

Date: _____

Your Name: _____



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

Released Science Inquiry Task

Percolation

2015

Grade 4

Student Answer Booklet

SCIENCE

Organizing and Presenting Your Data

Directions: You will work **on your own** for this part of the inquiry task. You will use the results of your investigation to create one graph and to answer questions.

Word Bank

Frost heave	a bump in the ground or pavement caused by the freezing of water in the soil (earth materials)
Median	the middle number in a list of numbers arranged from smallest to largest Example: The median for 2 cm, 4 cm, and 5 cm is 4 cm.
Percolation	the process of water moving downward through openings in earth material
Trial	each time a test is repeated

- 1.** In the walkway investigation on page 4 in your Inquiry Booklet, Claire and Thomas test their frost heave model.

Identify the materials that Claire and Thomas used for the walkway investigation. Explain how using these materials was an appropriate model to show how frost heaves form.

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2. Copy Data Table 1 (including your title and labels) from page 8 in your Inquiry Booklet into Data Table 1 below.

Data Table 1: Amount of Water that Moves through Three Different Earth Materials

	Amount of Water that Moved Through			
				Median (mL)

Claire and Thomas needed to find out how much water that each earth material held.

Find the median amount of water that each earth material held by subtracting the median amount of water that moved through the earth material from the 20 mL of water you poured into the earth material, as shown in the example below.

Example

Amount of Water Poured into the Earth Material	Median Amount of Water that Moved through the Earth Material	Median Amount of Water that the Earth Material Held
20 mL	9 mL	11 mL
Calculation example: $20 \text{ mL} - 9 \text{ mL} = 11 \text{ mL}$		

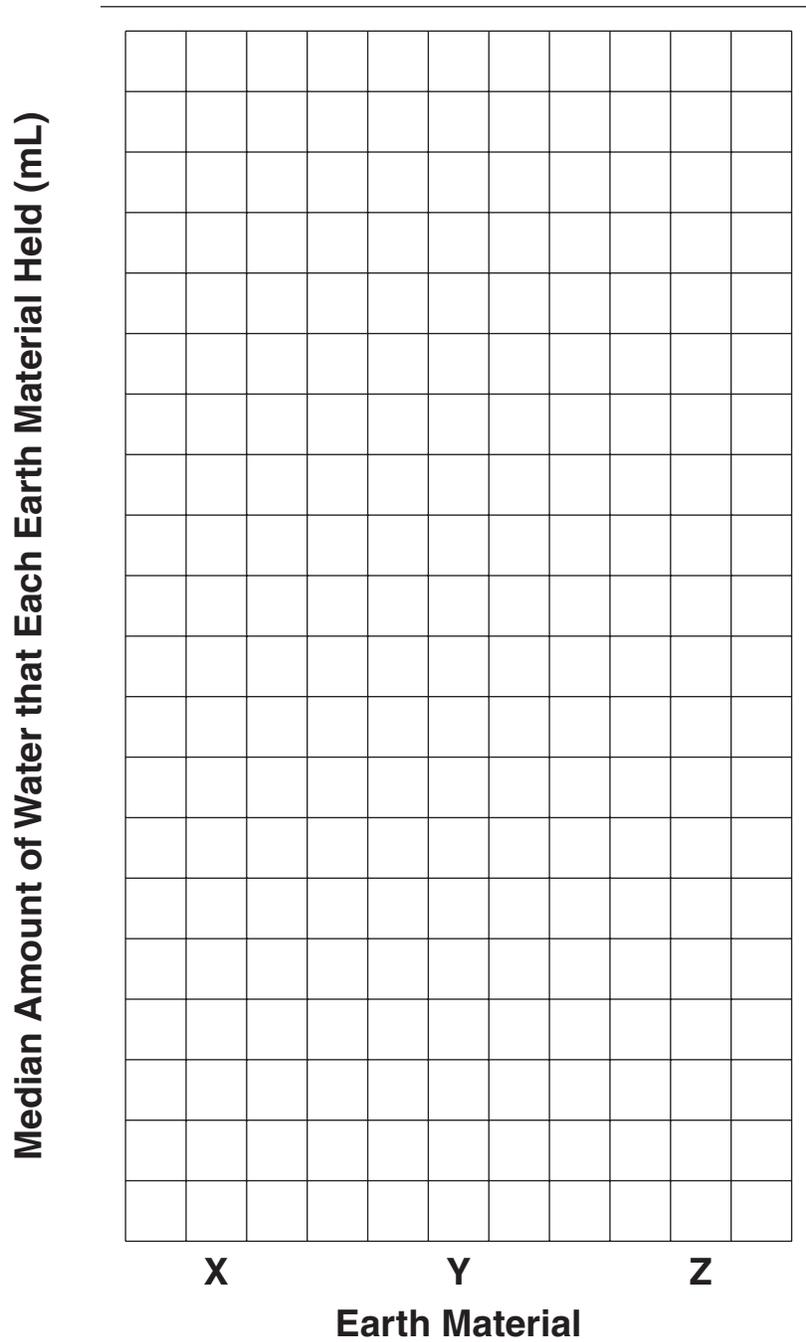
Use the median data from Data Table 1 to complete Data Table 2 below.

Data Table 2

Earth Material	Amount of Water Poured into the Earth Material	Median Amount of Water that Moved through the Earth Material	Median Amount of Water that the Earth Material Held
X	20 mL		
Y	20 mL		
Z	20 mL		

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3. Use the data you recorded in **Data Table 2** to create a bar graph that shows the **median** amount of water that each earth material held. Label and title your graph.



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4. Explain why it was important to perform three trials in this investigation. Support your reasoning with evidence (data and observations) from your investigation.

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Analyzing & Using Your Results

You investigated the following research question:

Does the amount of rainwater that an earth material can hold affect how frost heaves form?

Copy your prediction and explanation from page 5 in your Inquiry Booklet onto the lines below.

I predict

because

5. Check the box next to the statement that **best** describes whether your data and observations supported your prediction.

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

Use evidence from your investigation to explain why your data and observations did or did not support your prediction.

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6. Describe what your graph on page 3 shows about the median amount of water that each of the three earth materials held.

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Claire and Thomas look at Thomas's picture of the railroad tracks. They tell Ms. Sanders that they think they found a reason the railroad tracks became crooked.

- 7.** Use evidence from both the story and your investigation to explain why the railroad tracks from the Lackawanna Coal Mine became crooked over the past 100 years.

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Claire and Thomas review their investigations again. They decide that the frost heave model that they made to investigate how frost heaves affect a walkway could be improved. Claire and Thomas's frost heave model is shown below.

Fill container with earth material and water.	Before Freezing: In the container filled with earth material and water, put a thin layer of plaster on top.	After Freezing: Observe the container filled with earth material and water with a thin layer of plaster on top.
		

8. Identify two ways that Claire and Thomas could change the **materials** or the **procedure** to improve their frost heave model. Explain your answer.

