



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2011**

**Grade 4
Science**

**NECAP 2011 RELEASED ITEMS
GRADE 4 SCIENCE**

Grade 4 Science Released Item Information

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

Grade 4 Science Released Inquiry Task Information

Item Number	Big Idea ¹	Inquiry Construct	Depth of Knowledge Code	Item Type ²	Total Possible Points
1	INQ	5	2	SA	2
2	INQ	8	2	CR	3
3	INQ	10	2	SA	2
4	INQ	12	3	SA	2
5	INQ	10	2	CR	3
6	INQ	9	2	SA	2
7	INQ	11	2	SA	2
8	INQ	1	2	SA	2

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

²Item Type: MC = Multiple Choice, CR = Constructed Response, SA = Short Answer

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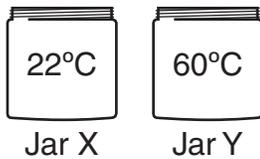
PS2 (K–4) SAE-5 Students will use observations of light in relation to other objects/substances to describe the properties of light (can be reflected, refracted, or absorbed).

- 1 A student wants to stay cool on a sunny summer day. What should the student wear?
- A. a black shirt to absorb the sunlight
 - B. a black shirt to reflect the sunlight
 - C. a white shirt to absorb the sunlight
 - D. a white shirt to reflect the sunlight

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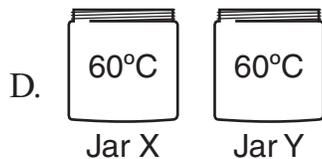
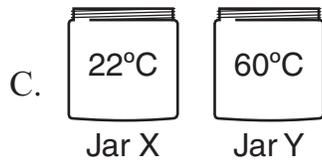
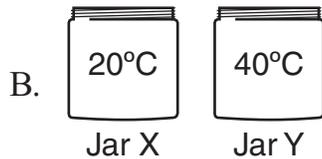
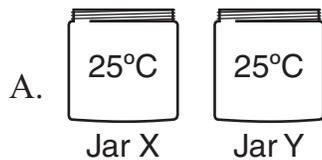
PS2 (K–4) SAE-6 Students will experiment, observe, or predict how heat might move from one object to another.

- 2 A student has two jars holding the same amount of water. The temperature of the water in each jar is shown in the pictures below.



The jars of water sit in a room overnight. The temperature in the room is 25°C . The next day, the student measures the temperature of the water in each jar.

What are the **most likely** water temperatures?



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PS3 (K–4) SAE-7 Students will use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls).

- 3 A student measures how far a toy car travels down a ramp. The student changes the height of the ramp for each trial. The table below shows the results.

Toy Car Data

Trial	Height of Ramp	Distance
1	10 cm	2 m
2	15 cm	5 m
3	20 cm	9 m
4	25 cm	14 m
5	30 cm	?

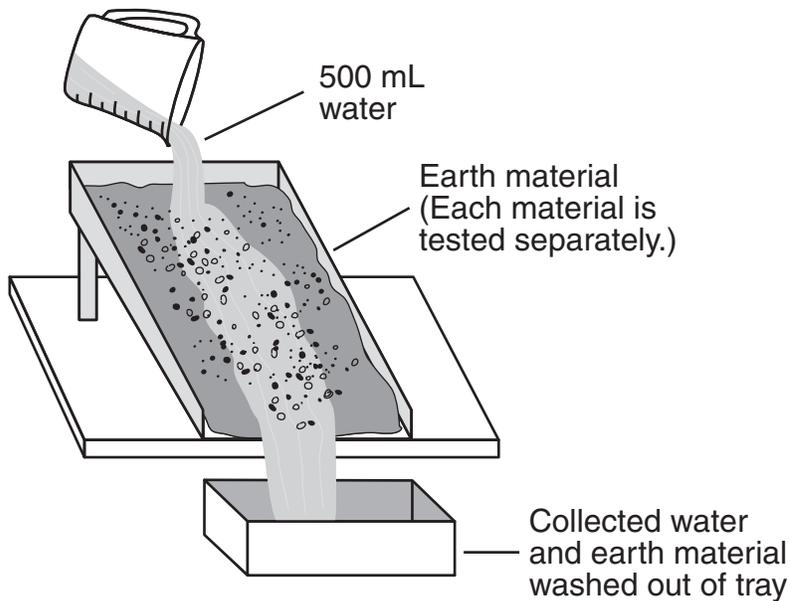
The pattern in the data helps the student predict the distance the car will travel. Based on the pattern, what distance will the car travel during Trial 5?

- A. 15 m
- B. 17 m
- C. 20 m
- D. 22 m

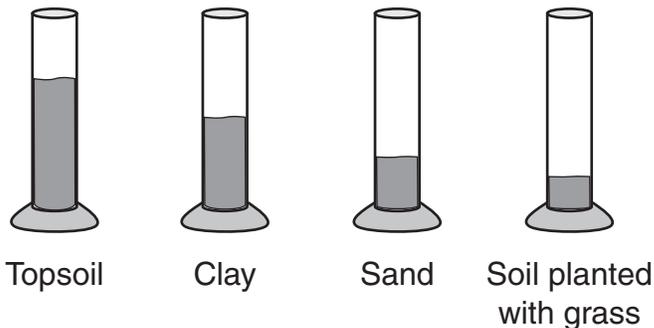
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ESS1 (K–4) INQ-2 Students will use results from an experiment to draw conclusions about how water interacts with Earth materials (e.g., percolation, erosion, frost heaves).

- 4 A student investigates erosion using four kinds of earth material: topsoil, clay, sand, and soil planted with grass. The setup for the investigation is shown below.



Water is separated from the earth material with a filter. The pictures below show the amounts of earth material that were collected.



The results of this investigation **best** support which conclusion?

- A. Topsoil is easily eroded.
- B. Sand has a coarse texture.
- C. Water travels fastest through soil planted with grass.
- D. Water drains most quickly through clay.

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ESS1 (K–4) NOS-3 Students will 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; metersticks/rulers: snow depth; rain gauges: rain amount in inches).

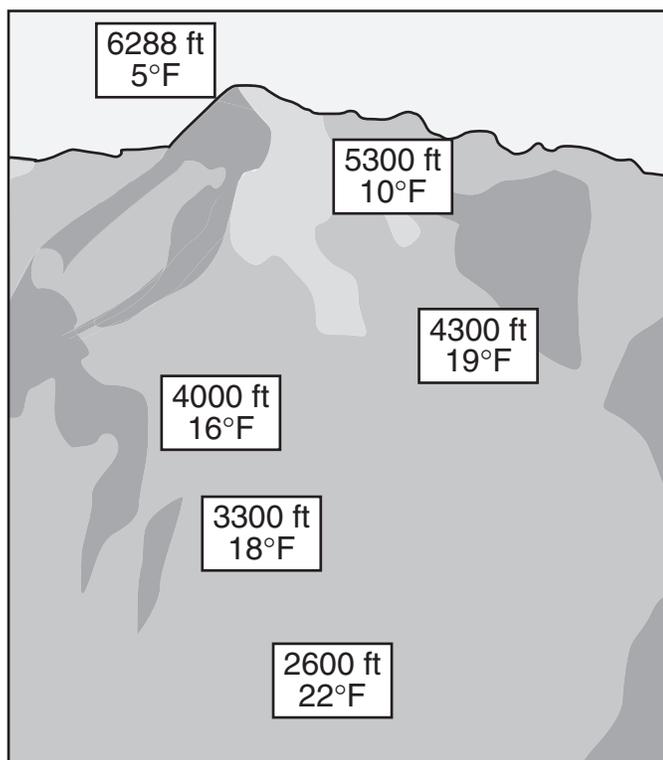
- 5 A student sets up a wind vane in her backyard. What can she learn about the wind by using the wind vane?
- A. wind direction
 - B. wind pressure
 - C. wind speed
 - D. wind temperature

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

- 6 On a February morning, scientists recorded the temperature on Mount Washington at different heights. The temperature data are shown in the diagram below.

Mount Washington Data



Which statement describes the weather **pattern** shown in the diagram?

- A. The temperature at 4300 feet is colder than the temperature at 3300 feet.
- B. The temperature in the morning is colder than the temperature in the afternoon.
- C. The greater heights are colder than the lower heights.
- D. The greater heights have deeper snow than the lower heights.

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LS1 (K–4) INQ-1 Students will sort/classify different living things using similar and different characteristics; describe why organisms belong to each group or cite evidence about how they are alike or not alike.

- 7 The table below shows the characteristics of two groups of animals.

**Characteristics of Mammals
and Reptiles**

Classification Group	Characteristics
Mammals	<ul style="list-style-type: none">• Fur• Warm-blooded• Produce milk to feed their young
Reptiles	<ul style="list-style-type: none">• Scales• Cold-blooded• Lay eggs

Which statement **best** explains why cats and dogs are classified as mammals?

- A. They both eat meat.
- B. They both have fur.
- C. They both have four legs.
- D. They both are types of pets.

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LS1 (K–4) SAE-2 Students will identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space).

8 What do **all** animals need to live?

- A. fur
- B. meat
- C. soil
- D. water

LS1 (K–4) FAF-4 Students will identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).

9 Some plants have seedpods that stick to animal fur. Why is this kind of seedpod helpful to plants?

- A. The seedpods get food from animal fur.
- B. The seedpods are kept warm by animal fur.
- C. The animal carries the seedpods to an area where a new plant has space to grow.
- D. The animal helps the seedpods mix with pollen from another plant.

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LS4 (K–4) POC-9 Students will distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading).

- 10 Children have characteristics that are either inherited or learned.
- a. Explain how an inherited characteristic is different from a learned characteristic.

 - b. Sort all the characteristics below into two groups: “Group 1: Inherited” and “Group 2: Learned.” You may use a table or chart for your answer.
 - tallest student in class
 - rides a bicycle
 - curly, black hair
 - plays the piano
 - reads mystery books
 - brown eyes
 - long fingers
 - speaks French

**NECAP 2011 RELEASED ITEMS
GRADE 4 SCIENCE**

Scoring Guide

Score	Description
4	The response demonstrates a thorough understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. The response explains in detail how a characteristic that is inherited is different from a characteristic that is learned. The response also correctly sorts all eight characteristics into two groups: Group 1: Inherited and Group 2: Learned.
3	The response demonstrates a general understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. The overall response is general.
2	The response demonstrates a limited understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. The overall response is limited.
1	The response demonstrates a minimal understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. The overall response is minimal.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

- a. A thorough response can be exemplified by one of the following sample responses for “Inherited” and one of the following sample responses for “Learned”:

Sample responses for “Inherited”

- Inherited characteristics are characteristics with which you are born.
- Inherited characteristics are passed from birth parents to their children.

Sample responses for “Learned”

- Learned characteristics develop because children have been taught how to do something.
- Learned characteristics develop because children have practiced how to do something.
- Learned characteristics are usually things that children know how to do.

- b. A thorough response can be exemplified by the following sample response:

Group 1: Inherited - curly black hair, brown eyes, long fingers, and tallest student in class

Group 2: Learned - rides a bicycle, plays the piano, reads mystery books, and speaks French

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SCORE POINT 4

10 A. The learned characteristic is something that you have practiced over time and have memorized how to do it. The inherited characteristic is something that you have naturally and were born with.

B. I put rides a bicycle, play the piano, read mystery books and speaks French in the learned category because they you had to practice to memorize. I put tallest student in class, curly, black hair, brown eyes and long fingers in the inherited group because they are something that you already have and something that you were born with.

Response demonstrates a thorough understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. Response includes a clear explanation of learned and inherited characteristics (learned: "something that you have practiced over time and have memorized" and inherited: "something that you have naturally and were born with"). All eight characteristics are sorted correctly.

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SCORE POINT 3

10 A.) An inherited characteristic is different from a learned characteristic because an inherited characteristic is something you can not change easily or at all, and a learned characteristic is something you have learned how to say or do, and like doing it.

inherited

tallest student in class

black curly hair

Brown eyes

long fingers

learned

rides a bicycle

plays the piano

speaks French

reads mystery

books



Response demonstrates a general understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. Part (a) is general with only the explanation of learned characteristics (learned: "learned how to say or do, and like doing it"). Part (b) is sorted correctly.

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SCORE POINT 2

10

Group 1 - inherited

curly, black hair, brown eyes, long
fingers, tallest student in class.

Group 2 - learned

Speak French, read mystery books,
play the piano, ride a bicycle

Response demonstrates a limited understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. Part A is not attempted. Part B is sorted correctly.

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SCORE POINT 1

10

(A) Because some one might not know how to do something good, and the other person who has been doing it for a while can do it better.

(B)

"Inherited"	"Learned" "Characteristic"
tallest student in class.	Curly black hair.
rides a bicycle.	plays the piano.
brown eyes.	reads mystery books.
	long fingers
	Speaks french.

Response demonstrates a minimal understanding of how to distinguish between human characteristics that are inherited from parents and characteristics that are learned. Part A is incorrect. Part B displays a minimal understanding with more sorted characteristics correct in each group than incorrect.

10

Well if a inherited didn't learn anything it wouldn't be smart at all. It won't know anything. And if a inherited did learned it would be very smart. Also it's much better if you learned. Did you know that?

I'm the tallest student in class. I love riding bicycle, I have curly, black hair, I love playing the piano, some time I read books, I have brown eyes, long finger nails, and I speak french.

Response is irrelevant.

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry:
Inquiry Construct 5:

Planning and Critiquing of Investigations
Develop an organized and logical approach to investigating the question, including controlling variables.

- 1 In your investigation, you measured how much water came out of three kinds of soil. Then you found the amount of water held by each soil.

Identify **one** thing that you kept the same for each test in the investigation.

Identify **one** thing that you changed for each test in the investigation.

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of controlling variables and testing one variable at a time in an investigation. The response identifies one thing that the student kept the same during each test and one thing that the student changed during each test.
1	The response demonstrates a limited understanding of controlling variables and testing one variable at a time in an investigation.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Kept the same—response includes **one** of the following:

- Amount of water poured into soil
- Amount of soil tested
- Amount of time for collecting the water
- The size of the holes in the cups

Changed—

- Particle size of each soil (kind of soil is also an acceptable response)

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SCORE POINT 2

- ① In your investigation, you measured how much water came out of three kinds of soil. Then you found the amount of water held by each soil.

Identify **one** thing that you kept the same for each test in the investigation.

One thing we kept the same
was the amount of water we
put in the soil.

Identify **one** thing that you changed for each test in the investigation.

One thing we changed was
what type of soil we
used.

The response demonstrates a general understanding of controlling variables and testing one variable at a time. The response identifies one thing that the student kept the same ("amount of water") during each test and one thing that the student changed ("type of soil").

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GRADE 4 SCIENCE

SCORE POINT 1

- 1 In your investigation, you measured how much water came out of three kinds of soil. Then you found the amount of water held by each soil.

Identify **one** thing that you kept the same for each test in the investigation.

One thing that I kept the same for each test in the investigation is the amount of water you put in the graduated cylinder.

Identify **one** thing that you changed for each test in the investigation.

One thing that I changed for each test in the investigation is who would do which step.

The response demonstrates a limited understanding of controlling variables and testing one variable at a time in an investigation. The response identifies one thing kept the same ("amount of water") during each test in the investigation, but receives no credit for one thing that the student changed.

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SCORE POINT 0

- 1 In your investigation, you measured how much water came out of three kinds of soil. Then you found the amount of water held by each soil.

Identify **one** thing that you kept the same for each test in the investigation.

One thing is my prediction. I kept it
the same.

Identify **one** thing that you changed for each test in the investigation.

One thing I changed was my answer
because we discovered another answer.

The response is incorrect; it does not demonstrate understanding of the concept being measured.

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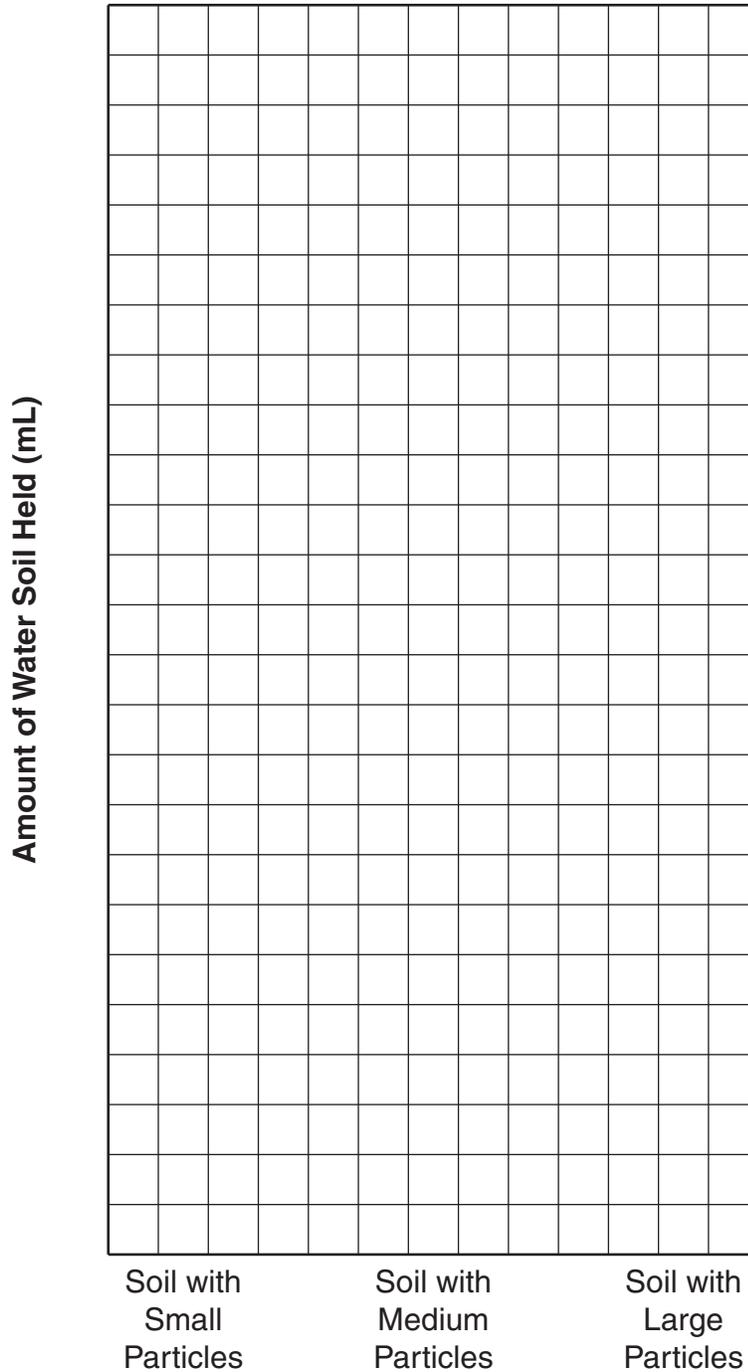
Broad Area of Inquiry:
Inquiry Construct 8:

Conducting Investigations
Use accepted methods for organizing, representing, and manipulating data.

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: _____



**NECAP 2011 RELEASED INQUIRY TASK
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Scoring Guide

Score	Description
3	The response demonstrates a thorough understanding of how to accurately represent data in a graph. The response includes a bar graph of the collected data that has appropriate title and scale for the range of data plotted.
2	The response demonstrates a general understanding of how to accurately represent data in a graph.
1	The response demonstrates a limited understanding of how to accurately represent data in a graph.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response includes the following:

- Title: "Particle Size and Amount of Water Soil Held" or an appropriate alternative; includes soil and/or water
- Scale on y-axis should range from 0 to about 25 mL, be evenly spaced, and be spread out enough to show differences between the soils.
- The height of the bars should match the data in Data Table 1: Amount of Water that Each Soil Held.

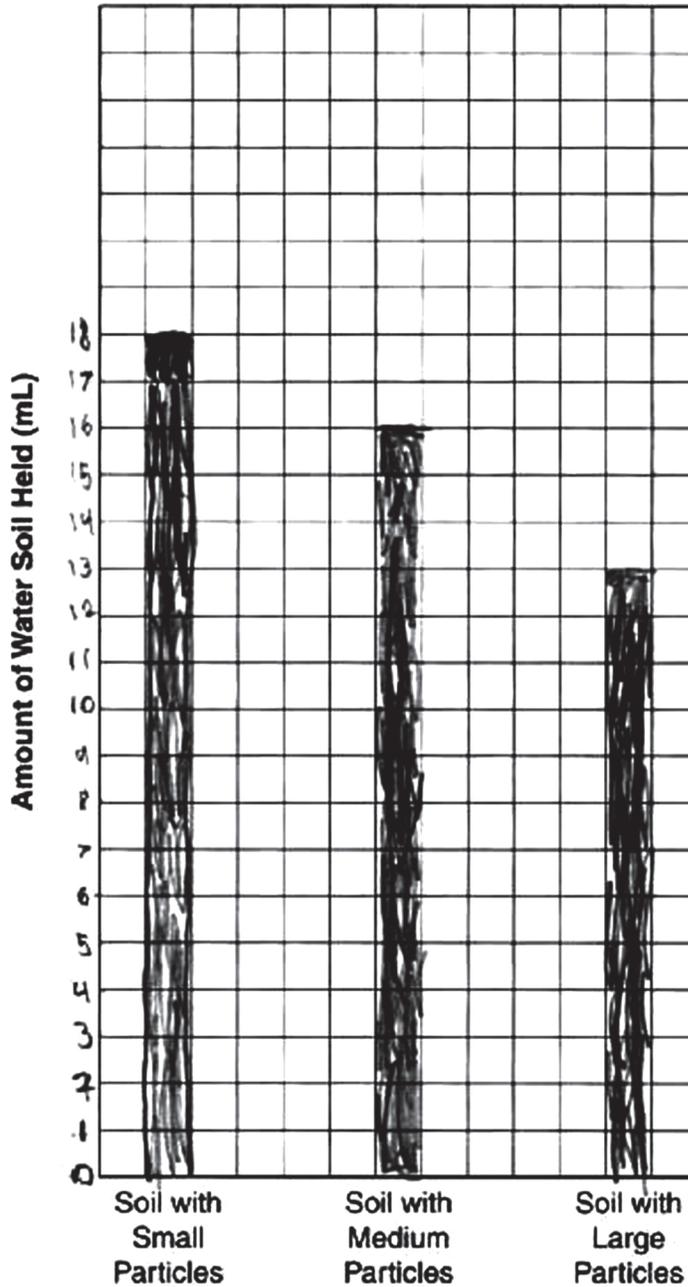
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SCORE POINT 3

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Amount of water in soil



Response demonstrates a thorough understanding of how to accurately represent data in a graph. Response includes a bar graph of the collected data that has an appropriate title and scale for the range of data plotted.

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SCORE POINT 3 (CONTINUED)

Copy the data from your Inquiry Booklet into your Student Answer Booklet:

Copy the data from the Soil Data Table on page 6 in your Inquiry Booklet into the appropriate columns in Data Table 1 below.

Data Table 1: Amount of Water that Each Soil Held

	Soil with Small Particles	Soil with Medium Particles	Soil with Large Particles
Amount of water that soil held	18 mL	16 mL	13 mL

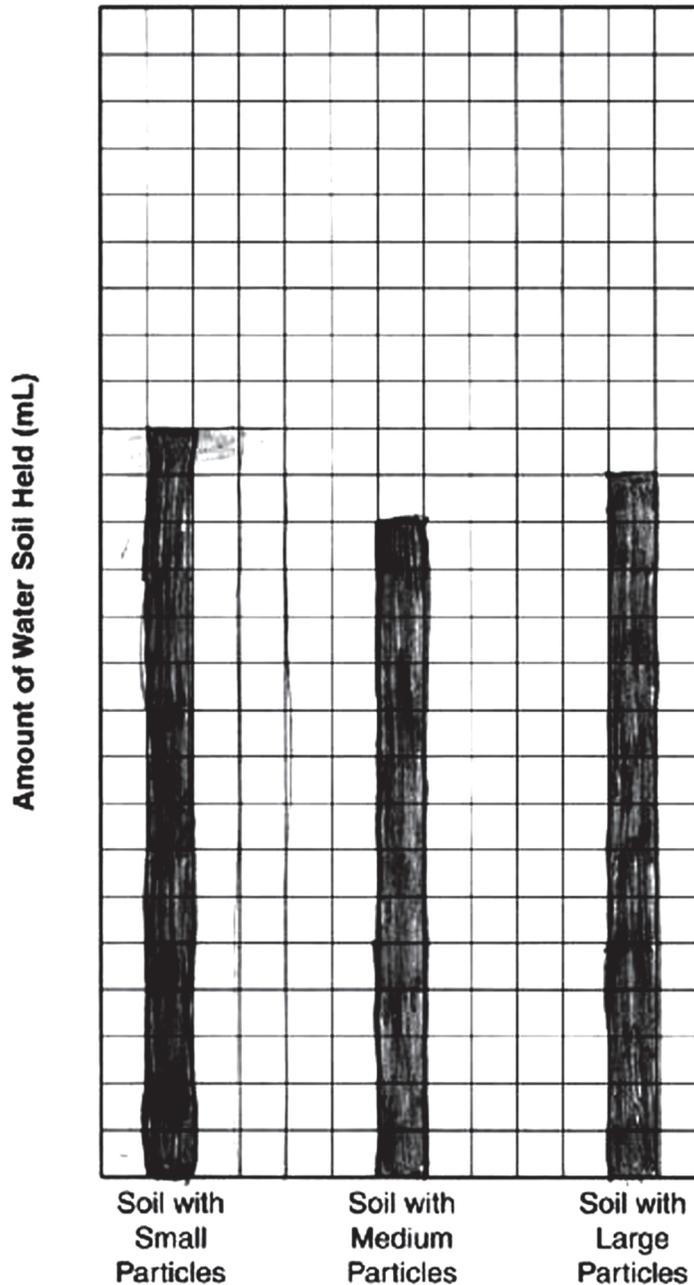
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GRADE 4 SCIENCE

SCORE POINT 2

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: How much Water each soil held?



Response demonstrates a general understanding of how to accurately represent data in a graph. Response includes a bar graph of the collected data that has an appropriate title, but is missing the y-axis scale.

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

Copy the data from your Inquiry Booklet into your Student Answer Booklet:

Copy the data from the Soil Data Table on page 6 in your Inquiry Booklet into the appropriate columns in Data Table 1 below.

Data Table 1: Amount of Water that Each Soil Held

	Soil with Small Particles	Soil with Medium Particles	Soil with Large Particles
Amount of water that soil held	<u>16</u> mL	<u>14</u> mL	<u>15</u> mL

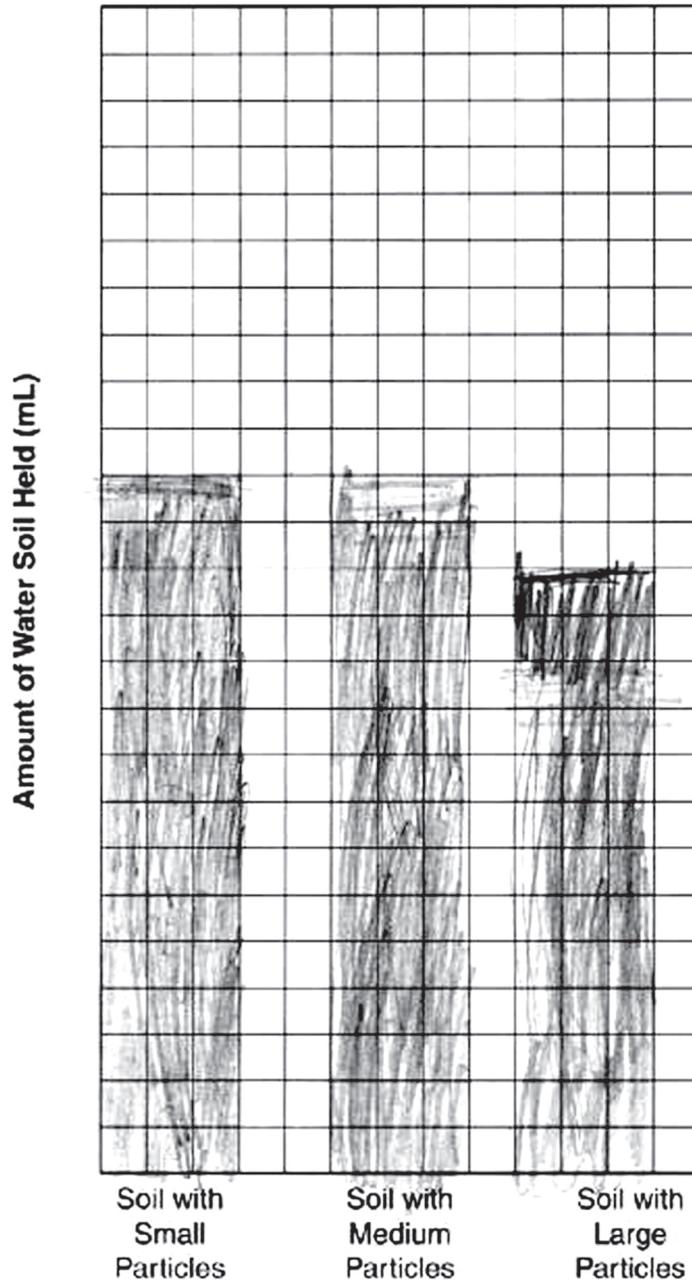
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SCORE POINT 1

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: _____



Response demonstrates a limited understanding of how to accurately represent data in a graph. Response does not include a title or y-axis scale and graphs only two out of three data values correctly.

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SCORE POINT 1 (CONTINUED)

Copy the data from your Inquiry Booklet into your Student Answer Booklet:

Copy the data from the Soil Data Table on page 6 in your Inquiry Booklet into the appropriate columns in Data Table 1 below.

Data Table 1: Amount of Water that Each Soil Held

	Soil with Small Particles	Soil with Medium Particles	Soil with Large Particles
Amount of water that soil held	15 mL	15 mL	12 mL

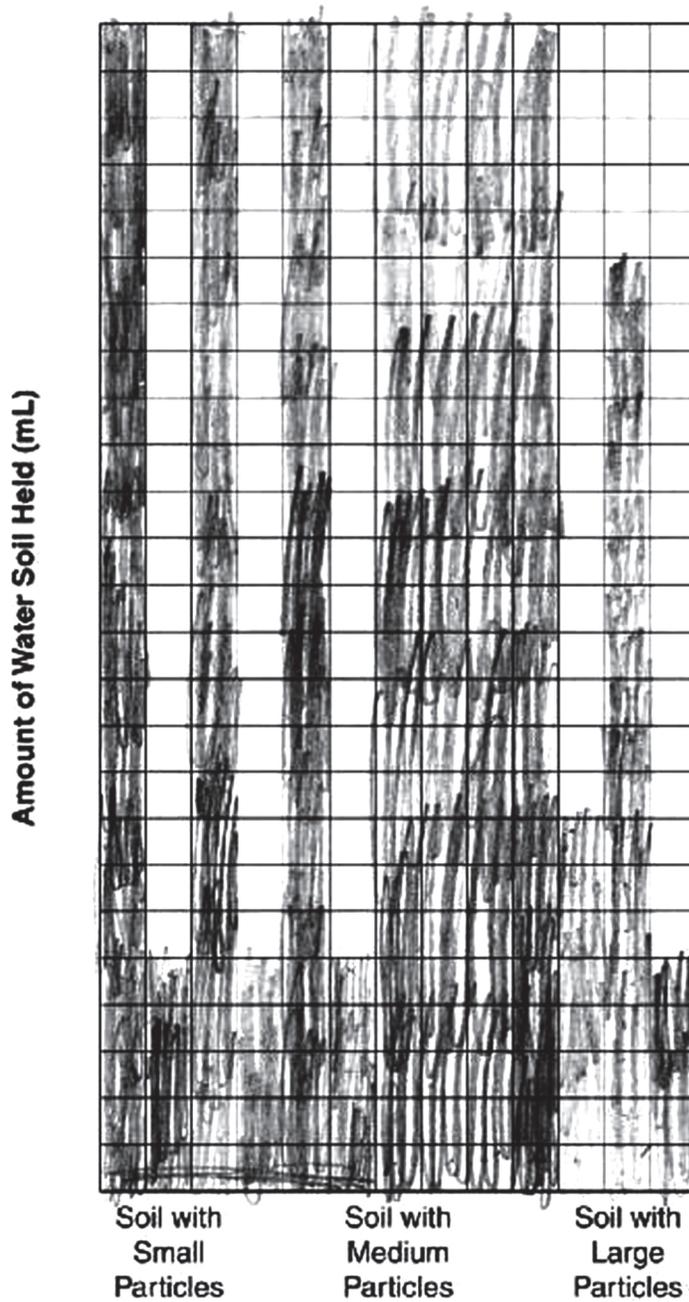
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SCORE POINT 0

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: _____



The response is incorrect; it shows no understanding of how to accurately represent data in a graph.

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SCORE POINT 0 (CONTINUED)

Copy the data from your Inquiry Booklet into your Student Answer Booklet:

Copy the data from the Soil Data Table on page 6 in your Inquiry Booklet into the appropriate columns in Data Table 1 below.

Data Table 1: Amount of Water that Each Soil Held

	Soil with Small Particles	Soil with Medium Particles	Soil with Large Particles
Amount of water that soil held	<u>10</u> mL	<u>5</u> mL	<u>10</u> mL

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry: Inquiry Construct 10:	Conducting Investigations Summarize results based on data.
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3 Describe the pattern in your graph.

Explain how increasing soil particle size affects the amount of water soil holds.

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of how to identify patterns and trends in data. The response describes the graph and explains what the graph tells about particle size and the amount of water soil held.
1	The response demonstrates a limited understanding of how to identify patterns and trends in data.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response includes a description and an explanation that matches the student's graph.

Sample response

Description:

The amount of water soil held starts out high on the left side of the graph (small particle size), and then goes down and down for the next two bars.

Explanation:

The small particle size soil holds the most water.

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SCORE POINT 2

- 3 Describe the pattern in your graph.

The pattern in my graph is that the smallest partical size rocks hold the most water. The middle partical's hold the middle amount of water and the largest rocks hold the least amount of water.

Explain how increasing soil particle size affects the amount of water soil holds.

If you increase the soil particle size the rocks will not be able to hold as much water as the smaller particals because the water will slip through the holes or spaces inbetween the rocks that the smaller ones.

Response demonstrates a general understanding of how to identify patterns and trends in data ("smallest . . . hold the most" and "largest . . . hold the least amount"). The response describes the graph and explains what the graph tells about particle size and the amount of water the soil held.

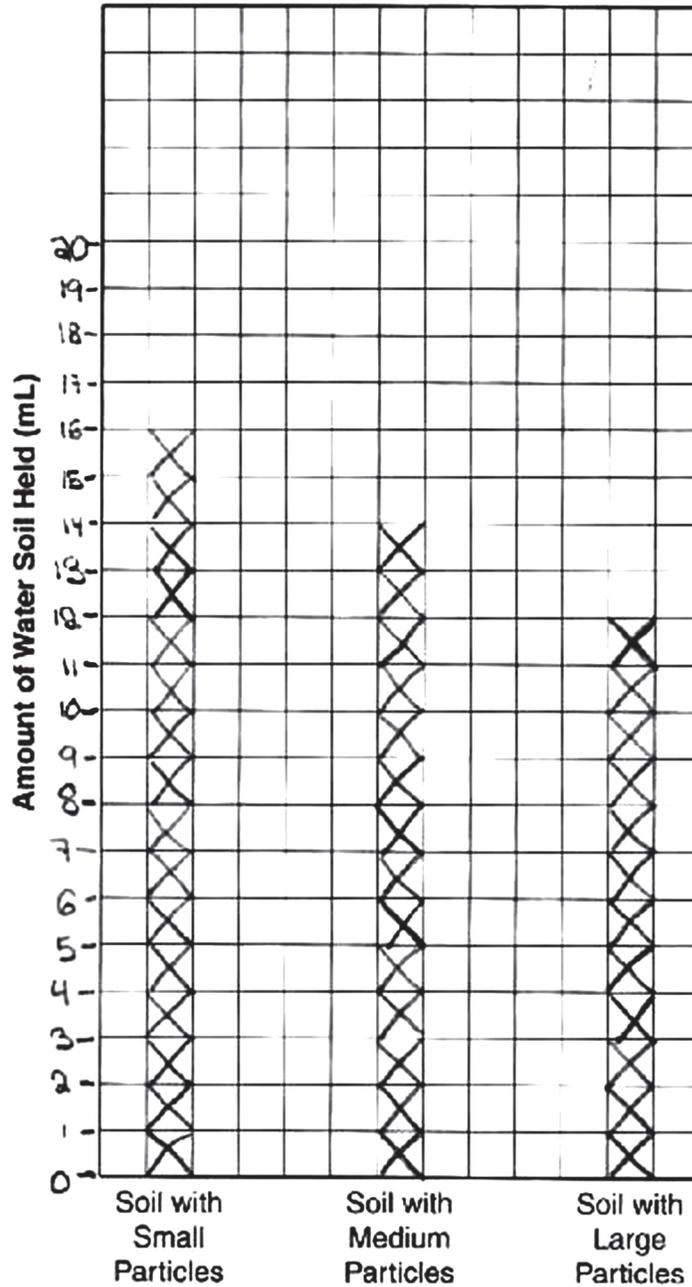
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SCORE POINT 2 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: How increasing soil particle size affects the amount of water soil holds



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SCORE POINT 1

- 3 Describe the pattern in your graph.

The smaller particles hold more water than the larger particles.

Explain how increasing soil particle size affects the amount of water soil holds.

If the particles get wet they don't absorb the water.

Response demonstrates a limited understanding of how to identify patterns and trends in data. No credit is given for the second portion of the response.

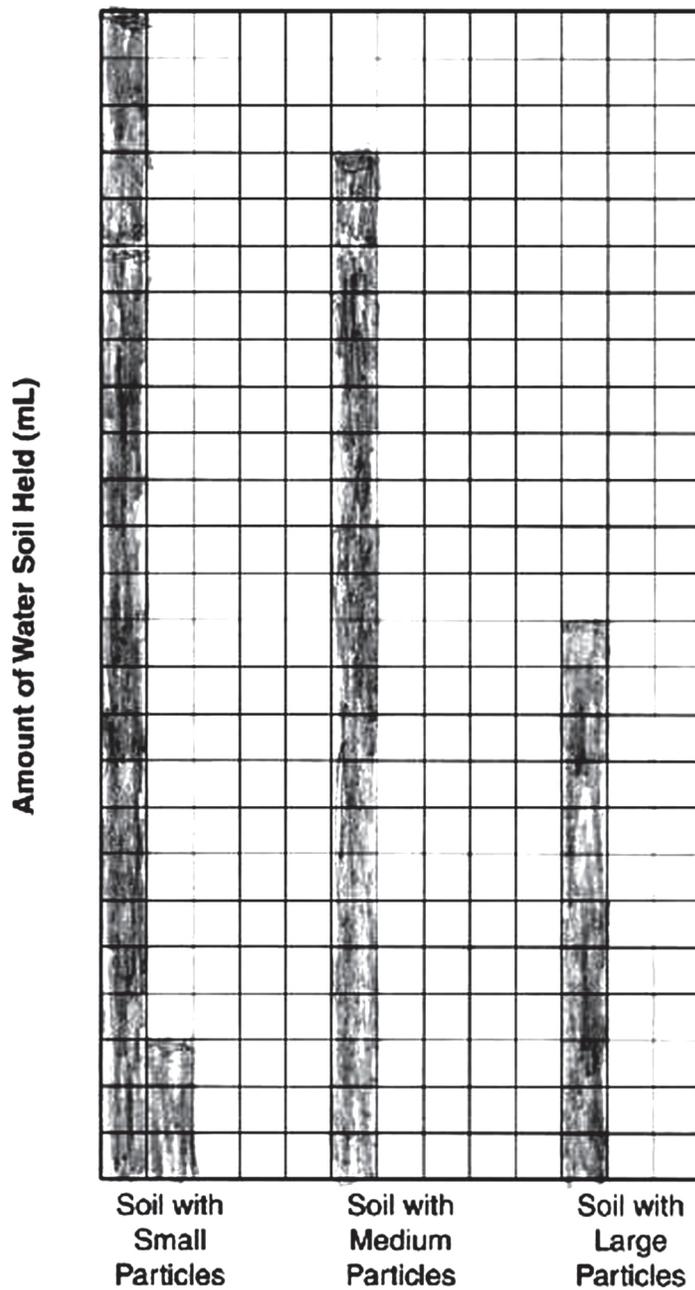
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GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Water Soils Hold



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SCORE POINT 0

- 3 Describe the pattern in your graph.

I write the number inside the
boxes.

Explain how increasing soil particle size affects the amount of water soil holds.

It can hold more water

Response is incorrect.

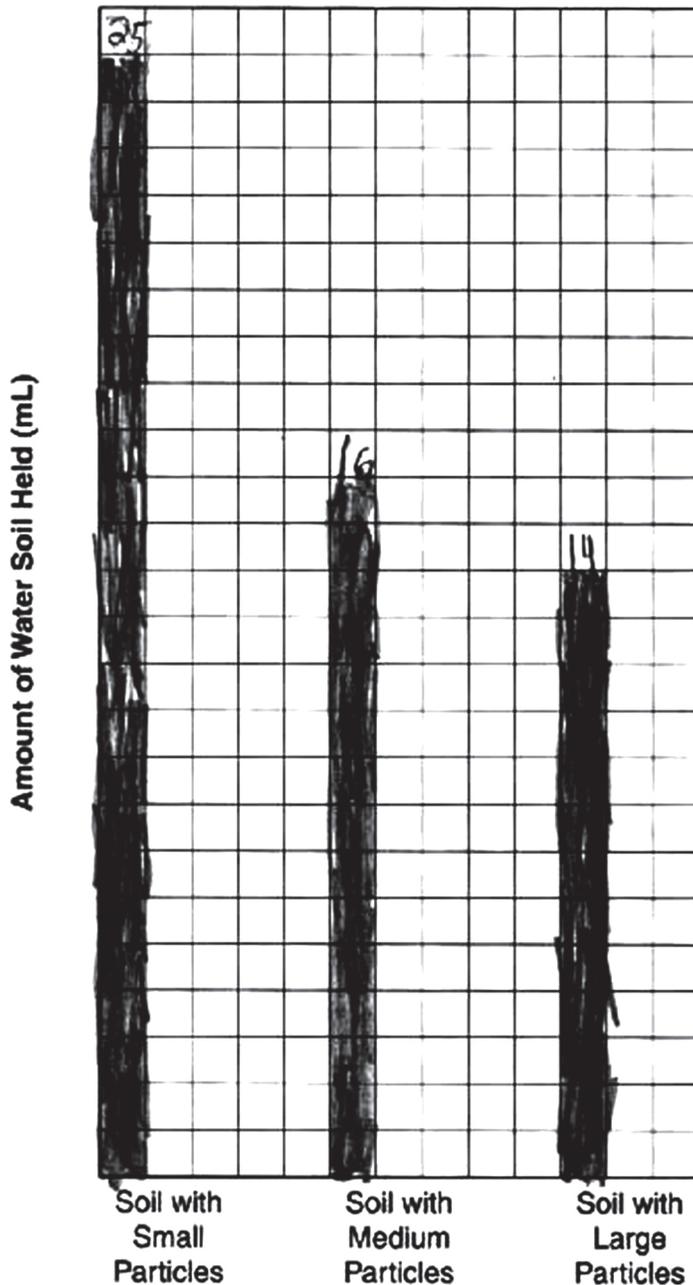
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SCORE POINT 0 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Amount of Water



**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry: Inquiry Construct 12:	Developing and Evaluating Explanations Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.
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4 Check the box next to the statement that **best** describes your data. Be sure to include specific data from your graph to support your reason.

The data **supported** my prediction.

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

I know this because _____

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of how to use evidence to support or refute a prediction. The response identifies whether the results of the investigation support or do not support the prediction and explains the reasoning.
1	The response demonstrates a limited understanding of how to use evidence to support or refute a prediction.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response may include but is not limited to **one** of the following:

- Support: I predicted that as the particle size of a soil increased the amount of water the soil held would decrease and that is what the data showed. For example, the small particle sized soil held the most water (___ mL) and the large particle sized soil held the least amount of water (___ mL).
- Do not support: I predicted that as the particle size of a soil increased the amount of water the soil held would also increase and that is not what the data showed. There was no pattern in the data (includes specific data demonstrating no pattern).
- Do not support: The data showed the opposite of my prediction. The data showed that as the particle size of a soil increased the water-holding capacity of a soil decreased. For example, the smallest particle sized soil had the highest water-holding capacity (___ mL) and the largest particle sized soil had the lowest water-holding capacity (___ mL).

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 2

"I predict that the larger the particles, the less water the particles can hold

because smaller particles can block water from seeping through, such as sand and hardened cement. Also, the larger particles, such as pebbles and small stones can't hold water very well."

- 4 Check the box next to the statement that **best** describes your data. Be sure to include specific data from your graph to support your reason.

The data **supported** my prediction.

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

"I know this because the soil with the small particles held 20 ml. of water. Also, the soil with the larger particles only held 12 ml. of water."

Response demonstrates a general understanding of how to use evidence to support the prediction. Response identifies that the results of the investigation support the prediction and includes data to explain reasoning.

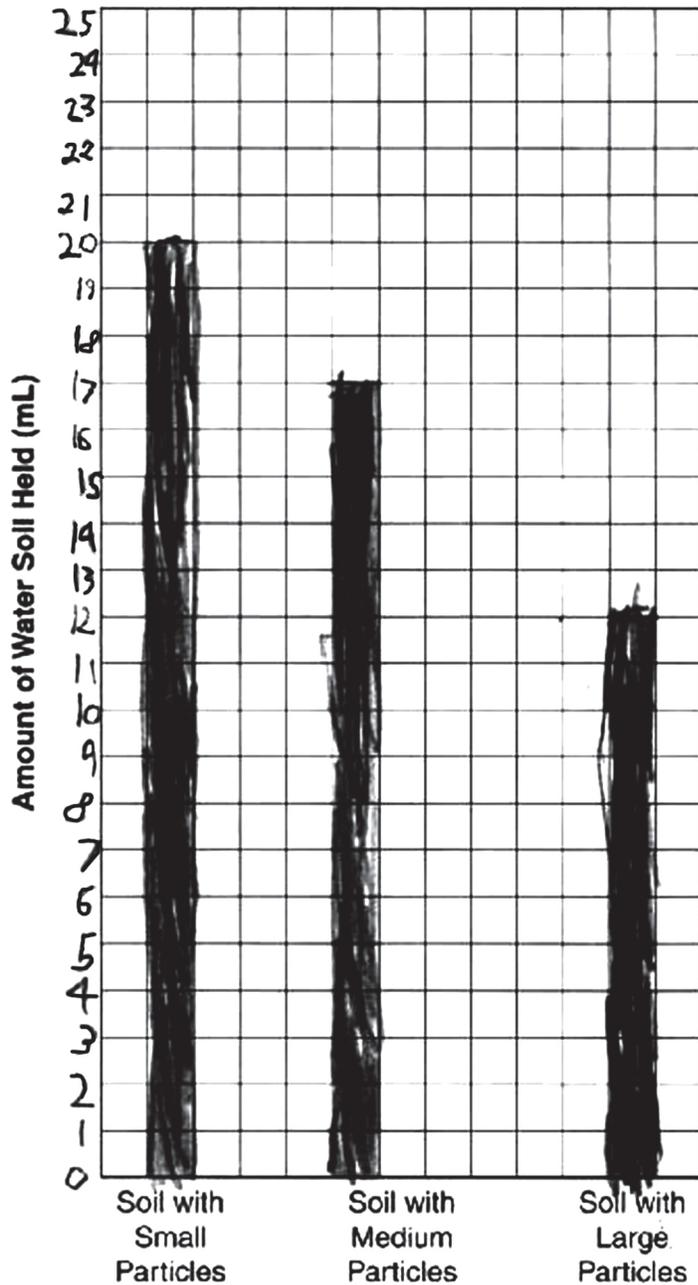
NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Amount of Water the Soil Held



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GRADE 4 SCIENCE

SCORE POINT 1

I predict that increasing particle size will make water drain quicker

because If you use larger particles there aren't as many pieces as smaller particles and water will drain faster because the more pieces, the more water they hold.

4 Check the box next to the statement that **best** describes your data. Be sure to include specific data from your graph to support your reason.

The data **supported** my prediction.

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

I know this because my prediction is exactly what happened.

Response demonstrates a limited understanding. Response correctly states that the prediction is correct; however, response does not provide evidence for support.

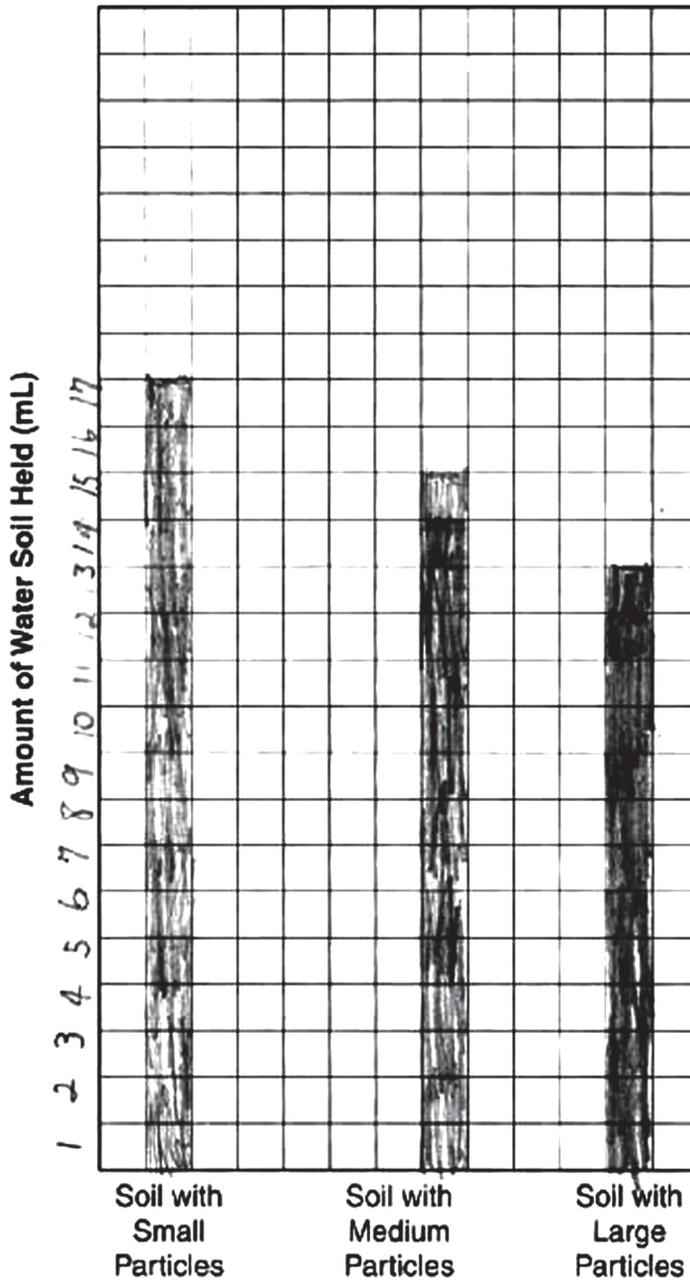
NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Differences of soil



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GRADE 4 SCIENCE

SCORE POINT 0

I predict The soil with medium particles
would hold the right amount of
water

because soil with medium particles hold
some water and lets some go

4 Check the box next to the statement that **best** describes your data. Be sure to include specific data from your graph to support your reason.

The data supported my prediction.

The data did not support my prediction.

I know this because

the soil with
medium particles held
the biggest amount of
water

Response is incorrect. The data on the graph does not support the prediction.

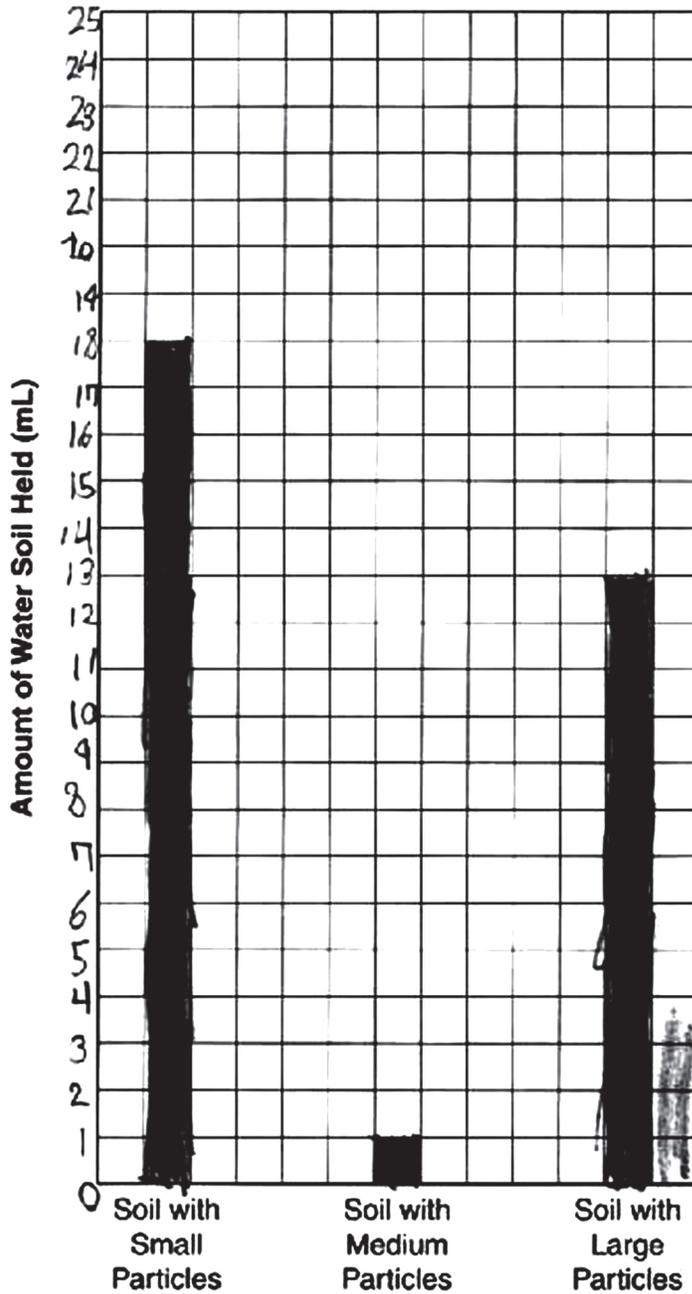
NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

- 2 Use the information in Data Table 1 to make a bar graph that compares the amount of water held by the three kinds of soil.

Use the grid below to make your bar graph.

Title: Soil and Water



**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry: Inquiry Construct 10:	Conducting Investigations Summarize results based on data.
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5 What do the results from the story tell about the amount of water that soil holds as particle size increases? Compare your investigation results with the results from the story using information in Data Table 2 on page 7. Include data from both investigations in your comparison.

Scoring Guide

Score	Description
3	The response demonstrates a thorough understanding of identifying patterns in data and how to consider all data when developing a conclusion. The response describes what the results from the story tell about what happens to water-holding capacity of a soil as particle size increases. The response compares the inquiry task results with the results from the story and uses data from both investigations in the comparison.
2	The response demonstrates a general understanding of identifying patterns in data and how to consider all data when developing a conclusion.
1	The response demonstrates a limited understanding of identifying patterns in data and how to consider all data when developing a conclusion.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response includes a description of the results from the story and compares the story results to the student's own data.

Sample response:

The story results showed that as the particle size of soil increased the water-holding capacity of soil decreased. My results were similar to the results for the story.

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 3

- 5 What do the results from the story tell about the amount of water that soil holds as particle size increases? Compare your investigation results with the results from the story using information in Data Table 2 on page 7. Include data from both investigations in your comparison.

As the particle size increases the amount of water the soil holds decreases. My data is very similar to the data on page 16. The amount of water the small particles held was 18 mL I got 17 mL. For medium I got 15 mL the Data Table 2 got 15 mL too. For large particles the table got 12 mL and I got 11 mL. Most of my results either the same or off by 1 to the results in the data table.

Response demonstrates a thorough understanding of identifying patterns in data and how to consider all data when developing a conclusion. The response describes what the results from the story tell about what happens to water-holding capacity of a soil as particle size increases. ("As the particle size increases the amount of water the soil holds decreases.") The response compares the inquiry task results with the results from the story and uses data from both investigations in the comparison.

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GRADE 4 SCIENCE

SCORE POINT 3 (CONTINUED)

Making Conclusions

Remember, the students in the story did a similar investigation to the one you did. They followed a similar procedure and used the same kinds of soil and experimental setup. However, in the story, the students did three trials for each soil and then determined the median amount of water each soil held. In your investigation, you did only one trial for each soil.

The investigation results for students in the story are shown below in Data Table 2: Investigation Results in the Story.

Complete the table below with the amount of water soil held from your results in Data Table 1 on page 3.

Data Table 2: Investigation Results in the Story

Trial	Amount of Water Soil Held		
	Small Particles	Medium Particles	Large Particles
1	10 mL	15 mL	12 mL
2	18 mL	14 mL	12 mL
3	19 mL	25 mL	9 mL
Median	18 mL	15 mL	12 mL
Amount of Water Soil Held (from Data Table 1)	17 mL	15 mL	11 mL

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 2

- 5 What do the results from the story tell about the amount of water that soil holds as particle size increases? Compare your investigation results with the results from the story using information in Data Table 2 on page 7. Include data from both investigations in your comparison.

It showed that the smaller the particles the more water it held. Both of our results showed the same thing. In both results it showed that the small particles held the most water.

Response demonstrates a general understanding of identifying patterns in data and how to consider all data when developing a conclusion. Response correctly discusses what the results of the story tell about water-holding capacity but does not compare the inquiry task data with the data from the story.

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GRADE 4 SCIENCE

SCORE POINT 2 (CONTINUED)

Making Conclusions

Remember, the students in the story did a similar investigation to the one you did. They followed a similar procedure and used the same kinds of soil and experimental setup. However, in the story, the students did three trials for each soil and then determined the median amount of water each soil held. In your investigation, you did only one trial for each soil.

The investigation results for students in the story are shown below in Data Table 2: Investigation Results in the Story.

Complete the table below with the amount of water soil held from your results in Data Table 1 on page 3.

Data Table 2: Investigation Results in the Story

Trial	Amount of Water Soil Held		
	Small Particles	Medium Particles	Large Particles
1	10 mL	15 mL	12 mL
2	18 mL	14 mL	12 mL
3	19 mL	25 mL	9 mL
Median	18 mL	15 mL	12 mL
Amount of Water Soil Held (from Data Table 1)	<u>8</u> mL	<u>15</u> mL	<u>13</u> mL

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 1

- 5 What do the results from the story tell about the amount of water that soil holds as particle size increases? Compare your investigation results with the results from the story using information in Data Table 2 on page 7. Include data from both investigations in your comparison.

In the investigation in the story the median data for the small particles was 18 mL. Our small particle data was 17 mL. There investigation data was larger than ours on the small particle soil. It probably was more accurate because they did 3 trials and we only did 1.

Response demonstrates a limited understanding of identifying patterns in data and how to consider all data when developing a conclusion. Response compares data only. Response does not describe what the results from the story tell about water-holding capacity of soil.

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 1 (CONTINUED)

Making Conclusions

Remember, the students in the story did a similar investigation to the one you did. They followed a similar procedure and used the same kinds of soil and experimental setup. However, in the story, the students did three trials for each soil and then determined the median amount of water each soil held. In your investigation, you did only one trial for each soil.

The investigation results for students in the story are shown below in Data Table 2: Investigation Results in the Story.

Complete the table below with the amount of water soil held from your results in Data Table 1 on page 3.

Data Table 2: Investigation Results in the Story

Trial	Amount of Water Soil Held		
	Small Particles	Medium Particles	Large Particles
1	10 mL	15 mL	12 mL
2	18 mL	14 mL	12 mL
3	19 mL	25 mL	9 mL
Median	18 mL	15 mL	12 mL
Amount of Water Soil Held (from Data Table 1)	<u>17</u> mL	<u>13</u> mL	<u>12</u> mL

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 0

- 5 What do the results from the story tell about the amount of water that soil holds as particle size increases? Compare your investigation results with the results from the story using information in Data Table 2 on page 7. Include data from both investigations in your comparison.

The bigger the soil
the more water it holds.

Response is incorrect; data from table does not support this statement.

NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE

SCORE POINT 0 (CONTINUED)

Making Conclusions

Remember, the students in the story did a similar investigation to the one you did. They followed a similar procedure and used the same kinds of soil and experimental setup. However, in the story, the students did three trials for each soil and then determined the median amount of water each soil held. In your investigation, you did only one trial for each soil.

The investigation results for students in the story are shown below in Data Table 2: Investigation Results in the Story.

Complete the table below with the amount of water soil held from your results in Data Table 1 on page 3.

Data Table 2: Investigation Results in the Story

Trial	Amount of Water Soil Held		
	Small Particles	Medium Particles	Large Particles
1	10 mL	15 mL	12 mL
2	18 mL	14 mL	12 mL
3	19 mL	25 mL	9 mL
Median	18 mL	15 mL	12 mL
Amount of Water Soil Held (from Data Table 1)	28 mL	17 mL	13 mL

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry: Inquiry Construct 9:	Conducting Investigations Collect sufficient data to study question, hypothesis, or relationships.
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- 6** Based on the results in the story, explain why it is better to do three trials for each soil than to do one trial for each soil. Give an example in your explanation.

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of the value of multiple trials. The response explains why it is better to do three trials than to do one trial and gives an example in the explanation.
1	The response demonstrates a limited understanding of the value of multiple trials.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response may include but is not limited to **one** of the following:

- If you do only one trial you can't trust your results as much as you could if you did three trials. Let's say you do only one test and make a mistake, you wouldn't know that you made a mistake because you don't have anything to compare with.
- If you do three trials you can trust your results more than one trial. The results should be about the same for each trial unless you made a mistake doing the test in one of the trials. Doing three trials helps you see if you made a mistake.

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GRADE 4 SCIENCE

SCORE POINT 2

- 6 Based on the results in the story, explain why it is better to do three trials for each soil than to do one trial for each soil. Give an example in your explanation.

It is better to do 3 trials for each size of particle because if you do only one you just have one answer to base your investigation on not three. What if you forgot to do one step and you only got to do the investigation once. That's why it's better to do three trials instead of one.

The response demonstrates a general understanding of the value of multiple trials. The response explains why it is better to do three trials than to do one trial and gives an example ("what if you forgot to do one step and you only got to do the investigation once").

SCORE POINT 1

- 6 Based on the results in the story, explain why it is better to do three trials for each soil than to do one trial for each soil. Give an example in your explanation.

You might make a mistake

Response demonstrates a limited understanding of the value of multiple trials ("might make a mistake").

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GRADE 4 SCIENCE

SCORE POINT 0

- 6 Based on the results in the story, explain why it is better to do three trials for each soil than to do one trial for each soil. Give an example in your explanation.

Because it will only be
a little bit of water to measure

Response is incorrect.

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry: Inquiry Construct 11:	Developing and Evaluating Explanations Analyze data, including determining if data are relevant, artifact, irrelevant, or anomalous.
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7 Some students in this story had difficulty measuring the amount of water they needed for their investigation. Explain how this could affect their results. Use information from your investigation to support your answer.

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of identifying factors that may affect experimental results (experimental error). The response describes how difficulty in measuring the amount of water could affect the results.
1	The response demonstrates a limited understanding of identifying factors that may affect experimental results (experimental error).
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response may include but is not limited to **one** of the following:

- Incorrectly measuring the amount of water poured into the soil would affect the results because more or less water than expected would probably come out of the soil.
- Incorrectly measuring the amount of water coming out of the soil would cause the results to be higher or lower than the actual results.

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GRADE 4 SCIENCE

SCORE POINT 2

- 7 Some students in this story had difficulty measuring the amount of water they needed for their investigation. Explain how this could affect their results. Use information from your investigation to support your answer.

It could affect their results because for example if you did the first kind of soil with 30 mL of water and the second with 10 you would not be able to compare them because you don't have the same starting number. I did 30 mL of water for every soil so I could compare.

Response demonstrates a general understanding of identifying factors that may affect experimental results (experimental error). Response describes how difficulty in measuring the amount of water could affect the results ("if you did the first kind of soil with 30 mL of water and the second with 10 (mL) you would not be able to compare").

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GRADE 4 SCIENCE

SCORE POINT 1

- 7 Some students in this story had difficulty measuring the amount of water they needed for their investigation. Explain how this could affect their results. Use information from your investigation to support your answer.

It could affect their results because if they used a differn amount of water their results could come out wrong.

Response demonstrates a limited understanding of identifying factors that may affect experimental results.

SCORE POINT 0

- 7 Some students in this story had difficulty measuring the amount of water they needed for their investigation. Explain how this could affect their results. Use information from your investigation to support your answer.

They could have poored a little of the water in the large cup an then fe started.

Response is irrelevant. Response does not address how this difficulty could affect their results.

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Broad Area of Inquiry:
Inquiry Construct 1:

Formulating Questions and Hypothesizing

Analyze information from observations, research, or experimental data for the purpose of formulating a question, hypothesis, or prediction.

- 8 Using the median results in Data Table 2, identify the soil that would be best for growing the cactus. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

Using the median results in Data Table 2, identify the soil from the investigation that would be best for growing the fern. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

**NECAP 2011 RELEASED INQUIRY TASK
GRADE 4 SCIENCE**

Scoring Guide

Score	Description
2	The response demonstrates a general understanding of how to analyze information from experimental data to make a prediction. The response identifies a soil that would be best for growing a cactus, a soil that would be best for growing a fern, and explains the reasoning using data from Data Table 2: Investigation Results in the Story.
1	The response demonstrates a limited understanding of connecting the investigation to a real-world example.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Response includes identifying a soil and an explanation for each type of plant.

Sample responses:

Cactus—response may include but is not limited to **one** of the following:

- Large particle soil for the cactus, because a cactus plant needs dry soil and large particle soil holds the least amount of water, 12 mL.
- The cactus plant needs dry soil but not so dry that the plant dies. Large particle soil held the least amount of water so it might work for a cactus. Small and medium particle soils hold more water, 18 mL and 15 mL of water, and that could be too much water for a cactus.

Fern—response may include but is not limited to **one** of the following:

- Small particle soil for the fern because a fern plant needs damp soil and small particle soil holds the largest amount of water, 18 mL.
- Small or medium particle soils for the fern because a fern plant needs damp soil, but not too wet. Small particle soil holds the largest amount of water, 18 mL. Medium particle soil holds 15 mL of water, which might be enough water for a fern plant.

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GRADE 4 SCIENCE

SCORE POINT 2

- 8 Using the median results in Data Table 2, identify the soil that would be best for growing the cactus. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

I think the soil with large particles will work good for the cactus. This is because it drains well. Also it only held 12 out of 30 mL.

Using the median results in Data Table 2, identify the soil from the investigation that would be best for growing the fern. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

I think the soil with small particles should work well with the fern because it stays damp. It also held 18 out of 30 mL.

Response demonstrates a general understanding of how to analyze information from experimental data to make a prediction. Response identifies a soil that would be best for growing a cactus ("large particles"), a soil that would be best for growing a fern ("small particles"), and explains the reasoning with data from Data Table 2 (cactus: "it drains well . . . only held 12 out of 30 mL" and fern: "stays damp . . . held 18 out of 30 mL").

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GRADE 4 SCIENCE

SCORE POINT 1

- 8 Using the median results in Data Table 2, identify the soil that would be best for growing the cactus. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

The cactus would need large soil particles.

Using the median results in Data Table 2, identify the soil from the investigation that would be best for growing the fern. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

The fern would need small soil particles.

Response demonstrates a limited understanding. Response identifies correct soil types without explanations.

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GRADE 4 SCIENCE

SCORE POINT 0

- 8 Using the median results in Data Table 2, identify the soil that would be best for growing the cactus. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

For the cactus I would give it 40 or 50 ml every other day because it doesn't need that much water

Using the median results in Data Table 2, identify the soil from the investigation that would be best for growing the fern. Explain your reasoning. Include data from Data Table 2 on page 7 in your explanation.

I would give it 40 or 50 ml. every day because it grows best in damp soil

Response is irrelevant to the skill or concept being measured.