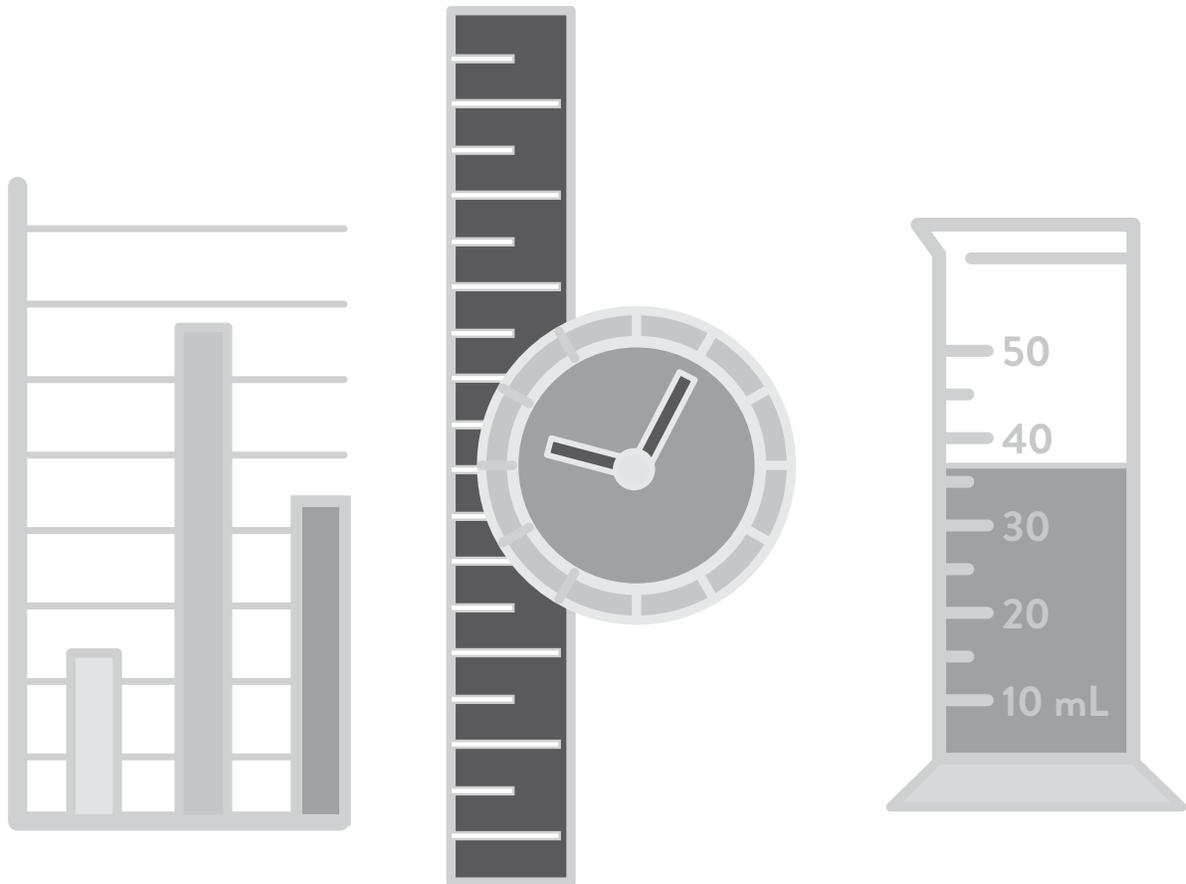


Exploring Measurement Concepts



Real-World Activities to Deepen Understanding

Sandi Cooper and Ruth Harbin Miles



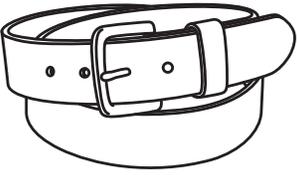
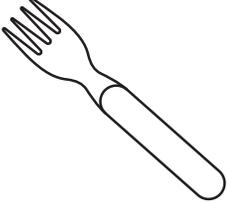
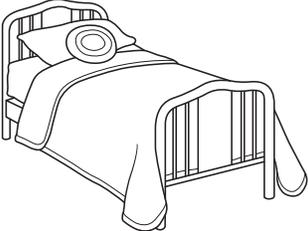
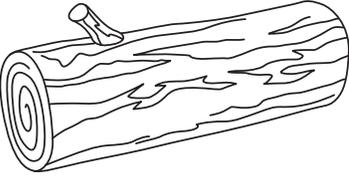
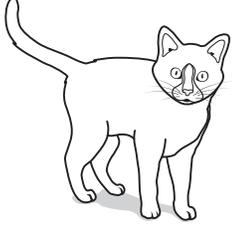
Rowley, Massachusetts

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Grade 2 Pre-Assessment

1. How long is each object? Circle your best estimate.

		
<p>Shorter than 6 inches About 6 inches Longer than 6 inches</p>	<p>Shorter than 6 inches About 6 inches Longer than 6 inches</p>	<p>Shorter than 6 inches About 6 inches Longer than 6 inches</p>
		
<p>Shorter than 1 yard About 1 yard Longer than 1 yard</p>	<p>Shorter than 1 yard About 1 yard Longer than 1 yard</p>	<p>Shorter than 1 yard About 1 yard Longer than 1 yard</p>

2. Kevin is at the water park. He sees a sign that says, “Mega Water Slide 15 yards this way.” He sees another sign that says, “Wave Pool 28 yards this way.” If Kevin wants to get to one of these quickly, which one is the shorter distance? How much shorter?

3. Measure these two lines in inches. Use your ruler.



Line A

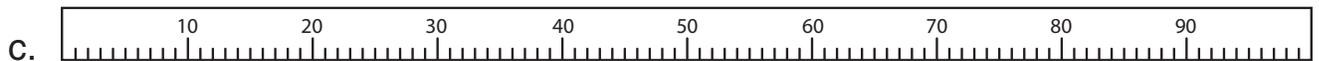
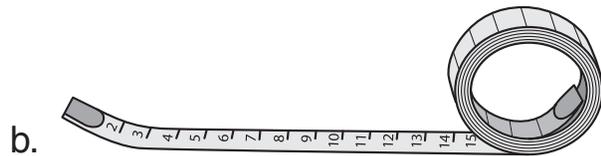
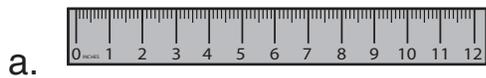


Line B

Which line is longer? Line A Line B (Circle)

How much longer? Line _____ is _____ inches longer than Line _____.

4. After school, the class participated in a long jump contest. Katie jumped 10 feet and 3 inches. Which tool should the teacher use to measure Katie's jump? Circle one:



5. David says the basketball hoop is taller than the monkey bars. Julio says the climbing wall is much taller than the monkey bars. Who is correct? Explain your solution.

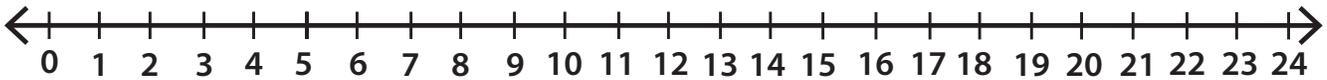
Basketball hoop = 10 feet

Monkey bars = 7 feet

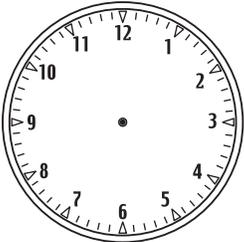
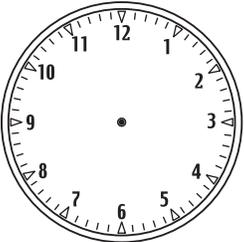
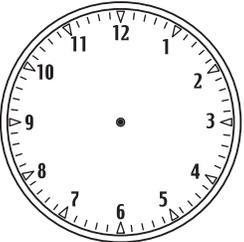
Climbing wall = 12 feet

Grade 2 Pre-Assessment (cont.)

6. Freddie the Frog jumped 10 spaces on the number line. Freda the Frog jumped 14 spaces. Both frogs started from 0. Which frog jumped farther? _____ How much farther? _____
Use the number line to solve the problem.



7. Draw hands on the analog clocks to show the times.

		
2:10	6:15	8:25

8. Is the time a.m. or p.m.? Circle one.

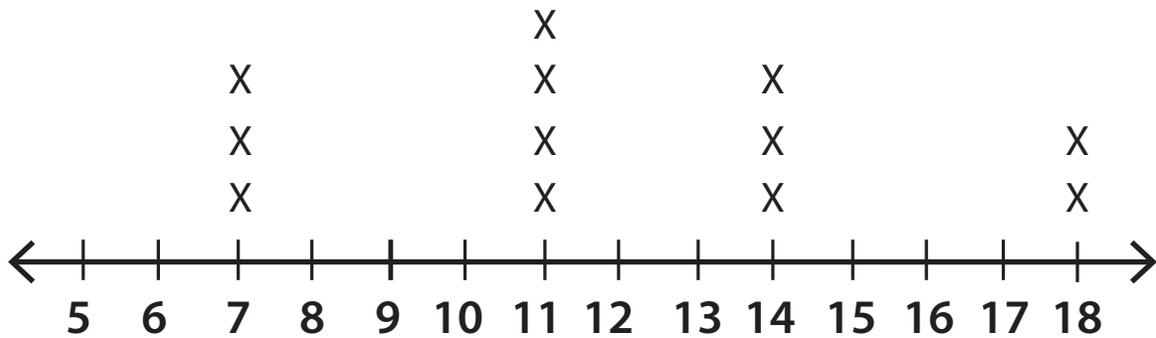
Susanna gets dressed for school in the morning at 6:30. a.m. p.m.

Sam plays basketball after school at 5:30. a.m. p.m.

Grace has lunch with her friends at school at 12:30. a.m. p.m.

Ella wakes up in the middle of the night at 2:30. a.m. p.m.

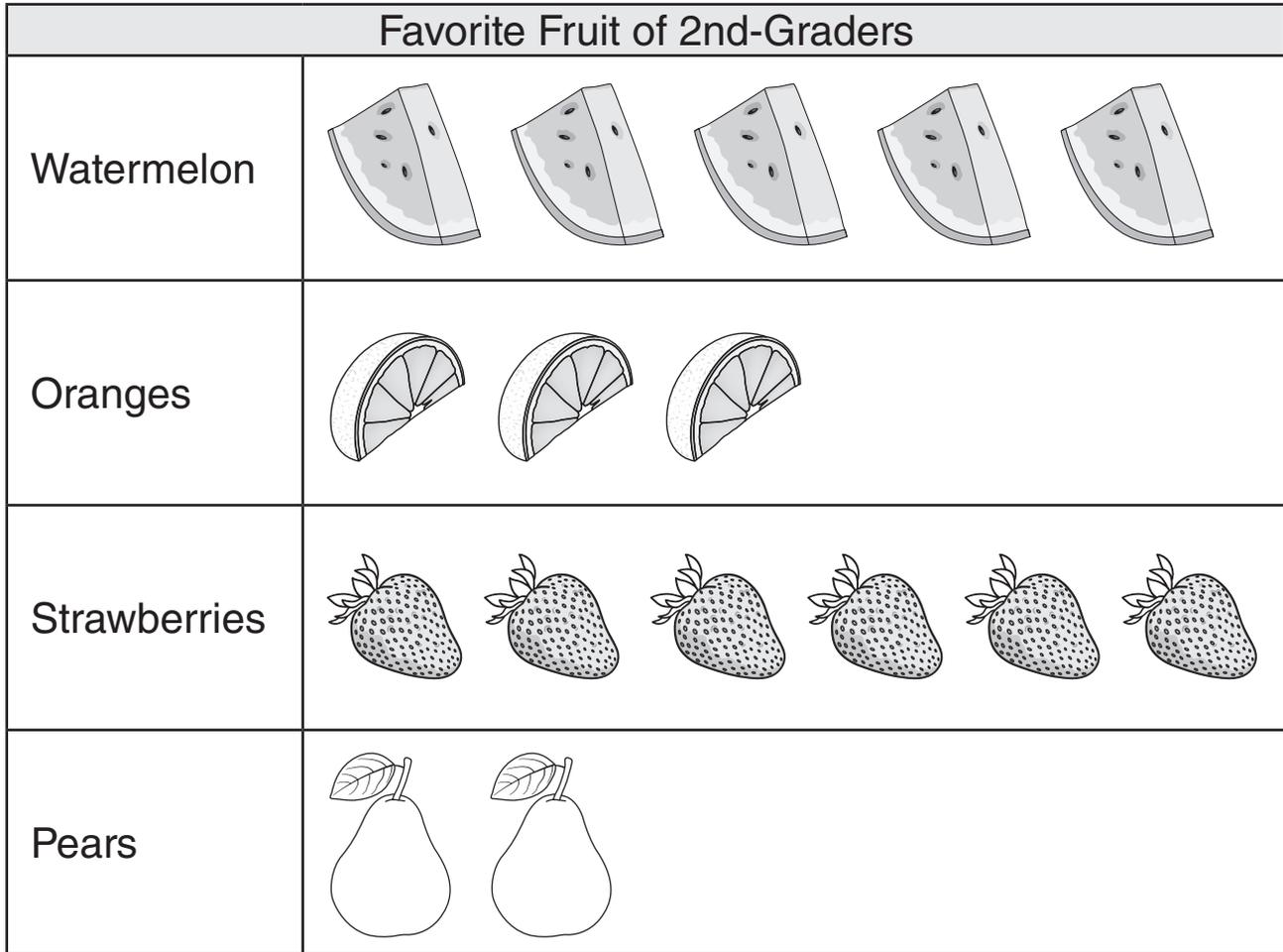
9. Stephen made a line plot to show the lengths of the Unifix trains he made. Write three statements (next page) to describe the data.



Lengths of Unifix trains

Grade 2 Pre-Assessment (cont.)

10. Study the pictograph below.



What is the favorite fruit of second-graders? _____

What is the least favorite fruit of second-graders? _____

6 Animal Tales



Number of Students

Small groups

Materials

- Rulers, yardsticks or meter sticks, measuring tape
- Adding machine tape/roll
- Photos of various wild animals
- “Animal Tales” cards (page 111)

Overview

In this activity, students decide which measuring tool is most appropriate to measure the length or height of various animals. Working in small groups, students create a “lengthy tale” for one animal and compare their tales with those of other groups.

Presenting the Activity

1. Begin the activity with a whole-group discussion about how and why scientists measure the length or height of animals. (It is to monitor health—for example, to make sure animals are developing normally in their habitats.)
2. Display various tools for measuring length (rulers, yardsticks and/or meter sticks, measuring tape). Display photos of various wild animals, and ask the students which tool would be most appropriate for measuring each animal.
3. As students verbalize their reasoning about the best ways to measure the height or length of an animal, point out that length and height are both linear measurements, so the same tools can be used to measure both. (For example, a yardstick can be laid flat to measure a snake, but it can also be held vertically to measure a monkey.)
4. Explain to the students that they are going to create and display the “tale” of one animal. The tale will include the length or height of the animal, other information about the animal (habitat, eating habits, and so on), and a short story about the animal.
5. Organize students into small groups of two or three. Place the “Animal Tales” cards in a bag or deck and have each group draw one card. These cards include the length or height of the animal, but you can add other information if desired

Focus of Development Length or height

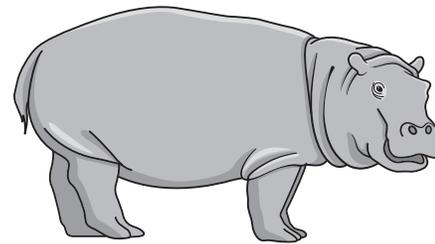
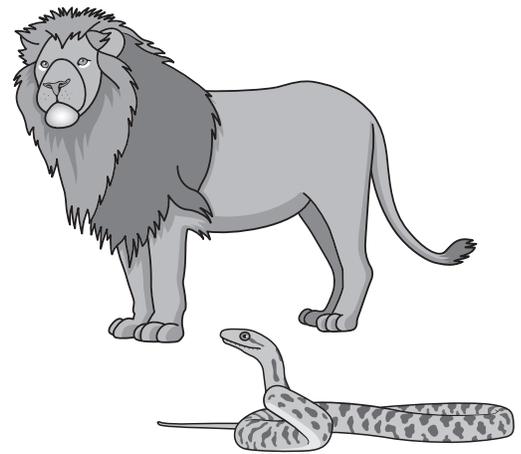
MATH STANDARDS: Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

to give the students a “head start” on their stories/tales. You can also create additional cards or alternative cards to fit the needs of your students.

Tip!

Use a decorated shoebox for the “Animal Tales” cards to create an element of surprise as each group draws a card to see which animal they get.

- Distribute a roll of adding machine tape to each group. Working together, the group should select the best tool to mark out the animal’s length or height on a strip of adding machine tape. Once they have this length, they should cut the strip.
- On the same strip, have group members write the name of the animal in big, bold letters at one end. Next to the animal’s name, the students can write facts about their animal, including other measurements, what the animal eats, the sounds it makes, the animal’s natural habitat (jungle, desert, and so on), and other interesting facts. On the remainder of the strip or on the back (depending on the length), have students write a short “tale” about their animal that includes something about the animal’s length or height.
- As teams complete their “animal tales,” lay these strips out on the floor, hang them up, or tape them to a board as a display.
- From these strips, have the class compare the length or height of different animals and discuss the various tools used. They could work to organize the animals from longest to shortest, or vice versa. After



this, the students could present their animal facts and share their “tales” with the whole class.



Assessing Student Responses

During the *small-group activity*, did students:

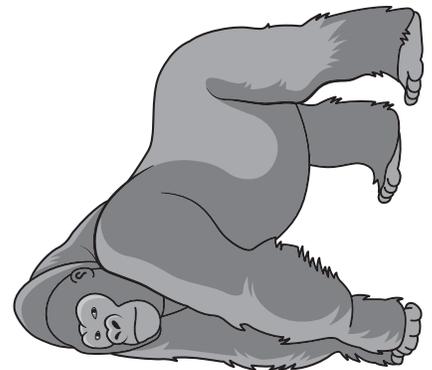
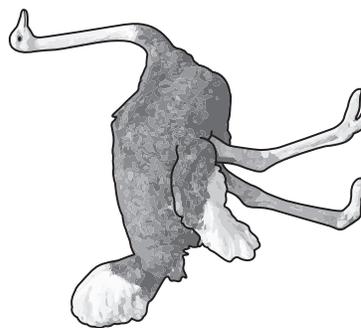
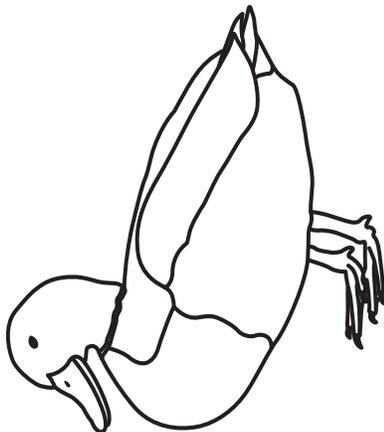
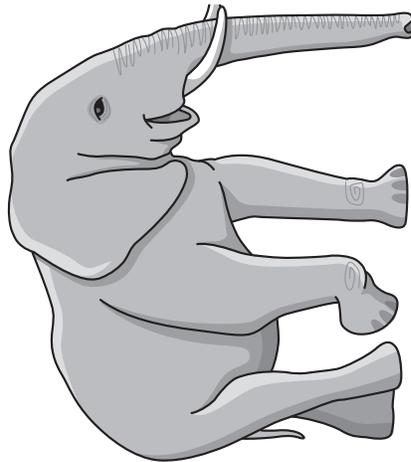
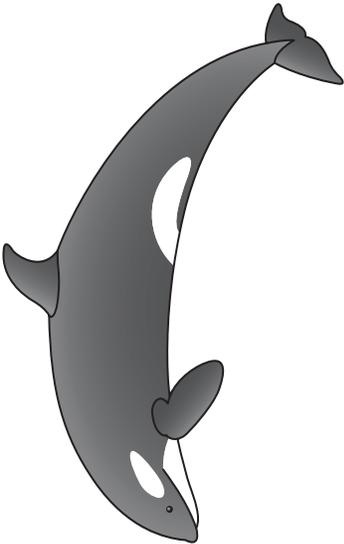
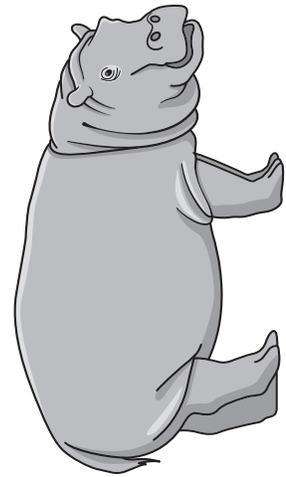
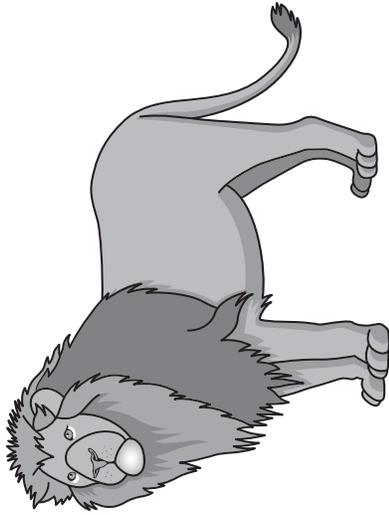
- Select the appropriate tool?
- Mark the measurements correctly using the measuring tool (zero point to end point)?
- Record the correct units and manage the determination of fractional units?

During the *whole-group discussion*, were students able to share the appropriate measurements of their animals and verbalize the comparisons?

Extending the Activity

Invite a veterinarian to share with students how they measure animals in the vet’s office. Have them share what tools they use and how they use this information.

"Animal Tales" Cards



4 Packing Light



Number of Students

Partner pairs

Overview

In this activity, students estimate weight (in grams and kilograms) and capacity (in liters) in the context of packing items for an imaginary plane trip. Students confirm their estimates by weighing items on a metric scale or filling containers with rice or beans.

Materials

- Metric scale to weigh grams/kilograms
- “Packing Light” recording sheet (page 149)
- Items that weigh about a gram or kilogram
- Containers that hold about a liter
- Water or rice to fill containers
- Liter measuring cup
- “Show It If You Know It!” word problem cards (page 150), cut apart and placed in a paper bag for extension activity

Presenting the Activity

1. Introduce students to the metric scale and demonstrate how to weigh objects and read their weights.
2. Tell students they are going to pack for a travel adventure by plane. Invite student pairs to bring personal items from home such as food (a juice box, bag of rice or dried beans), personal items (book, stuffed toy, inflatable beach ball), and clothing (shoes, cap). The total weight of their “packed” items must not exceed 5 kg to pass the weight restrictions on luggage for plane trips.
3. Distribute the “Packing Light” recording sheet to each partner pair. Ask pairs to

estimate the weight of each item they brought from home and then weigh it. Then have them record their findings on the recording sheet.

4. Explain to student that they need to take 3 liters of water on their trip. Invite them to bring one or more containers from home (or find containers in the classroom) that they think will hold about a liter each.

Tip!

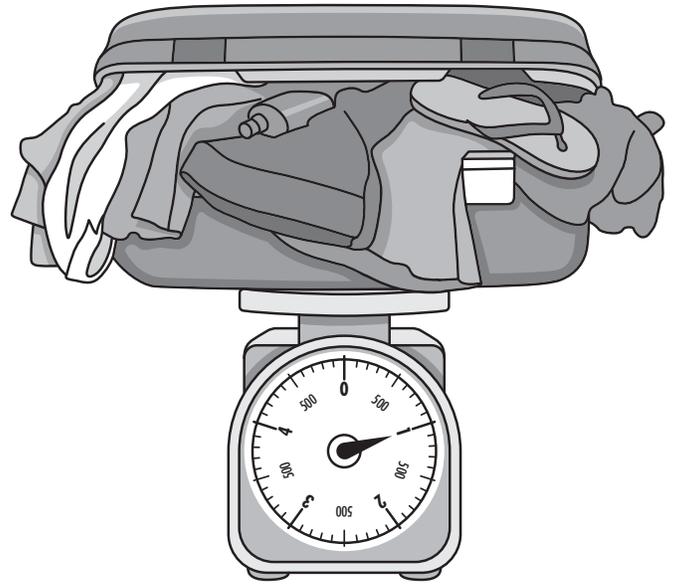
Measurements do not need to be exact in this activity. Talk about objects that weigh “close to” or “about” a gram or kilogram and containers that hold “close to” or “about” a liter.

Focus of Development

Measuring in metric units

MATH STANDARDS: Measure and estimate liquid volume and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).

5. Students should estimate capacity first, then check by filling the containers with rice or water, and then record their findings on their recording sheets.
6. Students then calculate the total weight and capacity of the items they are bringing to see how close they are to 5 kg and 3 liters, respectively.
7. After their measurements are complete, ask students to explain and discuss the mass (in grams or kilograms) and volume (in liters) of the items they are bringing on their trip.



Assessing Student Responses

Observe students as they measure and record weight and capacity.

- Did students accurately estimate which items weighed close to a gram or kilogram?
- Did students accurately estimate which containers held close to a liter?

Extending the Activity

1. Divide the class into two teams of equal ability and invite them to play the weight and capacity game “Show It If You Know It!”
2. Distribute individual whiteboards and markers. Cut apart the word problem cards (page 150) and place them in a paper bag.
3. Ask a student from Team 1 to draw a word problem card from the bag and place it on the document camera for all students to view. The student selecting the problem card will read the problem aloud.
4. Students on Team 2 solve the problem. After a designated amount of time (2–3 minutes), the Team 1 student at the document camera says, “Show it if you know it!”
5. The Team 2 students hold up their individual whiteboards.
6. The teacher shares the solution and calls on one of the Team 2 students to explain how they solved the problem. Team 2 students receive a point for each correct response.
7. The activity continues with a student from Team 2 drawing a card, placing it on the document camera, and reading it aloud for Team 1 to solve.
8. The game ends after 5 complete rounds. The team scoring the most points for the most correct solutions wins the game.

“Packing Light” Recording Sheet

Work with a partner to list 5 items that weigh about a gram or a kilogram. Estimate first, then weigh.

	Item to be packed	What we think it weighs	What it does weigh
1.			
2.			
3.			
4.			
5.			
		Total weight	

Work with a partner to list 3 containers that hold about a liter. Estimate first, and then check by filling with water or rice.

	Container to be packed	What we think it holds	What it does hold
1.			
2.			
3.			
		Total capacity	