collision.*

Core Extension 4: Gather data to investigate the force on an object during a collision. (CTAS-HS-PS2-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Teacher Directions for Collision Investigation – Collision Investigation Materials
- Activity 4 Resource 2: Teacher Directions for Collision Investigation – Collision Investigation Diagram
- Activity 4 Resource 3: Collision Investigation 1 Observations Data Table
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – reduces force
 - Sentence Strip 4b – increases force
 - Sentence Strip 4c – does not change force

Teacher-Provided Resources:

Use the materials and instructions included in Resource 1 to set up the investigation according to the diagram included in Resource 2. **Teacher must set up and test the investigation prior to introducing the investigation to the student.** Teacher-Provided Resources include:

- Wall
- Scissors
- Masking Tape
- 1 Ping Pong Ball (or Other Type of Ball)
- 1 Roll of Strong Tape (e.g., Duct Tape or Packing Tape)
- 1 Roll of String
- 2 Sheets of Cushioning Material (e.g., Bubble Wrap or Cotton)
- Impact Safety Glasses (1 Each for Teacher and Student[s])
- Measuring Device (Meter Stick, Yard Stick, or Measuring Tape)*

*Best practice in science instruction is to use metric measuring devices and units.

Activity 4 and Activity 5 must be completed back-to-back.

Steps to Follow:

1.

SAY	“In this activity, we are going to conduct an investigation to study a collision.”
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2. Use the materials and instructions included in Resource 1: Teacher Directions for Collision Investigation – Collision Investigation Materials to set up the investigation according to the Resource 2: Teacher Directions for Collision Investigation – Collision Investigation Diagram.
3. Display Resource 3: Collision Investigation 1 Observations Data Table for the student.

4. Indicate Resource 3.

SAY	“In this investigation, we will make observations about what happens to the distance that the ball bounces back from the wall during three different trials. We will record our observations in this data table. During Trial 1 (<i>indicate ‘Trial 1’</i>), we will have no cushioning on the wall (<i>indicate no cushion</i>), and we will measure the distance that the ball bounces back in centimeters (<i>indicate ‘___ centimeters’ row 1</i>). During Trial 2 (<i>indicate ‘Trial 2’</i>), we will have a small amount of cushioning on the wall (<i>indicate ‘Small Amount’</i>), and we will measure the distance that the ball bounces back in centimeters (<i>indicate ‘___ centimeters’ row 2</i>). During Trial 3 (<i>indicate ‘Trial 3’</i>), we will have a large amount of cushioning on the wall (<i>indicate ‘Large Amount’</i>), and we will measure the distance that the ball bounces back in centimeters (<i>indicate ‘___ centimeters’ row 3</i>).”
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5. **SAY** “We are ready to begin our investigation. Let’s begin Trial 1.”

6. Demonstrate Trial 1 for the student.

7. **ASK** “How far did the ball bounce back from the wall during Trial 1 when there was no cushioning on the wall?”

8. Allow student to record response in Resource 3: Collision Investigation 1 Observations Data Table.
Teacher may assist student if necessary.

9. **SAY** “Let’s begin Trial 2.”

10. Demonstrate Trial 2 for the student.

11. **ASK** “How far did the ball bounce back from the wall during Trial 2 when there was a small amount of cushioning on the wall?”

12. Allow student to record response in Resource 3: Collision Investigation 1 Observations Data Table.
Teacher may assist student if necessary.

13. **SAY** “Let’s begin Trial 3.”

14. Demonstrate Trial 3 for the student.

15. **ASK** “How far did the ball bounce back from the wall during Trial 3 when there was a large amount of cushioning on the wall?”

16. Allow student to record response in Resource 3.
Teacher may assist student if necessary.
17. **ASK** “Why does the ball not bounce back as far from the wall as when there is a large amount of cushioning on the wall?”
18. Provide Resource 4: Sentence Strips 4a – 4c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 4a.
- SAY** “The cushioning reduces the force on the ball.”
- b. Indicate Sentence Strip 4b.
- SAY** “The cushioning increases the force on the ball.”
- c. Indicate Sentence Strip 4c.
- SAY** “The cushioning does not change the force on the ball.”
19. **ASK AGAIN** “Why does the ball not bounce back as far from the wall as when there is a large amount of cushioning on the wall?”
20. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
21. Indicate Sentence Strip 4a.
- SAY** “The cushioning reduces the force on the ball.”
22. **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.

SAY	"[Insert description of incorrect Sentence Strip chosen by the student] is not the correct answer."
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2. **ASK** "Why does the ball not bounce back as far from the wall as when there is a large amount of cushioning on the wall?"

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

- a. Indicate Sentence Strip 4a.

SAY	"The cushioning reduces the force on the ball."
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- b. Indicate Sentence Strip 4b.

SAY	"The cushioning increases the force on the ball."
------------	---------------------------------------------------

- c. Indicate Sentence Strip 4c.

SAY	"The cushioning does not change the force on the ball."
------------	---------------------------------------------------------

4. **ASK AGAIN** "Why does the ball not bounce back as far from the wall as when there is a large amount of cushioning on the wall?"

5. Allow student to respond and record response.

6. Indicate Sentence Strip 4a.

SAY	"The cushioning reduces the force on the ball."
------------	-------------------------------------------------

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

The correct answer is as follows:

1. Why does the ball not bounce back as far from the wall as when there is a large amount of cushioning on the wall?
 - a. Sentence Strip 4a – The cushioning reduces the force on the ball.



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

ACTIVITY 5

Essence Statement: CTAS-HS-PS2-3 Test a device that minimizes the force on a common object during a collision.*

Core Extension 5: Make and support a claim about the modification to a device and its effect on reducing the force during the collision. (CTAS-HS-PS2-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Collision Investigation 2 Observations Data Table
- Activity 5 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – facial tissue
 - Sentence Strip 2b – paper towel
 - Sentence Strip 2c – clear tape

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about the results of an investigation. In this investigation, students conducted the same investigation that you just saw, where the students measured how far a ball bounced back after hitting a wall. This time, the students tried out different materials on the wall, and measured how far the ball bounced back with each material.”
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2. Display Resource 1: Collisions Investigation 2 Observations Data Table for the student.
3. Indicate Resource 1.

- | | |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAY | “A student tested the distance that a ball bounced back from the wall using three different materials as cushion on the wall. During Trial 1 (<i>indicate ‘Trial 1’</i>), there was facial tissue as cushion on the wall (<i>indicate ‘Facial Tissue’</i>), and the ball bounced back 15 centimeters (<i>indicate ‘15 centimeters’ in row 1</i>). During Trial 2 (<i>indicate ‘Trial 2’</i>), there was paper towel as cushion on the wall (<i>indicate ‘Paper Towel’</i>), and the ball bounced back 5 centimeters (<i>indicate ‘5 centimeters’ in row 2</i>). During Trial 3 (<i>indicate ‘Trial 3’</i>), there was clear tape as cushion on the wall (<i>indicate ‘Clear Tape’</i>), and the ball bounced back 25 centimeters (<i>indicate ‘25 centimeters’ in row 3</i>).” |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4.

ASK	“Which claim can be supported by the data in this data table?”
------------	----------------------------------------------------------------

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

- a. Indicate Sentence Strip 2a.

- | | |
|------------|----------------------------------------------------------------|
| SAY | “The facial tissue cushioned the impact of the ball the best.” |
|------------|----------------------------------------------------------------|

- b. Indicate Sentence Strip 2b.

- | | |
|------------|--------------------------------------------------------------|
| SAY | “The paper towel cushioned the impact of the ball the best.” |
|------------|--------------------------------------------------------------|

c. Indicate Strip 2c.

SAY	“The clear tape cushioned the impact of the ball the best.”
------------	-------------------------------------------------------------

6. **ASK AGAIN** “Which claim can be supported by the data in this 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 2b.

SAY	“The paper towel cushioned the impact of the ball the best.”
------------	--------------------------------------------------------------

9. **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.

SAY	"[Insert description of incorrect Strip chosen by the student] is not the correct answer."
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2.

ASK	"Which claim can be supported by the data in this data table?"
------------	----------------------------------------------------------------

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

- a. Indicate Sentence Strip 2a.

SAY	"The facial tissue cushioned the impact of the ball the best."
------------	----------------------------------------------------------------

- b. Indicate Sentence Strip 2b.

SAY	"The paper towel cushioned the impact of the ball the best."
------------	--------------------------------------------------------------

- c. Indicate Strip 2c.

SAY	"The clear tape cushioned the impact of the ball the best."
------------	-------------------------------------------------------------

4.

ASK AGAIN	"Which claim can be supported by the data in this data table?"
----------------------	----------------------------------------------------------------

5. Allow student to respond and record response.

6. Indicate Sentence Strip 2b.

SAY	"The paper towel cushioned the impact of the ball the best."
------------	--------------------------------------------------------------

7.

SAY	"We are now finished with this activity."
------------	-------------------------------------------

The correct answer is as follows:

1. Which claim can be supported by the data in this data table?
 - a. Sentence Strip 2b – The paper towel cushioned the impact of the ball the best.



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify the claim that is supported by the data in the data table (Sentence Strip 2b).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">after scaffolding, is able to identify the claim that is supported by the data in the data table (Sentence Strip 2b).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify the claim that is supported by the data in the data table (Sentence Strip 2b).	The student demonstrates understanding independently without scaffolding.	2



Connecticut
Alternate
Science
Assessment

Physical Science

Storyline 6: Using Energy Every Day

Grade 11 Performance Task



Connecticut
Alternate
Science
Assessment

Physical Science
Storyline 6: Using Energy Every Day
Grade 11 Performance Task

Guiding Questions: What types of energy do we use every day? How do devices we use every day transfer energy? How does heat energy transfer in a system?

NGSS Learning Progressions	Grade 11		
	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
PS3.A Definitions of Energy	HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*	CTAS-HS-PS3-3 Test a device that converts one form of energy into another form of energy.*	<ol style="list-style-type: none"> 1. Identify two ways that different forms of energy (e.g., heat, motion, light, sound, electrical, mechanical, wind, kinetic) are used in everyday life. (CTAS-HS-PS3-3) 2. Given examples of energy transformation, label the energy change from one form to another. (CTAS-HS-PS3-3) 3. Use the results of a test to show that energy is transferred using a device. (CTAS-HS-PS3-3) 4. Measure the temperature of water at two different temperatures. (CTAS-HS-PS3-4) 5. Use the results of an investigation to show that temperature equilibrium will be reached by combining water at two different temperatures. (CTAS-HS-PS3-4)
PS3.D Energy in Chemical Processes and Everyday Life	HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	CTAS-HS-PS3-4 Use the results of an investigation as evidence that when objects at different temperatures are brought together in a system, they will eventually reach equilibrium (the same temperature).	
Appropriate Vocabulary	Energy, motion, mechanical energy, kinetic energy, electrical energy, heat energy, light energy, sound energy, charge, transfer (move from one place to another), temperature, thermometer, equilibrium (a state in which opposing forces or influences are balanced)		

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



Physical Science

Storyline 6: Using Energy Every Day Grade 11 Performance Task

General Overview:

Students will complete a series of activities focusing on exploring ways that forms of energy are used in everyday life. Students will examine how energy can change from one form of energy to another, recognizing that energy transformation has occurred. Students will also use temperatures of samples of water to demonstrate temperature equilibrium.

List of Materials Needed:

Teacher-Provided Resources:

ACTIVITY 1

- 1 Piece of Paper
- 1 Pair of Scissors

ACTIVITY 4

Label the first cup with ‘**Sample 1**’ and the second cup with ‘**Sample 2**.’ Fill **Sample 1** with cold water. Fill **Sample 2** with hot water. These cups should be filled with two significantly different temperatures of water—there should be *at least* a 20-degree temperature difference between the two cups. **The investigation must be set up prior to the administration of the activity.** Teacher-Provided Resources include:

- Thermometer
- 2 Cups of the Same Type (e.g. 2 Paper Cups)
- Hot Water
- Cold Water

ACTIVITY 5

Label the first cup with ‘**Sample 1**,’ the second cup with ‘**Sample 2**,’ and the third cup with ‘**Sample 3**.’ Fill **Sample 1** one third of the way with cold water. Fill **Sample 2** one third of the way with hot water. These cups should be filled with two significantly different temperatures of water—there should be *at least* a 20-degree temperature difference between the two cups. You will combine the water in **Sample 1** and the water in **Sample 2** by pouring the contents of each into the cup labeled **Sample 3**.

The investigation must be set up prior to the administration of the activity. Teacher-Provided Resources include:

- Thermometer
- 3 Cups of the Same Type (e.g. 3 Paper Cups)
- Hot Water
- Cold 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 1: Cards 1a – 1c
 - Card 1a – Sound Energy
 - Card 1b – Electrical Energy
 - Card 1c – Mechanical Energy
- Activity 1 Resource 2: Toy Car Poster
- Activity 1 Resource 3: Cards 3a – 3c
 - Card 3a – Kinetic Energy
 - Card 3b – Light Energy
 - Card 3c – Heat Energy
- Activity 2 Resource 1: Table Lamp Poster
- Activity Resource 2: Cards 2a – 2c
 - Card 2a – Light Energy
 - Card 2b – Mechanical Energy
 - Card 2c – Sound Energy
- Activity 2 Resource 3: Electrical Energy to Radio Poster
- Activity 3 Resource 1a: Cell Phone 1 Charging Poster
- Activity 3 Resource 1b: Cell Phone 2 Charging Poster
- Activity 3 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – Cell Phone 1
 - Sentence Strip 2b – Cell Phone 2
 - Sentence Strip 2c – Both Cell Phones
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – Heat/Electrical
 - Strip 3b – Mechanical/Light
 - Strip 3c – Electrical/Battery
- Activity 4 Resource 1: Water Temperature Investigation 1 Data Table Poster
- Activity 5 Resource 1: Water Temperature Investigation 2 Data Table Poster
- Activity 5 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – Higher
 - Sentence Strip 2b – Lower
 - Sentence Strip 2c – Same

- Activity 5 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – Higher
 - Sentence Strip 3b – Lower
 - Sentence Strip 3c – Same
- Activity 5 Resource 4: Cards 4a – 4c
 - Card 4a – Sample 1
 - Card 4b – Sample 2
 - Card 4c – Sample 3

ACTIVITY 1

Essence Statement: CTAS-HS-PS3-3 Test a device that converts one form of energy into another form of energy.*

Core Extension 1: Identify two ways that different forms of energy (e.g., heat, motion, light, sound, electrical, mechanical, wind, kinetic) are used in everyday life. (CTAS-HS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Cards 1a – 1c
 - Card 1a – Sound Energy
 - Card 1b – Electrical Energy
 - Card 1c – Mechanical Energy
- Activity 1 Resource 2: Toy Car Poster
- Activity 1 Resource 3: Cards 3a – 3c
 - Card 3a – Kinetic Energy
 - Card 3b – Light Energy
 - Card 3c – Heat Energy

Teacher-Provided Resources:

- 1 Piece of Paper
- 1 Pair of Scissors

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about how we use different forms of energy in everyday life. There are many forms of energy that we use every day. The forms of energy that we use include heat, light, sound, electrical, mechanical, and kinetic energy.”
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2.

SAY	“We are going to cut a piece of paper with scissors.”
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3.

SAY	“Let’s cut the piece of paper with the scissors.”
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4. *If the student is unable to use scissors, the teacher may demonstrate cutting a piece of paper with scissors for the student.*

5.

ASK	“What is one form of energy that the scissors use to cut the paper?”
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6. Provide Resource 1: Cards 1a – 1c to the student. Indicate and read each Card.
 - a. Indicate Card 1a.

SAY	“Sound Energy”
------------	----------------

 - b. Indicate Card 1b.

SAY	“Electrical Energy”
------------	---------------------

c. Indicate Card 1c.

SAY	“Mechanical Energy”
------------	---------------------

7. **ASK AGAIN** “What is one form of energy that the scissors use to cut the paper?”

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

9. Indicate Card 1c.

SAY	“The scissors use mechanical energy to cut the paper.”
------------	--------------------------------------------------------

10. Display Resource 2: Toy Car Poster for the student.

11. Indicate Resource 2.

SAY	“This is a picture of a toy car. This toy car runs on a battery. The toy car is moving up a ramp.”
------------	----------------------------------------------------------------------------------------------------

12. **ASK** “What is one form of energy that the toy car uses when it moves up the ramp?”

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

a. Indicate Card 3a.

SAY	“Kinetic Energy”
------------	------------------

b. Indicate Card 3b.

SAY	“Light Energy”
------------	----------------

c. Indicate Card 3c.

SAY	“Heat Energy”
------------	---------------

14. **ASK AGAIN** “What is one form of energy that the toy car uses when it moves up the ramp?”

15. Allow student to respond and record response.

16. Indicate Card 3a.

SAY	“The car uses kinetic energy because the car is in motion when it moves up a ramp.”
------------	-------------------------------------------------------------------------------------

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The scissors use mechanical energy to cut the paper.”
------------	--------------------------------------------------------

2. Display Resource 2: Toy Car Poster for the student.

3. Indicate Resource 2.

SAY	“This is a picture of a toy car. This toy car runs on a battery. The toy car is moving up a ramp.”
------------	----------------------------------------------------------------------------------------------------

4. **ASK** “What is one form of energy that the toy car uses when it moves up the ramp?”

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

- a. Indicate Card 3a.

SAY	“Kinetic Energy”
------------	------------------

- b. Indicate Card 3b.

SAY	“Light Energy”
------------	----------------

- c. Indicate Card 3c.

SAY	“Heat Energy”
------------	---------------

6. **ASK AGAIN** “What is one form of energy that the toy car uses when it moves up the ramp?”

7. Allow student to respond and record response.

8. Indicate Card 3a.

SAY	“The car uses kinetic energy because the car is in motion when it moves up a ramp.”
------------	-------------------------------------------------------------------------------------

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

Correct answers are as follows:

1. What is one form of energy that the scissors use to cut the paper?
 - a. Card 1c – Mechanical Energy
2. What is one form of energy that the toy car uses when it moves up the ramp?
 - a. Card 3a – Kinetic Energy



Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that mechanical energy is the form of energy that the scissors use (Card 1c); andis unable to identify that kinetic energy is the form of energy that the toy car uses (Card 3a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify that mechanical energy is the form of energy that the scissors use (Card 1c); andis unable to identify that kinetic energy is the form of energy that the toy car uses (Card 3a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that mechanical energy is the form of energy that the scissors use (Card 1c); andafter scaffolding, is able to identify that kinetic energy is the form of energy that the toy car uses (Card 3a).	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to identify that mechanical energy is the form of energy that the scissors use (Card 1c); andis able to identify that kinetic energy is the form of energy that the toy car uses (Card 3a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 2

Essence Statement: CTAS-HS-PS3-3 Test a device that converts one form of energy into another form of energy.*

Core Extension 2: Given examples of energy transformation, label the energy change from one form to another. (CTAS-HS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Table Lamp Poster
- Activity Resource 2: Cards 2a – 2c
 - Card 2a – Light Energy
 - Card 2b – Mechanical Energy
 - Card 2c – Sound Energy
- Activity 2 Resource 3: Electrical Energy to Radio Poster

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how energy can change from one form to another. Energy changes forms all around us.”

2. Display Resource 1: Table Lamp Poster for the student.

3. Indicate Resource 1.

SAY “Here is a table lamp that is plugged into an electrical outlet in the wall. The lamp is turned on. There are two boxes below the table lamp with an arrow that leads from the first box to the second box (*indicate the blank box in Resource 1*). The first box says ‘**Electrical Energy**.’ The second box is blank. Let’s place an energy card in the blank box with the form of energy that the lamp produces when it is turned on.”

4. **ASK** “When the table lamp is turned on, what form of energy does the table lamp produce?”

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

a. Indicate Card 2a.

SAY “Light Energy”

b. Indicate Card 2b.

SAY “Mechanical Energy”

c. Indicate Card 2c.

SAY “Sound Energy”

6. **ASK AGAIN** “When the table lamp is turned on, what form of energy does the table lamp produce?”

7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. Indicate Card 2a.
- | | |
|------------|------------------------------------------------------------------------------------|
| SAY | “Electrical energy is changed into light energy when the table lamp is turned on.” |
|------------|------------------------------------------------------------------------------------|
9. Display Resource 3: Electrical Energy to Radio Poster for the student.
10. Indicate Resource 3.
- | | |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAY | “Here is a picture of a cord from a radio plugged into an electrical outlet in the wall. There are two boxes below the cord with an arrow that leads from the first box to the second box (<i>indicate the blank box in Resource 3</i>). The first box says ‘ Electrical Energy .’ The second box is blank. Let’s place an energy card in the blank box with the form of energy that the radio produces.” |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
11. **ASK** “What form of energy does the radio produce?”
12. Provide remaining Resource 2: Card 2b and Card 2c to the student. Indicate and read each remaining Card.
- a. Indicate Card 2b.
- | | |
|------------|---------------------|
| SAY | “Mechanical Energy” |
|------------|---------------------|
- b. Indicate Card 2c.
- | | |
|------------|----------------|
| SAY | “Sound Energy” |
|------------|----------------|
13. **ASK AGAIN** “What form of energy does the radio produce?”
14. Allow student to respond and record response.
15. Indicate Card 2c.
- | | |
|------------|------------------------------------------------------------------------------|
| SAY | “Electrical energy is changed into sound energy when you turn the radio on.” |
|------------|------------------------------------------------------------------------------|
16. **SAY** “We are now finished with this activity.”

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“Electrical energy is changed into light energy when the table lamp is turned on.”
------------	------------------------------------------------------------------------------------

2. Display Resource 3: Electrical Energy to Radio Poster for the student.

3. Indicate Resource 3.

SAY	“Here is a picture of a cord from a radio plugged into an electrical outlet in the wall. There are two boxes below the cord with an arrow that leads from the first box to the second box (<i>indicate the blank box in Resource 3</i>). The first box says ‘ Electrical Energy. ’ The second box is blank. Let’s place an energy card in the blank box with the form of energy that the radio produces.”
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4.

ASK	“What form of energy does the radio produce?”
------------	-----------------------------------------------

5. Provide remaining Resource 2: Card 2b and Card 2c to the student. Indicate and read each remaining Card.

- a. Indicate Card 2b.

SAY	“Mechanical Energy”
------------	---------------------

- b. Indicate Card 2c.

SAY	“Sound Energy”
------------	----------------

6.

ASK AGAIN	“What form of energy does the radio produce?”
------------------	-----------------------------------------------

7. Allow student to respond and record response.

8. Indicate Card 2c.

SAY	“Electrical energy is changed into sound energy when you turn the radio on.”
------------	------------------------------------------------------------------------------

9.

SAY	“We are now finished with this activity.”
------------	-------------------------------------------

Correct answers are as follows:

1. When the table lamp is turned on, what form of energy does the table lamp produce?
 - a. Card 2a – Light Energy
2. What form of energy does the radio produce?
 - a. Card 2c – Sound Energy



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">• gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that light energy is the form of energy that the lamp produces (Card 2a); and• is unable to identify that sound energy is the form of energy that the radio produces (Card 2c).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">• is able to identify that light energy is the form of energy that the lamp produces (Card 2a); and• is unable to identify that sound energy is the form of energy that the radio produces (Card 2c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that light energy is the form of energy that the lamp produces (Card 2a); and• after scaffolding, is able to identify that sound energy is the form of energy that the radio produces (Card 2c).	<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">• is able to identify that light energy is the form of energy that the lamp produces (Card 2a); and• is able to identify that sound energy is the form of energy that the radio produces (Card 2c).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 3

Essence Statements: CTAS-HS-PS3-3 Test a device that converts one form of energy into another form of energy.*

Core Extension 3: Use the results of a test to show that energy is transferred using a device. (CTAS-HS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1a: Cell Phone 1 Charging Poster
- Activity 3 Resource 1b: Cell Phone 2 Charging Poster
- Activity 3 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – Cell Phone 1
 - Sentence Strip 2b – Cell Phone 2
 - Sentence Strip 2c – Both Cell Phones
- Activity 3 Resource 3: Strips 3a – 3c
 - Strip 3a – Heat/Electrical
 - Strip 3b – Mechanical/Light
 - Strip 3c – Electrical/Battery

Prior to the administration of this activity, teacher may cut apart Resource 1a and Resource 1b.

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about how energy is transferred to a cell phone when it is charged.”

2. Display Resource 1a: Cell Phone 1 Charging Poster for the student.

3. Display Resource 1b: Cell Phone 2 Charging Poster for the student.

4. Indicate Resource 1a and Resource 1b.

SAY “This picture shows two cell phones charging. Cell Phone 1 has been charging for 10 minutes (*indicate Resource 1a*). Cell Phone 2 has been charging for 40 minutes (*indicate Resource 1b*).”

5. **ASK** “Which cell phone has more energy?”

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

a. Indicate Sentence Strip 2a.

SAY “Cell phone 1 has more energy.”

b. Indicate Sentence Strip 2b.

SAY “Cell phone 2 has more energy.”

c. Indicate Sentence Strip 2c.

SAY	“Both cell phones have the same amount of energy.”
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7. **ASK**
AGAIN “Which cell phone has more energy?”

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

9. Indicate Sentence Strip 2b.

SAY	“Cell phone 2 has more energy.”
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10. Indicate Resource 1a and Resource 1b.

SAY	“The charging cord for each cell phone is plugged into a wall outlet. This is a form of energy transfer.”
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11. **ASK** “What form of energy transfer is taking place when the cell phone is charging?”

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

a. Indicate Strip 3a.

SAY	“heat energy to electrical energy”
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b. Indicate Strip 3b.

SAY	“mechanical energy to light energy”
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c. Indicate Strip 3c.

SAY	“electrical energy to battery energy”
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13. **ASK**
AGAIN “What form of energy transfer is taking place when the cell phone is charging?”

14. Allow student to respond and record response.

15. Indicate Strip 3c.

SAY	“The energy transfer that takes place when the cell phone is charging is electrical energy to battery energy.”
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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 Sentence Strip 2b.

SAY	“Cell phone 2 has more energy.”
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2. Indicate Resource 1a and Resource 1b.

SAY	“The charging cord for each cell phone is plugged into a wall outlet. This is a form of energy transfer.”
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3. **ASK** “What form of energy transfer is taking place when the cell phone is charging?”

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

- a. Indicate Strip 3a.

SAY	“heat energy to electrical energy”
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- b. Indicate Strip 3b.

SAY	“mechanical energy to light energy”
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- c. Indicate Strip 3c.

SAY	“electrical energy to battery energy”
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5. **ASK AGAIN** “What form of energy transfer is taking place when the cell phone is charging?”

6. Allow student to respond and record response.

7. Indicate Strip 3c.

SAY	“The energy transfer that takes place when the cell phone is charging is electrical energy to battery energy.”
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8. **SAY** “We are now finished with this activity.”

Correct answers are as follows:

1. Which cell phone has more energy?
 - a. Sentence Strip 2b – Cell phone 2 has more energy.
2. What form of energy transfer is taking place when the cell phone is charging?
 - a. Strip 3c – electrical energy to battery energy



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">• gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that cell phone 2 has more energy (Sentence Strip 2b); and• is unable to identify that the transfer of energy is from electrical energy to battery energy (Strip 3c).	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none">• is able to identify that cell phone 2 has more energy (Sentence Strip 2b); and• is unable to identify that the transfer of energy is from electrical energy to battery energy (Strip 3c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that cell phone 2 has more energy (Sentence Strip 2b); and• after scaffolding, is able to identify that the transfer of energy is from electrical energy to battery energy (Strip 3c).	<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">• is able to identify that cell phone 2 has more energy (Sentence Strip 2b); and• is able to identify that the transfer of energy is from electrical energy to battery energy (Strip 3c).	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 4

Essence Statement: CTAS-HS-PS3-4 Use the results of an investigation as evidence that when objects at different temperatures are brought together in a system, they will eventually reach equilibrium (the same temperature).

Core Extension 4: Measure the temperature of water at two different temperatures. (CTAS-HS-PS3-4)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Water Temperature Investigation 1 Data Table Poster

Teacher-Provided Resources:

Label the first cup with ‘**Sample 1**’ and the second cup with ‘**Sample 2.**’ Fill **Sample 1** with cold water. Fill **Sample 2** with hot water. These cups should be filled with two significantly different temperatures of water—there should be *at least* a 20-degree temperature difference between the two cups.

The investigation must be set up prior to the administration of the activity. Teacher-Provided Resources include:

- Thermometer
- 2 Cups of the Same Type (e.g. 2 Paper Cups)
- Hot Water
- Cold Water

Steps to Follow:

1. **SAY** “In this activity, we are going to investigate the temperature of two different samples of water.”

2. Place **Sample 1** and **Sample 2** on the table.

3. Place the thermometer on the table.

4. **SAY** “First, we will use the thermometer to measure the temperature of **Sample 1.** Then, we will use the thermometer to measure the temperature of **Sample 2.**”

5. Display Resource 1: Water Temperature Investigation 1 Data Table Poster for the student.

6. Indicate Resource 1.

SAY “We will use this data table to record our measurements. For each ‘**Water Sample**’, we will record the temperature measurement in the ‘**Temperature**’ column.”

7. Indicate the thermometer and Sample 1.

SAY “Let’s use this thermometer (*indicate thermometer*) to measure the temperature of Sample 1.”

8. Allow student to measure the temperature of Sample 1 and record observation in the data table (*teacher may assist the student if necessary*). If no response or if incorrect response, proceed to scaffolding instructions.

9. Indicate the thermometer and Sample 2.

SAY	“Let’s use this thermometer (indicate thermometer) to measure the temperature of Sample 2.”
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10. Allow student to measure the temperature of Sample 2 and record observation in the data table (*teacher may assist the student if necessary*).

11. SAY	“We are now finished with this activity.”
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Scoring Guidance and Scaffolding

Scaffolding:

1. After student makes first incorrect attempt, demonstrate how to measure the temperature of Sample 1.

2. Indicate the thermometer and Sample 2.

SAY	“Let’s use this thermometer (indicate thermometer) to measure the temperature of Sample 2.”
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3. Allow student to measure the temperature of Sample 2 and record observation in the data table (*teacher may assist the student if necessary*).

4. SAY	“We are now finished with this activity.”
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Content Guidance	Rating	Score
Student... <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to measure the temperature of Sample 1 or Sample 2.	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to measure the temperature of Sample 1; andis unable to measure the temperature of Sample 2. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to measure the temperature of Sample 1; andafter scaffolding, is able to measure the temperature of Sample 2.	The student demonstrates limited understanding typically requiring additional support through scaffolding.	1
Student... <ul style="list-style-type: none">is able to measure the temperature of Sample 1 and Sample 2.	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 5

Essence Statement: CTAS-HS-PS3-4 Use the results of an investigation as evidence that when objects at different temperatures are brought together in a system, they will eventually reach equilibrium (the same temperature).

Core Extension 5: Use the results of an investigation to show that temperature equilibrium will be reached by combining water at two different temperatures. (CTAS-HS-PS3-4)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Water Temperature Investigation 2 Data Table Poster
- Activity 5 Resource 2: Sentence Strips 2a – 2c
 - Sentence Strip 2a – Higher
 - Sentence Strip 2b – Lower
 - Sentence Strip 2c – Same
- Activity 5 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – Higher
 - Sentence Strip 3b – Lower
 - Sentence Strip 3c – Same
- Activity 5 Resource 4: Cards 4a – 4c
 - Card 4a – Sample 1
 - Card 4b – Sample 2
 - Card 4c – Sample 3

Teacher-Provided Resources:

Label the first cup with ‘**Sample 1,**’ the second cup with ‘**Sample 2,**’ and the third cup with ‘**Sample 3.**’ Fill **Sample 1** one third of the way with cold water. Fill **Sample 2** one third of the way with hot water. These cups should be filled with two significantly different temperatures of water—there should *be at least* a 20-degree temperature difference between the two cups. You will combine the water in **Sample 1** and the water in **Sample 2** by pouring the contents of each into the cup labeled **Sample 3.**

The investigation must be set up prior to the administration of the activity. Teacher-Provided Resources include:

- Thermometer
- 3 Cups of the Same Type (e.g. 3 Paper Cups)
- Hot Water
- Cold Water

Steps to Follow:

1. **SAY** “In this activity, we are going to investigate the temperature of three different samples of water.”
2. Place **Sample 1** cup filled with cold water and **Sample 2** cup filled with hot water on the table.
3. Place the thermometer on the table.

4. **SAY** “Here is a cup labeled ‘**Sample 1.**’ This cup holds cold water (*indicate Sample 1 cup*). Here is a cup labeled ‘**Sample 2.**’ This cup holds hot water (*indicate Sample 2 cup*). Let’s measure the water temperature in each of these cups.”

5. Display Resource 1: Water Temperature Investigation 2 Data Table Poster for the student.

6. Indicate Resource 1.

SAY “For each ‘**Water Sample,**’ we will record the temperature measurement in the ‘**Temperature**’ column.”

7. Indicate the thermometer and **Sample 1.**

SAY “Let’s use this thermometer (*indicate thermometer*) to measure the temperature of Sample 1.”

8. Allow student to measure the temperature of Sample 1 and record observation in the data table (*teacher may assist the student if necessary*).

9. Indicate the thermometer and **Sample 2.**

SAY “Let’s use this thermometer (*indicate thermometer*) to measure the temperature of Sample 2.”

10. Allow student to measure the temperature of Sample 2 and record observation in the data table (*teacher may assist the student if necessary*).

11. Place empty cup labeled **Sample 3** on the table.

12. **SAY** “Now we are going to observe what happens to the temperature when the cold water in **Sample 1** is combined with the hot water in **Sample 2.** We will pour the cold water and the hot water into the cup labeled ‘**Sample 3**’ (*indicate Sample 3 cup*).”

13. Pour **Sample 1** and **Sample 2** in cup labeled **Sample 3.**

14. Indicate the thermometer and Sample 3.

SAY “Let’s use this thermometer (*indicate thermometer*) to measure the temperature of Sample 3.”

15. Allow student to measure the temperature of Sample 3 and record observation in the data table (*teacher may assist the student if necessary*).

16. **ASK** “How does the water temperature in Sample 3 compare to the hot water temperature in Sample 2?”
17. Provide Resource 2: Sentence Strips 2a – 2c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 2a.
- SAY** “The temperature in Sample 3 is higher than the temperature in Sample 2.”
- b. Indicate Sentence Strip 2b.
- SAY** “The temperature in Sample 3 is lower than the temperature in Sample 2.”
- c. Indicate Sentence Strip 2c.
- SAY** “The temperature in Sample 3 is the same as the temperature in Sample 2.”
18. **ASK AGAIN** “How does the water temperature in Sample 3 compare to the hot water temperature in Sample 2?”
19. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
20. Indicate Sentence Strip 2b.
- SAY** “The temperature in Sample 3 is lower than the temperature in Sample 2.”
21. **ASK** “How does the water temperature in Sample 3 compare to the cold water temperature in Sample 1?”
22. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 3a.
- SAY** “The temperature in Sample 3 is higher than the temperature in Sample 1.”
- b. Indicate Sentence Strip 3b.
- SAY** “The temperature in Sample 3 is lower than the temperature in Sample 1.”
- c. Indicate Sentence Strip 3c.
- SAY** “The temperature in Sample 3 is the same as the temperature in Sample 1.”
23. **ASK AGAIN** “How does the water temperature in Sample 3 compare to the cold water temperature in Sample 1?”

24. Allow student to respond and record response.
25. Indicate Sentence Strip 3a.
- | | |
|------------|---------------------------------------------------------------------------|
| SAY | “The temperature in Sample 3 is higher than the temperature in Sample 1.” |
|------------|---------------------------------------------------------------------------|
26. **ASK** “Which water sample reached temperature equilibrium: Sample 1, Sample 2, or Sample 3?”
27. Provide Resource 4: Cards 4a – 4c to the student. Indicate and read each Card.
- a. Indicate Card 4a.
- | | |
|------------|------------|
| SAY | “Sample 1” |
|------------|------------|
- b. Indicate Card 4b.
- | | |
|------------|------------|
| SAY | “Sample 2” |
|------------|------------|
- c. Indicate Card 4c.
- | | |
|------------|------------|
| SAY | “Sample 3” |
|------------|------------|
28. **ASK AGAIN** “Which water sample reached temperature equilibrium: Sample 1, Sample 2, or Sample 3?”
29. Allow student to respond and record response.
30. Indicate Card 4c.
- | | |
|------------|---------------------------------------------|
| SAY | “Sample 3 reached temperature equilibrium.” |
|------------|---------------------------------------------|
31. **SAY** “We are now finished with this activity.”

Scoring Guidance and Scaffolding

Scaffolding:

Note: Optionally, you may ask the student the third question, “Which sample reached temperature equilibrium: Sample 1, Sample 2, or Sample 3?” if the scaffold is applied. However, if you choose to ask the third question and the student answers the third question correctly, the student will still receive one point.

1. Indicate Sentence Strip 2b.

SAY	“The temperature in Sample 3 is lower than the temperature in Sample 2.”
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2.

ASK	“How does the water temperature in Sample 3 compare to the cold water temperature in Sample 1?”
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3. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.

- a. Indicate Sentence Strip 3a.

SAY	“The temperature in Sample 3 is higher than the temperature in Sample 1.”
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- b. Indicate Sentence Strip 3b.

SAY	“The temperature in Sample 3 is lower than the temperature in Sample 1.”
------------	--------------------------------------------------------------------------

- c. Indicate Sentence Strip 3c.

SAY	“The temperature in Sample 3 is the same as the temperature in Sample 1.”
------------	---------------------------------------------------------------------------

4.

ASK	“How does the water temperature in Sample 3 compare to the cold water temperature in Sample 1?”
AGAIN	

5. Allow student to respond and record response.

6.

SAY	“We are now finished with this activity.”
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Correct answers are as follows:

1. How does the water temperature in Sample 3 compare to the hot water temperature in Sample 2?
 - a. Sentence Strip 2b – The temperature in Sample 3 is lower than the temperature in Sample 2.
2. How does the water temperature in Sample 3 compare to the cold-water temperature in Sample 1?
 - a. Sentence Strip 3a – The temperature in Sample 3 is higher than the temperature in Sample 1.
3. Which water sample reached temperature equilibrium: Sample 1, Sample 2, or Sample 3?
 - a. Card 4c – Sample 3



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the temperature in Sample 3 is lower than the temperature in Sample 2 (Sentence Strip 2b); andis unable to identify that the temperature in Sample 3 is higher than the temperature in Sample 1 (Sentence Strip 3a); andis unable to identify that Sample 3 reached temperature equilibrium (Card 4c).	<p>The student does not demonstrate understanding.</p>	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the temperature in Sample 3 is lower than the temperature in Sample 2 (Sentence Strip 2b); oris able to identify that the temperature in Sample 3 is higher than the temperature in Sample 1 (Sentence Strip 3a); andis unable to identify that Sample 3 reached temperature equilibrium (Card 4c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the temperature in Sample 3 is lower than the temperature in Sample 2 (Sentence Strip 2b); orafter scaffolding, is able to identify that the temperature in Sample 3 is higher than the temperature in Sample 1 (Sentence Strip 3a).	<p>The student demonstrates limited understanding typically requiring additional support through scaffolding.</p>	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the temperature in Sample 3 is lower than the temperature in Sample 2 (Sentence Strip 2b); oris able to identify that the temperature in Sample 3 is higher than the temperature in Sample 1 (Sentence Strip 3a); andis able to identify that Sample 3 reached temperature equilibrium (Card 4c).	<p>The student demonstrates understanding independently without scaffolding.</p>	2