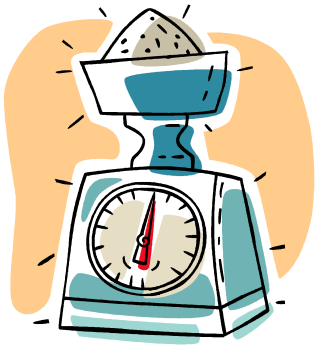
Scaffolding Task: Worth the Weight



STANDARDS FOR MATHEMATICAL CONTENT

MCC4.MD.1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36)

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

Students need to be familiar with the terms gram and kilogram, metric units used to measure the mass of an object. One kilogram is equal to 1,000 grams. One gram weighs about as much as a large paper clip or a packet of sweetener and one kilogram is the weight of a textbook and is equal to about 2.2 pounds.

ESSENTIAL QUESTIONS

- How are grams and kilograms related?
- What around us weighs about a gram? About a kilogram?
- When should we measure with grams? Kilograms?
- What happens to a measurement when we change units?

MATERIALS

- "Worth the Weight, Part 1 – Grams" student recording sheet
- "Worth the Weight, Part 2 – Kilograms" student recording sheet
- Large paper clip
- Gram weight
- Balance
- 1 kg reference weights
- Spring scales

GROUPING

Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will experiment with gram and kilogram weights. They will select objects to weigh, estimate their weight, and then use a spring scale to determine the actual weight.

Comments

Before beginning this task, you may want to review the previous task in which students made kilogram weights from bags and material such as aquarium gravel.

This task can be broken into two parts or the class can be broken into groups and the students can rotate through each part of the task.

One liter bottles filled with water weigh about one kilogram. Alternatively, fill bags with sand, aquarium gravel, or dried beans. Students can use these "reference weights" to compare weights when looking for items that weigh one kilogram.

Part 1

To introduce this part of the task, hold up a large paper clip and explain that it weighs about one gram. Pass some large paper clips around to the students so that they can get an idea of how much a gram is. Involve the class in a discussion about what might be appropriate to measure in grams. After asking the class for a few suggestions, students will list things in the classroom they think they could weigh using grams. Ask students to record their items in the table on their student recording sheet, "Worth the Weight, Part 1 – Grams."

For each item on their chart, students should hold the item to estimate its weight first, measure its weight using a spring scale, and write down the actual weight of each item.

When students are finished, hold a class discussion about what objects are appropriate to weigh in grams and what students learned from this part of the task.

Part 2

To introduce this part of the task, pass the kilogram referents around to the students. Ask the class for a few suggestions of classroom items for which kilograms would be an appropriate unit of measure.

For each item on their chart, students should first hold the item to estimate its weight (more than, less than, or about 1 kilogram), measure its weight using a spring scale, and write down the actual weight of each item.

When students are finished, hold a class discussion about what objects are appropriate to weigh in grams and what students learned from this part of the task.

Task Directions

Part 1 - Grams

Students will follow the directions below from the "Worth the Weight, Part 1 - Grams" student recording sheet.

Think about how heavy a paper clip is. Now find five objects that you think should be weighed using grams. Do not use a scale to check yet! After you have found five objects:

- Write the name of the objects in the chart below.
- Make an estimate for each item and record it in the chart below.
- Weigh each item using the scale provided and record it in the chart below.

1. How did you make your estimates?
2. Why are the items you chose appropriate to measure in grams? Be ready to share your thinking with the class.

Part 2

Students will follow the directions below from the "Worth the Weight, Part 2 - Kilograms" student recording sheet.

You and your partner are going on a kilogram scavenger hunt! Use one of the reference weights to get an idea of how heavy one kilogram is. Then find items around the room that weigh less than, about, and more than one kilogram.

1. List the items in the table below.
2. Predict whether each item is more than, less than, or about 1 kilogram.
3. Weigh each item with a spring scale.
4. Record the weight in the last column.

Remember: 1 kg = 1,000 grams

Look at the table. Write about what you found about your understanding of a kilogram? Be prepared to discuss your findings with the class.

On the back of this sheet, list at least five items for which kilograms would be appropriate as the unit of measure.

FORMATIVE ASSESSMENT QUESTIONS

- Why is it important to associate items with a weight?
- When would you use grams and kilograms in your everyday life?
- What are your predictions for which objects will weigh about a gram? Why?
- What are your predictions for which objects will weigh about a kilogram? Why?

DIFFERENTIATION

Extension

- Have students find ten items around their house that they would measure using grams or kilograms. Encourage them to find five items for grams, and five items for kilograms. Have them estimate how much each item weighs.

- Have students estimate how many kilograms five different people weigh (family members, neighbors, friends, babysitters, etc.).

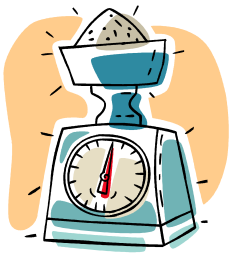
Intervention

- Each week, have a ten minute discussion about units of weights. Ask students to choose an item from the classroom, discuss the appropriate unit to use to measure the weight, and then estimate the weight of the object. In math journals, have students keep a reference list of how much different items weigh using grams and kilograms. This can be used as a reference throughout the year.

Name _____ Date _____

Worth the Weight

Part 1 - Grams



Think about how heavy a paper clip is. Now find five objects that you think should be weighed using grams. Do not use a scale to check yet! After you have found five objects:

- Write the name of the objects in the chart below.
- Make an estimate for each item and record it in the chart below.
- Weigh each item using the scale provided and record it in the chart below.

Object	Estimated Weight (g)	Actual Weight (g)
1.		
2.		
3.		
4.		
5.		
6.		

1. How did you make your estimates?

_____

_____

_____

2. Why are the items you chose appropriate to measure in grams?

_____

_____

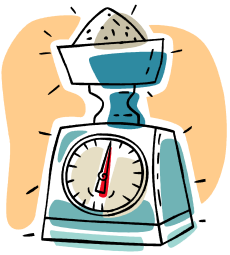
_____

3. Be ready to share your thinking with the class.

Name _____ Date _____

Worth the Weight

Part 2 - Kilograms



You and your partner are going on a kilogram scavenger hunt! Use one of the reference weights to get an idea of how heavy one kilogram is. Then find items around the room that weigh less than, about, and more than one kilogram.

1. List the items in the table below.
2. Predict whether each item is more than, less than, or about 1 kilogram.
3. Weigh each item with a spring scale.
4. Record the weight in the last column.

Remember: 1 kg = 1,000 grams

Object	**Prediction** (check the correct box below)			**Actual Weight (g)**
	Less Than 1 Kilogram	More Than 1 Kilogram	About 1 Kilogram	
1.				
2.				
3.				
4.				
5.				
6.				

Look at the table. Write what you found about your understanding of a kilogram? Be prepared to discuss your findings with the class.

_____

_____

_____

_____

On the back of this sheet, list at least five items for which kilograms would be appropriate as the unit of measure.