

Measuring Weight/Mass

Strand:	Measurement and Geometry
Topic:	Estimating, measuring, and recording weight, using U.S. Customary and metric units
Primary SOL:	4.8 The student will b) estimate and measure weight/mass and describe the result in U.S. Customary and metric units.
Related SOL:	4.8c, 4.16

Materials

- Measuring Weight/Mass Recording Sheet, two-sided (attached)
- Everyday objects for weighing (identified on the Measuring Weight/Mass Recording Sheet)
- Balance scale
- U.S. Customary weights (ounces and pound)
- Metric weights (gram and kilogram)
- Spring scale (with ounce, pound, gram, kilogram unit capabilities)
- Digital scale (with ounce, pound, gram, kilogram unit capabilities)
- Seesaw Balances Fun Challenge activity sheet (attached; optional challenge aligned with 4.16)

Vocabulary

balance, balance scale, digital scale, equal, equivalence, grams, kilograms, mass, ounces, pounds, spring scale, unit weight

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Present the following scenario to serve as a warmup for the activity. Have students work with a partner or in groups of three to discuss the following scenario. Try to bring in a large plastic bucket or plastic trash can to use as a visual during the discussion. Say: *“Manny weighed an empty large plastic bucket in pounds. Was this the best unit to use? Why or why not?”* Walk around and listen in on the discussions to identify students you want to share their thoughts and any misconceptions you need to clarify. After a few minutes select a few students to share their thoughts. Pounds is not the most reasonable or best unit to use to measure the empty bucket. The bucket, perhaps considered a large object, would weigh less than a pound, so ounces or grams would have been better unit choices. Present also the following: *“Once Manny figured out that a more reasonable unit to weigh the bucket would be ounces or grams, he attempted to use a balance scale to weigh the bucket. What do you think happened when Manny used the balance scale?”* Again have students discuss. Demonstrate weighing the bucket using each measuring tool. The bucket will be difficult to balance on a small balance scale with buckets or even trays. It is likely that Manny was unable to use the balance scale to weigh the bucket. He should have used a spring scale or digital scale instead.

2. Explain to students that they will have to use the same reasoning for the activity that follows. Distribute the Measuring Weight/Mass Recording Sheet to each student to reference as you explain the activity. Students select three objects of their choice from each of two lists of available objects. *(Note: the objects on the list can be substituted for items that may be more convenient to find.)* Students will need to select the most appropriate unit of measurement, estimate the weight using the selected unit, and weigh each object twice in the selected unit (once with either a spring scale or balance scale and the second time with a digital scale).
3. Ask students to help you select an object to model the activity's process. For example, students may select the magazine. Conduct a think-aloud to model selection of an appropriate unit, measurement tool, and reasonable estimate. Model using all three scale options, but make it clear to students that they are only required to choose the balance scale or spring scale for their first weight measurement, then the digital scale to confirm and check the measurement. Any balance scale can be used, including a bucket balance or a pan balance. Any spring scale can be used (for example, one similar to a hanging scale in a grocery store or a kitchen spring scale, both indicating the weight on a circular dial). Finally, students will use a digital scale to check the accuracy of the other weight measurements. Show students how to toggle back and forth between the available units on the digital scale. Model recording measurements on the Measuring Weight Recording Sheet.
4. Place students in partnerships. Distribute measurement tools or set up stations and directions for rotation if you do not have enough tools for each partnership. Place the objects for weighing in a central location where groups can freely travel to select them and return them for others to use. Circulate and note students' actions and discussions during the activity closely as you formatively assess their learning and adjustments you need to make in instruction. Assist as needed.
5. As students complete their active work, have them complete the reflection questions on side 2 of the recording sheet. Bring all students back together when measuring is complete to discuss these questions as closure to the lesson.

Assessment

- **Questions**
 - Select one object you chose to measure. Compare your estimated weights to the actual weights. How does this result help you estimate objects in the future?
 - What must be considered when selecting the most reasonable weight measurement tool for an object?
 - What must be considered when selecting the most reasonable unit for measuring the weight of an object?
 - Why are gram weights used when measuring with a balance scale?
 - What are the benefits of using a balance scale? What are the drawbacks?
 - What are the benefits of using a spring scale? What are the drawbacks?
 - What are the benefits of using a digital scale? What are the drawbacks?

- **Journal/writing prompts**
 - Explain the process of weighing items on a balance scale to someone who has never used such a scale before.
 - Explain how using a balance scale is different from using a bathroom scale or a spring scale for weighing fruits and vegetables in a grocery store.
 - Draw a representation of a spring scale dial from a real-life spring scale. Label all the parts and show the dial measuring an object weighing 4 pounds, 3 ounces.
- **Other Assessments**
 - Use the completed recording sheet for assessment purposes.
 - Provide students with another copy of the Weight/Mass Recording Sheet and let them choose other classroom objects or everyday objects to estimate and weigh.

Extensions and Connections (for all students)

- Find two objects that you think have equivalent weights. Pick an appropriate unit and weigh the objects. How did the weights compare?
- Conduct an experiment to see whether different measurement tools measure an object as having the exact same weight. Pick an object that weighs less than 5 pounds. Make a reasonable weight estimate using a reasonable unit of measurement. Use three different measurement tools to weigh the object. Discuss the results of the experiment.
- The Seesaw Balances Fun Challenge tasks can be used during number talks, as independent work, or as whole-class work. Children may enjoy and learn more from working a few of the tasks at any one time. The thinking involved is aligned with standard 4.16. Distribute the Seesaw Balances Fun Challenge activity sheet or a copy of the first task, and display the first task and solution recording chart. Explain that the creatures pictured are called Gobots. Each Gobot has a particular weight that is more than zero pounds. Gobots that look different have different weights. In order to balance the seesaw, the combined weights of the Gobots on the left side of the seesaw must equal the combined weights of those on the right. In the first task, we can say that weight of one sun shape is equivalent to the combined weights of the star and the hexagon. Let students work on the first example, and then have students share some of the solutions they found and how they found the solutions. Have students discuss strategies they can use to determine solutions (e.g., working backward, guess-and-test, looking for patterns). Once students have been introduced to the seesaw balance idea, you may select a task for number talks, use them in stations or for morning work, or select some for whole-class work.

Strategies for Differentiation

- Some students may benefit from estimating and weighing fewer than six items in the activity to accommodate for processing, memory, or motor issues that may affect rate of completion.
- Include opportunities for students who show depth of understanding of estimating and weighing objects to experience how to express weights of objects with more than one unit: for example, 5 pounds, 2 ounces, or 1 kilogram, 12 grams.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Measuring Weight/Mass Recording Sheet (Front)

Select three objects from each list for the activities that follow.

Object Selection Lists	
Selection List A	Selection List B
Grape	Rock
Quarter	Magazine
Pencil	Child's shoe
Candy bar	Empty backpack
Can of soup	Pillow
Crayon	2-liter bottle of soda, unopened
Plastic glass or cup	Bag of granulated sugar
Feather	Hammer

Record the six objects selected from the Object Selection Lists in the chart below. Record the units to use and then estimate the weight of each.

Identify Units and Estimate Weight Chart		
Object	Metric Unit and Estimated Weight	U.S. Customary Unit and Estimated Weight

Measuring Weight/Mass Recording Sheet (Back)

Record the six objects selected from the Object Selection Lists in the chart below.

Use the measurement tools and information from the Identify Units and Estimate Weight Chart to complete the required information in the chart below.

Actual Weight Compared to Estimated Weight Chart				
Object	Balance Scale or Spring Scale Measurement		Digital Scale Measurement	
	Metric Unit and Estimated Weight	U.S. Customary Unit and Weight	Metric Unit and Estimated Weight	U.S. Customary Unit and Weight

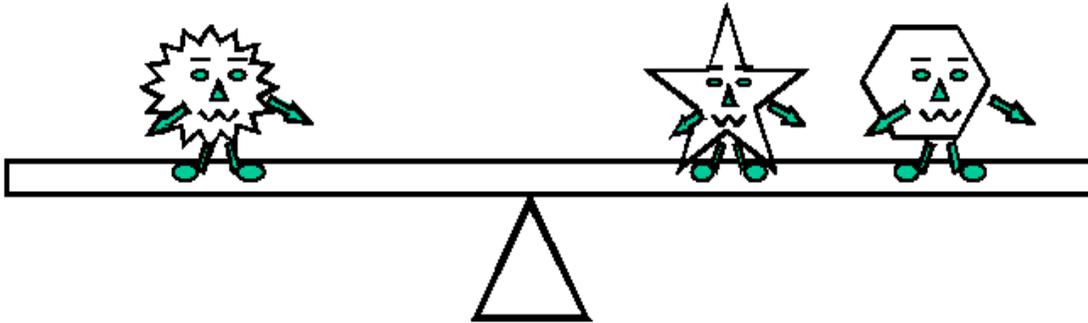
Answer the following reflection questions:

How accurate are your estimated weights when compared to the actual weights?

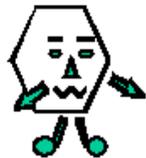
What things must be considered when making measurement estimates closer to the actual weight?

Seesaw Balances Fun Challenge

Name: _____ Date: _____

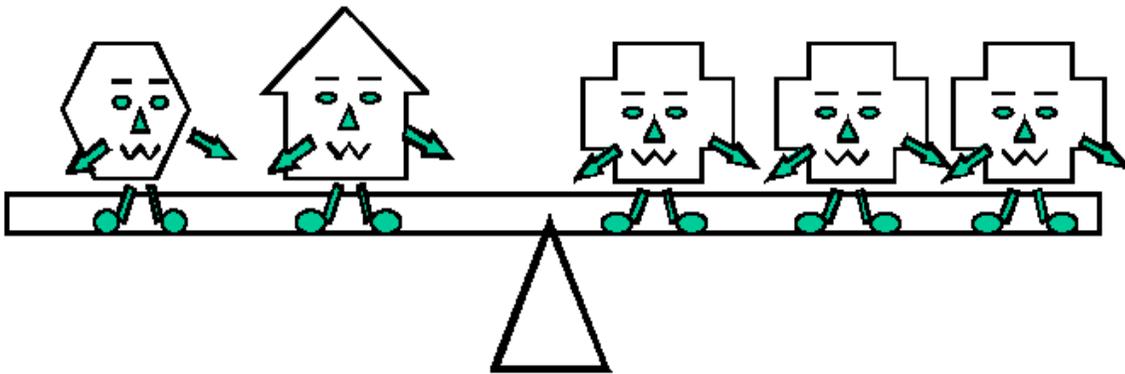


If  on the seesaw weighs four pounds, what could the other gobots weigh?

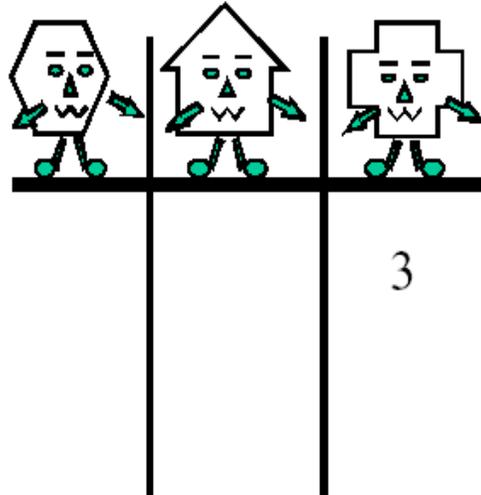
		
4	1	3
4	3	

If  on the seesaw weighs seven pounds, what could the other gobots weigh?

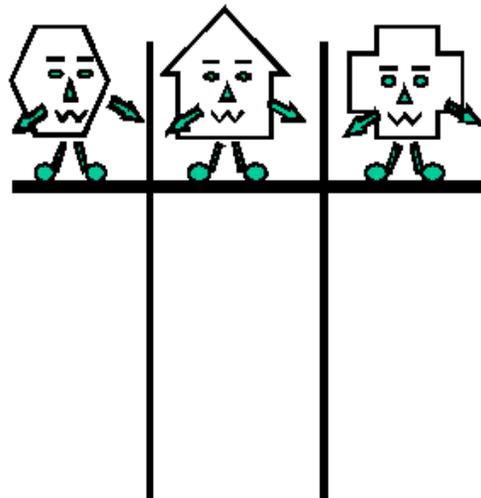
		

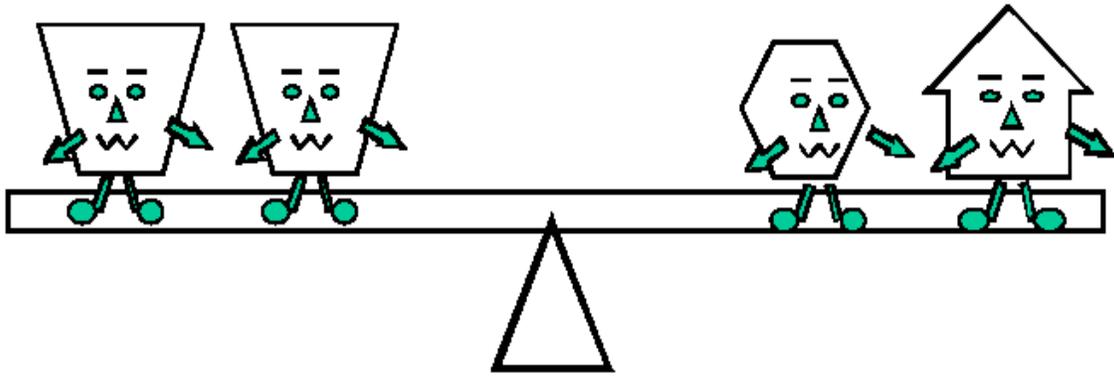


If  on the seesaw weighs three pounds, what could the other gobots weigh?

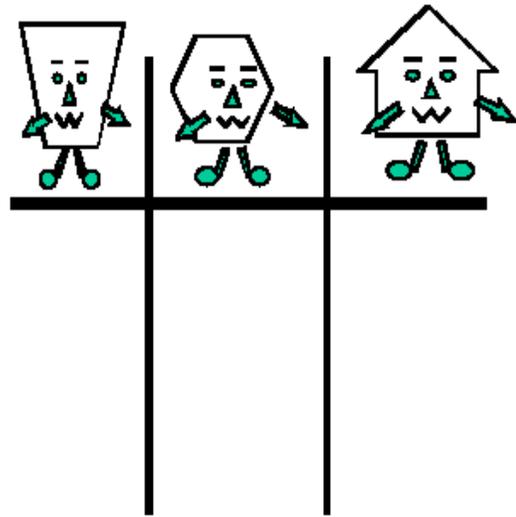


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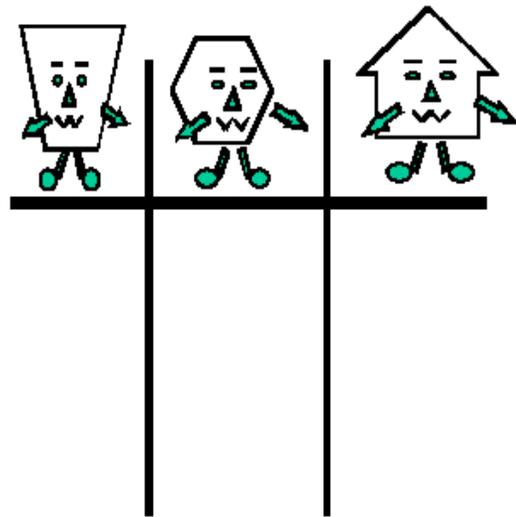


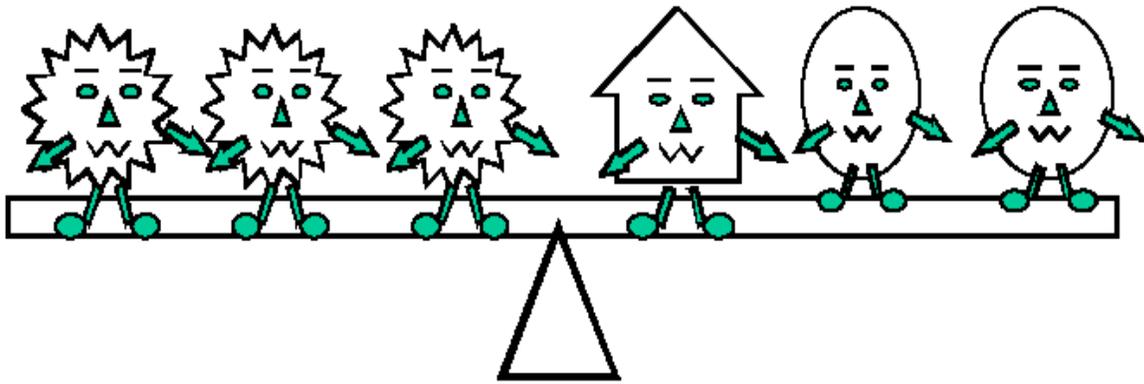


If  on the seesaw weighs three pounds, what could the other gobots weigh?

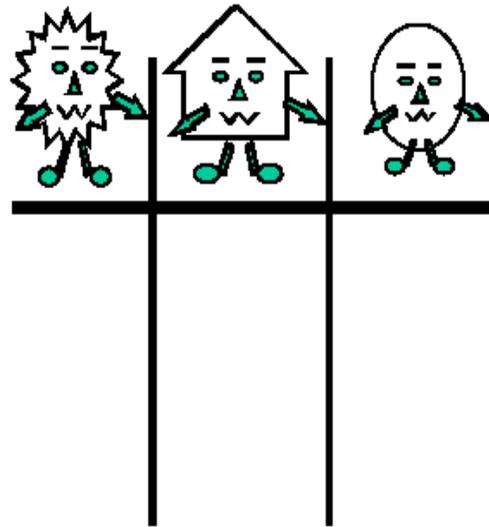


If  on the seesaw weighs five pounds, what could the other gobots weigh?





If  on the seesaw weighs five pounds, what could the other gobots weigh?



If  on the seesaw weighs six pounds, what could the other gobots weigh?

