Constructing Task: Exploring an Ounce

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 should have worked with the gram and kilogram prior to this task. They should also understand simple fractions and the use of a balance scale and spring scale.

ESSENTIAL QUESTIONS

- What do you do if a unit is too heavy to measure an item?
- What units are appropriate to measure weight?

MATERIALS

- "Exploring an Ounce, Part 1 – Creating an Ounce" student recording sheet (2 pages)
- "Exploring an Ounce, Part 2 – Estimating an Ounce" student recording sheet
- One pound of clay, play-dough, or sand per group
- Balance scales (for part 1)
- Spring scales (for part 2)

GROUPING

Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will construct an ounce and investigate its uses in weight measurement.

Comments

An important concept for students in weight measurement is to develop referents for different units of measurement. The ounce can seem very arbitrary to students, especially since it is a sixteenth of a pound, not a commonly used fraction. Physically constructing an ounce (in Part 1) allows students to gain an understanding of the relationship between an ounce and a pound.

Students should search for items in this activity the same way in which they found items for the pound, gram, and kilogram. (See Part 2)

Make sure students do not confuse a weight measure ounce with a liquid measure ounce, this is a common mistake. Many students may be familiar with a 16-ounce or 20-ounce drink, and they can easily confuse the two different units.

Task Directions

Part 1 – Creating an Ounce

Students will follow the directions below from the "Exploring an Ounce – Part 1 Creating an Ounce" student recording sheet.

1. Would pounds be a good way to measure the weight of a nickel? Why or why not?
2. Would pounds be a good way to measure the weight of a pencil? Why or why not?
3. Would pounds be a good way to measure the weight of a textbook? Why or why not?
4. Some things are too small to weigh accurately in terms of a whole pound. Therefore, we need some way to divide the pound into smaller units. You're going to use one pound (1 lb) of clay (or other materials) to do that.
    a. Using the scale at your desk, divide your clay into two equal parts. How did you use your scale to determine if it has been divided equally?
    b. What fraction of a whole pound have you created?
    c. Take one of the pieces you just created and divide it into two equal pieces. Again, make sure the pieces equal using your balance scale. What fraction of the whole pound is one of these pieces of clay?
    d. Continue doing this until you have two pieces of clay that are each 1/16 of the pound. How many times did you have to divide to do this? Explain how you know.
    e. The smallest unit you have created is called an ounce. How many ounces are there in a pound?
5. Using your ounce of clay, find three items in your classroom that weigh approximately one ounce. List them below.

6. When you think about an ounce, it helps to have something you can easily think of that weighs about one ounce. How can use the three items above to help you estimate an ounce?
7. Find three things that weigh about 8 ounces. List them.
(*Hint: What fraction of a pound is 8 ounces? Do you have a piece of clay you can use to make this easier?*)
8. How can you use this knowledge to estimate the weight of objects?

Part 2 – Estimating an Ounce

Students will follow the directions below from the "Exploring an Ounce – Part 2 Estimating an Ounce" student recording sheet.

Think about how heavy one ounce (1 oz) is. Now find five objects that you think should be weighed using ounces. 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 ounces?
3. Be ready to share your thinking with the class.

FORMATIVE ASSESSMENT QUESTIONS

- What unit(s) is the most appropriate to measure the weight of items that would fit in your pocket? Why?
- What method would you choose to use when measuring a pencil? Why? Describe how that method is used.

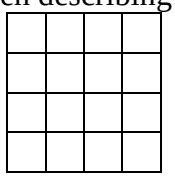
DIFFERENTIATION

Extension

- Have students create algebraic expressions and/or balance scale problems for ounces and pounds.

Intervention

- Use square divided into 16 small squares (see below) to help develop the understanding of the concept of 16ths and relate it to 1 pound. Move those sixteenths into eights, then fourths, then halves and use the terminology quarter-pound, half-pound, etc. which may be familiar to students (such as when describing hamburgers).



Name _____ Date _____

Exploring an Ounce

Part 1 – Creating an Ounce

1. Would pounds be a good way to measure the weight of a nickel? Why or why not?

   _____

   _____

2. Would pounds be a good way to measure the weight of a pencil? Why or why not?

   _____

   _____

3. Would pounds be a good way to measure the weight of a textbook? Why or why not?

   _____

   _____

4. Some things are too small to weigh accurately in terms of a whole pound. Therefore, we need some way to divide the pound into smaller units. You're going to use one pound (1 lb) of clay (or other materials) to do that.

   a. Using the scale at your desk, divide your clay into two equal parts. How did you use your scale to determine if it has been divided equally?

      _____

      _____

   b. What fraction of a whole pound have you created? _____

   c. Take one of the pieces you just created and divide it into two equal pieces. Again, make sure the pieces equal using your balance scale.
      What fraction of the whole pound is one of these pieces of clay? _____

   d. Continue doing this until you have two pieces of clay that are each 1/16 of the pound. How many times did you have to divide to do this? Explain how you know.

      _____

      _____

e. The smallest unit you have created is called an ounce. How many ounces are there in a pound? _____

5. Using your ounce of clay, find three items in your classroom that weigh approximately one ounce. List them below.

_____

_____

_____

6. When you think about an ounce, it helps to have something you can easily think of that weighs about one ounce. How can use the three items above to help you estimate an ounce?

_____

_____

7. Find three things that weigh about 8 ounces. List them.
(*Hint: What fraction of a pound is 8 ounces? Do you have a piece of clay you can use to make this easier?*)

_____

_____

_____

8. How can you use this knowledge to estimate the weight of objects?

_____

_____

_____

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_____

Name _____ Date _____

Exploring an Ounce

Part 2 – Estimating an Ounce

Think about how heavy one ounce (1 oz) is. Now find five objects that you think should be weighed using ounces. 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 (oz)	Actual Weight (oz)
1.		
2.		
3.		
4.		
5.		
6.		

1. How did you make your estimates?

_____

_____

_____

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

_____

_____

_____

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