

The Inquiry Project

Grade 4

Implementation Workshops

Teacher Handouts

1. Science Concepts Grades 3-5 Chart
2. Observations of some minerals
Notebook pg. 6, Investigation 1.3
3. What make a good weight line?
Weight Line Concept Cartoon, Investigation 2.2
4. What's the volume of 40g of an earth material?
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5. Scale for measuring cup
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6. When the weights are equal, what's the volume?
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Science Concepts for Grades 3–5 in the Inquiry Project Curriculum

A carefully constructed sequence of curriculum progressively builds student understanding about a network of concepts about weight, volume, material including the material property of density, and matter across a three-year period. These concepts are essential for understanding the core idea **matter** and will inform investigations in physical science, life science, earth science and engineering contexts from K–12.

Science Concepts				
	Weight	Volume	Material	Matter
Grade 3	The weight of objects can be compared using a pan balance and standard (gram) units.	Two solid objects cannot occupy the same space. The amount of 3D space that objects occupy can be compared.	Objects can be described in terms of their weight and volume and the materials they are made of (clay, cloth, paper, etc.). Materials have observable physical properties such as color, size, texture, flexibility, etc. Same size objects can have different weights when they are made of different materials.	Materials can be subdivided into small pieces and the pieces still have weight.
Grade 4	The weight of solids and/or liquids can be compared using a digital scale and can be represented on a weight line or a table. Weight is conserved during crushing and reshaping	Liquid and solid volumes can be measured in cubic centimeters. When immersed, a solid displaces a liquid volume equal to the solid volume.	The relationship between weight and volume (i.e. density) is a property of solid and liquid materials.	Matter can be divided into tiny pieces, and even the tiniest pieces have weight and take up space.
Grade 5	Weight is conserved during dissolving, freezing, melting, evaporation and condensation.	Volume may not be conserved in phase change.	Air is a mixture of gaseous materials composed of particles too small and spread apart to see. Melting, freezing, evaporation and condensation change the form of matter but do not change the material.	Matter is composed of particles that have weight, occupy space, and are too small to see. Gases, liquids and solids are all forms of matter and have weight and take up space.

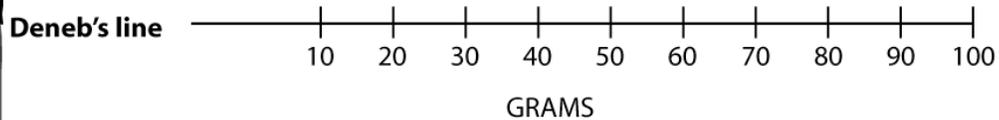
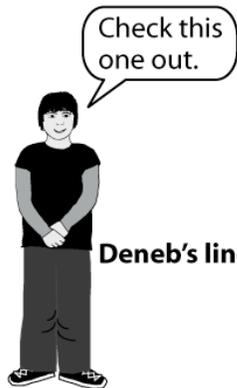
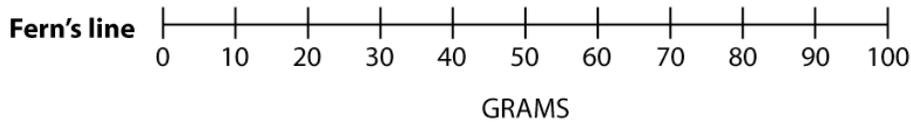
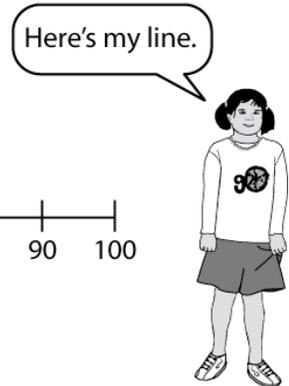
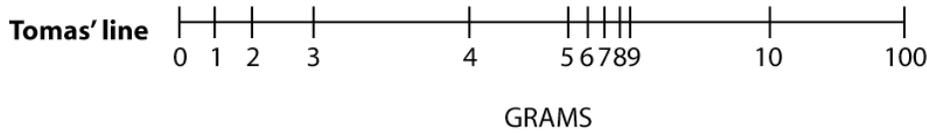
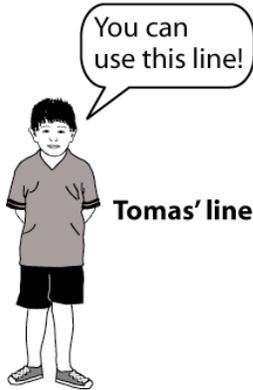
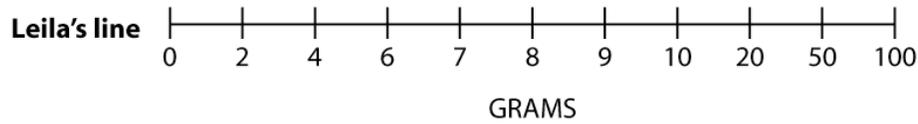
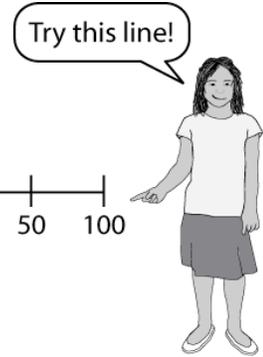
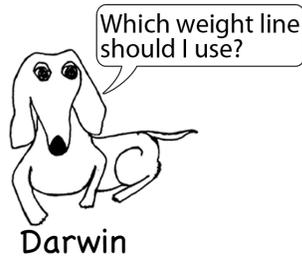
Date: _____

Observations of some minerals

Mineral	Color	Luster (shiny or dull)	Hardness Harder than fingernail? (Y/N)	Translucence Can light shine through? (Y/N)	Friability Crumbles easily? (Y/N)

Under Foot 1.3: *What can we learn about minerals by observing them carefully?*

Darwin has a 5 gram, a 20 gram, and a 100 gram dog biscuit. He wants a weight line to show how much more one weighs than another.



Date: _____

Dear Darwin

Tell Darwin what you think is good or not-so-good about each weight line using pictures and words.

Dear Darwin,

I'm going to tell you what I think is good or not-so-good about each character's weight line. You'll see a star* by the one I think is best to use.

Leila's line _____

Tomas's line _____

Fern's line _____

Deneb's line _____

Date: _____

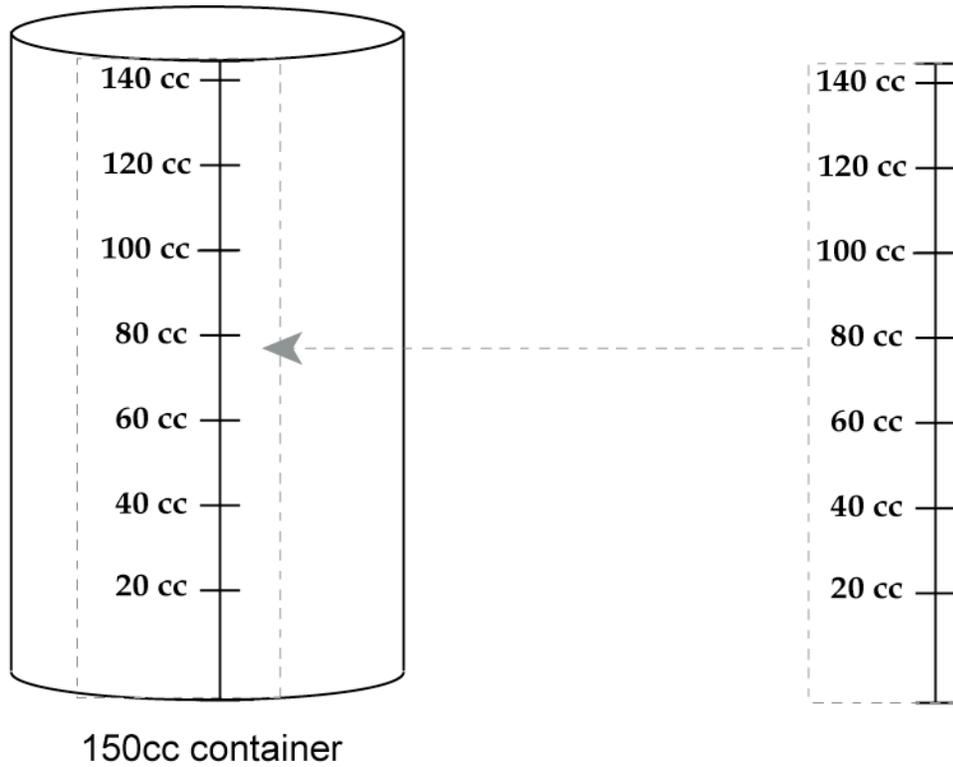
What's the volume of 40 grams of an earth material?

40 grams each of gravel, sand, water, mineral oil, organic soil

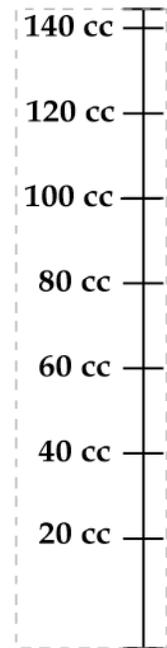
I predict that the volumes of these materials will look like this:

Observations after measuring 40 grams of each material:

Date: _____



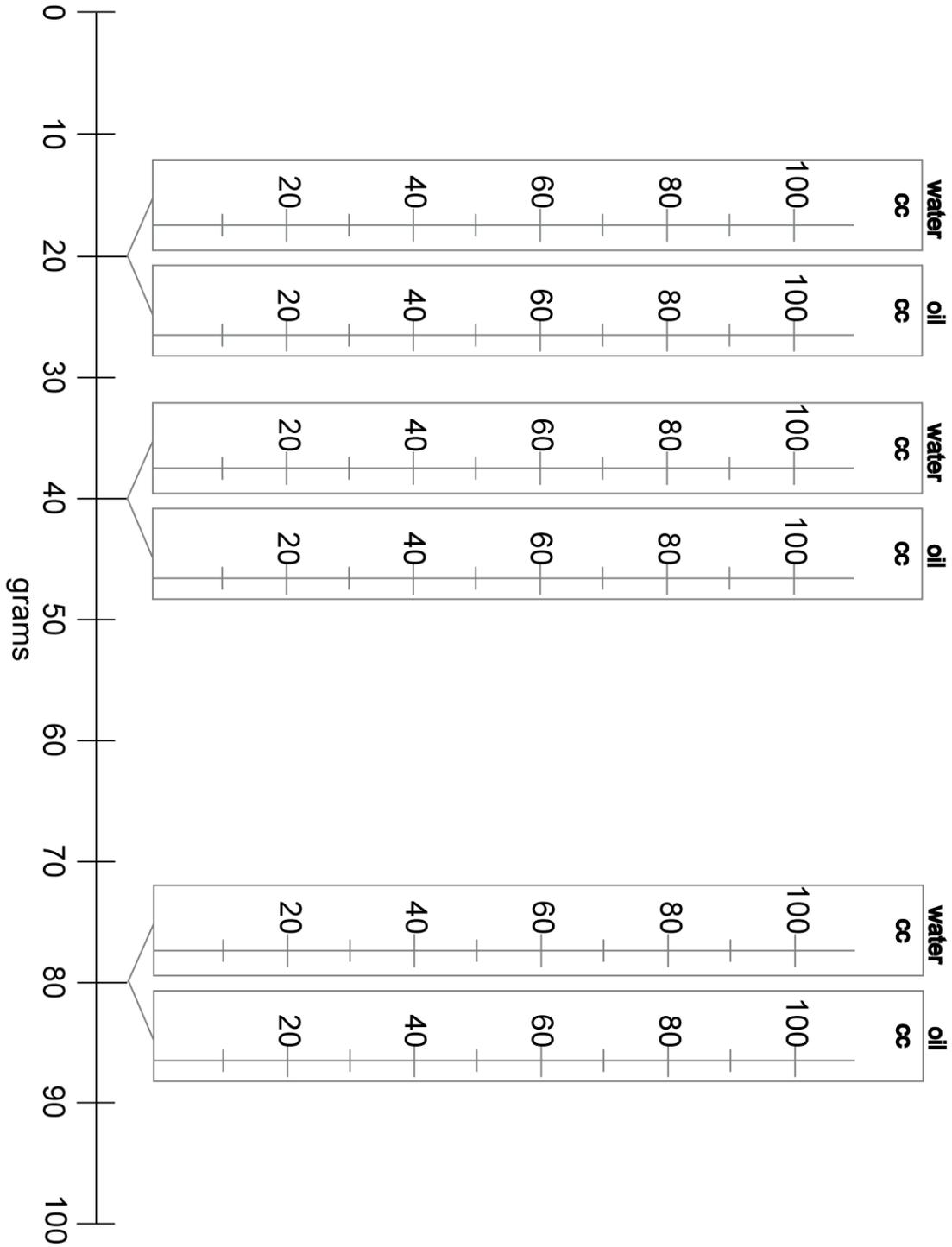
Carefully cut out the volume guide at right, along the dotted lines. Use this guide to measure the volume of liquids in the 150cc containers.



Date: _____

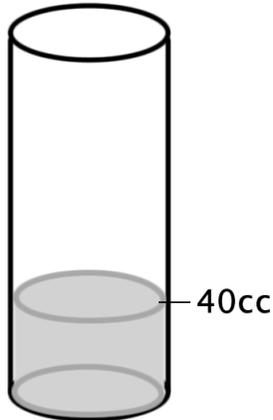
When the weights are equal, what's the volume?

Mark the volumes of the water and the oil at the three weights: 20g, 40g, and 80g.



Date: _____

What happens when we add earth materials to water?



Always start with 40cc of water in your graduated cylinder.

Predict before you test.

Cubes

What if we put in 10 centimeter cubes?
What if we add another 10 cubes?

Water

What if we add 20 cubic centimeters (cc) of water?

Rock

What if we add a rock?

**Bulk
Gravel**

What if we add 40 cubic centimeters (cc) of bulk gravel?