CONSTRUCTING TASK: MAKING A KILOGRAM

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 will be involved in a kinesthetic activity that helps them experience how heavy a kilogram is and develop a conceptual understanding of a kilogram. Students will then use that experience to estimate the weight of everyday items.

To introduce this task, pass a one kilogram weight around to the students. Ask each student to hold the one kilogram and to try to remember how heavy it feels.

Students should empty and refill their bags at least three times, even if they were very close to one kilogram on their first or second attempt. Also, using mathematical words to describe whether the bag weighs more than, less than, or equal to a kilogram is an important part of this activity. Make sure the students don't skip this step.

Students should have had experience using a spring scale and understand that a kilogram is a standard unit of weight measurement.

ESSENTIAL QUESTIONS

- About how heavy is a kilogram?
- What around us weighs about a kilogram?
- How can you figure out the weight (in kilograms) of multiple objects?

MATERIALS

- "Making a Kilogram" student recording sheet
- 1 kilogram weight (a liter of water weighs about one kilogram)
- Cloth or paper bags (one per student)
- Sand, aquarium gravel, blocks, cubes, beans, etc. for students to use when filling bags
- Spring scale

Comments

You will need a lot of material (sand, aquarium gravel, blocks, cubes, and/or beans) if every student is going to create their own kilogram. A kilogram weighs about 2.2 pounds so you will need at least 50 pounds of material for 20 students. In order to allow students to experiment when creating one kilogram, there should be more than one kilogram of material per student. If you do not have enough material, students may work in pairs or triplets to create a kilogram. This can also be done with empty student backpacks, with classroom items as filler to create the 1 kilogram weight.

GROUPING

Whole Group/Individual Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students will follow the directions below from the "Making a Kilogram" student recording sheet.

Part I

Think about how heavy the kilogram your teacher gave you felt. Now create a bag that you think will weigh about 1 kilogram. Do not use a scale to create your bag! After you have made your 1 kilogram bag, weigh your bag using the scale provided.

- Does your bag weigh less than a kilogram?
- More than a kilogram?
- Exactly one kilogram?

Part II

Determine if your bag weighs more than, less than, or equal to one kilogram. Record your results in the chart below.

	Actual Weight of My Bag	**More Than**, **Less Than**, or **Equal to** one Kilogram
Attempt #1		My bag weighs _____ a kilogram.
Attempt #2		My bag weighs _____ a kilogram.
Attempt #3		My bag weighs _____ a kilogram.

1. Do you think a kilogram weighs more than or less than a pound? Explain your thinking.

FORMATIVE ASSESSMENT QUESTIONS

- How can you use your kilogram bag to measure weight?
- Why is it important to have a standard unit of weight?
- What items in your bedroom could be measured using kilograms?
- How can you figure out the weight (in kilograms) of multiple objects?

DIFFERENTIATION

Extension

- Sometimes it is helpful to have some referents for weights. Ask students to create a poster of common everyday objects that weigh a specific amount. (Be careful about weights indicated on a product package as that will *not* include the weight of the container, which may be significant in some situations. This would be a good discussion to have with students.)

Intervention

- Have students work in pairs to accomplish this task.

TECHNOLOGY CONNECTION

http://www.mathsisfun.com/measure/metric-mass.html Provides some background on metric measures and lists items that weigh about one kilogram.

Name _____ Date _____

Making a Kilogram

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Attempt #1		My bag weighs _____ a kilogram.
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Attempt #3		My bag weighs _____ a kilogram.

2. Do you think a kilogram weighs more than or less than a pound? Explain your thinking.

_____

_____

3. Look at the actual weights of your bag. What could you do if you wanted to determine the weight of three bags with the same exact weight? Explain your thinking.

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