



**NEW ENGLAND  
COMMON ASSESSMENT PROGRAM**

**Released Items  
Support Materials  
2009**

**Grade 4  
Science**

**NECAP 2009 RELEASED ITEMS  
GRADE 4 SCIENCE**

**Grade 4 Science Released Item Information**

<b>Item Number</b>	<b>Big Idea<sup>1</sup></b>	<b>Assessment Target</b>	<b>Depth of Knowledge Code</b>	<b>Item Type<sup>2</sup></b>	<b>Answer Key</b>	<b>Total Possible Points</b>
1	POC	PS 1-2	1	MC	D	1
2	SAE	PS 1-3	2	MC	B	1
3	SAE	PS 3-8	2	MC	C	1
4	INQ	ESS 1-2	2	MC	D	1
5	NOS	ESS 1-3	2	MC	D	1
6	POC	ESS 1-5	2	MC	B	1
7	POC	LS 1-3	1	MC	B	1
8	SAE	LS 3-7	2	MC	D	1
9	FAF	LS 4-8	2	MC	A	1
10	SAE	LS 2-6	2	CR		4

**Grade 4 Science Released Inquiry Task Information**

<b>Item Number</b>	<b>Big Idea<sup>1</sup></b>	<b>Inquiry Construct</b>	<b>Depth of Knowledge Code</b>	<b>Item Type<sup>2</sup></b>	<b>Total Possible Points</b>
1	INQ	8	2	CR	3
2	INQ	7	1	SA	2
3	INQ	10	2	SA	2
4	INQ	12	2	SA	2
5	INQ	6	2	SA	2
6	INQ	1	3	CR	3
7	INQ	12	3	SA	2
8	INQ	13	3	SA	2

<sup>1</sup>Big Idea: NOS = Nature of Science, SAE = Systems and Energy, MAS = Models and Scale, POC = Patterns of Change, FAF = Form and Function, INQ = Scientific Inquiry

<sup>2</sup>Item Type: MC = Multiple Choice, CR = Constructed Response, SA = Short Answer

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**PS1 (K–4) POC-2** Make a prediction about what might happen to the state of common materials when heated or cooled or categorize materials as a solid, liquid, or gas.

- 1 A student concludes that the material in a round bowl is a liquid. Which statement about the material **must** be true?
- A. The material is clear.
  - B. The material weighs 1 kg.
  - C. The material has a temperature of 35°C.
  - D. The material takes the shape of its container.

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PS1 (K-4) SAE-3 Use measures of weight (data) to demonstrate that the whole equals the sum of its parts.

- 2 Susan uses 1000 g of plastic building blocks to build a tower. Janet takes the tower apart and uses all of the blocks to build a ship.

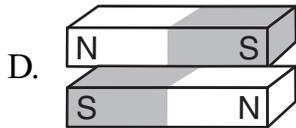
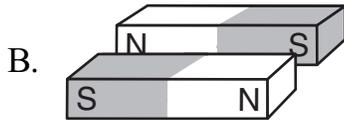
What is the weight of the ship?

- A. 500 g
- B. 1000 g
- C. 1500 g
- D. 2000 g

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PS3 (K-4) SAE-8 Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect).

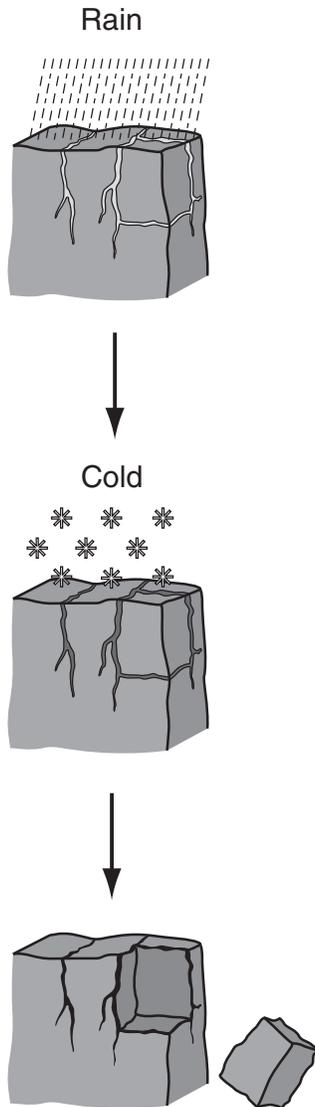
- 3 A student wants to arrange two bar magnets so they repel each other. Which diagram shows the **best** arrangement for the magnets?



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ESS1 (K-4) INQ-2 Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves).

- 4 Students studied the rock diagram shown below.



What does the diagram show?

- A. how water moves rock from place to place
- B. how different types of rock are formed
- C. how rock gets moisture
- D. how freezing and thawing of water breaks rock

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**ESS1 (K–4) NOS-3** Explain how the use of scientific tools helps to extend senses and gather data about weather (i.e., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches).

- 5 Fourth-grade students use a rain gauge to measure how much rain falls every day for three weeks. They record the information.

At the end of three weeks, which question can the students **best** answer using their data?

- A. When will the next rainfall happen?
- B. How much rain does grass need?
- C. How much rain soaks into the soil?
- D. Does it rain the same amount every day?

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GRADE 4 SCIENCE**

**ESS1 (K–4) POC-5** Based on data collected from daily weather observations, describe weather changes or weather patterns.

- 6** The table below lists the temperature at different times on a summer day.

**Summer Temperatures**

<b>Time</b>	<b>Temperature</b>
7:00 A.M.	72°F
9:00 A.M.	79°F
11:00 A.M.	84°F
1:00 P.M.	88°F
3:00 P.M.	93°F
5:00 P.M.	90°F
7:00 P.M.	84°F

How does the temperature change during the day?

- A. The day begins warm, cools down, and then heats up.
- B. The day begins warm, heats up, and then cools down.
- C. The day begins cool, cools down more, and then heats up.
- D. The day begins cool, heats up, and then heats up more.

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LS1 (K-4) POC-3 Predict, sequence, or compare the life stages of organisms - plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms).

- 7 The life cycle of butterflies has four stages. One of these stages is pictured below.



What is the **next** stage in the life cycle of butterflies?



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**LS3 (K-4) SAE-7** Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).

- 8 The table below lists foods some birds like to eat in nature.

**Food Birds Eat**

	<b>Bird</b>			
<b>Food</b>	<b>Blue Jay</b>	<b>Cardinal</b>	<b>Chickadee</b>	<b>Robin</b>
Berries	Yes	Yes	Yes	No
Earthworms	No	No	No	Yes
Insects	Yes	Yes	Yes	Yes
Seeds	Yes	Yes	Yes	No

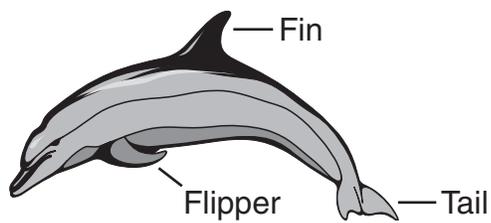
In New England, seeds and berries are the only foods available for most birds during the winter. Which bird moves away to find food during the winter?

- A. blue jay
- B. cardinal
- C. chickadee
- D. robin

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**LS4 (K-4) FAF-8** Identify what the physical structures of humans do (e.g., sense organs - eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals.

- 9 The labeled diagram below shows structures of a dolphin.



The flipper of a dolphin is similar to which structure of a human?

- A. arm
- B. ear
- C. hip
- D. rib

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LS2 (K-4) SAE-6 Describe ways plants and animals depend on each other (e.g., shelter, nesting, food).

- 10 Apple trees and some animals depend on each other.
- a. Describe **two** ways apple trees help some animals survive.
  - b. Describe **two** ways some animals help apple trees survive.

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GRADE 4 SCIENCE**

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>4</b>	Response demonstrates a thorough understanding of ways plants and animals depend on each other (e.g., shelter, nesting, food). The response describes two ways apple trees help animals survive and describes two ways animals help apple trees survive. The response has no errors or omissions.
<b>3</b>	Response demonstrates a general understanding of ways plants and animals depend on each other (e.g., shelter, nesting, food). The response has an error or omission.
<b>2</b>	Response demonstrates a limited understanding of ways plants and animals depend on each other (e.g., shelter, nesting, food). The response has errors and omissions.
<b>1</b>	Response demonstrates a minimal understanding of ways plants and animals depend on each other (e.g., shelter, nesting, food). The response has several errors and omissions.
<b>0</b>	Response is incorrect or contains some work that is irrelevant to the skill or concept being measured.
<b>Blank</b>	No response

**Training Notes:**

- a. Responses may include, but are not limited to, the following:
- Food for energy: deer, raccoons, etc. eat apples; bees get nectar from apple blossoms; birds eat insects in the bark
  - Shelter: hiding places for insects and birds
  - Reproduction: nests for birds; egg-laying sites for insects, beehives
- b. Responses may include, but are not limited to, the following:
- Bees pollinate apple blossoms to make fruit (apples with seeds).
  - Deer and other animals eat the apples and spread seeds in their droppings.
  - Animal droppings fertilize soil around apple trees.
  - Birds eat the pest insects on apple trees.

A score of 4 must include detailed descriptions. A score of 3 may include four correct, but not detailed, descriptions.

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SCORE POINT 4

10

Two ways apple trees help animals survive is it provides animals shelter and the apple are something animals can eat.

Two ways animals help apple trees survive are animal waste is like fertilizer to apple trees and animals can eat bugs that try to eat and chew the tree down.

The response demonstrates a thorough understanding. The response clearly gives two ways that apple trees help animals (food and shelter) and thoroughly explains them (apples to eat, shelter to survive). The response clearly gives two ways that animals can help the apple trees (fertilize them, eat harmful bugs off of them) and thoroughly explains them (animal waste, bugs might chew tree down). No errors or omissions are present.

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SCORE POINT 3

10

apple tree's could provide food and shelter for birds. the animals waste could be come fertilizer and some bird's would eat bugs that the tree could be harmed by that bug.

The response is general. The response gives two ways that apple trees help animals (food and shelter), but doesn't elaborate on the two ways. Part B is good, because the student gives two ways that animals can help apple trees (fertilizer, eat harmful bugs) and provides details. The lack of explanation in part A makes this a 3 score.

SCORE POINT 2

10

Apple trees help animals survive because they feed the animals, animals help apple trees survive because they fertilize them.

The response is limited. The response only gives one way that apple trees can help animals (food) and only one way that animals can help apple trees (fertilizer). The explanations are limited.

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SCORE POINT 1

10

Apple trees help animals survive because they have something to eat.

The response is minimal. Only one way that apple trees can help animals (food) is provided.

SCORE POINT 0

10

The apple trees has seeds fo grow apples.

The response does not address the prompt. There is no mention of how apple trees and animals can help each other.

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GRADE 4 SCIENCE

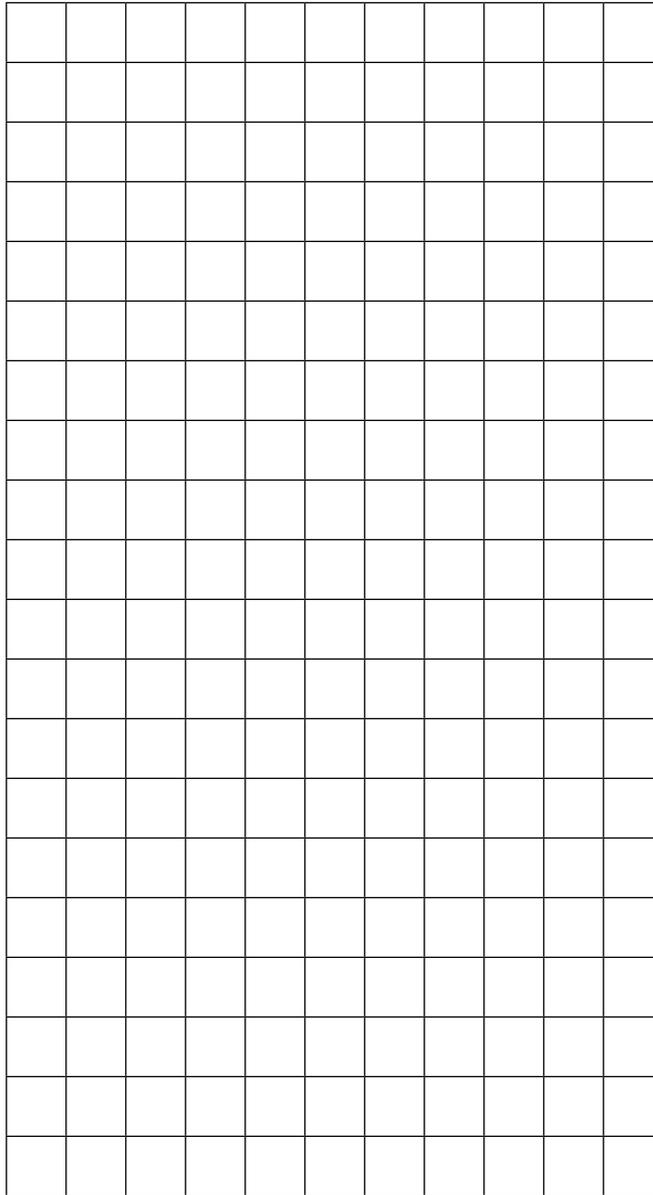
**Broad Area of Inquiry:** Conducting Investigations

**Inquiry Construct 8:** Use accepted methods for organizing, representing, and manipulating data.

- 1 Make a bar graph that shows the data you collected. Graph the median numbers of pennies it took to move the **box with no added weight**, the **box with the small weight**, and the **box with the large weight**.

**Title:** \_\_\_\_\_

Median Number of Pennies



\_\_\_\_\_

**Weight in Boxes**

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>3</b>	Median identified in the Data Table is graphed correctly and includes an appropriate title, scale, labels, and units.
<b>2</b>	Median identified in the Data Table is graphed correctly to scale. One element of the graph may be missing or incorrect.
<b>1</b>	Median identified in the Data Table is not graphed correctly or the scale is incorrect. At least one of the other elements of the graph is correct.
<b>0</b>	Response does not contain any correct elements or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

A bar graph is the expected presentation, but a pictogram with correct values would be accepted.

The scale is the appropriate number of graphed boxes in relation to the values in the Data Table. The units are the labeling of the *y*-axis.

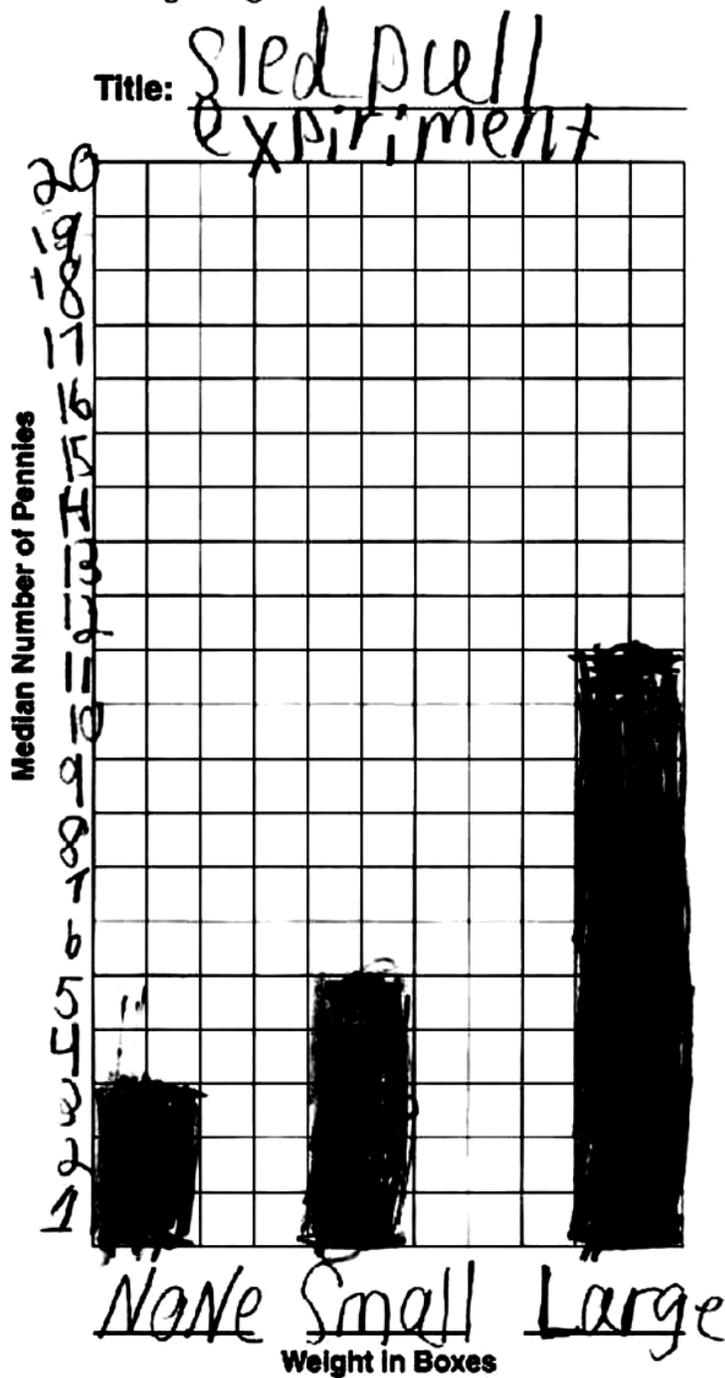
Examples of incorrect elements are missing title, missing labels, missing units. Another example would be bars greatly misaligned with the *x*-axis labels.

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SCORE POINT 3

1

Make a bar graph that shows the data you collected. Graph the median numbers of pennies it took to move the box with no added weight, the box with the small weight, and the box with the large weight.



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SCORE POINT 3 (CONTINUED)

The median values are properly graphed based on the Data Table. The x- and y-axes are appropriately labeled and scaled. The title is appropriate.

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	4	3	2	3
<b>Box with Small Weight</b>	5	6	5	5
<b>Box with Large Weight</b>	11	16	10	11

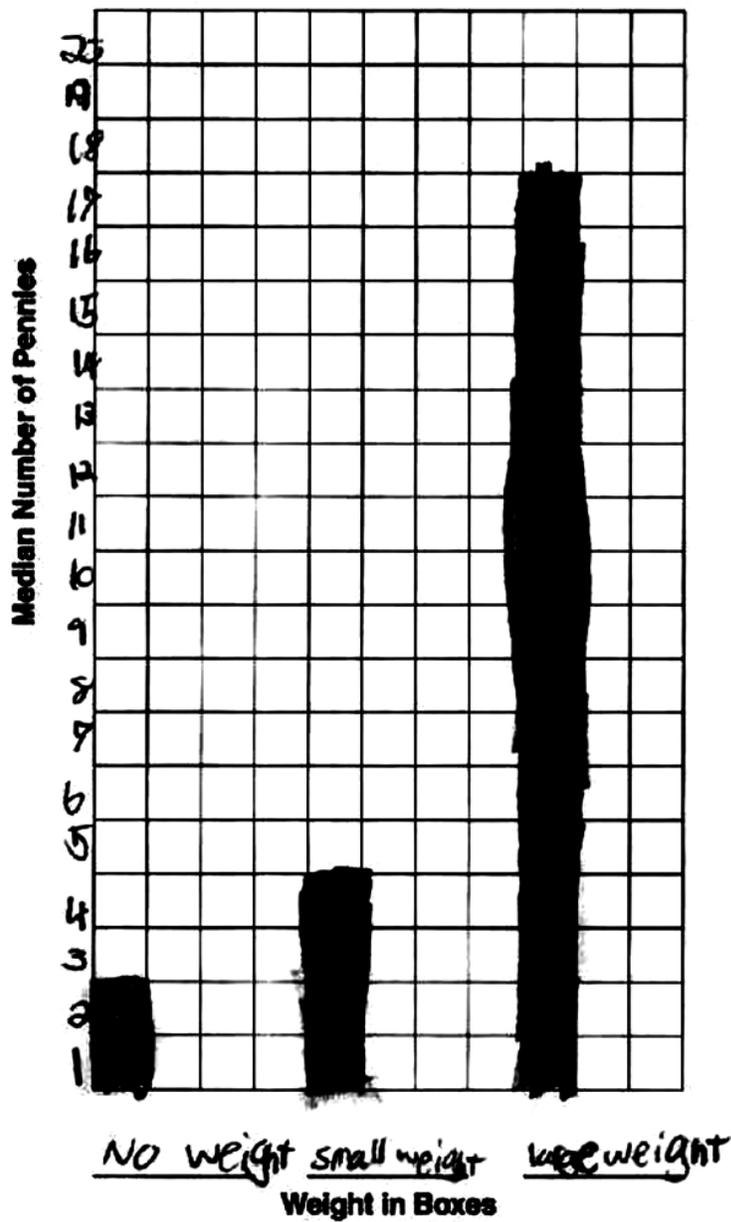
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SCORE POINT 2

1

Make a bar graph that shows the data you collected. Graph the median numbers of pennies it took to move the box with no added weight, the box with the small weight, and the box with the large weight.

Title: \_\_\_\_\_



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SCORE POINT 2 (CONTINUED)

The response correctly graphs the values from the Median column in the Data Table. The scales and labels are appropriate. No title prevents a 3 score.

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	2	2	2
<b>Box with Small Weight</b>	4	4	5	4
<b>Box with Large Weight</b>	13	18	17	17

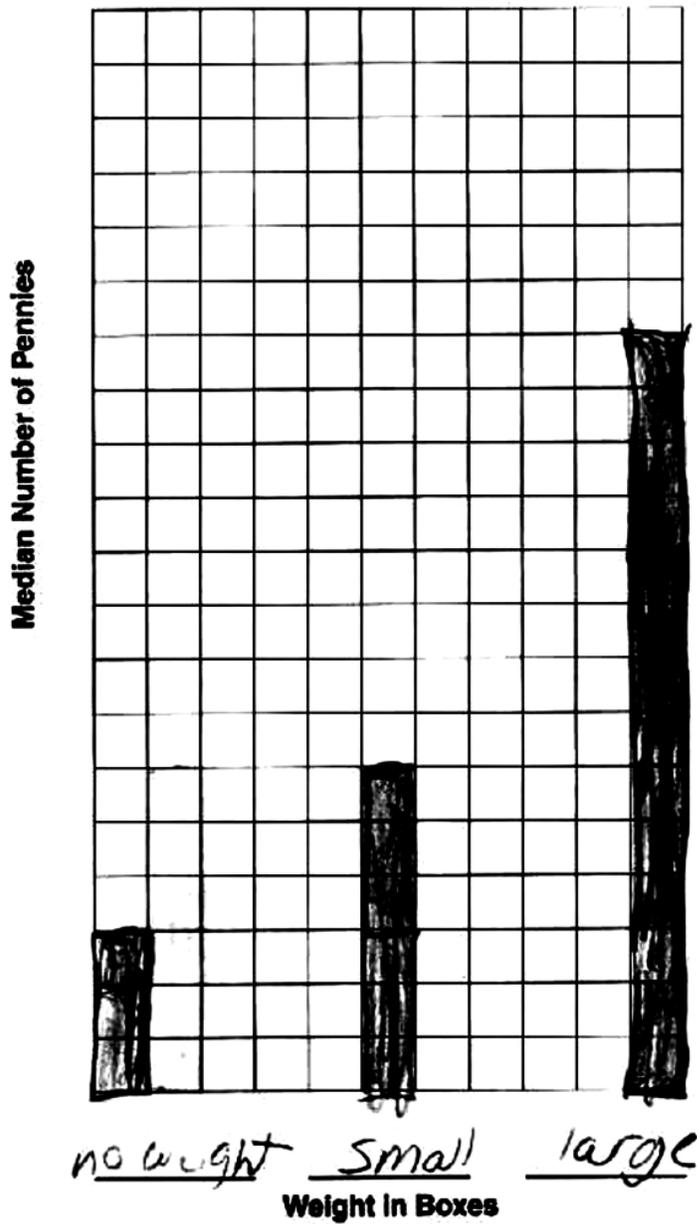
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SCORE POINT 1

1

Make a bar graph that shows the data you collected. Graph the median numbers of pennies it took to move the **box with no added weight**, the **box with the small weight**, and the **box with the large weight**.

Title: \_\_\_\_\_



NECAP 2009 RELEASED INQUIRY TASK  
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SCORE POINT 1 (CONTINUED)

The medians are graphed correctly according to values from the table, and under the assumption that 1 box = 1 penny. The x-axis is appropriately labeled. No title and no scale make this response a 1 score.

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	3	2	3
<b>Box with Small Weight</b>	6	6	7	6
<b>Box with Large Weight</b>	16	14	14	14

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

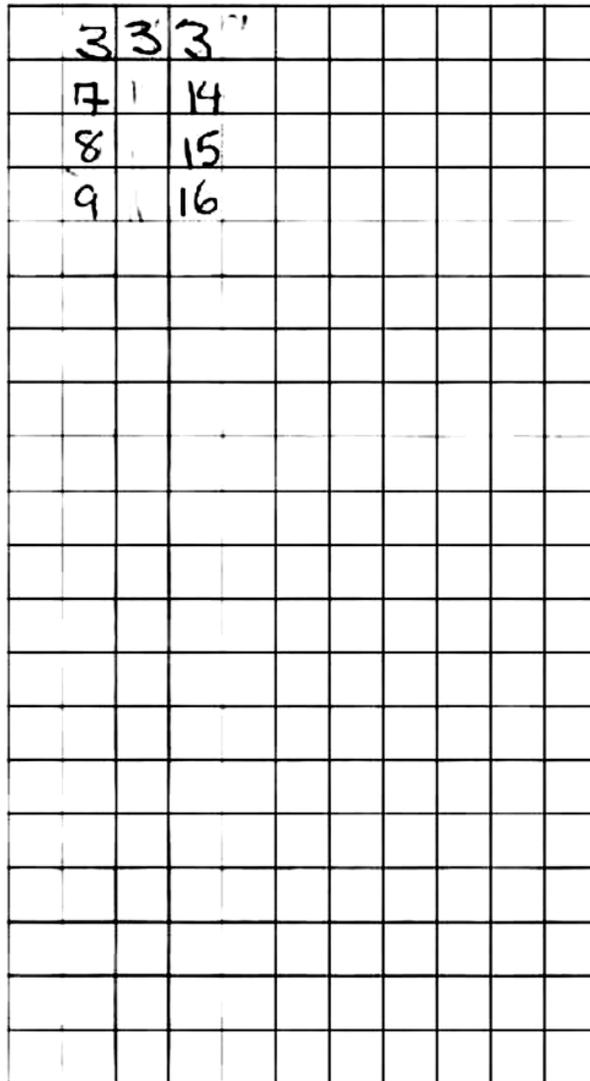
SCORE POINT 0

1

Make a bar graph that shows the data you collected. Graph the median numbers of pennies it took to move the **box with no added weight**, the **box with the small weight**, and the **box with the large weight**.

Title: \_\_\_\_\_

Median Number of Pennies



3      7      14  
Weight in Boxes

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SCORE POINT 0 (CONTINUED)

The response does not demonstrate an understanding of constructing a graph.

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	3	3	
<b>Box with Small Weight</b>	8	7	9	
<b>Box with Large Weight</b>	14	15	16	

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Broad Area of Inquiry:** Conducting Investigations

**Inquiry Construct 7:** Follow procedures for collecting and recording qualitative or quantitative data, using equipment or measurement devices accurately.

**2** What is the median number of pennies (force) it took to move the box with no added weight to the straw at the end of the placemat?

\_\_\_\_\_ pennies

What is the median number of pennies (force) it took to move the box with the small weight to the straw at the end of the placemat?

\_\_\_\_\_ pennies

What is the median number of pennies (force) it took to move the box with the large weight to the straw at the end of the placemat?

\_\_\_\_\_ pennies

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>2</b>	The correct amount for each section is filled in as identified in the Data Table.
<b>1</b>	At least 1 or 2 correct amounts filled in.
<b>0</b>	Response does not contain any correct elements or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

Response is scored against the identified median from each of the three trials, not the values for “Median” in the Data Table.

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GRADE 4 SCIENCE

SCORE POINT 2

2

What is the median number of pennies (force) it took to move the box with no added weight to the straw at the end of the placemat?

4 pennies

What is the median number of pennies (force) it took to move the box with the small weight to the straw at the end of the placemat?

8 pennies

What is the median number of pennies (force) it took to move the box with the large weight to the straw at the end of the placemat?

14 pennies

The medians are correctly calculated for all three scenarios based on the information from the three trials in the Data Table.

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SCORE POINT 2 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	4	4	4
<b>Box with Small Weight</b>	9	8	8	8
<b>Box with Large Weight</b>	16	13	14	14

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GRADE 4 SCIENCE

SCORE POINT 1

2

What is the median number of pennies (force) it took to move the box with no added weight to the straw at the end of the placemat?

10 pennies

What is the median number of pennies (force) it took to move the box with the small weight to the straw at the end of the placemat?

12 pennies

What is the median number of pennies (force) it took to move the box with the large weight to the straw at the end of the placemat?

15 pennies

One of the three medians is correctly calculated (box with the small weight) based on the three trials from the Data Table.

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SCORE POINT 1 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	11	10	11	10
<b>Box with Small Weight</b>	20+	10	12	12
<b>Box with Large Weight</b>	15	20+	20+	15

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SCORE POINT 0

2

What is the median number of pennies (force) it took to move the box with no added weight to the straw at the end of the placemat?

332 pennies

What is the median number of pennies (force) it took to move the box with the small weight to the straw at the end of the placemat?

668 pennies

What is the median number of pennies (force) it took to move the box with the large weight to the straw at the end of the placemat?

141825 pennies

The response does not demonstrate understanding of calculating medians.

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SCORE POINT 0 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3 pennies	2 pennies	3 pennies	3, 3, 2
<b>Box with Small Weight</b>	6 pennies	8 pennies	6 pennies	8, 6, 6
<b>Box with Large Weight</b>	19 pennies	20 pennies	20 pennies	20, 20, 19

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Broad Area of Inquiry:** Conducting Investigations  
**Inquiry Construct 10:** Summarize results based on data.

- 3** Explain how the amount of force (pennies) needed to move the box changed as the weight in the box became heavier. Use **two** examples from your data to support your answer.

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**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>2</b>	Response indicates that with the addition of more weight to the box, more pennies were needed to move it. Response includes <b>two</b> examples of data from the investigation.
<b>1</b>	Response shows some understanding of the relationship but does not show evidence <b>or</b> response cites examples of data from the investigation but does not explain that with more weight, more pennies are needed to move the box.
<b>0</b>	Response does not contain any correct elements or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

“My data” or “my results” without numbers **does not** count as “citing an example of data.” (Must provide actual values.)

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GRADE 4 SCIENCE

SCORE POINT 2

3

Explain how the amount of force (pennies) needed to move the box changed as the weight in the box became heavier. Use **two** examples from your data to support your answer.

The box at first needed 3 pennies to pull the box but when you add weights you make the box heavier, and it needs more force for it to be pulled. For example the first time without weights it took 3 pennies, at the end with a large weight it took 19 pennies.

The response correctly identifies that more force is needed to pull more weight. Two examples from the Data Table are used (no weight used 3 pennies, whereas the large weight took 19 pennies).

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SCORE POINT 2 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	3	3	3
<b>Box with Small Weight</b>	7	3	4	4
<b>Box with Large Weight</b>	14	20	17	17

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

3

Explain how the amount of force (pennies) needed to move the box changed as the weight in the box became heavier. Use two examples from your data to support your answer.

You needed to add more pennies everytime something was heavier or the force would not work. If you had 2 pennies on the small weight the force would not pull.

The response recognizes that more force is needed to move heavier objects. Only one example from the Data Table is used (2 pennies would not pull the small weight).

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SCORE POINT 1 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	2	2	2
<b>Box with Small Weight</b>	5	6	5	5
<b>Box with Large Weight</b>	15	15	18	15

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0

3

Explain how the amount of force (pennies) needed to move the box changed as the weight in the box became heavier. Use two examples from your data to support your answer.

because the cup was hanging upside down  
and so the force would be stronger.  
also the box was very light so it  
came down faster.

The response does not demonstrate understanding that more force is needed to pull more weight.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	5	6	3	5
<b>Box with Small Weight</b>	11	8	3	8
<b>Box with Large Weight</b>	17	15	11	15

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Broad Area of Inquiry:** Developing and Evaluating Explanations

**Inquiry Construct 12:** Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.

**4** Copy your prediction from page 5 in your Inquiry Booklet to the lines below.

I predict

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Circle one of the following statements:

- The data **supported** my prediction.
- The data **did not support** my prediction.

My evidence is

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**Scoring Guide**

Score	Description
2	Response clearly explains how the data did or did not support a prediction and cites one example of data within the answer.
1	Response provides a partial explanation as to how the data did or did not support the prediction. Response may or may not cite data.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

**Training Notes:**

Response must **indicate** (circled or written) whether the data support the prediction or no point is awarded.

If data connects to prediction but response argues it does not, only one point is awarded (also true for reverse situation).

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2

4

Copy your prediction from page 5 in your Inquiry Booklet to the lines below.

I predict that increasing the weight of an object makes it heavy so it needs more force to be moved.

Circle one of the following statements:

- The data supported my prediction.
- The data did not support my prediction.

My evidence is that every time I added more weight, I needed to place more pennies in the cup to get it to the straw.

The response takes a position (the data supported my prediction), and provides evidence with a clear discussion of the investigation (as I added more weight, I needed more pennies).

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	2	2	2
<b>Box with Small Weight</b>	6	6	6	6
<b>Box with Large Weight</b>	16	16	17	16

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

4

Copy your prediction from page 5 in your Inquiry Booklet to the lines below.

I predict that it will take alot  
more force to move the large  
weight.

Circle one of the following statements:

- The data supported my prediction.
- The data did not support my prediction.

My evidence is it did take alot  
more force to move that large  
weight. It's in the graph.

The response takes a position (the data supported my prediction), and gives a partial explanation. No specific examples from the investigation have been used.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	2	1	2
<b>Box with Small Weight</b>	3	3	4	3
<b>Box with Large Weight</b>	10	8	7	8

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0

4 Copy your prediction from page 5 in your Inquiry Booklet to the lines below.

I predict that when you put something in the cup  
the object you put in it will stay

Circle one of the following statements:

- The data supported my prediction.
- The data **did not support** my prediction.

My evidence is that when I put heavier things on  
the sled the sled will stay

It is not clear what "the sled will stay" means. The response doesn't demonstrate understanding of the task.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	3	3	3
<b>Box with Small Weight</b>	6	5	6	6
<b>Box with Large Weight</b>	11	11	14	11

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Broad Area of Inquiry:** Planning and Critiquing of Investigations

**Inquiry Construct 6:** Provide reasoning for appropriateness of materials, tools, procedures, and scale used in the investigation.

**5** Read the definition below from the Word Bank on page 9.

**Fair test:** an investigation in which scientists change one thing at a time

Do you think this investigation was a fair test? Use one example to explain your thinking.

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**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>2</b>	Response indicates this investigation is or is not a fair test with one example and a sufficient explanation.
<b>1</b>	Response indicates this investigation is or is not a fair test with an example but without a sufficient explanation.
<b>0</b>	Response does not contain any correct factors or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

Stating only “Yes” or “No” is considered a 0.

Examples that indicate tests are fair include:

- The test/investigation includes multiple trials.
- Only one thing (weight in the box) is changed.
- The same materials (box, placemat, etc.) are used throughout.
- The same procedure is followed throughout.
- All conditions remain constant except for one thing.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2

5

Read the definition below from the Word Bank on page 9.

**Fair test:** an investigation in which scientists change one thing at a time

Do you think this investigation was a fair test? Use one example to explain your thinking.

This investigation I think  
was a fair test because  
each time we tested the  
weight we made it so the  
box was in the same spot, it  
had the same set up, and  
we did it more than once.

The response takes a stance on whether the test was fair, and gives at least one clear example to explain why the investigation was a fair test.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

5

Read the definition below from the Word Bank on page 9.

**Fair test:** an investigation in which scientists change one thing at a time

Do you think this investigation was a fair test? Use one example to explain your thinking.

Yes I think it was a fair test. Because they started with one waight then moved to another.

The response takes a stance on whether the test was fair. The example given is not completely erroneous, but it is not clear how the example supports the stance.

SCORE POINT 0

5

Read the definition below from the Word Bank on page 9.

**Fair test:** an investigation in which scientists change one thing at a time

Do you think this investigation was a fair test? Use one example to explain your thinking.

Yes. because it was harder to pickup than to just pull hard. expeshali with alot of pennies.

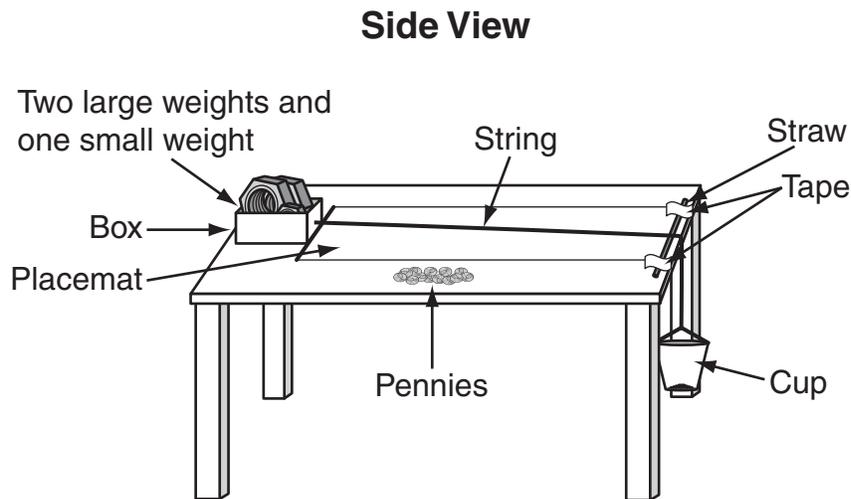
The response takes a stance, but the explanation does not demonstrate any understanding about experimental design.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

**Broad Area of Inquiry:** Formulating Questions and Hypothesizing

**Inquiry Construct 1:** Analyze information from observations, research, or experimental data for the purpose of formulating a question, hypothesis, or prediction.

- 6 The students in Mrs. Smith's class decide to investigate the amount of force (pennies) needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. The diagram below shows how the students set up their investigation.



Predict how much force (pennies) will be needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. Explain why you made this prediction. Include evidence from your investigation to support your prediction.

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**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>3</b>	Response demonstrates a thorough understanding using data from the investigation to make a prediction. The response demonstrates an understanding that adding more weight to the box will require more force (pennies) to move the box.
<b>2</b>	Response demonstrates a general understanding using data from the investigation to make a prediction. The response demonstrates an understanding that adding more weight to the box will require more force (pennies) to move the box. Some minor aspects of the response may be missing or incorrect. Minor errors may be present in the response.
<b>1</b>	Response demonstrates a minimal understanding of making a prediction based on the investigation. Major aspects of the response may be missing or incorrect. Major errors may be present in the response.
<b>0</b>	Response does not contain any correct elements or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

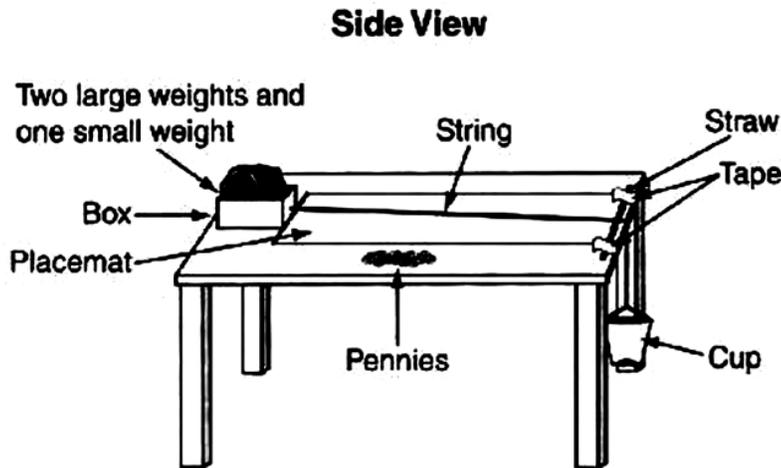
Prediction should be based on data from the investigation; e.g., “In my investigation it took 6 pennies to move the box with the one small weight in it and 14 pennies to move the box with the large weight in it. Because there is more weight in the box, I predict that it would take about 36 pennies (or more force) to move the box to the end of the track with two large weights and one small weight in it.”

A minimal “1” can be given for a reasonable prediction without explanation. A reasonable prediction is one related to the data table.

SCORE POINT 3

6

The students in Mrs. Smith's class decide to investigate the amount of force (pennies) needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. The diagram below shows how the students set up their investigation.



Predict how much force (pennies) will be needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. Explain why you made this prediction. Include evidence from your investigation to support your prediction.

My prediction is that the force will be around 70 to 80 pennies. I predict this because I got 10 pennies for the small weight. I got 30 pennies for one large weight. If you double the force on the large weight, the force would be 60 pennies.  $60 + 10$  is 70. So the force would probably be around 70 to 80 pennies.

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**SCORE POINT 3 (CONTINUED)**

The response gives an accurate prediction of how many pennies it will take to move the box. The response uses data from the table to clearly explain how the prediction was made.

**Data Table: Measuring Amounts of Force**

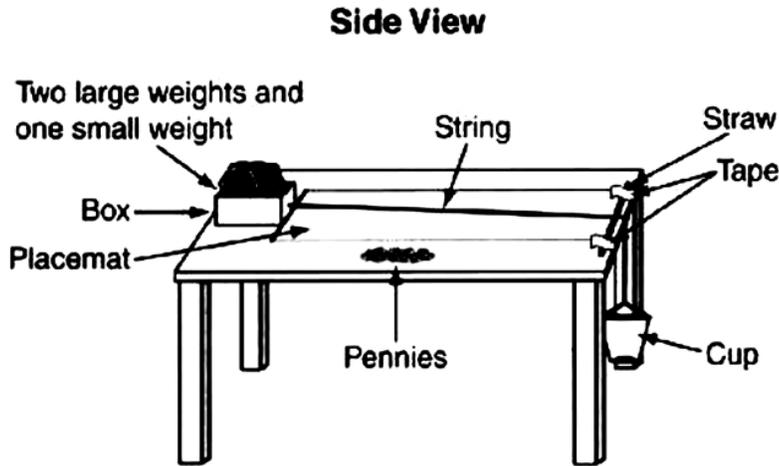
	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	:4 pennies :in between fast and slow	:4 pennies :in between fast and slow	:4 pennies :in between fast and slow	:Trial 2 :4 pennies
<b>Box with Small Weight</b>	:12 pennies :slow	:10 pennies :slow	:7 pennies :slow	:Trial 2 :10 pennies
<b>Box with Large Weight</b>	:20+ pennies :slow	:20+ pennies :slow	:20+ :slow	:Trial 2 :over 20 pennies

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2

6

The students in Mrs. Smith's class decide to investigate the amount of force (pennies) needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. The diagram below shows how the students set up their investigation.



Predict how much force (pennies) will be needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. Explain why you made this prediction. Include evidence from your investigation to support your prediction.

My prediction is it would take 48 or 49 pennies because it took 20 for on big wait so double the 20 and add 8 or 9 to 40 = 48 or 49.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

A reasonable prediction is made, and the reasoning is generally explained. It is not clear where the 8 or 9 is coming from, but the idea of doubling the large weight is some correct procedure.

**Data Table: Measuring Amounts of Force**

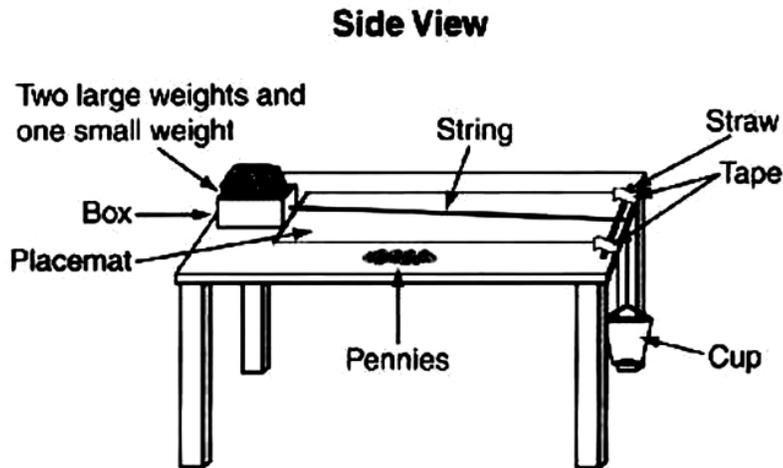
	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	3	3	3
<b>Box with Small Weight</b>	14	17	20	17
<b>Box with Large Weight</b>	20	20	20	20

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

6

The students in Mrs. Smith's class decide to investigate the amount of force (pennies) needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. The diagram below shows how the students set up their investigation.



Predict how much force (pennies) will be needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. Explain why you made this prediction. Include evidence from your investigation to support your prediction.

It will take a lot of force because it took most of our pennies to pull one big weight.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

The response gives a very vague prediction with an unspecific reference to the data (it took most of our pennies to pull one big weight).

**Data Table: Measuring Amounts of Force**

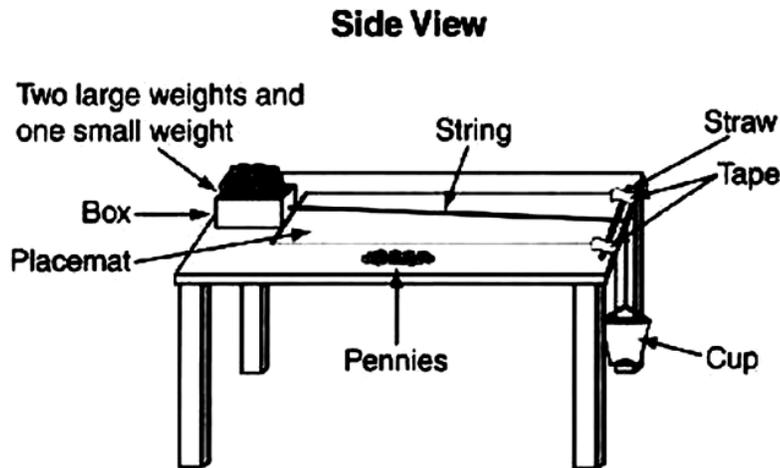
	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	4	4	four
<b>Box with Small Weight</b>	13	13	8	thirteen
<b>Box with Large Weight</b>	17	20	19	twenty

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0

6

The students in Mrs. Smith's class decide to investigate the amount of force (pennies) needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. The diagram below shows how the students set up their investigation.



Predict how much force (pennies) will be needed to move the box with **one** small weight and **two** large weights to the straw at the end of the placemat. Explain why you made this prediction. Include evidence from your investigation to support your prediction.

It is 2 pennies why to prove it for the test.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

The response gives an arbitrary prediction with no qualifying explanation. No understanding has been demonstrated.

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	4	4	4	4
<b>Box with Small Weight</b>	7	7	8	7
<b>Box with Large Weight</b>	13	13	13	13

**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Broad Area of Inquiry:** Developing and Evaluating Explanations

**Inquiry Construct 12:** Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.

- 7** Two students in Mrs. Smith’s class used pennies to measure the amount of force needed to move the **box with one large weight** across different flat surfaces. The table below shows the results.

**Number of Pennies Needed to Move Box with Large Weight  
Across Different Flat Surfaces**

Surface Type	Median Number of Pennies
Sticky	30
Rough	25
Bumpy	20
Smooth	15
Icy	7

Look at the data in the table. Identify and explain the trend (pattern) in the amount of force (pennies) needed to move the **box with one large weight** across different flat surfaces.

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**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>2</b>	Response identifies a trend (pattern) and explains that it takes more force to move the box over rougher surfaces <b>or</b> that it takes less force to move the box over smoother surfaces and includes an example.
<b>1</b>	Response identifies a trend (pattern) or data, but not both.
<b>0</b>	Response does not contain any correct element or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

The explanation should correctly reflect the data in the table.

A complete response clearly uses an example to show a trend (pattern) in the amount of force needed to move the box across the five different surfaces.

The response may either go from rough surface to smooth surface, indicating that more force was needed for sticky and rough surfaces, or from smooth surfaces to rough surfaces, indicating that smooth surfaces took less force.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2

7

Two students in Mrs. Smith's class used pennies to measure the amount of force needed to move the **box with one large weight** across different flat surfaces. The table below shows the results.

**Number of Pennies Needed to Move Box with Large Weight  
Across Different Flat Surfaces**

Surface Type	Median Number of Pennies
Sticky	30
Rough	25
Bumpy	20
Smooth	15
Icy	7

Look at the data in the table. Identify and explain the trend (pattern) in the amount of force (pennies) needed to move the **box with one large weight** across different flat surfaces.

The ~~rufer~~ the surface more pennies need to pull to the smooth Icy was 7 pennies, smooth 15 pennies, Bumpy 20 pennies, Rough 25 pennies, Sticky 30 pennies. It takes more force on the rufer surface.  
This is a fractest because you have to change the surface one at a time.

The response identifies the trend (the rougher the surface, the more pennies needed), and shows with data that each increasingly rough surface took more pennies.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

7

Two students in Mrs. Smith's class used pennies to measure the amount of force needed to move the **box with one large weight** across different flat surfaces. The table below shows the results.

**Number of Pennies Needed to Move Box with Large Weight  
Across Different Flat Surfaces**

Surface Type	Median Number of Pennies
Sticky	30
Rough	25
Bumpy	20
Smooth	15
Icy	7

Look at the data in the table. Identify and explain the trend (pattern) in the amount of force (pennies) needed to move the **box with one large weight** across different flat surfaces.

The pattern I see is that as the surfaces got smoother, the amount of force needed to pull it decreased.

The response identifies the trend, but does not explain the trend.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0

7

Two students in Mrs. Smith's class used pennies to measure the amount of force needed to move the **box with one large weight** across different flat surfaces. The table below shows the results.

**Number of Pennies Needed to Move Box with Large Weight  
Across Different Flat Surfaces**

Surface Type	Median Number of Pennies
Sticky	30
Rough	25
Bumpy	20
Smooth	15
Icy	7

Look at the data in the table. Identify and explain the trend (pattern) in the amount of force (pennies) needed to move the **box with one large weight** across different flat surfaces.

*I predictic that 25 force would  
move the box*

No trend has been identified.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

**Broad Area of Inquiry:** Developing and Evaluating Explanations

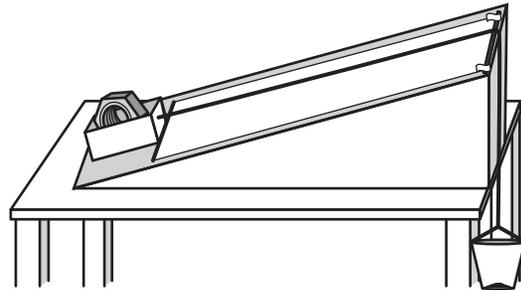
**Inquiry Construct 13:** Communicate how scientific knowledge applies to explain results, propose further investigations, or construct and analyze alternative explanations.

- 8 The students in Mrs. Smith's class decide to investigate the amount of force needed to move the **box with one large weight** up a slanted surface. The diagrams below show both a flat and a slanted surface.

**Flat Surface**



**Slanted Surface**



Will it take more force (pennies) to move the **box with one large weight** across a flat surface **or** up a slanted surface? Use observations and data from your investigation to explain your answer.

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**NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE**

**Scoring Guide**

<b>Score</b>	<b>Description</b>
<b>2</b>	Response indicates that additional pennies (more force) would be needed to move the box up the slanted surface than on the flat surface. Response is supported by data from the investigation.
<b>1</b>	Response indicates that additional pennies (more force) would be needed to move the box up the surface. Explanation is minimal.
<b>0</b>	Response does not contain any correct elements or is irrelevant.
<b>Blank</b>	No response

**Training Notes:**

No credit will be given for stating only “slanted” with no explanation.

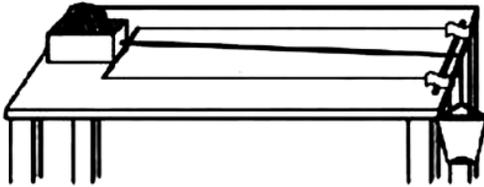
NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2

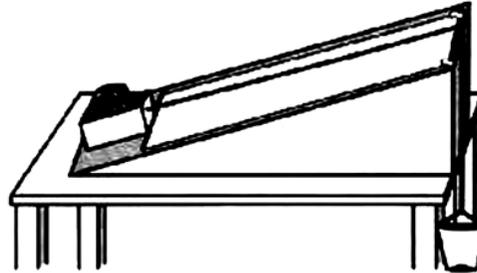
8

The students in Mrs. Smith's class decide to investigate the amount of force needed to move the **box with one large weight** up a slanted surface. The diagrams below show both a flat and a slanted surface.

**Flat Surface**



**Slanted Surface**



Will it take more force (pennies) to move the **box with one large weight** across a flat surface **or** up a slanted surface? Use observations and data from your investigation to explain your answer.

It will take more to move up the slanted surface, because if the box is going uphill then it will take more pennies to get it there. It already took 12 pennies to do it on the flat surface, so it would take more pennies to get it up there.

The response indicates that it would take more pennies to go up the slanted surface, and uses data from the investigation for explanation (it took 12 pennies on a flat surface, so it would take more).

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	3	3	4	3
<b>Box with Small Weight</b>	6	6	8	6
<b>Box with Large Weight</b>	12	12	12	12

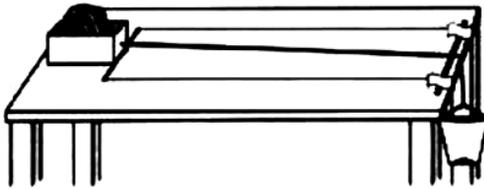
NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1

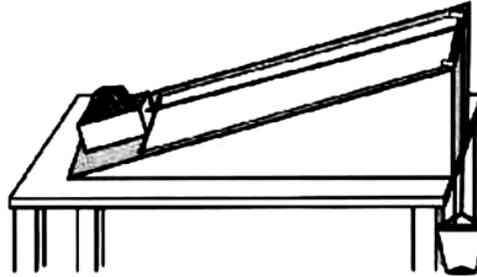
8

The students in Mrs. Smith's class decide to investigate the amount of force needed to move the **box with one large weight** up a slanted surface. The diagrams below show both a flat and a slanted surface.

**Flat Surface**



**Slanted Surface**



Will it take more force (pennies) to move the **box with one large weight** across a flat surface **or** up a slanted surface? Use observations and data from your investigation to explain your answer.

*I think if it was up slanted  
it would take more pennies  
than the flat surface.*

The response indicates that more pennies would be needed to go across the slanted surface, but does not use observations and data to explain the answer.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	4	3	3	3
<b>Box with Small Weight</b>	8	7	9	7
<b>Box with Large Weight</b>	20	20	20	20

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0

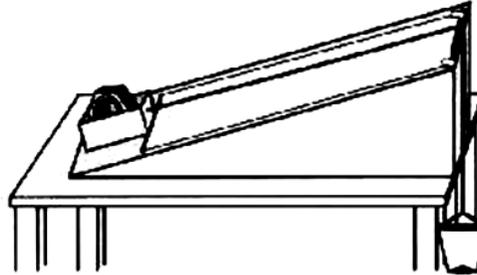
8

The students in Mrs. Smith's class decide to investigate the amount of force needed to move the **box with one large weight** up a slanted surface. The diagrams below show both a flat and a slanted surface.

Flat Surface



Slanted Surface



Will it take more force (pennies) to move the **box with one large weight** across a flat surface **or** up a slanted surface? Use observations and data from your investigation to explain your answer.

Same because the cup

puts more and the flat surf-

ace is flater

The response does not acknowledge that the scenario with the slanted surface would require more force.

NECAP 2009 RELEASED INQUIRY TASK  
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

**Data Table: Measuring Amounts of Force**

	Number of Pennies			
	Trial 1	Trial 2	Trial 3	Median
<b>Box with No Added Weight</b>	2	1	2	2
<b>Box with Small Weight</b>	5	4	4	4
<b>Box with Large Weight</b>	10	8	11	10