Practice with Mass  
4th Grade  
Daniel F. Fink and Lashonda Orrell

References:

- 2003-04 Columbus Public Schools Science SLC Guide

Benchmarks:

SLC 3: Students will compare the mass, dimensions, and volume of familiar objects in standard and non-standard units.

Objectives:

Students will compare relationships in units of metric measurements between metric measured objects and select the appropriate unit of measurement for the objects.

Materials:

- Triple-beam balances
- Beakers
- Equal portions of oil and water
- Common small objects, e.g. toy cars, plastic animals, batteries, etc.

Initial Demonstration:

Remind students that you have been asking the question all week “how big is it?” So far we have always answered the question by measuring the dimensions of the object [width, length, height]. Now we want to answer the question “how big is it?” in terms of weight/mass.

Ask the students for examples of units of weight/mass [e.g. pounds, grams, kilograms, tons]. Pass out the 1 ml cubes and tell them that the 1 ml cubes weighed one gram to give them a sense of scale. Explain that 1000 of them make a kilogram [use meters and kilometers as an analogy] and that about 400 g make a pound.

Initial Observations:

- Grams are small and are a good unit for light things.

Initial Model:

- We can use grams to measure the weight of small/light objects.
**Procedure:**

Explain to the students how to use a triple beam balance. Use analogies to levers if they know levers. Otherwise explain that it works like a lot like a teeter-totter. Show them the three beams and how to slide the weights and in what order to slide them. This will be too much information at first for most of them, but this is OK. Expect to have to work with many of them individually while they are massing the common objects.

Have the students try massing the first object. Take them through it step by step. [put the item in the tray, move the middle beam weight, move the back beam weight, move the front beam weight]. Once the beam is balanced, call on a student to read the weight. They probably do not know how. Talk them through it by showing them that the middle beam is 100s place, the back is 10s and the front is the 1s place. If they know decimals teach them that the front has the 0.1s place. Repeat with other objects and other students as time allows.

Go over the various weights that the students measured. If they measured incorrectly, have them go back and try again. This is not a concept lesson so much as it is a skill-building lesson, designed to give the students an opportunity to practice using balances.

Take a beaker and equal portions of oil and water. Pour oil into a beaker/bottle and then pour water into the beaker/bottle. Observe that the oil floats on the water. If the students have done density bottles in the past, do this quickly. If not, spend some time showing the students the properties of this combination.

Ask the students which liquid they think will weigh the most. Ask the students how to weigh them accurately. The key idea here is to get them to figure out a way to account for the mass of the beakers themselves. Acceptable solutions are to use identical beakers or to pre-weigh the beakers before filling them. Then the students need to state that each beaker must have the same volume of oil. Have them mass the two liquids; the oil will have less mass b/c it is less dense than water, which is why it floats.

**Target Observations:**

- The same volume of oil has less mass than the same volume of water.

**Target Revised Model:**

- Because oil has less mass per volume than water does, it floats on top of water.

**Summary:**

Students have been introduced to the triple-beam balance, and should be on their way to be proficient in its use. They have also indirectly been exposed to the concept of density in the oil versus water portion of the lesson.