

Date: _____

Your Name: _____

Name(s) of Partner(s): _____



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

Released Science Inquiry Task

Soil and Water

2011

Grade 4

Inquiry Booklet

Science

Directions:

You will read a story about students in a fourth-grade science class doing a scientific investigation with soil and water. You and a partner or partners will do a similar scientific investigation.

Word Bank

Median	the middle value in a list of ordered measurements Example: The median for 2 cm, 4 cm, and 5 cm is 4 cm.
Particle	a small piece that makes up a material
Particle Size	the size of most of the pieces in a material Example: the size of most of the pieces in a kind of soil
Prediction	what you think will happen in an investigation
Trial	each time a test is repeated

Soil and Water Story

A fourth-grade science class decided to grow plants for a project.

The students wondered what kind of soil to grow the plants in. They learned in class that some kinds of soil hold more water than other kinds of soil. Soil that cannot hold much water dries out quickly after the plant is watered. Soil that can hold a lot of water stays wet for a long time after the plant is watered.

The teacher explained that plants use their roots to take in water from the soil. If the soil is too dry, the plants will die. Then the teacher explained that most plants do not grow well if their roots stay wet.

Some students said they should use soil that holds a lot of water, so the plants do not dry up and die. Other students said they should use soil that does not hold much water, so the plant roots do not stay wet.

The teacher explained that most kinds of soil are made up of particles of rock. Each soil has different sized particles. She also explained that the different-sized particles affect the amount of water the soil can hold. The students decided to investigate the following research question:

How does increasing soil particle size affect the amount of water soil holds?

During the investigation, the students tested three kinds of soil.

They looked closely at each soil to compare the particle sizes and particle shapes. Then the students placed the soils in order from the soil with the smallest particle size to the soil with the largest particle size.

Finally, the students found the amount of water each soil held. To do this, they put soil in a cup that had small holes in the bottom. Then they poured water into the cup and measured how much water came out in one minute. To learn the amount of water the soil still held, the students found the difference between the amount of water poured into the cup and the amount of water that came out. This amount was recorded as the amount of water that soil holds.

You will do a similar investigation.

Making a Prediction—What Do You Think?

Make a prediction **on your own** about the research question below.

Research Question:

How does increasing soil particle size affect the amount of water soil holds?

Use what you know about soil and water to make a prediction about the research question.

I predict

because

DO NOT GO ON.



Materials for the Investigation:

1 placemat
3 kinds of soil
1 one-minute timer
1 bottle with spout for pouring water
1 graduated cylinder for measuring water
3 small filter cups with holes in the bottom
1 medium collection cup
1 large cup for used water
1 paper plate

Safety:

DO NOT put soil or water in your mouth or nose.

Procedure:

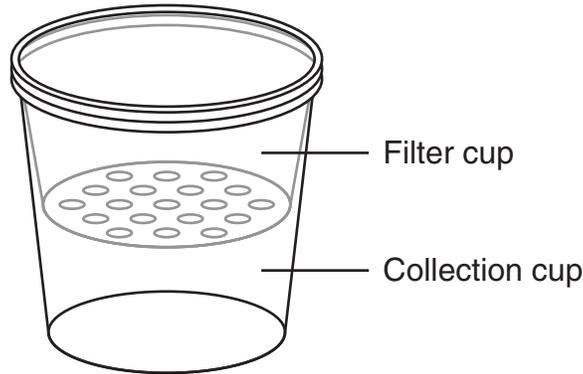
- You and your partner(s) will work together to do the investigation.
- You will each record all of the data you collect in your own Inquiry Booklet in the data table on page 6.

Step 1: Order Kinds of Soil by Particle Size.

1. Look closely at the size of the particles in each bag of soil.
2. Place the three bags of soil in order by particle size in the labeled boxes on the placemat.

Step 2: Measure the Amount of Water that Comes Out of Each Soil.

1. Place a filter cup into the collection cup, as shown below.



2. Pour **ALL** of the soil with small particles into the filter cup.
3. Pour water from the bottle into the graduated cylinder until it reaches the line for 30 mL.
4. **SLOWLY** pour all of the water from the graduated cylinder into the filter cup. **AT THE SAME TIME**, have your partner turn over the timer to measure one minute.
5. After one minute, remove the filter cup from the collection cup and place the filter cup on the paper plate.
6. Pour the water from the collection cup into the graduated cylinder to measure the amount of water that came out of the soil.
7. Record the result in the “Amount of water that came out of the soil” row of the data table on page 6 in the column for the soil with small particles.
8. Find the amount of water that the soil holds. See the example on page 6 for help doing this.
9. Record this amount in the “Amount of water that soil held” row of the data table on page 6 in the column for the soil with small particles.
10. Pour the water from the graduated cylinder into the large cup for used water.
11. Repeat steps 1–10 for the soil with medium particles and the soil with large particles. Use a clean filter cup for each soil.

Soil Data Table

	Soil with Small Particles	Soil with Medium Particles	Soil with Large Particles
Amount of water poured into the soil	30 mL	30 mL	30 mL
Amount of water that came out of the soil	____ mL	____ mL	____ mL
Amount of water that soil held*	____ mL	____ mL	____ mL

*You will copy the data from this row into your Student Answer Booklet.

Example

To find the amount of water soil held, subtract the amount of water that came out of soil from the amount of water poured into soil, as shown below.

Amount of water poured into soil	30 mL	Calculation example: $\begin{array}{r} 30 \\ -10 \\ \hline 20 \end{array}$
Amount of water that came out of soil	10 mL	
Amount of water that soil held	20 mL	

