



CONSTRUCTING TASK: SETTING THE STANDARD

APPROXIMATE TIME: 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC.3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

In this task, students transition from non-standard to a standard unit of measure (grams). Then students use grams to measure the weight of fruit.

The emphasis of this unit should be placed on measurement. In the classroom, teachers should use the correct name (mass or weight) depending of the instrument used to make the measurement. (“Mass” is used when measuring with a balance scale; “weight” is used when measuring with a spring scale, which includes scales like a bathroom scale.) The correct term for this task is mass because students are using a balance scale.

As a review, ask students to share what they discovered during the previous task. To introduce this task, show a gram weight. Introduce its name and symbol and describe it as a standard unit of weight. Ask students to use the balance scale to compare 1 gram (1g) to both sizes of the paper clips used in the previous task. Show the other gram weights (5g, 10g, and 20g) and have students estimate and then measure how many paper clips would equal each weight. Ask students to share their findings.

While students work on the “Setting the Standard” student recording sheet, they may refer to their charts from the previous lesson for the weight in paper clips or measure each item again in paper clips.

When discussing the weight of the fruit, guide students to suggest making new units (100 g weights). These can be created using a zippered plastic bag and aquarium gravel. Let students show how these can be created. Students should determine that they will have to combine their weight sets to get a total of 100 grams on one side of the balance scale and then measure an equivalent amount of gravel to balance the scale. Provide the fruit and have students measure the fruit using the new and old weights. (A medium apple weighs about 200g.)

Some students may try to name this new unit 100 grams (100g). If so, encourage the use of metric roots and prefixes from prior knowledge to do so (see “Background Knowledge” below.) Finally, collect 10 of the 100g bags and place them in a large zippered plastic bag. Ask students to figure out how much this new unit weighs (1000 g). Guide students to the term kilogram meaning 1000 grams.

Students should have had experience measuring and comparing weight using a balance scale and understand the difference between standard and non-standard units in measurement.

The Metric prefixes are as follows:

Kilo	Hecto	Deka	Gram	Deci	Centi	Milli
1,000	100	10	1	1/10	1/100	1/1,000

Based on the chart above, 10 grams is 1 dekagram, 100 grams is 1 hectogram, and 1,000 grams is a kilogram. Also, one tenth of a gram is a decigram, one hundredth of a gram is a centigram, and one thousandth of a gram is a milligram. **Remember, in third grade students are only responsible to know and understand the relationship between kilogram and gram.** However, it is appropriate to use the correct label when creating 10 gram weights and 100 gram weights.

ESSENTIAL QUESTIONS

- What is the difference between a standard and non-standard unit of measurement?
- What units are appropriate to measure weight?
- How are units in the same system of measurement related?
- What strategies could you use to figure out the weight of multiple objects?
- What happens to a measurement when we change units?

MATERIALS

For each group

- Balance scale
- Set of small items (from previous task)
- Set of gram weights (1g, 5g, 10g, and 20g) *Common items weighing 1 gram- 1 lg paper clip, 1 dime, a business card, a dollar bill. 100 grams- 20 nickels (5 grams per nickel)*
- Paper clips (in two sizes from previous task)

For each student

- “Setting the Standard” student recording sheet
- Snack-size zippered plastic bag

For the class

- 5 lbs aquarium gravel
- Several pieces of fruit (apple, orange, banana)
- One 2-gallon zippered plastic bag (to create a 1 kilogram bag)

GROUPING

Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students will follow the directions below from the “Setting the Standard” student recording sheet.

1. Find the weight of each object using paper clips and 1 gram (1 g) weights. Record the weights in the chart below.
2. Place a piece of fruit in your balance scale. Talk with your group about how you would measure the fruit using standard units. Record your thoughts below.
3. Create a three-column chart similar to the one above. Label the first column **Fruit Name**, the second column **Paper Clips**, and the third column **Grams (g)**. Find the weight of each piece of fruit and record it in your chart.

Item Name	Measurement in Paper Clips	Measurement in Grams (g)

FORMATIVE ASSESSMENT QUESTIONS

- What is the difference between a standard and non-standard unit of measurement?
- How can you use gram weights and a balance scale to measure the weight of an object?
- Ask what happens when the unit is too small to measure an object?
- What is the difference between units in the same system of measurement?
- How can you figure out the weight of multiple objects?

DIFFERENTIATION

Extension

- Ask students to find the weight of the objects using different units, such as hectograms and dekagrams.
- Ask students to estimate how many apples would be needed to make one kilogram? How many bananas? How many oranges?

Intervention

- Make the relationship between kilogram and gram (1kg = 1,000g) explicit.
- Add the second chart to the student recording sheet, allowing the student to focus on measurement, not creating a chart.

Fruit Name	Non-Standard Unit Paper Clips	Standard Unit Grams (g)

Name _____ Date _____

Setting the Standard



1. Measure each item using paper clips in the balance scale, like you did in the “How Many Paper Clips?” task. Then measure each item using grams (g). Record the measures in the chart below.

Item Name	Measurement in Paper Clips	Measurement in Grams (g)

2. Place a piece of fruit in your balance scale. Talk with your group about how you would measure the fruit using standard units. Record your thoughts below.

3. Create a three-column chart similar to the one above. Label the first column **Fruit Name**, the second column **Non-Standard Unit – Paper Clips**, and the third column **Standard Unit – Grams (g)**. Find the weight of each piece of fruit and record it in your chart.