Lesson 1

Anchoring Units of Measurement

Goals

- Compare (orally) the relative size of different units of measure for one attribute, that is, length, volume, and weight or mass.
- Comprehend the approximate size of 1 “inch,” “foot,” “yard,” “mile,” “millimeter,” “centimeter,” “meter,” “kilometer,” “ounce,” “pound,” “ton,” “gram,” “kilogram,” “cup,” “quart,” “gallon,” “milliliter,” and “liter.”
- Identify which unit is closest to the length, volume, weight, or mass of a given object, and explain (orally) the reasoning.

Learning Targets

- I can name common objects that are about as long as 1 inch, foot, yard, mile, millimeter, centimeter, meter, or kilometer.
- I can name common objects that weigh about 1 ounce, pound, ton, gram, or kilogram, or that hold about 1 cup, quart, gallon, milliliter, or liter.
- When I read or hear a unit of measurement, I know whether it is used to measure length, weight, or volume.

Lesson Narrative

This lesson activates and builds on students’ prior knowledge of units of measurement. It anchors students’ perception of standard units of length, volume, weight, and mass with familiar objects serving as benchmarks. This work prepares students to reason about ratios and rates in the context of measurement and to perform unit conversions.

The lesson opens with an invitation to estimate the volume of salt in a salt shaker. It is followed by two optional activities that reinforce standards from earlier grades. The first optional activity, “What Do They Measure?”, prompts students to classify standard units based on what they measure. The second optional activity, “Cutting Strings,” grounds students’ awareness of standard units of length in concrete objects (a collection of strings).

Access for Students with Diverse Abilities

- Engagement (Activity 3)

Access for Multilingual Learners

- MLR2: Collect and Display (Activity 1, Activity 3)
- MLR8: Discussion Supports (Activity 2)

Instructional Routines

- Card Sort

Required Materials

Materials to Gather

- Scissors: Activity 2
- String: Activity 2
- Household items: Activity 3
- Meter sticks: Activity 3
- Quart-sized bottle: Activity 3
- Rulers: Activity 3
- Yardsticks: Activity 3

Materials to Copy

- Measurement Benchmarks Cards (1 copy for every 4 students): Activity 3

Required Preparation

Warm-up:

For the *Warm-up* activity, each group of 2 students needs scissors and more string than necessary for their assigned unit of length. To distribute the string without wasting too much or giving away the actual lengths, consider dividing one ball of string ahead of time into equal spools, enough for every group to get one. The spools can then be reused class after class. Rotate the spools between groups who are assigned shorter and longer lengths, so that one spool does not run out long before the others. Only one of each of the rulers, meter sticks, and yardsticks is needed for demonstration purposes.

For the “Measurements Card Sort” activity, prepare 1 copy of the blackline master for each group of 4–6 students. These slips can be reused from one class to the next. If possible, copy each complete set on a different color of paper, so that a stray card can quickly be put back.

Lesson Timeline

Warm-up	Activity 1	Activity 2	Activity 3	Lesson Synthesis	Assessment: Cool-down
10 min	10 min	10 min	20 min	10 min	5 min

Lesson 1

Anchoring Units of Measurement

Lesson Narrative (continued)

The main activity is a card sort in which students match images of common objects with their closest unit of length, volume, mass, or weight. Relating standard units with perceivable objects (such as the length of a baseball bat) or experiences (such as the distance walked in 10 minutes) strengthens students' grasp of the units and prompts them to reason abstractly and quantitatively.

A note about weight and mass:

In earlier grades, students learned that "weight" describes how heavy an object is and can be measured in grams and kilograms. Because this understanding is consistent with everyday usage and because students may not have learned the distinction between mass and weight, these materials continue to use grams and kilograms as units for weight. For students who can distinguish mass and weight, consider clarifying that weight can be expressed in grams or kilograms assuming that it is measured at sea level on Earth.

If students wonder about the meaning of "mass," consider explaining that it measures how much matter is in an object and is usually measured in grams or kilograms. Clarify that these concepts will be studied in a future science course.

Student Learning Goal

Let's see how big different things are.

Also for the "Measurements Card Sort" activity, prepare several examples of real objects depicted on the cards, so the students can see them at actual size, especially any objects on the cards that may be unfamiliar to students. A real quart-sized bottle is an especially crucial example to have.

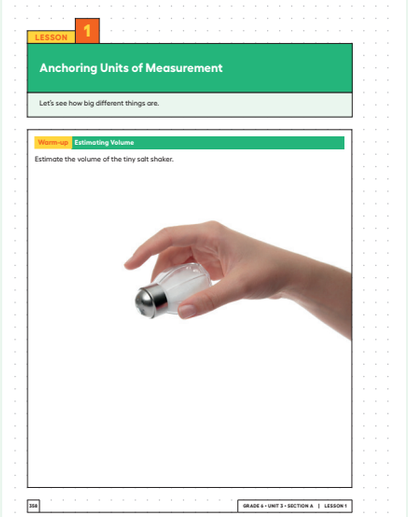
Activity 2:
For each group of 2 students, prepare a pair of scissors and more string than necessary for their assigned unit of length. To distribute the string without wasting too much or giving away the actual lengths, consider dividing one ball of string ahead of time into equal spools, enough for every group to get one. The spools can then be reused class after class. Rotate the spools between groups assigned shorter and longer lengths, so that one spool does not run out long before the others.

Only one of each of the ruler, meter stick, and yardstick is needed for demonstration purposes.

Activity 3:
Prepare 1 copy of the blackline master for each group of 4–6 students. If possible, copy each complete set of cards on a different color of paper, so that a stray card can quickly be put back.

Prepare several examples of real objects depicted on the cards so that students can see them at actual size, especially any objects that may be unfamiliar to students. A real quart-sized bottle is an especially crucial example to have.

Student Workbook


LESSON 1

Anchoring Units of Measurement

Let's see how big different things are.

Warm-up Estimating Volume

Estimate the volume of the tiny salt shaker.

Warm-up

Estimating Volume

10 min

Activity Narrative

This *Warm-up* prompts students to recall units of volume and reason about appropriate units of measurement in order to make an estimate. It gives the teacher an opportunity to hear what students know about measurement units for volume and how they choose a unit.

Launch

Arrange students in groups of 2. Tell students that they will be estimating the volume of a tiny salt shaker. Ask students to give a signal when they have an estimate. Give students 1 minute of quiet think time followed by 2 minutes to discuss their estimates with a partner. Ask them to discuss the following questions, displayed for all to see:

- *"How close are your estimates to one another?"*
- *"How did you decide on the unit of measure?"*
- *"Which parts of the image were important for making your estimate?"*
- *"Could you record your measurement using a different unit?"*

Student Task Statement

Estimate the volume of the tiny salt shaker.

Reasonable estimates would be close to 3 teaspoons, 15 milliliters, or 15 cubic centimeters.

Activity Synthesis

Poll the class on their estimates. Record and display the estimates for all to see. Invite a few students to share how they chose their unit of measurement and any information in the image that informs their estimates. After each explanation, solicit questions from the class that could help students clarify their reasoning. If only one or two units are used in the estimates, ask if there are other units that could be used.

If time permits, tell students that the length, width, and height of the shaker are each 2.5 centimeters. Ask them to use that information to check the reasonableness of their estimates. It may help to know that 1 cubic centimeter is the same volume as 1 milliliter.

During the discussion, students may question if the volume of the shaker as determined by the exterior side lengths indicates how much salt the shaker can hold. Welcome questions such as these and discuss how students' assumptions affected their estimates.

Activity 1: Optional

What Do They Measure?

10 min

Activity Narrative

In this activity, students classify units of measurement by the attribute they measure: length, volume, and weight or mass. It gives students an opportunity to activate what they learned in prior grades about what different units measure.

Launch

Direct students' attention to the list of units. Ask them to think about which attribute—length, volume, or weight or mass—each unit measures and to record it in one column accordingly.

Arrange students in groups of 2–4. Give them 2–3 minutes of quiet think time and then 2 minutes to discuss their responses with their group.

Access for Multilingual Learners (Activity 1, Student Task)

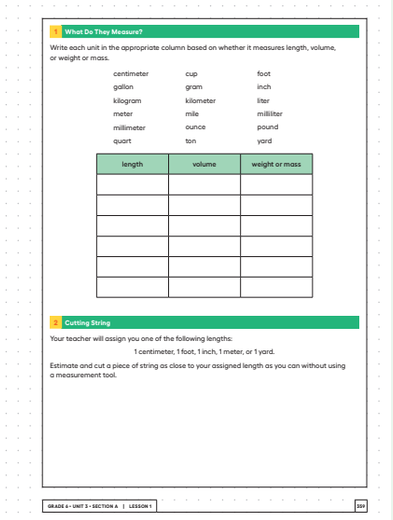
MLR2: Collect and Display.
Collect the language that students use to describe their understanding of the units and the attributes being measured. Display words and phrases such as "how long (or short)," "how thick (or thin)," "how much (or little)," "how much can fit into (or can fill)," or "how heavy (or light)." Invite students to borrow language from the display as needed.

Advances: Conversing, Reading

Building on Student Thinking

Students may think of volume solely in terms of the number of cubic units that fit in a three-dimensional figure. They may not recognize cups, quarts, gallons, liters, and milliliters as units of volume but as a separate set of units for measuring amounts of liquids or fine-grained solids. Clarify that these units still measure how much a three-dimensional region is filled.

Student Workbook


1 What Do They Measure?

Write each unit in the appropriate column based on whether it measures length, volume, or weight or mass.

centimeter, cup, foot, gallon, gram, inch, kilogram, kilometer, liter, meter, mile, milliliter, millimeter, ounce, pound, quart, ton, yard

length	volume	weight or mass

2 Cutting String

Your teacher will assign you one of the following lengths:

1 centimeter, 1 foot, 1 inch, 1 meter, or 1 yard.

Estimate and cut a piece of string as close to your assigned length as you can without using a measurement tool.

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Student Task Statement

Write each unit in the appropriate column based on whether it measures length, volume, or weight or mass.

centimeter	kilogram	millimeter
cup	kilometer	ounce
foot	liter	pound
gallon	meter	quart
gram	mile	ton
inch	milliliter	yard

length	volume	weight or mass
inch	cup	ounce
foot	quart	pound
yard	gallon	ton
mile	milliliter	gram
millimeter	liter	kilogram
centimeter		
meter		
kilometer		

Activity Synthesis

Invite students to share the units that they placed in each category, and discuss any disagreements. Make sure that students understand that length measures distance or how long something is, volume measures capacity or how much it takes to fill a three-dimensional region, and weight measures how heavy something is.

If time permits, consider asking students to share a few examples of units of length, volume, and weight that they have used or encountered outside of class.

Activity 2: Optional
Cutting String

10 min

Activity Narrative

In this activity, students are prompted to cut a string that is as close as possible to an assigned unit of length without using a measurement tool. The task offers an opportunity to assess students' prior knowledge of standard units of length and to find out the kinds of objects that students already use as benchmarks for estimating length units.

As students work, listen for any benchmark comparisons that they make. For example, a student might say that an inch is approximately the length of their thumb, or a yard is approximately the length of their arm.

Some students who are assigned the length of 1 meter are likely to say that it is basically the same as 1 yard. This is acceptable during group work but should be addressed during whole-class discussion.

Students are likely to produce their length of string pretty quickly. The majority of the time in this activity will be spent comparing and discussing the estimated lengths with the whole class.

Launch

Hold up a pen, an envelope, or another object whose length is likely unfamiliar to students (unlike an index card or a letter-size paper, which are more likely to be familiar). Choose one length of the object and ask students to estimate how long it is in centimeters. (Consider taking a quick walk around the room with the object so students can get a closer look.) Ask them to share their estimate with a partner, and then reveal the actual length.

Tell students that people who work with certain units of length on a repeated basis can get very good at estimating lengths with those units. For example, someone who sews may be very good at estimating yards of fabric. Explain that they will cut a piece of string as close to their assigned length as possible without using a measurement tool.

Arrange students in groups of 2. Distribute scissors and string. Assign each group one of the following lengths: 1 centimeter, 1 foot, 1 inch, 1 meter, or 1 yard. Not all of these lengths have to be used, but each length to be used should be assigned to 2–3 different groups so their estimations can be compared at the end.

Student Task Statement

Your teacher will assign you one of the following lengths:

1 centimeter, 1 foot, 1 inch, 1 meter, or 1 yard.

Estimate and cut a piece of string as close to your assigned length as you can without using a measurement tool.

Strings of varying lengths

Access for Multilingual Learners (Activity 2, Synthesis)

MLR8: Discussion Supports.
To amplify the use of mathematical language when communicating units of measurement, invite students to chorally repeat phrases that include measurements in context, for example: "This piece of string measures 1 centimeter." "The length of this piece of string is 1 foot."

Advances: Speaking, Representing

Instructional Routines

Card Sort

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Activity Synthesis

Gather and sort the strings based on their assigned length. Then, display each group of strings for all to see and compare. Start with the strings estimated to be 1 foot long, followed by 1 inch and 1 centimeter. For the shorter lengths, glue or tape them to a colored piece of paper so they can be held up for all to see.

Discuss the following:

- *"How close are these estimates to each other?"*
- *"How close are these estimates to the actual length?"*
- *"What strategies were used to make estimates?"*

Highlight any benchmark comparisons that students made previously, but it is not necessary to discuss other benchmarks that students did not mention themselves.

Finally, hold up both the yardstick and the meter stick to compare their actual lengths. Ensure that students notice that 1 meter is slightly longer than 1 yard. Then, hold up all the strings that were assigned to be 1 yard or 1 meter. Discuss how the estimated lengths compare to the actual 1 yard or 1 meter. Ask students whether or how the strings should be re-sorted based on the given information.

Activity 3

Card Sort: Measurement Benchmarks

20 min

Activity Narrative

This activity is intended to further ground students' familiarity with measurement units in benchmark objects. Students are given cards with pictures of objects and asked to match each object with the closest unit of length, volume, or weight or mass.

Students may not readily distinguish between units that are very close (such as 1 liter and 1 quart) and may consider them interchangeable. This is acceptable at this point and will be investigated further in the next lesson.

When students have completed the matching, they form new groups to analyze the matches made by one of the original groups. Those who are analyzing someone else's work can voice their support or disagreement with the placements of the cards. One student—who now belongs to a new group but whose work with the original group is being analyzed—can defend the matching decisions to the others. As they analyze and discuss one another's work, students practice constructing logical arguments and critiquing those of others.

Launch

Tell students to close their books or devices (or to keep them closed). Arrange students in groups of 4–6, and distribute pre-cut cards. Allow students to familiarize themselves with the representations on the cards:

- Give students 1 minute to place all the cards face up and to start thinking about possible ways to sort the cards into categories.
- Pause the class and select 1–3 students to share the categories they identified.
- Discuss as many different categories as time allows.

Tell students that this activity has two parts—matching and discussion—and that they will complete the first part with one group and the second part with a different group. Assign a number or letter label to each group member. (For example, assign the numbers 1–4 or letters A–D to a group of 4.) Explain that students with the same label will form a new group for discussion later.

Explain the matching portions of the activity. If not already brought up previously, point out that each card shows an object and a letter that represents a measurable attribute ("L" for length, "V" for volume, and "WM" for weight or mass). Tell students that their job is to match each object with an appropriate unit for measuring the specified attribute and to organize their matches on graphic organizers.

Give each group a set of graphic organizers from the blackline master.

Display several examples of real objects that are depicted on the cards so students can see them at actual size. The quart-sized bottle is an especially crucial real example to have, because many things that are packaged in quarts are also commonly available in other sizes.

Student Task Statement

Your teacher will give you a set of cards, each with a picture of an object and a letter in the top right corner. Use the graphic organizers to sort the cards with the same letter.

1. Match each picture card that has the letter "L" to a unit of length that is closest to the length of the object.

Objects matched to units of length:

1 inch	1 foot	1 yard	1 mile
length of a thumb width of a quarter thickness of a hockey puck	length of a ruler length of a shoe length of a football length of a license plate	length from chest to fingers length of a baseball bat	distance run in 10 minutes

1 millimeter	1 centimeter	1 meter	1 kilometer
thickness of a dime	width of a pinky finger width of the head of a golf tee	length from fingers to opposite armpit length of a baseball bat and ball	distance walked in 10 minutes

Access for Multilingual Learners (Activity 3, Student Task)

MLR2: Collect and Display.
Direct attention to words collected and displayed from a previous activity about units of measurement and the attributes that they measure. Invite students to borrow language from the display as needed, and update it throughout the lesson.

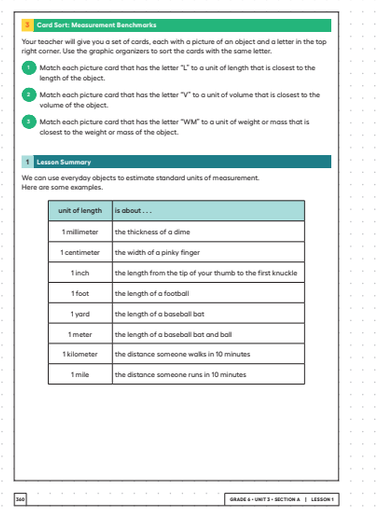
Advances: Conversing, Reading

Access for Students with Diverse Abilities (Activity 3, Student Task)

Engagement: Develop Effort and Persistence.
Chunk this task into more manageable parts. Give students a subset of the cards to start with, and introduce the remaining cards after students have completed their initial set of matches.

Supports accessibility for: Conceptual Processing, Organization, Memory

Student Workbook



3 Card Sort: Measurement Benchmarks

Your teacher will give you a set of cards, each with a picture of an object and a letter in the top right corner. Use the graphic organizers to sort the cards with the same letter.

1. Match each picture card that has the letter "L" to a unit of length that is closest to the length of the object.
2. Match each picture card that has the letter "V" to a unit of volume that is closest to the volume of the object.
3. Match each picture card that has the letter "WM" to a unit of weight or mass that is closest to the weight or mass of the object.

1 Lesson Summary

We can use everyday objects to estimate standard units of measurement. Here are some examples.

unit of length	is about . . .
1 millimeter	the thickness of a dime
1 centimeter	the width of a pinky finger
1 inch	the length from the tip of your thumb to the first knuckle
1 foot	the length of a football
1 yard	the length of a baseball bat
1 meter	the length of a baseball bat and ball
1 kilometer	the distance someone walks in 10 minutes
1 mile	the distance someone runs in 10 minutes

Building on Student Thinking

If students are very unfamiliar with any unit of volume, weight, or mass, tell them one object from the cards that matches with that unit. For example, if students have little knowledge of 1 milliliter, share that it is close to the amount of water in a full typical eyedropper. Ask students to decide by comparison which other objects could be matched to that unit.

2. Match each picture card that has the letter "V" to a unit of volume that is closest to the volume of the object.

Objects matched to units of volume:

1 cup	1 quart	1 gallon	1 milliliter	1 liter
measuring cup school milk carton	large bottle of sports drink small paint can	large milk jug large paint can	1s cube eyedrop packet of artificial sweetener	1,000s cube reusable water bottle half of a large soda bottle

3. Match each picture card that has the letter "WM" to a unit of weight or mass that is closest to the weight or mass of the object.

Objects matched to units of weight or mass:

1 ounce	1 pound	1 ton	1 gram	1 kilogram
mouse slice of bread birthday card	crow loaf of bread jar of peanut butter box of 96 crayons hooded sweatshirt	small car draft horse	paper clip dollar bill 2 raisins	textbook bunch of bananas guinea pig

Activity Synthesis

When most groups have finished matching the objects with the units, instruct them to form new groups based on their assigned number or letter (so that each new group consists of one person from each original group). Assign each new group a set of matched cards (done by an original group) to analyze. Display and read aloud the following guiding questions:

💬 *"Did your original groups match the objects to the same units?"*

"Which objects did your groups match differently?"

"Which objects or units were the easiest to match? Why?"

"Which objects or units were the hardest to match? Why?"

Observe whether any object or unit was matched incorrectly by most of the class. If so, discuss what the correct match is.

At the end of the discussion, consider asking students to mix up the cards and put them back in the envelopes for another class to use.

Lesson Synthesis

Display some actual objects pictured in the cards for all to see. Ask students to express the length, volume, weight, or mass of each object. For other units without physical objects to display, consider inviting students to think of an actual object they have or know of that might be close to each unit.

Consider creating a classroom display that shows standard units and corresponding benchmark objects to serve as a reference later. Alternatively, consider asking students to create a personal reference in their notebook. For each unit of measurement, ask students to record one benchmark object of their choice.

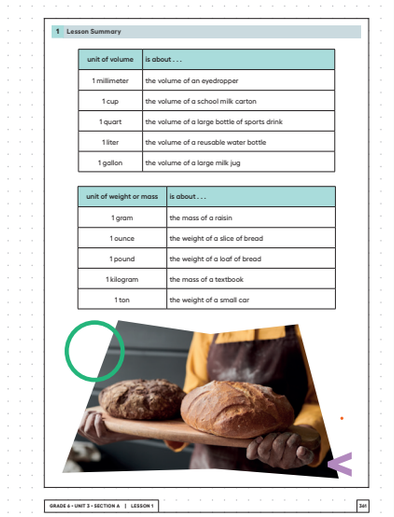
Lesson Summary

We can use everyday objects to estimate standard units of measurement. Here are some examples.

unit of length	is about ...
1 millimeter	the thickness of a dime
1 centimeter	the width of a pinky finger
1 inch	the length from the tip of your thumb to the first knuckle
1 foot	the length of a football
1 yard	the length of a baseball bat
1 meter	the length of a baseball bat and ball
1 kilometer	the distance someone walks in 10 minutes
1 mile	the distance someone runs in 10 minutes

unit of volume	is about ...
1 milliliter	the volume of an eyedropper
1 cup	the volume of a school milk carton
1 quart	the volume of a large bottle of sports drink
1 liter	the volume of a reusable water bottle
1 gallon	the volume of a large milk jug

Student Workbook


1 Lesson Summary

unit of volume	is about . . .
1 millimeter	the volume of an eyedropper
1 cup	the volume of a school milk carton
1 quart	the volume of a large bottle of sports drink
1 liter	the volume of a reusable water bottle
1 gallon	the volume of a large milk jug

unit of weight or mass	is about . . .
1 gram	the mass of a raisin
1 ounce	the weight of a slice of bread
1 pound	the weight of a loaf of bread
1 kilogram	the mass of a textbook
1 ton	the weight of a small car

Responding To Student Thinking

More Chances
Students will have more opportunities to understand the mathematical ideas addressed here. There is no need to slow down or add additional work to the next lessons.

unit of weight or mass	is about ...
1 gram	the mass of a raisin
1 ounce	the weight of a slice of bread
1 pound	the weight of a loaf of bread
1 kilogram	the mass of a textbook
1 ton	the weight of a small car

Cool-down

So Much in Common

5 min

Students use their reinforced understanding of how big standard units are to compare a pair of lengths, a pair of volumes, and a pair of weight and mass. Both measurements in each pair have the same numerical value but different units.

Launch

Remind students to think about the benchmark objects for each unit of measurement while answering the questions.

Student Task Statement

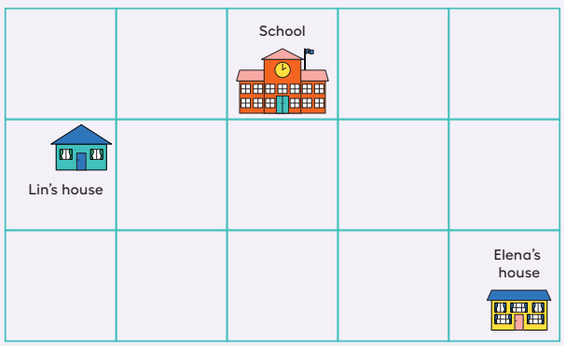
Lin and Elena have discovered they have so much in common.

1. They each walk 500 units to school.

   Who walks 500 feet? Lin walks 500 feet.

   Who walks 500 yards? Elena walks 500 yards.

   Explain your reasoning.



- Yards are longer than feet, and Elena's house is farther away than Lin's.
- It looks like 500 foot-long rulers could reach from Lin's house to the school, but it would take 500 yardsticks to reach from Elena's house to the school.

2. They each have a fish tank holding 20 units of water.

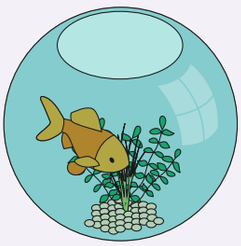
Whose tank holds 20 gallons? Elena's fish tank holds 20 gallons.

Whose tank holds 20 cups? Lin's fish bowl holds 20 cups.

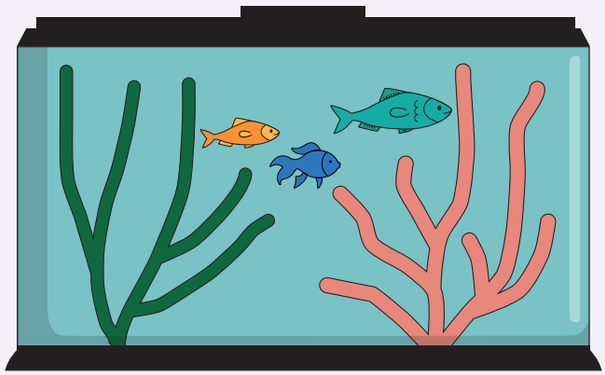
Explain your reasoning.

Sample reasoning:

- Gallons are bigger than cups, and Elena's tank is larger.
- It looks like Elena's fish tank could hold 20 large milk jugs of water while Lin's fish bowl could only hold 20 school milk cartons of water.



Lin's Fish Bowl



Elena's Fish Tank

3. They each have a dog that weighs 24 units.

Whose dog weighs 24 pounds? Lin's dog weighs 24 pounds.

Whose dog weighs 24 kilograms? Elena's dog weighs 24 kilograms.

Explain your reasoning.

Sample reasoning:

- Kilograms are heavier than pounds, and Elena's dog is bigger.
- It looks like Lin's dog would weigh as much as 24 boxes of crayons while Elena's dog would weigh as much as 24 textbooks.

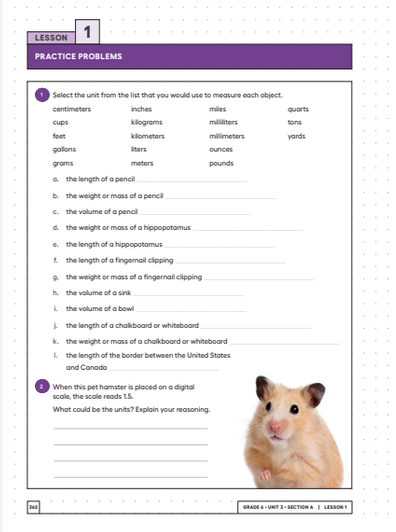
Lin's Dog Elena's Dog

Lesson 1

Practice Problems

6 Problems

Student Workbook



LESSON 1

PRACTICE PROBLEMS

1. Select the unit from the list that you would use to measure each object.

centimeters	inches	miles	quarts
cups	kilograms	milliliters	tons
feet	kilometers	millimeters	yards
gallons	liters	ounces	
grams	meters	pounds	

a. the length of a pencil
b. the weight or mass of a pencil
c. the volume of a pencil
d. the weight or mass of a hippopotamus
e. the length of a hippopotamus
f. the length of a fingernail clipping
g. the weight or mass of a fingernail clipping
h. the volume of a sink
i. the volume of a bowl
j. the length of a chalkboard or whiteboard
k. the weight or mass of a chalkboard or whiteboard
l. the length of the border between the United States and Canada

2. When this pet hamster is placed on a digital scale, the scale reads 1.5.
What could be the units? Explain your reasoning.

Problem 1

Select the unit from the list that you would use to measure each object.

centimeters	inches	miles	quarts
cups	kilograms	milliliters	tons
feet	kilometers	millimeters	yards
gallons	liters	ounces	
grams	meters	pounds	

Sample responses:

a. the length of a pencil inches, centimeters

b. the weight or mass of a pencil grams, ounces

c. the volume of a pencil milliliters

d. the weight or mass of a hippopotamus pounds, kilograms, tons

e. the length of a hippopotamus feet, yards, meters

f. the length of a fingernail clipping millimeters

g. the weight or mass of a fingernail clipping grams

h. the volume of a sink gallons, liters, quarts

i. the volume of a bowl cups, liters, quarts

j. the length of a chalkboard or whiteboard feet. yards, meters

k. the weight or mass of a chalkboard or whiteboard kilograms, pounds

l. the length of the border between the United States and Canada kilometers, miles

Problem 2

When this pet hamster is placed on a digital scale, the scale reads 1.5.

What could be the units? Explain your reasoning.

Ounces.

Sample reasoning: Grams and milligrams are too small. Pounds and kilograms are too big.

Problem 3

Circle the larger unit of measure. Then, write down what the unit measures: distance, volume, or weight (or mass).

a. meter or (kilometer)

distance

b. (yard) or foot

distance

c. cup or (quart)

volume

d. (pound) or ounce

weight (mass)

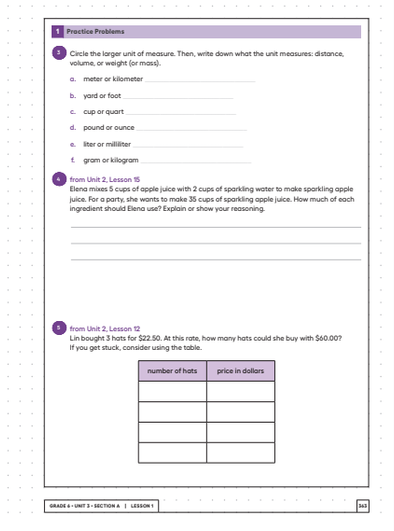
e. (liter) or milliliter

volume

f. gram or (kilogram)

weight (mass)

Student Workbook



1 Practice Problems

3 Circle the larger unit of measure. Then, write down what the unit measures: distance, volume, or weight (or mass).

a. meter or kilometer _____

b. yard or foot _____

c. cup or quart _____

d. pound or ounce _____

e. liter or milliliter _____

f. gram or kilogram _____

4 from Unit 2, Lesson 15

Elena mixes 5 cups of apple juice with 2 cups of sparkling water to make sparkling apple juice. For a party, she wants to make 35 cups of sparkling apple juice. How much of each ingredient should Elena use? Explain or show your reasoning.

5 from Unit 2, Lesson 12

Lin bought 3 hats for $22.50. At this rate, how many hats could she buy with $60.00? If you get stuck, consider using the table.

number of hats	price in dollars

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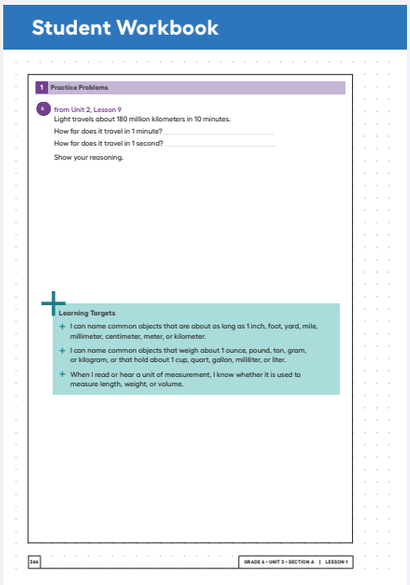
Student Workbook


1 Practice Problems

6 from Unit 2, Lesson 9
Light travels about 180 million kilometers in 10 minutes.
How far does it travel in 1 minute?
How far does it travel in 1 second?
Show your reasoning.

Learning Targets
+ I can name common objects that are about as long as 1 inch, foot, yard, mile, millimeter, centimeter, meter, or kilometer.
+ I can name common objects that weigh about 1 ounce, pound, ton, gram, or kilogram, or that hold about 1 cup, quart, gallon, milliliter, or liter.
+ When I read or hear a unit of measurement, I know whether it is used to measure length, weight, or volume.

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Problem 4

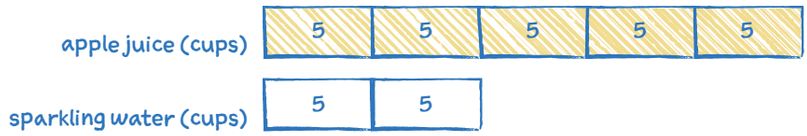
from Unit 2, Lesson 15

Elena mixes 5 cups of apple juice with 2 cups of sparkling water to make sparkling apple juice. For a party, she wants to make 35 cups of sparkling apple juice. How much of each ingredient should Elena use? Explain or show your reasoning.

25 cups of apple juice and 10 cups of sparkling water.

Sample reasoning:

- There are 7 cups of sparkling juice in each batch, since 5 + 2 = 7. To make 35 cups Elena will need 5 batches since 5 · 7 = 35. Five batches mean 25 cups of apple juice and 10 cups of sparkling water.



Problem 5

from Unit 2, Lesson 12

Lin bought 3 hats for $22.50. At this rate, how many hats could she buy with $60.00? If you get stuck, consider using the table.

8 hats.

Sample reasoning:

number of hats	price in dollars
3	22.50
1	7.50
5	37.50
8	60

Problem 6

from Unit 2, Lesson 9

Light travels about 180 million kilometers in 10 minutes. How far does it travel in 1 minute? How far does it travel in 1 second? Show your reasoning.

Light travels about 18 million km in 1 minute and about 300,000 km in 1 second. Sample reasoning: 18,000,000 ÷ 60 = 300,000, so light travels about 300,000 km in one second.