Just in Time Quick Check

Standard of Learning 3.MG.1

Strand: Measurement and Geometry

Standard of Learning 3.MG.1

The student will reason mathematically using standard units (U.S. Customary and metric) with appropriate tools to estimate and measure objects by length, weight/mass, and liquid volume to the nearest half or whole unit.

Students will demonstrate the following Knowledge and Skills:

a) Justify whether an estimate or an exact measurement is needed for a contextual situation and choose an appropriate unit.

b) Estimate and measure:

   i) length of an object to the nearest U.S. Customary unit ($\frac{1}{2}$ inch, inch, foot, yard) and metric unit (centimeter, meter);

   ii) weight/mass of an object to the nearest U.S. Customary unit (pound) and metric unit (kilogram); and

   iii) liquid volume to the nearest U.S. Customary unit (cup, pint, quart, gallon) and metric unit (liter).

c) Compare estimates of length, weight/mass, or liquid volume with the actual measurements.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 2.MG.1, 3.MG.2

Just in Time Quick Check 3.MG.1

*Note to teacher - Students will need the following materials to complete this quick check: inch ruler, centimeter ruler, meter stick, yard stick, scale, or balance with weights.

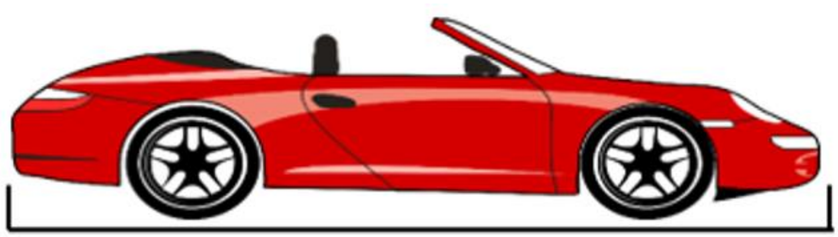
1. Mr. Donovan is putting paper on the large bulletin board in his classroom. He needs to know how wide the bulletin board is so he can fit the paper on it.
    a) Should Mr. Donovan use an estimate or an exact measurement of the width of the bulletin board? Justify your reasoning.

    b) Which unit of measurement should Mr. Donovan use? (Circle one)

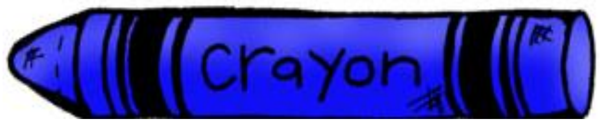
       ½ inch　　　　foot　　　　centimeter

2. Estimate, then measure the length of the marker to the nearest half inch.

3. Estimate, then measure the length of the toy car to the nearest inch.



4. Estimate, then measure the length of the crayon to the nearest centimeter.



5. Use a ruler to measure the width of a door to the nearest foot.
    a) What door did you measure? ________________________________
    b) What is the width of that door to the nearest foot?
    ____

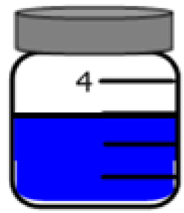
6. Use a yardstick to measure the distance from the floor to the doorknob of the same door. What is the distance from the floor to the doorknob to the nearest yard?

    ____

7. Use a meter stick to measure the height of that same door. What is the height of that door to the nearest meter?

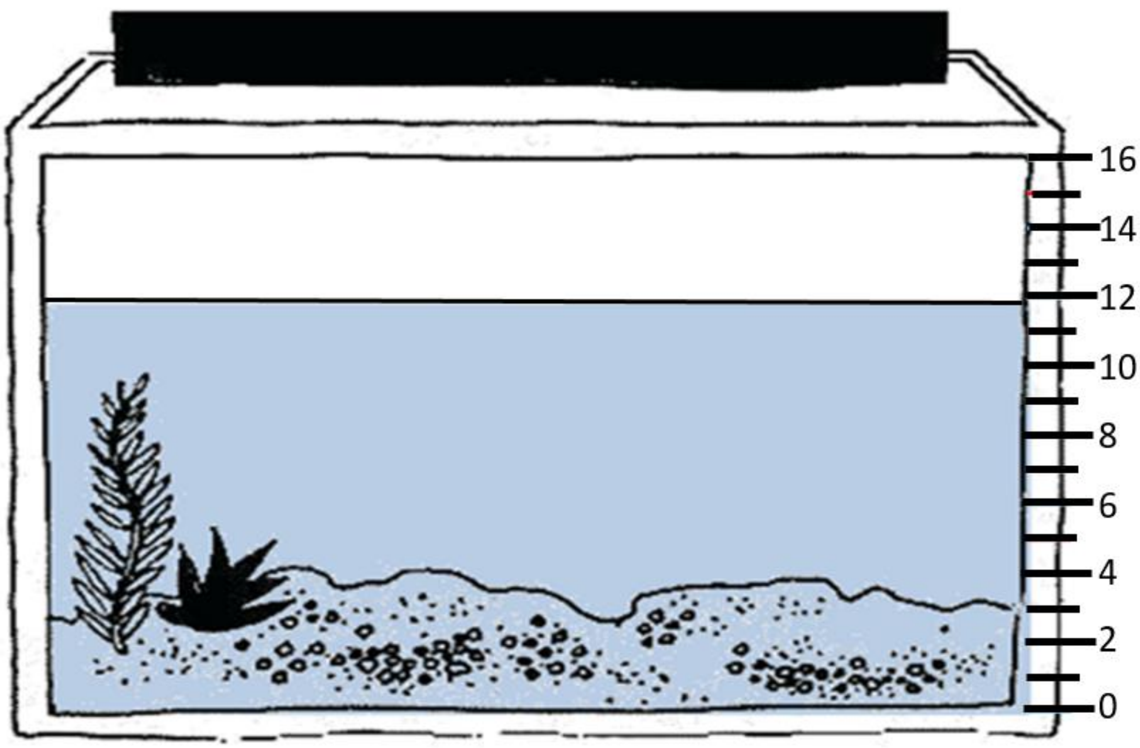
    ____

8. Henry had an empty jar that holds 4 cups. He poured juice into the jar as shown below.



How many cups of juice did Henry pour into the jar?

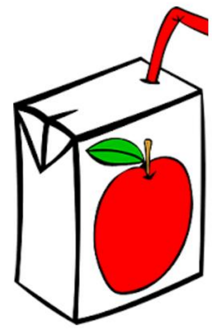
9. Look at this fish tank. The scale beside the fish tank is in liters. About how many liters of water are in this fish tank?



10. Each picture shows a container with some liquid inside. Draw a line from each container to the most reasonable estimate for the amount of liquid inside that container.

This line shows the amount of liquid in the dog's pool.

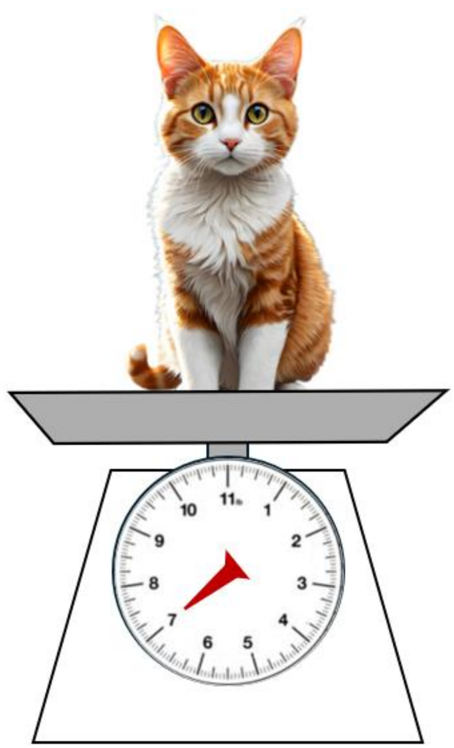
This line shows the amount of liquid in the container.



This juice box is filled to the top with liquid.

$\frac{1}{2}$ gallon 1 gallon 4 gallons 40 gallons 1 quart 3 quarts 1 cup 2 pints

11. What is the weight of this cat, measured to the nearest pound?



12. Choose objects in your classroom to measure. Estimate each measurement, then determine the actual measurement.

Object Name	Measurement	Estimate	Actual Measurement	Comparison (greater than/less than)
	Length			My estimate was ______________ the actual measurement.
	Length			My estimate was ______________ the actual measurement.
	Mass			My estimate was ______________ the actual measurement.
	Mass			My estimate was ______________ the actual measurement.

3.MG.1 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

*Note to teacher - Students will need the following materials to complete this quick check: inch ruler, centimeter ruler, meter stick, yard stick, scale, or balance with weights.

1. Mr. Donovan is putting paper on the large bulletin board in his classroom. He needs to know how wide the bulletin board is so he can fit the paper on it.

    a) Should Mr. Donovan use an estimate or an exact measurement of the width of the bulletin board? Justify your reasoning.

    Students may confuse situations that require an estimate with those that require an exact measurement. They may state that Mr. Donovan should use an estimate because the context feels informal or because they associate estimation with "real life" tasks. Teachers can address these misconceptions by emphasizing the purpose of the measurement; because Mr. Donovan needs the paper to fit the board, an exact measurement is necessary to avoid the paper being too short or too long for the bulletin board.

    b) Which unit of measurement should Mr. Donovan use? (Circle one)

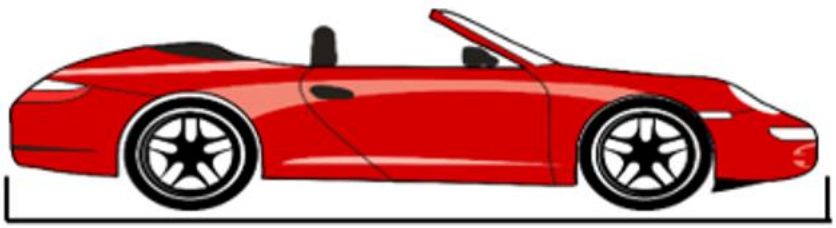
    ½ inch   foot   centimeter

    This item is designed to elicit student discussion. Prior to discussion, it may be helpful to show students a large bulletin board in the classroom or elsewhere in the school. Some students may choose foot because they noticed that it was a "large" bulletin board and feet are the largest units. Other students may choose ½ inch or centimeter because they recognize that the measurement needs to be exact, and using a smaller unit will provide a more exact measurement. Classroom discussions may also bring forth the idea that measurements may combine multiple units. For example, when we measure the height of a person, we would likely say that the person is 5 feet, 6 inches tall. Similarly, we could say that the bulletin board is 6 feet, 8 ½ inches long. Because all the given answers could be justified as correct, it is important for teachers to listen to students' explanations and justifications for their choice of unit of measurement.

2. Estimate, then measure the length of the marker to the nearest half inch.

Students may report the length to the nearest half inch as 7 inches rather than 6 $\frac{1}{2}$ inches, indicating that students are measuring to the nearest inch. Students may be rounding up to the next inch since the marker's length is a little more than 6 $\frac{1}{2}$ inches. Students may benefit from additional experience using a ruler to measure the length of objects to the nearest inch and to the nearest half inch and discussing the difference between the measurements.

3. Estimate, then measure the length of the toy car to the nearest inch.



Students may report the length of the toy car as 2 inches, which may indicate the students are measuring from one wheel to the next instead of measuring the full length of the car. Teachers are encouraged to observe students measuring an object to determine how students align the ruler with the object, where they start (e.g., the edge/end of the ruler, the zero mark), where they end, and what the students are counting (tick marks versus unit spaces).

4. Estimate, then measure the length of the crayon to the nearest centimeter.

Students may misalign the ruler and measure from the end of the ruler instead of from zero. Students who use an inch ruler need additional experience measuring the length of different objects in both inches and centimeters to build conceptual understanding of the difference between the units and the measuring tools.

5. Use a ruler to measure the width of a door to the nearest foot.
   a) What door did you measure? ________________________________
   b) What is the width of that door to the nearest foot?
   ____

Students may have difficulty measuring the width of the door with a ruler since they will need more than one iteration of the ruler to determine the total width. These students may overlap feet as they measure and report a greater number of feet than the actual width, or they may leave gaps between feet and report fewer feet than the actual width. These students would benefit from additional experiences that require them to use more than one iteration of the measuring tool to determine the length of an object or a linear distance.

6. Use a yardstick to measure the distance from the floor to the doorknob of the same door. What is the distance from the floor to the doorknob to the nearest yard?

    ____

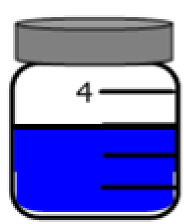
Students may report the distance from the floor to the doorknob as 3 yards, which may indicate that students have memorized the relationship between feet and yards but are confusing the units. Students will benefit from experience using yardsticks to measure lengths that are less than one yard as well as lengths that are greater than one yard.

7. Use a meter stick to measure the height of that same door. What is the height of that door to the nearest meter?

    ____

Students may have difficulty measuring the height of the door with the meter stick, as this will require more than one iteration. Students need opportunities to measure a variety of lengths using a meter stick to include lengths that are greater than one meter and lengths that are less than one meter. Students also benefit from measuring the same lengths using a meter stick and a yardstick as they develop understanding of the similarities and differences between units within the U.S. Customary and metric systems.

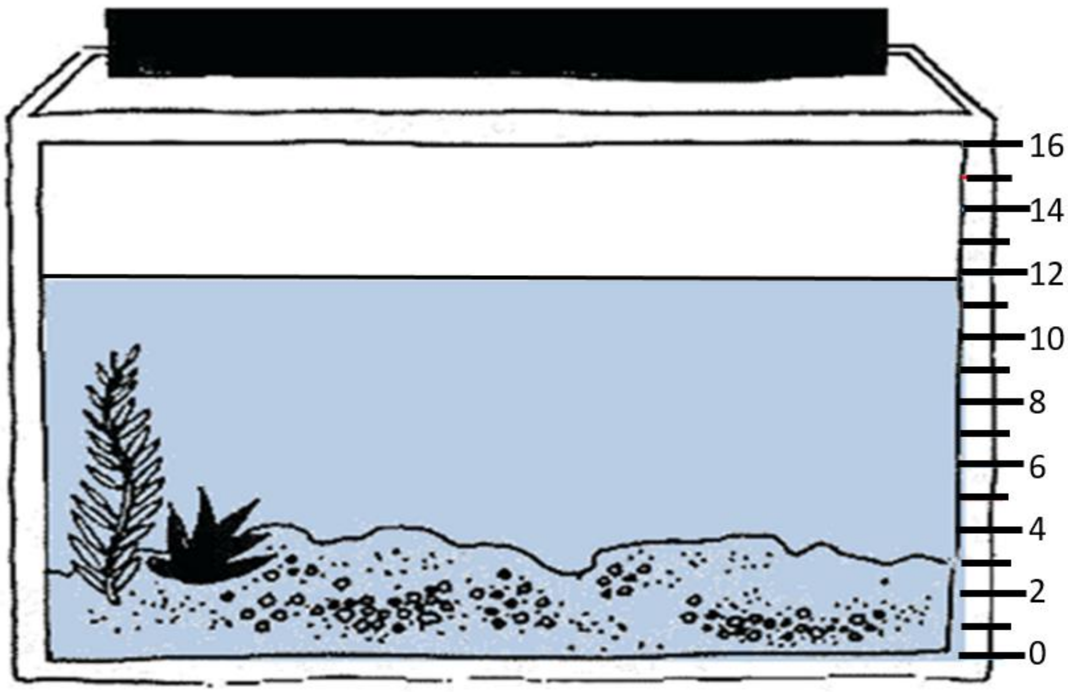
8. Henry had an empty jar that holds 4 cups. He poured juice into the jar as shown below.



How many cups of juice did Henry pour into the jar?

Students may answer 4 cups, since that amount is mentioned in the question and labeled in the figure, or they may answer 6 cups, thinking that each increment represents 2 cups. Students may need more experience measuring liquids with actual measuring cups that have different capacities and scales. Weekly measuring stations provide regular opportunities for students to practice estimation and measuring skills.

9. Look at this fish tank. The scale beside the fish tank is in liters. About how many liters of water are in this fish tank?

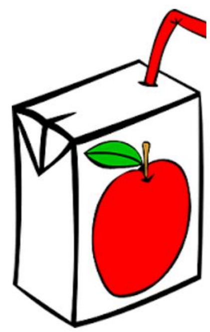


Students may report that 16 liters of water are contained in the tank since that is the maximum capacity labeled. Students may report that the fish tank holds 11 liters of water since the fill line is slightly below 12. Students would benefit from more experience measuring liquids in a variety of contexts.

10. Each picture shows a container with some liquid inside. Draw a line from each container to the most reasonable estimate for the amount of liquid inside that container.

This line shows the amount of liquid in the dog's pool.

This line shows the amount of liquid in the container.



This juice box is filled to the top with liquid.

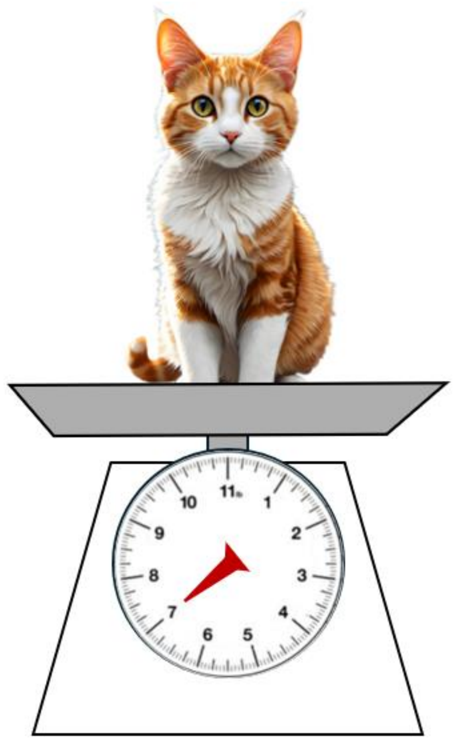
$\frac{1}{2}$ gallon   1 gallon   4 gallons   40 gallons   1 quart   3 quarts   1 cup   2 pints

Students may indicate that the dog's pool contains 4 gallons, indicating they have not developed an understanding of large volumes of liquid and need more experience exploring with gallons. Providing opportunities to estimate and then determine the number of gallons needed to fill different large containers will help students understand the magnitude of one gallon. Similarly, opportunities to use one gallon of water to determine the number of smaller containers that can be filled helps build understanding for this unit.

Students may select 1 gallon for the milk container, indicating familiarity with the unit and the type of container but also indicating that students are unsure how the fill line should impact their estimate. Students may select 1 quart for the milk container, indicating that students recognize that the estimate should be less than one gallon but also indicating that students lack understanding of the relationship between quarts and gallons. These students would benefit from more hands-on experiences with quarts and gallons to build understanding of the relationships between these units.

Students may select 2 pints for the juice box, indicating that students need more experiences with this unit of measure. Students may select $\frac{1}{2}$ *gallon for the juice box, which may indicate that students understand this container has the smallest capacity of the containers shown and are drawn to the fraction* $\frac{1}{2}$ *because it is less than 1 whole, while ignoring the unit of measure. These* *students need more experience with different units of measure to build understanding of the significance of the units represented in a measurement.*

11. What is the weight of this cat, measured to the nearest pound?



A common error students may make is to state that the cat weighs 7 kilograms or 7 ounces. (Even though ounces are not formally introduced until Grade 4, students may have heard of ounces and associate ounces with something light, like a small cat.) This error may indicate that students did not see the "lb" at the top of the scale. Teachers should explicitly teach students how to read a scale and how rounding works in measurement contexts, emphasizing that when a scale points directly to a labeled value, as in the image above, that value is the nearest whole unit. Using practice examples with scales that point exactly at a number and examples that fall between numbers can help students distinguish when rounding is necessary and build confidence in interpreting measurement tools.

12. Choose objects in your classroom to measure. Estimate each measurement, then determine the actual measurement.

Object Name	Measurement	Estimate	Actual Measurement	Comparison (greater than/less than)
	Length			My estimate was ____________ the actual measurement.
	Length			My estimate was ____________ the actual measurement.
	Mass			My estimate was ____________ the actual measurement.
	Mass			My estimate was ____________ the actual measurement.

Students may struggle to distinguish between an estimate and an actual measurement, sometimes recording two identical values or treating the estimate as a "guess" with no reasoning behind it. Students may also rush to determine the actual measurement without first thinking about a reasonable estimate, which limits the purpose of estimating. Other students may think their estimate is "wrong" if it does not match the actual measurement. During instruction, teachers should model how to make thoughtful estimate using benchmarks (e.g., a foot-ruler, a pound, a cup). It may also be beneficial to emphasize the idea that in most cases, an estimate will not perfectly match the actual measurement, and this is OK. Having students compare their estimates to the exact measurements helps them develop their estimation skills and determine what are reasonable and unreasonable estimates.

Additional note: Teachers may wish to add one or two additional rows to the chart to address liquid volume measurements, depending on what is available in the classroom setting. It may be helpful for teachers to collect a variety of empty containers of varying sizes. Suggestions may include (but are not limited to) using rice or water to measure the capacity of water bottles, soap containers, juice containers, milk containers, a small fishtank, hand sanitizer container, watering can, shampoo bottles, cups, mugs, etc.