



**Connecticut
Alternate
Science
Assessment**

Grade 8 Performance Tasks

Physical Science

Storyline 5: Forces and Motion

Storyline 6: Using Energy Every Day



Connecticut
Alternate
Science
Assessment

Physical Science

Storyline 5: Forces and Motion

Grade 8 Performance Task



Physical Science

**Storyline 5: Forces and Motion
Grade 8 Performance Task**

Guiding Questions: How can the motion of an object be described? What factors affect the motion of an object?

Grade 8			
NGSS Learning Progressions	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
PS2.A Forces and motion	MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.	CTAS-MS-PS2-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.	<ol style="list-style-type: none"> 1. Recognize the relative strength (e.g., stronger or weaker) of two different forces on an object. (CTAS-MS-PS2-2) 2. Use the results of an investigation to support a claim about the effect of two (balanced or unbalanced) forces on the motion of an object. (CTAS-MS-PS2-2) 3. Using equipment (e.g., a balance or scale), measure the mass of an object in grams. (CTAS-MS-PS2-2) 4. Use the results of an investigation to support a claim about the effect of an object’s mass on its motion when force is applied (e.g., an object with more mass will take more force to move). (CTAS-MS-PS2-2) 5. Identify the changing (independent) variable and one constant in the provided investigation. (CTAS-MS-PS2-2)
Appropriate Vocabulary	Strength of forces (weaker, stronger), investigation, claim, mass, grams, motion, independent variable, constant, balanced, unbalanced, kilograms		



Physical Science
Storyline 5: Forces and Motion
Grade 8 Performance Task

General Overview:

This performance task focuses on the motion of objects and how forces (pushes or pulls) and mass (or weight) can affect motion. Students will consider how the motion of an object is affected by the forces pulling on it. Students will also conduct an investigation to study how changing the mass of the object affects the force needed to move it.

Note: *Students are not expected to know the difference between mass and weight (i.e., the term weight may be used instead of mass throughout the performance task.)*

List of Materials Needed:

Teacher-Provided Resources:

ACTIVITY 3:

- Table
- Balance (double beam, triple beam, or electronic)
- 3 Books (of similar weights/masses such as paperback books)*
*The selected books must provide enough mass so that the rubber band stretches when pulled during the investigation.

Make sure that the mass of three books together does not exceed the capacity of the balance. Activities 3, 4, and 5 should be completed back-to-back.

ACTIVITY 4:

Use the materials and instructions included in Activity 4 Resource 1a and Activity 4 Resource 1b to set up the investigation according to the diagram included in Activity 4 Resource 2. **Teacher must set up and test the investigation prior to introducing the investigation to the student.** Teacher-Provided Resources include:

- Table
- 1 Piece of Cardboard (approximately 8.5" x 11")
- 1 Roll of Strong Tape (e.g., duct tape or packing tape)
- 2 Large Paper Clips
- 1 Large Rubber Band
- 1 Provided Paper Ruler
- Impact Safety Glasses, 1 each for teacher and student(s)
- 3 Books (of similar weights/masses such as paperback books)*
*The selected books must provide enough mass so that the rubber band stretches when pulled during the investigation.

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: Shopping Cart Poster 1
- Activity 1 Resource 2: Card 2a and Card 2b
 - Card 2a – Person on Left
 - Card 2b – Person on Right
- Activity 1 Resource 3: Shopping Cart Poster 2
- Activity 1 Resource 4: Card 4a and Card 4b
 - Card 4a – Person on Left
 - Card 4b – People on Right
- Activity 2 Resource 1: Balanced Forces Poster
- Activity 2 Resource 2: Unbalanced Forces Poster
- Activity 2 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – boy’s side
 - Sentence Strip 3b – girl’s side
 - Sentence Strip 3c – both sides
- Activity 2 Resource 4: See-saws Poster
- Activity 2 Resource 5: Cards 5a – 5e
 - Card 5a – 100 kg
 - Card 5b – 25 kg
 - Card 5c – 100 kg
 - Card 5d – 50 kg
 - Card 5e – 50 kg
- Activity 2 Resource 6: Claim Sentence Strip
- Activity 3 Resource 1: Forces Data Table Poster
- Activity 4 Resource 1a: Teacher Directions for Forces Investigation – Forces Investigation Materials
- Activity 4 Resource 1b: Teacher Directions for Forces Investigation – Forces Investigation Materials
- Activity 4 Resource 2: Teacher Directions for Forces Investigation – Forces Investigation Diagram
- Activity 4 Resource 3: *Use Semi-Completed Activity 3 Resource 1: Forces Data Table Poster*
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – More Force/More Mass
 - Sentence Strip 4b – Less Force/More Mass
 - Sentence Strip 4c – More Force/Less Mass

- Activity 4 Resource 5: Sentence Strips 5a – 5c
 - Sentence Strip 5a – 1 Book
 - Sentence Strip 5b – 2 Books
 - Sentence Strip 5c – 3 Books
- Activity 5 Resource 1: Cards 1a – 1c
 - Card 1a – mass
 - Card 1b – table
 - Card 1c – rubber band
- Activity 5 Resource 2: Strips 2a – 2c
 - Strip 2a – mass in each trial
 - Strip 2b – surface of table
 - Strip 2c – distance cardboard moved
- Activity 5 Resource 3: *Use Completed Activity 3 Resource 1: Forces Data Table Poster*

ACTIVITY 1

Essence Statement: CTAS-MS-PS2-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.

Core Extension 1: Recognize the relative strength (e.g., stronger or weaker) of two different forces on an object. (CTAS-MS-PS2-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Shopping Cart Poster 1
- Activity 1 Resource 2: Card 2a and Card 2b
 - Card 2a – Person on Left
 - Card 2b – Person on Right
- Activity 1 Resource 3: Shopping Cart Poster 2
- Activity 1 Resource 4: Card 4a and Card 4b
 - Card 4a – Person on Left
 - Card 4b – People on Right

Steps to Follow:

1. **SAY** “In this activity, we are going to look at pictures of different forces pulling on the same object.”

2. Display Resource 1: Shopping Cart Poster 1 for the student.

3. Indicate Resource 1.

SAY “This picture shows two people pulling a shopping cart in opposite directions. The person pulling the shopping cart to the left is much stronger than the person pulling the shopping cart to the right.”

4. **ASK** “Which person will pull the shopping cart with greater force?”

5. Provide Resource 2: Card 2a and Card 2b to the student. Indicate and describe each Card.

a. Indicate Card 2a.

SAY “The person on the **left**.”

b. Indicate Card 2b.

SAY “The person on the **right**.”

6. **ASK AGAIN** “Which person will pull the shopping cart with greater force?”

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 person on the left .” |
|------------|-----------------------------------|
9. Display Resource 3: Shopping Cart Poster 2 for the student.
10. Indicate Resource 3.
- | | |
|------------|---|
| SAY | “This picture shows three people pulling a shopping cart. All three people are the same size and have the same strength. There is one person pulling the shopping cart to the left. There are two people pulling the shopping cart to the right. Each person pulls on the shopping cart with the same force.” |
|------------|---|
11. **ASK** “Who will likely give the shopping cart a stronger pull?”
12. Provide Resource 4: Card 4a and Card 4b to the student. Indicate and describe each Card.
- a. Indicate Card 4a.
- | | |
|------------|-----------------------------------|
| SAY | “The person on the left .” |
|------------|-----------------------------------|
- b. Indicate Card 4b.
- | | |
|------------|------------------------------------|
| SAY | “The people on the right .” |
|------------|------------------------------------|
13. **ASK AGAIN** “Who will likely give the shopping cart a stronger pull?”
14. Allow student to respond and record response.
15. Indicate Card 4b.
- | | |
|------------|------------------------------------|
| SAY | “The people on the right .” |
|------------|------------------------------------|
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 person on the left .”
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2. Display Resource 3: Shopping Cart Poster 2 for the student.

3. Indicate Resource 3.

SAY	“This picture shows three people pulling a shopping cart. All three people are the same size and have the same strength. There is one person pulling the shopping cart to the left. There are two people pulling the shopping cart to the right. Each person pulls on the shopping cart with the same force.”
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4.

ASK	“Who will likely give the shopping cart a stronger pull?”
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5. Provide Resource 4: Card 4a and Card 4b to the student. Indicate and describe each Card.

- a. Indicate Card 4a.

SAY	“The person on the left .”
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- b. Indicate Card 4b.

SAY	“The people on the right .”
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6.

ASK AGAIN	“Who will likely give the shopping cart a stronger pull?”
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7. Allow student to respond and record response.

8. Indicate Card 4b.

SAY	“The people on the right .”
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9.

SAY	“We are now finished with this activity.”
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Correct responses are as follows:

1. Which person will pull the shopping cart with greater force?
 - a. Card 2a – The person on the **left**.
2. Who will likely give the shopping cart a stronger pull?
 - a. Card 4b – The people on the **right**.



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 person on the left will pull the shopping cart with greater force because the person on the left is stronger (Card 2a); andis unable to identify that the people on the right will give the shopping cart a stronger pull (Card 4b).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the person on the left will pull the shopping cart with greater force because the person on the left is stronger (Card 2a); andis unable to identify that the people on the right will give the shopping cart a stronger pull (Card 4b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify that the person on the left will pull the shopping cart with greater force because the person on the left is stronger (Card 2a); andafter scaffolding, is able to identify that the people on the right will give the shopping cart a stronger pull (Card 4b).	The student demonstrates limited understanding typically requiring additional support.	1
<p>Student...</p> <ul style="list-style-type: none">is able to identify that the person on the left will pull the shopping cart with greater force because the person on the left is stronger (Card 2a); andis able to identify that the people on the right will give the shopping cart a stronger pull (Card 4b).	The student demonstrates understanding independently.	2

ACTIVITY 2

Essence Statement: CTAS-MS-PS2-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.

Core Extension 2: Use the results of an investigation to support a claim about the effect of two (balanced or unbalanced) forces on the motion of an object. (CTAS-MS-PS2-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Balanced Forces Poster
- Activity 2 Resource 2: Unbalanced Forces Poster
- Activity 2 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – boy’s side
 - Sentence Strip 3b – girl’s side
 - Sentence Strip 3c – both sides
- Activity 2 Resource 4: See-saws Poster
- Activity 2 Resource 5: Cards 5a – 5e
 - Card 5a – 100 kg
 - Card 5b – 25 kg
 - Card 5c – 100 kg
 - Card 5d – 50 kg
 - Card 5e – 50 kg
- Activity 2 Resource 6: Claim Sentence Strip

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about balanced and unbalanced forces.”

2. Display Resource 1: Balanced Forces Poster for the student.

3. Indicate Resource 1.

SAY “In this investigation, students studied the effect of forces on the motion of an object. The object is a see-saw. In the first image (*indicate Resource 1*) the mass on each side of the see-saw is 10 kilograms. Both boxes have equal masses (*indicate each box*). These boxes represent balanced forces because the see-saw is balanced. In this picture, the see-saw does not move up or down because balanced forces do not change the motion of the object.”

4. Display Resource 2: Unbalanced Forces Poster for the student.

5. Indicate Resource 2.

SAY	“In this picture, there is a see-saw with a 10-kilogram box on each side of the see-saw (<i>indicate each 10-kilogram box</i>). The see-saw is balanced. A boy standing to the left of the see-saw holds a 30-kilogram box (<i>indicate the boy on the left</i>), and a girl standing to the right of the see-saw holds a 10-kilogram box (<i>indicate the girl on the left</i>). Each student will place their boxes on the see-saw. There will be 40 kilograms on the left side of the see-saw (<i>indicate the 40-kilogram mass below the see-saw</i>) and 20 kilograms on the right side of the see-saw (<i>indicate the 20-kilogram mass below the see-saw</i>).”
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6. **ASK** “How will the see-saw move?”

7. Provide Sentence Strips 3a – 3c for the student. Indicate and read each Sentence Strip.

a. Indicate Sentence Strip 3a.

SAY	“The boy’s side of the see-saw will go down.”
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b. Indicate Sentence Strip 3b.

SAY	“The girl’s side of the see-saw will go down.”
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c. Indicate Sentence Strip 3c.

SAY	“Both sides of the see-saw will go down.”
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8. **ASK AGAIN** “How will the see-saw move?”

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

10. Indicate Sentence Strip 3a.

SAY	“The side with more mass will move down. The boy’s side has more mass, so the boy’s side of the see-saw will go down. These different mass values represent unequal forces. Unequal forces cause an object to move.”
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11. Display Resource 4: See-saws Poster for the student.

12. Indicate Resource 4.

SAY	“Now we are going to look at two see-saws. The see-saw on the left is balanced (<i>indicate the balanced see-saw on the left</i>) and the see-saw on the right is not balanced (<i>indicate the unbalanced see-saw on the right</i>).”
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13.

SAY	“Let’s look at four boxes with different weights.”
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14. Provide Resource 5: Cards 5a – 5e to the student. Read and indicate each Card.
- a. Indicate Card 5a.

SAY	“100 kg”
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- b. Indicate Card 5b.

SAY	“25 kg”
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- c. Indicate Card 5c.

SAY	“100 kg”
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- d. Indicate Card 5d.

SAY	“50 kg”
------------	---------
- e. Indicate Card 5e.

SAY	“50 kg”
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15. Indicate Resource 4.

SAY	“Let’s choose two boxes to place at each end of the balanced see-saw to keep the see-saw balanced (<i>indicate balanced see-saw</i>).”
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16.

ASK	“Which two boxes belong on the balanced see-saw?”
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- a. Indicate Card 5a.

SAY	“100 kg”
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- b. Indicate Card 5b.

SAY	“25 kg”
------------	---------
- c. Indicate Card 5c.

SAY	“100 kg”
------------	----------
- d. Indicate Card 5d.

SAY	“50 kg”
------------	---------
- e. Indicate Card 5e.

SAY	“50 kg”
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17. **ASK AGAIN** “Which two boxes belong on the balanced see-saw?”
18. Allow student to respond and record response.
Teacher may physically assist the student in moving each box to the location that the student chooses.
19. Indicate Resource 4.
- SAY** “Let’s choose two boxes to place at each end of the unbalanced see-saw to keep the see-saw unbalanced (*indicate unbalanced see-saw*).”
20. **ASK** “Which two boxes belong on the unbalanced see-saw?”
- a. Indicate Card 5a.
- SAY** “100 kg”
- b. Indicate Card 5b.
- SAY** “25 kg”
- c. Indicate Card 5c.
- SAY** “100 kg”
- d. Indicate Card 5d.
- SAY** “50 kg”
- e. Indicate Card 5e.
- SAY** “50 kg”
21. **ASK AGAIN** “Which two boxes belong on the unbalanced see-saw?”
22. Allow student to respond and record response.
Teacher may physically assist the student in moving each box to the location that the student chooses.
23. Display Resource 6: Claim Sentence Strip for the student.
24. Indicate Resource 6.
- SAY** “This is a claim. ‘Claim: Unequal forces make an object move.’”

25. **ASK** “Which see-saw supports the claim: a balanced see-saw (*indicate the balanced see-saw*) or an unbalanced see-saw (*indicate the unbalanced see-saw*)?”

26. Allow student to respond and record response.

27. Indicate the unbalanced see-saw on Resource 46.

SAY “The unbalanced see-saw supports this claim.”

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

Scoring Guidance and Scaffolding

Scaffolding:

Note: Optionally, you may ask the student the third question, “Which two boxes belong on the unbalanced see-saw?” and/or fourth question, “Which see-saw supports the claim: a balanced see-saw or an unbalanced see-saw?” if the scaffold is applied. However, if you choose to ask the third question and/or the fourth question and the student answers the third question and/or fourth question correctly, the student will still receive one point.

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

SAY “The side with more mass will move down. The boy’s side has more mass, so the boy’s side of the see-saw will go down. These different mass values represent unequal forces. Unequal forces cause an object to move.”

2. Display Resource 4: See-saws Poster for the student.

3. Indicate Resource 4.

SAY “Now we are going to look at two see-saws. The see-saw on the left is balanced (*indicate the balanced see-saw on the left*) and the see-saw on the right is not balanced (*indicate the unbalanced see-saw on the right*).”

4. **SAY** “Let’s look at four boxes with different weights.”

5. Provide Resource 5: Cards 5a – 5e to the student. Read and indicate each Card.

a. Indicate Card 5a.

SAY “100 kg”

b. Indicate Card 5b.

SAY “25 kg”

c. Indicate Card 5c.

SAY	“100 kg”
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d. Indicate Card 5d.

SAY	“50 kg”
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e. Indicate Card 5e.

SAY	“50 kg”
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6. Indicate Resource 4.

SAY	“Let’s choose two boxes to place at each end of the balanced see-saw to keep the see-saw balanced (<i>indicate balanced see-saw</i>).”
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7. **ASK** “Which two boxes belong on the balanced see-saw?”

a. Indicate Card 5a.

SAY	“100 kg”
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b. Indicate Card 5b.

SAY	“25 kg”
------------	---------

c. Indicate Card 5c.

SAY	“100 kg”
------------	----------

d. Indicate Card 5d.

SAY	“50 kg”
------------	---------

e. Indicate Card 5e.

SAY	“50 kg”
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8. **ASK** “Which two boxes belong on the balanced see-saw?”

AGAIN	
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9. Allow student to respond and record response.

Teacher may physically assist the student in moving each box to the location that the student chooses.

Correct answers are as follows:

1. How will the see-saw move?
 - a. Sentence Strip 3a – The boy’s side of the see-saw will go down.
2. Which two boxes belong on the balanced see-saw?
 - a. Card 5a – 100 kg / Card 5c – 100 kg
 - b. Card 5d – 50 kg / Card 5e – 50 kg
3. Which two boxes belong on the unbalanced see-saw?
 - a. Card 5b – 25 kg / Card 5d – 50 kg
 - b. Card 5b – 25 kg / Card 5e – 50 kg
 - c. Card 5b – 25 kg / Card 5a – 100 kg
 - d. Card 5b – 25 kg / Card 5c – 100 kg
 - e. Card 5d – 50 kg / Card 5a – 100 kg
 - f. Card 5d – 50 kg / Card 5c – 100 kg
 - g. Card 5e – 50 kg / Card 5c – 100 kg
 - h. Card 5e – 50 kg / Card 5a – 100 kg
4. Which see-saw supports the claim: a balanced see-saw or an unbalanced see-saw?
 - a. Student indicates the unbalanced see-saw.

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 boy’s side of the see-saw will move down (Sentence Strip 3a); and • is unable to identify two boxes that belong on the balanced see-saw and/or two boxes that belong on the unbalanced see-saw; and • is unable to identify that the unbalanced see-saw supports the claim. 	<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 boy's side of the see-saw will move down (Sentence Strip 3a); and• is unable to identify two boxes that belong on the balanced see-saw or two boxes that belong on the unbalanced see-saw; and• is unable to identify that the unbalanced see-saw supports the claim. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is able to identify that the boy's side of the see-saw will move down (Sentence Strip 3a); and• is able to identify two boxes that belong on the balanced see-saw and/or two boxes that belong on the unbalanced see-saw; and• is unable to identify that the unbalanced see-saw supports the claim. <p style="text-align: center;">OR</p> <ul style="list-style-type: none">• is unable to identify that the boy's side of the see-saw will move down (Sentence Strip 3a); and• after scaffolding, is able to identify two boxes that belong on the balanced see-saw.	<p>The student demonstrates limited understanding typically requiring additional support.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none">• is able to identify that the boy's side of the see-saw will move down (Sentence Strip 3a); and• is able to identify two boxes that belong on the balanced see-saw and two boxes that belong on the unbalanced see-saw; and• is able to identify that the unbalanced see-saw supports the claim.	<p>The student demonstrates understanding independently.</p>	<p>2</p>

ACTIVITY 3

Essence Statement: CTAS-MS-PS-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.

Core Extension 3: Using equipment (e.g., a balance or scale), measure the mass of an object in grams. (CTAS-MS-PS2-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1: Forces Data Table Poster

Teacher-Provided Resources:

- Table
- Balance (double beam, triple beam, or electronic)
- 3 Books (of similar weights/masses such as paperback books)*

*The selected books must provide enough mass so that the rubber band stretches when pulled during the investigation.

Make sure that the mass of three books together does not exceed the capacity of the balance. Activities 3, 4, and 5 should be completed back-to-back.

Steps to Follow:

1. Place the balance on the table.
2. Place the three books on the table.

SAY	“In this activity, we are going to record the mass of each object using the balance (<i>indicate the balance</i>). We will measure the mass of these books (<i>indicate the books</i>). We will use the mass of these books in the next activity.”
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4. Display Resource 1: Forces Data Table Poster for the student.
5. Indicate Resource 1.

SAY	“There are four columns in the data table. (<i>Indicate each heading as you read the following text</i>). This column heading says ‘ Trial ’. This column heading says ‘ Object(s) ’. This column heading says ‘ Mass ’. We will be filling in this column during this activity. This column heading says, ‘ Rubber Band Stretch ’. We will fill in this column during the next activity. We will take three different measurements in different Trials (<i>indicate each row</i>). During Trial 1, we will measure one book alone. During Trial 2, we will measure two books together. During Trial 3, we will measure three books together.”
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6. Indicate the balance and Resource 1.

SAY	“This balance can be used to measure the mass of an object. We will measure the mass in grams of each book in front of you. We are going to use this data table to record our measurements.”
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- | | | |
|-----|------------|---|
| 7. | ASK | “What is the mass of one book alone?” |
| 8. | | Allow the student to record the mass of one book alone in the data table (<i>with teacher assistance, if necessary.</i>) If no response or if incorrect response, proceed to scaffolding instructions. |
| 9. | ASK | “What is the mass of two books together?” |
| 10. | | Allow the student to record the mass of two books together in the data table (<i>with teacher assistance, if necessary.</i>) |
| 11. | ASK | “What is the mass of three books together?” |
| 12. | | Allow the student to record the mass of three books together in the data table (<i>with teacher assistance, if necessary.</i>) |
| 13. | SAY | “We are now finished with this activity.” |

Scoring Guidance and Scaffolding

Scaffolding:

*Note: Optionally, you may ask the student the third question, “What is the mass of **three** books together?” 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. If student is unable to measure the mass of the books in any Trial, teacher must model the activity for the student and complete Resource 1. Resource 1 is used in Activity 4 and in Activity 5.*

- After student makes first incorrect attempt, demonstrate how to measure the mass of an object in grams using the balance.
 - Assist the student in repeating the process for the measurement of **two** books together.
- | | | |
|----|------------|---|
| 3. | ASK | “What is the mass of two books together?” |
| 4. | | Allow the student to record the mass of two books together in the data table (<i>with teacher assistance, if necessary.</i>) |
| 5. | SAY | “We are now finished with this activity.” |

Correct answers are as follows:

1. What is the mass of **one** book alone?
 - a. Student is able to measure, report, and/or record the mass of **one** book alone in Trial 1.
2. What is the mass of **two** books together?
 - a. Student is able to measure, report, and/or record the mass of **two** books together in Trial 2.
3. What is the mass of **three** books together?
 - a. Student is able to measure, report, and/or record the mass of **three** books together in Trial 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 measure the mass of the books in Trial 1, Trial 2, or Trial 3. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is able to measure the mass of the book in Trial 1; <i>and</i> • is unable to measure the mass of the books in Trial 2 and Trial 3. <p><i>Note: If student is unable to measure the mass of the books in any Trial, teacher must model the activity for the student and complete Resource 1. Resource 1 is used in Activity 4 and in Activity 5.</i></p>	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"> • after scaffolding, is able to measure the mass of the books in Trial 2. 	<p>The student demonstrates limited understanding typically requiring additional support.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none"> • is able to measure the mass of the books in Trial 1, Trial 2, and Trial 3. 	<p>The student demonstrates understanding independently.</p>	<p>2</p>

ACTIVITY 4

Essence Statement: CTAS-MS-PS2-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.

Core Extension 4: Use the results of an investigation to support a claim about the effect of an object’s mass on its motion when force is applied (e.g., an object with more mass will take more force to move). (CTAS-MS-PS2-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1a: Teacher Directions for Forces Investigation – Forces Investigation Materials
- Activity 4 Resource 1b: Teacher Directions for Forces Investigation – Forces Investigation Materials
- Activity 4 Resource 2: Teacher Directions for Forces Investigation – Forces Investigation Diagram
- Activity 4 Resource 3: *Use Semi-Completed Activity 3 Resource 1: Forces Data Table Poster*
- Activity 4 Resource 4: Sentence Strips 4a – 4c
 - Sentence Strip 4a – More Force/More Mass
 - Sentence Strip 4b – Less Force/More Mass
 - Sentence Strip 4c – More Force/Less Mass
- Activity 4 Resource 5: Sentence Strips 5a – 5c
 - Sentence Strip 5a – 1 Book
 - Sentence Strip 5b – 2 Books
 - Sentence Strip 5c – 3 Books

Teacher-Provided Resources:

Use the materials and instructions included in Resource 1a and Resource 1b 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:

- Table
- 1 Piece of Cardboard (approximately 8.5” x 11”)
- 1 Roll of Strong Tape (e.g., duct tape or packing tape)
- 2 Large Paper Clips
- 1 Large Rubber Band
- 1 Provided Paper Ruler
- Impact Safety Glasses, 1 each for teacher and student(s)
- 3 Books (of similar weights/masses such as paperback books)*
*The selected books must provide enough mass so that the rubber band stretches when pulled during the investigation.

Activities 3, 4, and 5 should be completed back-to-back.

Steps to Follow:

1. Use the materials and instructions included in Resource 1a: Teacher Directions for Forces Investigation – Forces Investigation Materials and Resource 1b: Teacher Directions for Forces Investigation – Forces Investigation Materials to set up the investigation according to the Resource 2: Teacher Directions for Forces Investigation – Forces Investigation Diagram.
2. Display semi-completed Resource 3: Forces Data Table Poster for the student.
3. Indicate Resource 3.

SAY	“In this activity, we will use the measurements of the mass of the books that we recorded on the data table to complete this activity. When you pull on the rubber band, the piece of cardboard moves (<i>demonstrate for student</i>). The length the rubber band stretches shows how much force is needed to move the cardboard.”
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4. Place the first book on the piece of cardboard.

SAY	“We will use the rubber band to pull the cardboard. Let’s see how much force is needed to pull this book that has a mass of ‘[insert measurement of 1 Book]’ grams. We will record how much the rubber band stretches in centimeters in our data table for each trial (<i>indicate Resource 3</i>).”
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5. Trial 1, teacher pulls the device with one book and student measures how many centimeters the rubber band stretches.

6. Student records the estimate or measurement in the data table (*with teacher assistance, if necessary.*)

7. Place the two books on the piece of cardboard.

SAY	“We will use the rubber band to pull the cardboard. Let’s see how much force is needed to pull these book that have a mass of ‘[insert measurement of 2 Books]’ grams. We will record how much the rubber band stretches in centimeters in our data table for each trial (<i>indicate Resource 3</i>).”
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8. Trial 2, teacher pulls the device with two books and student measures how many centimeters the rubber band stretches.

9. Student records the estimate or measurement in the data table (*with teacher assistance, if necessary.*)

10. Place the three books on the piece of cardboard.

SAY	“We will use the rubber band to pull the cardboard. Let’s see how much force is needed to pull these book that have a mass of ‘[insert measurement of 3 Books]’ grams. We will record how much the rubber band stretches in centimeters in our data table for each trial (<i>indicate Resource 3</i>).”
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11. Trial 3, teacher pulls the device with three books and student measures how many centimeters the rubber band stretches.

12. Student records the estimate or measurement in the data table *(with teacher assistance, if necessary.)*

13. **ASK** "Based on the investigation, how does the mass of an object affect the force needed to pull it?"

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

a. Indicate Sentence Strip 4a.

SAY "It will take more force to move an object with more mass."

b. Indicate Sentence Strip 4b.

SAY "It will take less force to move an object with more mass."

c. Indicate Sentence Strip 4c.

SAY "It will take more force to move an object with less mass."

15. **ASK AGAIN** "Based on the investigation, how does the mass of an object affect the force needed to pull it?"

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

17. Indicate Sentence Strip 4a.

SAY "It will take more force to move an object with more mass."

18. **ASK** "What evidence from the data table supports the claim that it will take more force to move an object with more mass?"

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

a. Indicate Sentence Strip 5a.

SAY "The rubber band stretched more with 1 book."

b. Indicate Sentence Strip 5b.

SAY "The rubber band stretched less with 2 books."

c. Indicate Sentence Strip 5c.

SAY "The rubber band stretched the most with 3 books."

20. **ASK AGAIN** “What evidence from the data table supports the claim that it will take more force to move an object with more mass?”

21. Allow student to respond and record response.

22. Indicate Sentence Strip 5c.

SAY “The rubber band stretched the most with 3 books.”

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

Scoring Guidance and Scaffolding

Scaffolding:

1. Indicate Sentence Strip 4a.

SAY “It will take more force to move an object with more mass.”

2. **ASK** “What evidence from the data table supports the claim that it will take more force to move an object with more mass?”

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

a. Indicate Sentence Strip 5a.

SAY “The rubber band stretched more with 1 book.”

b. Indicate Sentence Strip 5b.

SAY “The rubber band stretched less with 2 books.”

c. Indicate Sentence Strip 5c.

SAY “The rubber band stretched the most with 3 books.”

4. **ASK AGAIN** “What evidence from the data table supports the claim that it will take more force to move an object with more mass?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 5c.

SAY “The rubber band stretched the most with 3 books.”

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

Correct answers are as follows:

1. Based on the investigation, how does the mass of an object affect the force needed to pull it?
 - a. Sentence Strip 4a – It will take more force to move an object with more mass.
2. What evidence from the data table supports the claim that it will take more force to move an object with more mass?
 - a. Sentence Strip 5c – The rubber band stretched the most with 3 books.

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 how the mass of an object affects the force needed to pull it (Sentence Strip 4a); and • is unable to identify the evidence from the data table that supports the claim that it will take more force to move an object with more mass (Sentence Strip 5c). <p><i>Note: If student is unable to measure the stretch of the rubber band in any Trial, teacher must model the activity for the student and complete Resource 3.</i></p>	<p>The student does not demonstrate understanding.</p>	<p>0</p>
<p>Student...</p> <ul style="list-style-type: none"> • is able to determine how the mass of an object affects the force needed to pull it (Sentence Strip 4a); and • is unable to identify the evidence from the data table that supports the claim that it will take more force to move an object with more mass (Sentence Strip 5c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to determine how the mass of an object affects the force needed to pull it (Sentence Strip 4a); and • after scaffolding, is able to identify the evidence from the data table that supports the claim that it will take more force to move an object with more mass (Sentence Strip 5c). 	<p>The student demonstrates limited understanding typically requiring additional support.</p>	<p>1</p>
<p>Student...</p> <ul style="list-style-type: none"> • is able to determine how the mass of an object affects the force needed to pull it (Sentence Strip 4a); and • is able to identify the evidence from the data table that supports the claim that it will take more force to move an object with more mass (Sentence Strip 5c). 	<p>The student demonstrates understanding independently.</p>	<p>2</p>

ACTIVITY 5

Essence Statement: CTAS-MS-PS2-2 Use and evaluate the results of an investigation to provide evidence that the change in an object’s motion depends on the forces acting on the object and the mass of the object.

Core Extension 5: Identify the changing (independent) variable and one constant variable in the provided investigation. (CTAS-MS-PS2-2)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Cards 1a – 1c
 - Card 1a – mass
 - Card 1b – table
 - Card 1c – rubber band
- Activity 5 Resource 2: Strips 2a – 2c
 - Strip 2a – mass in each trial
 - Strip 2b – surface of table
 - Strip 2c – distance cardboard moved
- Activity 5 Resource 3: *Use Completed Activity 3 Resource 1: Forces Data Table Poster*

Activities 3, 4, and 5 should be completed back-to-back.

Steps to Follow:

1. **SAY** “In this activity, we are going to talk about the different variables in our investigation. In a fair test, one variable is changed on purpose. This is called the independent variable.”

2. Display completed Resource 3: Forces Data Table Poster for the student.

3. Indicate Resource 3.

SAY “Let’s look at our data table and think about our investigation.”

4. **ASK** “Which variable was changed on purpose, making it the independent variable in this investigation?”

5. Provide Resource 1: Cards 1a – 1c to the student. Indicate and read each Card.

a. Indicate Card 1a.

SAY “mass”

b. Indicate Card 1b.

SAY “table”

c. Indicate Card 1c.

SAY “rubber band”

6. **ASK AGAIN** “Which variable was changed on purpose, making it the independent variable in this investigation?”

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

8. Indicate Card 1a.

SAY “Mass is the independent variable because we purposefully changed it for each trial in this investigation.”

9. **SAY** “In an investigation, there are variables that are NOT changed. These are kept the same on purpose. These are called ‘constants’.”

10. **ASK** “What is one variable in this investigation that should be held constant, or stay the same, to make this a fair test?”

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

a. Indicate Strip 2a.

SAY “the mass in each trial”

b. Indicate Strip 2b.

SAY “the surface of the table”

c. Indicate Strip 2c.

SAY “the distance that the cardboard moved”

12. **ASK AGAIN** “What is one variable in this investigation that should be held constant, or stay the same, to make this a fair test?”

13. Allow student to respond and record response.

14. Indicate Strip 2b.

SAY “The variable that should be held constant, or stay the same, is the surface of the table.”

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	"Mass is the independent variable because we purposefully changed it for each trial in this investigation."
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2. **SAY** "In an investigation, there are variables that are NOT changed. These are kept the same on purpose. These are called 'constants'."

3. **ASK** "What is one variable in this investigation that should be held constant, or stay the same, to make this a fair test?"

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

- a. Indicate Strip 2a.

SAY	"the mass in each trial"
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- b. Indicate Strip 2b.

SAY	"the surface of the table"
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- c. Indicate Strip 2c.

SAY	"the distance that the cardboard moved"
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5. **ASK AGAIN** "What is one variable in this investigation that should be held constant, or stay the same, to make this a fair test?"

6. Allow student to respond and record response.

7. Indicate Strip 2b.

SAY	"The variable that should be held constant, or stay the same, is the surface of the table."
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8. **SAY** "We are now finished with this activity."

Correct answers are as follows:

1. Which variable was changed on purpose, making it the independent variable in this investigation?
 - a. Card 1a – mass
2. What is one variable in this investigation that should be held constant, or stay the same, to make this a fair test?
 - a. Strip 2b – the surface of 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 mass as the independent variable in this investigation (Card 1a); andis unable to identify the surface of the table as the variable in this investigation that should be held constant (Strip 2b).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">is able to identify mass as the independent variable in this investigation (Card 1a); andis unable to identify the surface of the table as the variable in this investigation that should be held constant (Strip 2b). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify mass as the independent variable in this investigation (Card 1a); andafter scaffolding, is able to identify the surface of the table as the variable in this investigation that should be held constant (Strip 2b).	The student demonstrates limited understanding typically requiring additional support.	1
Student... <ul style="list-style-type: none">is able to identify mass as the independent variable in this investigation (Card 1a); andis able to identify the surface of the table as the variable in this investigation that should be held constant (Strip 2b).	The student demonstrates understanding independently.	2



Connecticut
Alternate
Science
Assessment

Physical Science

Storyline 6: Using Energy Every Day

Grade 8 Performance Task



Physical Science

Storyline 6: Using Energy Every Day

Grade 8 Performance Task

Guiding Questions: How is temperature measured? How do we keep something hot or cold? How can kinetic energy be changed into other types of energy?

Grade 8			
NGSS Learning Progressions	NGSS Standard Performance Expectations	Connecticut Alternate Science Essence Statements	Core Extensions
PS3.A Definitions of Energy	MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*	CTAS-MS-PS3-3 Test a device that either minimizes or maximizes heat energy transfer.*	<ol style="list-style-type: none"> 1. Recognize that the appropriate tool to measure temperature is a thermometer in units called degrees. (CTAS-MS-PS3-3) 2. Identify objects that minimize or maximize heat energy transfer. (CTAS-MS-PS3-3) 3. When shown a visual representation of a fair test, select the item that shows the loss of heat energy minimized. (CTAS-MS-PS3-3) 4. Suggest an improvement to a device to further minimize heat energy transfer. (CTAS-MS-PS3-3) 5. When provided examples of energy being used, identify kinetic energy as energy of motion. (CTAS-MS-PS3-5) 6. Support a claim using provided materials that kinetic energy (energy of motion) can be changed into other forms of energy (e.g., heat, sound). (CTAS-MS-PS3-5)



PS3.B Conservation of Energy and Energy Transfer	MS-PS3-5: Construct, use and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from an object.	CTAS-MS-PS3-5 Make and support a claim about the transfer of energy (kinetic energy) between two objects.	
Appropriate Vocabulary	Measure, temperature, degrees, energy transfer, fair test, device, kinetic energy, heat, sound, motion		

***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 8 Performance Task

General Overview:

Students will participate in a series of activities to explore sources of heat energy and explore which materials minimize or maximize heat energy transfer. Students will also identify kinetic energy and investigate kinetic energy changing into other forms of energy (e.g., sound, heat).

List of Materials Needed:

Teacher-Provided Resources:

No Teacher-Provided Resources 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: Cards 1a – 1c
 - Card 1a – scale
 - Card 1b – thermometer
 - Card 1c – ruler
- Activity 1 Resource 2: Cards 2a – 2c
 - Card 2a – grams
 - Card 2b – inches
 - Card 2c – degrees
- Activity 2 Resource 1: Cards 1a – 1c
 - Card 1a – wool hat
 - Card 1b – baseball hat
 - Card 1c – straw hat
- Activity 2 Resource 2: Cards 2a – 2c
 - Card 2a – cardboard box
 - Card 2b – plastic container
 - Card 2c – insulated cooler
- Activity 3 Resource 1: Cup Investigation Data Table Poster
- Activity 3 Resource 2: Cards 2a – 2c
 - Card 2a – glass cup
 - Card 2b – paper cup
 - Card 2c – foam cup

- Activity 3 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – warmest in foam cup
 - Sentence Strip 3b – warmest in paper cup
 - Sentence Strip 3c – warmest in glass cup
- Activity 4 Resource 1: Foam Cup Poster
- Activity 4 Resource 2: Strips 2a – 2c
 - Strip 2a – color
 - Strip 2b – straw
 - Strip 2c – lid
- Activity 4 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – heat longer
 - Sentence Strip 3b – taste better
 - Sentence Strip 3c – colder
- Activity 5 Resource 1: Cards 1a – 1c
 - Card 1a – stove
 - Card 1b – vase
 - Card 1c – girl
- Activity 5 Resource 2: Cards 2a – 2c
 - Card 2a – car
 - Card 2b – dog
 - Card 2c – picture
- Activity 6 Resource 1: Sentence Strips 1a – 1d
 - Sentence Strip 1a – rubbing hands
 - Sentence Strip 1b – pushing car
 - Sentence Strip 1c – hitting triangle
 - Sentence Strip 1d – stirring mix

ACTIVITY 1

Essence Statement: CTAS-MS-PS3-3 Test a device that either minimizes or maximizes heat energy transfer.*

Core Extension 1: Recognize that the appropriate tool to measure temperature is a thermometer in units called degrees. (CTAS-MS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 1 Resource 1: Cards 1a – 1c
 - Card 1a – scale
 - Card 1b – thermometer
 - Card 1c – ruler
- Activity 1 Resource 2: Cards 2a – 2c
 - Card 2a – grams
 - Card 2b – inches
 - Card 2c – degrees

Steps to Follow:

1. **SAY** “In this activity, we are going to look at three different measurement devices.”

2. **ASK** “Which device is used to measure temperature?”

3. Provide Resource 1: Cards 1a – 1c to the student. Indicate and read each Card.

a. Indicate Card 1a.

SAY “scale”

b. Indicate Card 1b.

SAY “thermometer”

c. Indicate Card 1c.

SAY “ruler”

4. **ASK AGAIN** “Which device is used to measure temperature?”

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

6. Indicate Card 1b.

SAY “A thermometer is used to measure temperature.”

7. **SAY** “Measurements are taken using units. For example, the length of a book can be measured in units called inches.”

8. **ASK** “What units are used to measure temperature?”

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

a. Indicate Card 2a.

SAY “grams”

b. Indicate Card 2b.

SAY “inches”

c. Indicate Card 2c.

SAY “degrees”

10. **ASK AGAIN** “What units are used to measure temperature?”

11. Allow student to respond and record response.

12. Indicate Card 2c.

SAY “Degrees are the units used to measure temperature.”

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	"A thermometer is used to measure temperature."
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2.

SAY	"Measurements are taken using units. For example, the length of a book can be measured in units called inches."
------------	---

3.

ASK	"What units are used to measure temperature?"
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4. Provide Resource 2: Cards 2a – 2c to the student. Indicate and read each Card.

- a. Indicate Card 2a.

SAY	"grams"
------------	---------

- b. Indicate Card 2b.

SAY	"inches"
------------	----------

- c. Indicate Card 2c.

SAY	"degrees"
------------	-----------

5.

ASK	"What units are used to measure temperature?"
AGAIN	

6.

Allow student to respond and record response.

7. Indicate Card 2c.

SAY	"Degrees are the units used to measure temperature."
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8.

SAY	"We are now finished with this activity."
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Correct answers are as follows:

1. Which device is used to measure temperature?
 - a. Card 1b – thermometer
2. What units are used to measure temperature?
 - a. Card 2c – degrees

For the second question, the student does not need to indicate degrees Fahrenheit or Celsius.

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 thermometer as the device that is used to measure temperature (Card 1b); and • is unable to identify degrees as the units that are used to measure temperature (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 the thermometer as the device that is used to measure temperature (Card 1b); and • is unable to identify degrees as the units that are used to measure temperature (Card 2c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify the thermometer as the device that is used to measure temperature (Card 1b); and • after scaffolding, is able to identify degrees as the units that are used to measure temperature (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 the thermometer as the device that is used to measure temperature (Card 1b); and • is able to identify degrees as the units that are used to measure temperature (Card 2c). 	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 2

Essence Statement: CTAS-MS-PS3-3 Test a device that either minimizes or maximizes heat energy transfer.*

Core Extension 2: Identify objects that minimize or maximize heat energy transfer. (CTAS-MS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 2 Resource 1: Cards 1a – 1c
 - Card 1a – wool hat
 - Card 1b – baseball hat
 - Card 1c – straw hat
- Activity 2 Resource 2: Cards 2a – 2c
 - Card 2a – cardboard box
 - Card 2b – plastic container
 - Card 2c – insulated cooler

Steps to Follow:

1. **SAY** “In this activity, we are going to look at different objects that may either help to keep something warm or help to keep something cold.”

2. **ASK** “Which type of hat will keep your head the warmest when it is cold outside?”

3. Provide Resource 1: Cards 1a – 1c to the student. Indicate and read each Card.

a. Indicate Card 1a.

SAY “wool hat”

b. Indicate Card 1b.

SAY “baseball hat”

c. Indicate Card 1c.

SAY “straw hat”

4. **ASK AGAIN** “Which type of hat will keep your head the warmest when it is cold outside?”

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

6. Indicate Card 1a.

SAY “A wool hat will keep your head the warmest when it is cold outside.”

7. **ASK** “Which container will best keep ice from melting?”

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

a. Indicate Card 2a.

SAY	“cardboard box”
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b. Indicate Card 2b.

SAY	“plastic container”
------------	---------------------

c. Indicate Card 2c.

SAY	“insulated cooler”
------------	--------------------

9. **ASK AGAIN** “Which container will best keep ice from melting?”

10. Allow student to respond and record response.

11. Indicate Card 2c.

SAY	“The insulated cooler will best keep ice from melting.”
------------	---

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

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	"A wool hat will keep your head the warmest when it is cold outside."
------------	---

2. **ASK** "Which container will best keep ice from melting?"

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

- a. Indicate Card 2a.

SAY	"cardboard box"
------------	-----------------

- b. Indicate Card 2b.

SAY	"plastic container"
------------	---------------------

- c. Indicate Card 2c.

SAY	"insulated cooler"
------------	--------------------

4. **ASK AGAIN** "Which container will best keep ice from melting?"

5. Allow student to respond and record response.

6. Indicate Card 2c.

SAY	"The insulated cooler will best keep ice from melting."
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7. **SAY** "We are now finished with this activity."

Correct answers are as follows:

1. Which type of hat will keep your head the warmest when it is cold outside?
 - a. Card 1a – wool hat
2. Which type of container will best keep ice from melting?
 - a. Card 2c – insulated cooler

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 wool hat will keep your head the warmest when it is cold outside (Card 1a); and • is unable to identify that the insulated cooler will best keep ice from melting (Card 2c). 	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none"> • is able to identify that the wool hat will keep your head the warmest when it is cold outside (Card 1a); and • is unable to identify that the insulated cooler will best keep ice from melting (Card 2c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify that the wool hat will keep your head the warmest when it is cold outside (Card 1a); and • after scaffolding, is able to identify that the insulated cooler will best keep ice from melting (Card 2c). 	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 wool hat will keep your head the warmest when it is cold outside (Card 1a); and • is able to identify that the insulated cooler will best keep ice from melting (Card 2c). 	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 3

Essence Statement: CTAS-MS-PS3-3 Test a device that either minimizes or maximizes heat energy transfer.*

Core Extension 3: When shown a visual representation of a fair test, select the item that shows the loss of heat energy minimized. (CTAS-MS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 3 Resource 1: Cup Investigation Data Table Poster
- Activity 3 Resource 2: Cards 2a – 2c
 - Card 2a – glass cup
 - Card 2b – paper cup
 - Card 2c – foam cup
- Activity 3 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – warmest in foam cup
 - Sentence Strip 3b – warmest in paper cup
 - Sentence Strip 3c – warmest in glass cup

Steps to Follow:

1.

SAY	“In this activity, we are going to discuss the results of an investigation.”
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2.

SAY	“A student wants to investigate which type of cup best keeps hot chocolate warm. The student tests a glass cup, a paper cup, and a foam cup. The student adds the same amount of hot chocolate to the glass cup, the paper cup, and the foam cup. The student measures the temperature of the hot chocolate in each type of cup at the start of the investigation and after 30 minutes.”
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3. Display Resource 1: Cup Investigation Data Table Poster for the student.

4. Indicate Resource 1.

SAY	“The student records the results of their investigation in this data table titled ‘ Cup Investigation ’ (<i>indicate title</i>). The student measures the temperature of the hot chocolate in each cup (<i>indicate ‘Temperature of the Hot Chocolate’ table heading</i>): a glass cup (<i>indicate ‘Glass Cup’</i>), a paper cup (<i>indicate ‘Paper Cup’</i>), and a foam cup (<i>indicate ‘Foam Cup’</i>). The student records the temperature of the hot chocolate in each cup at the start of the investigation and again after 30 minutes (<i>indicate ‘Time’ column</i>). At the start of the investigation (<i>indicate ‘Start [0 Minutes]’ in the ‘Time’ column</i>), the hot chocolate is 150 degrees in the glass cup, 150 degrees in the paper cup, and 150 degrees in the foam cup. After 30 minutes (<i>indicate ‘After 30 Minutes’ in the ‘Time’ column</i>), the hot chocolate is 70 degrees in the glass cup, 75 degrees in the paper cup, and 100 degrees in the foam cup.”
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5.

ASK	“Which type of cup keeps the hot chocolate the warmest?”
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6. Provide Resource 2: Card 2a – 2c to the student. Indicate and read each Card.
- a. Indicate Card 2a.
- | | |
|------------|-------------|
| SAY | “glass cup” |
|------------|-------------|
- b. Indicate Card 2b.
- | | |
|------------|-------------|
| SAY | “paper cup” |
|------------|-------------|
- c. Indicate Card 2c.
- | | |
|------------|------------|
| SAY | “foam cup” |
|------------|------------|
7.

ASK AGAIN	“Which type of cup keeps the hot chocolate the warmest?”
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8. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
9. Indicate Card 2c.
- | | |
|------------|--|
| SAY | “The foam cup keeps the hot chocolate the warmest throughout the investigation.” |
|------------|--|
10.

SAY	“Based on the results of this investigation, we can claim that foam cups are best for keeping hot drinks hot.”
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11.

ASK	“How do the results from the investigation support this claim?”
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12. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 3a.
- | | |
|------------|---|
| SAY | “The hot chocolate was the warmest in the foam cup after 30 minutes.” |
|------------|---|
- b. Indicate Sentence Strip 3b.
- | | |
|------------|--|
| SAY | “The hot chocolate was the warmest in the paper cup after 30 minutes.” |
|------------|--|
- c. Indicate Sentence Strip 3c.
- | | |
|------------|--|
| SAY | “The hot chocolate was the warmest in the glass cup after 30 minutes.” |
|------------|--|



13. **ASK AGAIN** “How do the results from the investigation support this claim?”
14. Allow student to respond and record response.
15. Indicate Sentence Strip 3a.
- SAY** “The hot chocolate was the warmest in the foam cup after 30 minutes.”
16. **SAY** “We are now finished with this activity.”

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“The foam cup keeps the hot chocolate the warmest throughout the investigation.”
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2. **SAY** “Based on the results of this investigation, we can claim that foam cups are best for keeping hot drinks hot.”

3. **ASK** “How do the results from the investigation support this claim?”

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

- a. Indicate Sentence Strip 3a.

SAY	“The hot chocolate was the warmest in the foam cup after 30 minutes.”
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- b. Indicate Sentence Strip 3b.

SAY	“The hot chocolate was the warmest in the paper cup after 30 minutes.”
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- c. Indicate Sentence Strip 3c.

SAY	“The hot chocolate was the warmest in the glass cup after 30 minutes.”
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5. **ASK AGAIN** “How do the results from the investigation support this claim?”

6. Allow student to respond and record response.

7. Indicate Sentence Strip 3a.

SAY	“The hot chocolate was the warmest in the foam cup after 30 minutes.”
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8. **SAY** “We are now finished with this activity.”

Correct answers are as follows:

1. Which type of cup keeps the hot chocolate the warmest?
 - a. Card 2c – Foam Cup
2. How do the results from the investigation support this claim?
 - a. Sentence Strip 3a – The hot chocolate was the warmest in the foam cup after 30 minutes.

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 type of cup that keeps the hot chocolate the warmest (Card 2c); and • is unable to describe how the results from the investigation support the claim (Sentence Strip 3a). 	<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 type of cup that keeps the hot chocolate the warmest (Card 2c); and • is unable to describe how the results from the investigation support the claim (Sentence Strip 3a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • is unable to identify the type of cup that keeps the hot chocolate the warmest (Card 2c); and • after scaffolding, is able to describe how the results from the investigation support the claim (Sentence Strip 3a). 	<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 type of cup that keeps the hot chocolate the warmest (Card 2c); and • is able to describe how the results from the investigation support the claim (Sentence Strip 3a). 	<p>The student demonstrates understanding independently without scaffolding.</p>	<p>2</p>

ACTIVITY 4

Essence Statements: CTAS-MS-PS3-3 Test a device that either minimizes or maximizes heat energy transfer.*

Core Extension 4: Suggest an improvement to a device to further minimize heat energy transfer. (CTAS-MS-PS3-3)

Teacher Notes:

Collect the following resources for this activity:

- Activity 4 Resource 1: Foam Cup Poster
- Activity 4 Resource 2: Strips 2a – 2c
 - Strip 2a – color
 - Strip 2b – straw
 - Strip 2c – lid
- Activity 4 Resource 3: Sentence Strips 3a – 3c
 - Sentence Strip 3a – heat longer
 - Sentence Strip 3b – taste better
 - Sentence Strip 3c – colder

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about the design of a foam cup.”
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2. Display Resource 1: Foam Cup Poster for the student.
3. Indicate Resource 1.

SAY	“We are going to talk about how we can make the design of this foam cup better.”
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4.

ASK	“How can we change the foam cup to make the cup better at keeping the hot chocolate warm?”
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5. Provide Resource 2: Strips 2a – 2c to the student. Indicate and read each Strip.
 - a. Indicate Strip 2a.

SAY	“color the cup with a marker”
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 - b. Indicate Strip 2b.

SAY	“put a straw in the cup”
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 - c. Indicate Strip 2c.

SAY	“add a lid to the cup”
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6.

ASK AGAIN	“How can we change the foam cup to make the cup better at keeping the hot chocolate warm?”
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7. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
8. Indicate Strip 2c.
- | | |
|------------|---|
| SAY | “When you add a lid to the cup, it will make the cup better at keeping the hot chocolate warm.” |
|------------|---|
9. **ASK** “Why will adding a lid to the cup help keep the hot chocolate warm?”
10. Provide Resource 3: Sentence Strips 3a – 3c to the student. Indicate and read each Sentence Strip.
- a. Indicate Sentence Strip 3a.
- | | |
|------------|---|
| SAY | “The lid will keep the heat in the hot chocolate longer.” |
|------------|---|
- b. Indicate Sentence Strip 3b.
- | | |
|------------|---|
| SAY | “The lid will make the hot chocolate taste better.” |
|------------|---|
- c. Indicate Sentence Strip 3c.
- | | |
|------------|---|
| SAY | “The lid will make the hot chocolate colder.” |
|------------|---|
11. **ASK AGAIN** “Why will adding a lid to the cup help keep the hot chocolate warm?”
12. Allow student to respond and record response.
13. Indicate Sentence Strip 3a.
- | | |
|------------|---|
| SAY | “The lid will keep the heat in the hot chocolate longer.” |
|------------|---|
14. **SAY** “We are now finished with this activity.”

Scoring Guidance and Scaffolding

Scaffolding:

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

SAY	“When you add a lid to the cup, it will make the cup better at keeping the hot chocolate warm.”
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2.

ASK	“Why will adding a lid to the cup help keep the hot chocolate warm?”
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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 lid will keep the heat in the hot chocolate longer.”
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- b. Indicate Sentence Strip 3b.

SAY	“The lid will make the hot chocolate taste better.”
------------	---

- c. Indicate Sentence Strip 3c.

SAY	“The lid will make the hot chocolate colder.”
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4.

ASK AGAIN	“Why will adding a lid to the cup help keep the hot chocolate warm?”
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5. Allow student to respond and record response.

6. Indicate Sentence Strip 3a.

SAY	“The lid will keep the heat in the hot chocolate longer.”
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7.

SAY	“We are now finished with this activity.”
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Correct answers are as follows:

1. How can we change the foam cup to make the cup better at keeping the hot chocolate warm?
 - a. Strip 2c – add a lid to the cup
2. Why will adding a lid to the cup help keep the hot chocolate warm?
 - a. Sentence Strip 3a – The lid will keep the heat in the hot chocolate longer.



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 we can change the design of the cup to make the cup better at keeping the hot chocolate warm (Strip 2c); andis unable to describe why adding a lid to the cup will help keep the hot chocolate warm (Sentence Strip 3a).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify one way that we can change the design of the cup to make the cup better at keeping the hot chocolate warm (Strip 2c); andis unable to describe why adding a lid to the cup will help keep the hot chocolate warm (Sentence Strip 3a). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify one way that we can change the design of the cup to make the cup better at keeping the hot chocolate warm (Strip 2c); andafter scaffolding, is able to describe why adding a lid to the cup will help keep the hot chocolate warm (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 identify one way that we can change the design of the cup to make the cup better at keeping the hot chocolate warm (Strip 2c); andis able to describe why adding a lid to the cup will help keep the hot chocolate warm (Sentence Strip 3a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 5

Essence Statement: CTAS-MS-PS3-5 Make and support a claim about the transfer of energy (kinetic energy) between two objects.

Core Extension 5: When provided examples of energy being used, identify kinetic energy as energy of motion. (CTAS-MS-PS3-5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 5 Resource 1: Cards 1a – 1c
 - Card 1a – stove
 - Card 1b – vase
 - Card 1c – girl
- Activity 5 Resource 2: Cards 2a – 2c
 - Card 2a – car
 - Card 2b – dog
 - Card 2c – picture

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about different forms of energy.”
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2.

SAY	“Heat energy is only one type of energy. There are other types of energy including sound, light, and energy of motion. Energy of motion is also called kinetic energy. I am going to show you pictures of different types of energy being used.”
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3.

ASK	“Energy of motion is kinetic energy. Which picture shows an example of kinetic energy?”
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4. Provide Resource 1: Cards 1a – 1c to the student. Indicate and read each Card.
 - a. Indicate Card 1a.

SAY	“stove turned on”
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 - b. Indicate Card 1b.

SAY	“vase on a shelf”
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 - c. Indicate Card 1c.

SAY	“girl running on a track”
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5.

ASK AGAIN	“Energy of motion is kinetic energy. Which picture shows an example of kinetic energy?”
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6. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
7. Indicate Card 1c.
- | | |
|------------|--|
| SAY | “The picture of the girl running on a track shows an example of kinetic energy.” |
|------------|--|
8. **ASK** “Energy of motion is kinetic energy. Which is another picture that shows an example of kinetic energy?”
9. Provide Resource 2: Cards 2a – 2c to the student. Indicate and read each Card.
- a. Indicate Card 2a.
- | | |
|------------|---------------------------|
| SAY | “car rolling down a hill” |
|------------|---------------------------|
- b. Indicate Card 2b.
- | | |
|------------|-----------------------------|
| SAY | “dog sitting on a sidewalk” |
|------------|-----------------------------|
- c. Indicate Card 2c.
- | | |
|------------|-----------------------------|
| SAY | “picture hanging on a wall” |
|------------|-----------------------------|
10. **ASK AGAIN** “Energy of motion is kinetic energy. Which is another picture that shows an example of kinetic energy?”
11. Allow student to respond and record response.
12. Indicate Card 2a.
- | | |
|------------|--|
| SAY | “The picture of the car rolling down a hill shows an example of kinetic energy.” |
|------------|--|
13. **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 picture of the girl running on a track shows an example of kinetic energy.”
------------	--

2. **ASK** “Energy of motion is kinetic energy. Which is another picture that shows an example of kinetic energy?”

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

- a. Indicate Card 2a.

SAY	“car rolling down a hill”
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- b. Indicate Card 2b.

SAY	“dog sitting on a sidewalk”
------------	-----------------------------

- c. Indicate Card 2c.

SAY	“picture hanging on a wall”
------------	-----------------------------

4. **ASK AGAIN** “Energy of motion is kinetic energy. Which is another picture that shows an example of kinetic energy?”

5. Allow student to respond and record response.

6. Indicate Card 2a.

SAY	“The picture of the car rolling down a hill shows an example of kinetic energy.”
------------	--

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

Correct answers are as follows:

1. Energy of motion is kinetic energy. Which picture shows an example of kinetic energy?
 - a. Card 1c – girl running on a track
2. Energy of motion is kinetic energy. Which is another picture that shows an example of kinetic energy?
 - a. Card 2a – car rolling down a hill



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 picture that shows an example of kinetic energy (Card 1c or Card 2a).	The student does not demonstrate understanding.	0
Student... <ul style="list-style-type: none">with or without scaffolding, is able to identify one picture that shows an example of kinetic energy (Card 1c or 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 both pictures that show an example of kinetic energy (Card 1c and Card 2a).	The student demonstrates understanding independently without scaffolding.	2

ACTIVITY 6

Essence Statement: CTAS-MS-PS3-5 Make and support a claim about the transfer of energy (kinetic energy) between two objects.

Core Extension 6: Support a claim using provided materials that kinetic energy (energy of motion) can be changed into other forms of energy (e.g., heat, sound). (CTAS-MS-PS3-5)

Teacher Notes:

Collect the following resources for this activity:

- Activity 6 Resource 1: Sentence Strips 1a – 1d
 - Sentence Strip 1a – rubbing hands
 - Sentence Strip 1b – pushing car
 - Sentence Strip 1c – hitting triangle
 - Sentence Strip 1d – stirring mix

Steps to Follow:

1.

SAY	“In this activity, we are going to talk about how one form of energy can transfer into another form of energy.”
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2.

SAY	“Kinetic energy (energy of motion) can transfer into heat energy and can also transfer into sound energy.”
------------	--

3.

ASK	“Which is an example of kinetic energy (energy of motion) transferring into heat energy?”
------------	---

4. Provide Resource 1: Sentence Strips 1a – 1d to the student. Indicate and read each Sentence Strip.
 - a. Indicate Sentence Strip 1a.

SAY	“Rubbing two hands together makes them warm.”
------------	---
 - b. Indicate Sentence Strip 1b.

SAY	“Pushing a toy car down a hill makes it move.”
------------	--
 - c. Indicate Sentence Strip 1c.

SAY	“Hitting a triangle with a metal rod makes it ring.”
------------	--
 - d. Indicate Sentence Strip 1d.

SAY	“Stirring drink mix into water makes it colorful.”
------------	--

5.

ASK AGAIN	“Which is an example of kinetic energy (energy of motion) transferring into heat energy?”
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6. Allow student to respond and record response. If no response or if incorrect response, proceed to scaffolding instructions.
7. Indicate Sentence Strip 1a.

SAY	“Rubbing two hands together is kinetic energy. When you rub your hands together is makes them warm. Heat is another form of energy.”
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8. **ASK** “Which is an example of kinetic energy (energy of motion) transferring into sound energy?”
9. Provide remaining Resource 1: Sentence Strips 1b – 1d to the student. Indicate and read each remaining Sentence Strip.
 - a. Indicate Sentence Strip 1b.

SAY	“Pushing a toy car down a hill makes it move.”
------------	--
 - b. Indicate Sentence Strip 1c.

SAY	“Hitting a triangle with a metal rod makes it ring.”
------------	--
 - c. Indicate Sentence Strip 1d.

SAY	“Stirring drink mix into water makes it colorful.”
------------	--
10. **ASK AGAIN** “Which is an example of kinetic energy (energy of motion) transferring into sound energy?”
11. Allow student to respond and record response.
12. Indicate Sentence Strip 1c.

SAY	“Hitting a triangle with a metal rod is kinetic energy. This motion makes the triangle ring. Sound is another form of energy.”
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13. **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	“Rubbing two hands together is kinetic energy. When you rub your hands together is makes them warm. Heat is another form of energy.”
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2. **ASK** “Which is an example of kinetic energy (energy of motion) transferring into sound energy?”

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

- a. Indicate Sentence Strip 1b.

SAY	“Pushing a toy car down a hill makes it move.”
------------	--

- b. Indicate Sentence Strip 1c.

SAY	“Hitting a triangle with a metal rod makes it ring.”
------------	--

- c. Indicate Sentence Strip 1d.

SAY	“Stirring drink mix into water makes it colorful.”
------------	--

4. **ASK AGAIN** “Which is an example of kinetic energy (energy of motion) transferring into sound energy?”

5. Allow student to respond and record response.

6. Indicate Sentence Strip 1c.

SAY	“Hitting a triangle with a metal rod is kinetic energy. This motion makes the triangle ring. Sound is another form of energy.”
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7. **SAY** “We are now finished with this activity.”

Correct answers are as follows:

1. Which is an example of kinetic energy (energy of motion) transferring into heat energy?
 - a. Sentence Strip 1a - Rubbing two hands together makes them warm.
2. Which is an example of kinetic energy (energy of motion) transferring into sound energy?
 - a. Sentence Strip 1c – Hitting a triangle with a metal rod makes it ring.



Content Guidance	Rating	Score
<p>Student...</p> <ul style="list-style-type: none">gives NO response. <p style="text-align: center;">AND</p> <ul style="list-style-type: none">is unable to identify an example of kinetic energy transferring into heat energy (Sentence Strip 1a); andis unable to identify an example of kinetic energy transferring into sound energy (Sentence Strip 1c).	The student does not demonstrate understanding.	0
<p>Student...</p> <ul style="list-style-type: none">is able to identify an example of kinetic energy transferring into heat energy (Sentence Strip 1a); andis unable to identify an example of kinetic energy transferring into sound energy (Sentence Strip 1c). <p style="text-align: center;">OR</p> <ul style="list-style-type: none">is unable to identify an example of kinetic energy transferring into heat energy (Sentence Strip 1a); andafter scaffolding, is able to identify an example of kinetic energy transferring into sound energy (Sentence Strip 1c).	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 an example of kinetic energy transferring into heat energy (Sentence strip 1a); andis able to identify an example of kinetic energy transferring into sound energy (Sentence Strip 1c).	The student demonstrates understanding independently without scaffolding.	2

