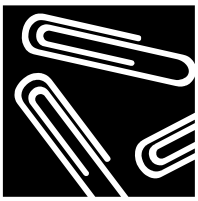
CONSTRUCTING TASK: HOW MANY PAPER CLIPS?

APPROXIMATE TIME: 2-3 Days



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.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

In this task, students will explore weight using simple household items and a balance scale. Students are introduced to the need for standardized units while exploring weight using paper clips.

Therefore, the emphasis of this unit should be placed on measurement. In the classroom, teachers should use the correct name (mass or weight) depending on 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.

There are three parts to this task. First, students sort items by weight. Next, they sort the same items a second time using a balance scale. Finally, students find the weight of each item in terms of paper clips. After each part of this task, students should be brought together as a class to share what they found, to describe their procedures, and to defend their results. During each part of the task, students may record their results on the student task sheet, but also record their results in a way that data can be shared with the class (i.e., ask all groups to record their results on the white board, poster paper, or projected computer).

When introducing the third part of the task, ask students how the objects could be compared if each item was weighed separately. Students should recognize that there would need to be a value attached to each object in order to allow students to compare the objects. Tell students they will be using paper clips to measure the objects. Groups will get either jumbo paper clips or regular paper clips to use as a unit of measure (half of the groups should get regular paper clips and half of the groups should get jumbo paper clips). Model the

procedure for using paper clips to weigh an item (not one of the items in the set). Make sure each group uses a number and a unit to record results.

While there might be little differences between the groups that used the same size paper clips, the differences between the groups using different sized paper clips should be much more noticeable. When students discuss the shared results, it is important to let them determine why the measures are not the same.

Ask the students to think about times when it is important for everyone to agree upon the weight of an object. Examples might include the weight of produce at the grocery store if you are paying by the pound or the importance of accurate weight in a scientific experiment.

Students should have some experience using a balance scale and non-standard units of measurement. If necessary, explain to students that a balance scale is a tool that can help them be more accurate when comparing weight and demonstrate the use of the balance scale.

ESSENTIAL QUESTIONS

- What is a unit?
- What is weight?
- Why do we measure weight?

MATERIALS

For each group:

- "How Many Paper Clips?" student recording sheet
- Set of small objects to weigh (steel washer, plastic chip, wooden cube or dice, nickel, etc.)
- Primary balance (directions provided below)
- 100 paper clips (1/2 the class should have regular paper clips and 1\2 should have jumbo paper clips)

GROUPING

Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students will follow the directions below from the "How Many Paper Clips?" student recording sheet.

Part 1

Using a set of items,

a. Remove the items from the bag and order them from lightest to heaviest.
b. Record your results on the chart below.

c. Write to explain how you decided on the order of the items. Also, be ready to report to the class how you decided on the order.

Order Items from Lightest to Heaviest	Order Items from Lightest to Heaviest Using the Balance Scale	Give the Weight in Paper Clips of Each Object

Part II

Using a balance scale,

a. Explore the balance scale using the set of items.
b. Using the balance scale, compare and then order the items in your set from lightest to heaviest.
c. Record your results on the chart.
d. If the order of your items changed, write to explain why any changes that were made. Be prepared to explain to the class why you made any changes to the order of your items.

Part III

Using paper clips,

a. Use the paper clips to weigh each item in your set.
b. Record the weight of each item in the chart below. Use a number and a label ("jumbo paper clips" or "regular paper clips") for each item.
c. Write below to explain what you noticed or learned during this task. Be prepared to share findings with the class.

FORMATIVE ASSESSMENT QUESTIONS

- If you were asked to compare the weight of items without a scale, how could you do it?
- In what ways can we determine how much an object weighs?
- What do you notice about the weights of the items in the set?
- Why is it important to know how much things weigh?
- Does the size of an object always determine how much it weighs?
    - Can you give examples of small objects that weigh more/less than expected?
    - Can you give examples of large objects that weigh more/less than expected?
- When would it be important for people to get the same weight when measuring?
    - How do we use weight at school? (Please remember, it is not appropriate to measure and/or display a student's weight)
    - How do you use measures of weight at home?
    - How do your parents use measures of weight at work?
- What happens to measurement when you change units?

DIFFERENTIATION

Extension
Ask students to create a graph for the data collected for the weight of the objects.

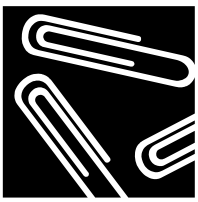
Intervention
For the third part of the task, give intervention groups a smaller set of items and have them weigh each item twice, once with each size paper clip, and show a direct comparison in a two-column chart.

TECHNOLOGY CONNECTION

http://public.doe.k12.ga.us/DMGetDocument.aspx/Grade%204%20Unit%203%20Creating%20Scales.pdf?p=6CC6799F8C1371F6CA1D4816B288AA4D386F6BD621BEA7BF4B4B9C6CFBBB4292&Type=D Link to directions on how to make a balance scale and a spring scale using common materials.

Name _____ Date _____

How Many Paper Clips?



1. Using a set of items.
    a. Remove the items from the bag and order them from lightest to heaviest.
    b. Record your results on the chart below.
    c. Write to explain how you decided on the order of the items. Also, be ready to report to the class how you decided on the order.

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Order Items from Lightest to Heaviest	**Order Items from Lightest to Heaviest Using the Balance Scale**	**Give the Weight in Paper Clips of Each Object**

2. Using a balance scale.
    a. Explore the balance scale using the set of items.
    b. Using the balance scale, compare and then order the items in your set from lightest to heaviest.
    c. Record your results on the chart.
    d. If the order of your items changed, write to explain why any changes that were made. Be prepared to explain to the class why you made any changes to the order of your items.

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3. Using paper clips.
    a. Use the paper clips to weigh each item in your set.
    b. Record the weight of each item in the chart below. Use a number and a label ("jumbo paper clips" or "regular paper clips") for each item.
    c. Write below to explain what you noticed or learned during this task. Be prepared to share findings with the class.

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