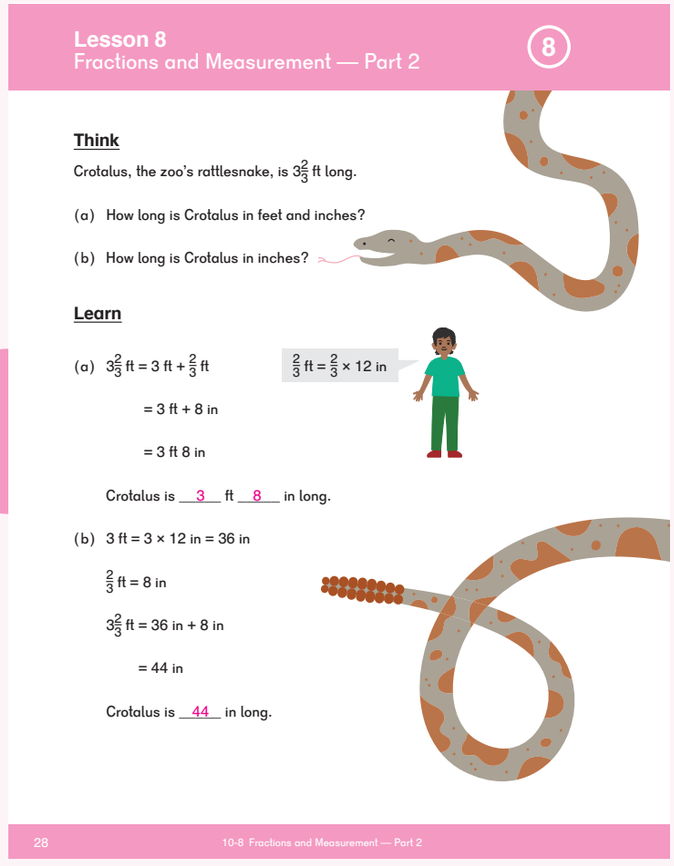
Objectives

- Convert a measurement given as a mixed number to compound units and single units.
- Express a smaller unit of measurement as a fraction of a larger unit of measurement that is not a whole number.



Think

Pose the **Think** problem. Provide students with time to solve the problems independently.

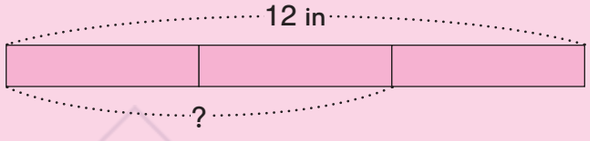
Discuss student solutions to the **Think** questions.

Learn

Have students compare the methods shown in **Learn** with their solutions from **Think**.

(a) Since the question asks for the answer to be expressed in feet and inches, help students see that only the fraction part of the solution needs to be converted into inches. Alex is converting $\frac{2}{3}$ ft into in.

As in the previous lesson, students may have drawn a bar model to solve for the number of inches in the problem:



3 units ⟶ 12 in
1 unit ⟶ 12 in ÷ 3 = 4 in
2 units ⟶ 2 × 4 in = 8 in

(b) Since the question asks for the answer to be expressed in inches, even the feet in whole number need to be converted into inches. First convert 3 feet to 36 inches, then add $\frac{2}{3}$ of a foot, which was calculated in (a).

Do

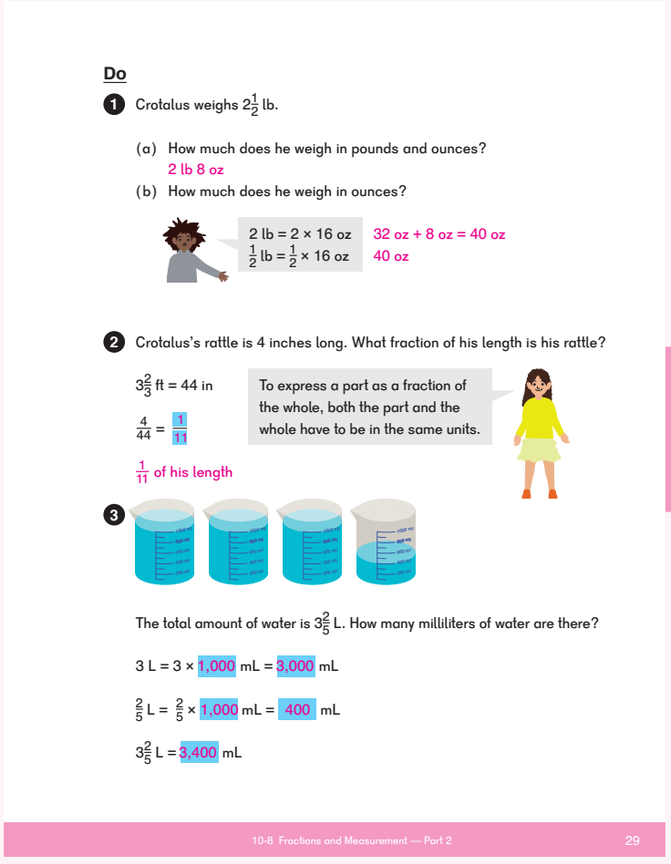
❶—❹ For each question, discuss the different calculations shown to find the answer.

❶ Ask students, "What needs to be converted in (a) and (b), the fraction or the whole number?"

(a) Since we want to know the weight in pounds and ounces, we only need to convert into ounces the part of the weight that is expressed as a fraction of a pound. The whole number of pounds stay as pounds. Dion knows that 1 lb = 16 oz so he can convert $\frac{1}{2}$ pound into 8 ounces.

(b) We want to know the weight in ounces, so we need to convert all the units into ounces.

❷ Discuss Sofia's comment. Help students think of it as 4 out of 44 inches.



Do

❶ Crotalus weighs $2\frac{1}{2}$ lb.

(a) How much does he weigh in pounds and ounces?
2 lb 8 oz

(b) How much does he weigh in ounces?

2 lb = 2 × 16 oz
$\frac{1}{2}$ lb = $\frac{1}{2}$ × 16 oz
32 oz + 8 oz = 40 oz
40 oz

❷ Crotalus's rattle is 4 inches long. What fraction of his length is his rattle?

$3\frac{2}{3}$ ft = 44 in

$\frac{4}{44}$ = $\frac{1}{11}$

$\frac{1}{11}$ of his length

To express a part as a fraction of the whole, both the part and the whole have to be in the same units.

❸

The total amount of water is $3\frac{2}{5}$ L. How many milliliters of water are there?

3 L = 3 × 1,000 mL = 3,000 mL

$\frac{2}{5}$ L = $\frac{2}{5}$ × 1,000 mL = 400 mL

$3\frac{2}{5}$ L = 3,400 mL

10-8 Fractions and Measurement — Part 2 29

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6 – **9** Students should be able to solve these problems independently.

6 $1\text{ m} \longrightarrow 100\text{ cm}$
$\frac{3}{5}\text{ m} \longrightarrow \frac{3}{5} \times 100\text{ cm} = 60\text{ cm}$

7 Students can add the mixed numbers together first, and then express the distance as meters:

$2\frac{1}{2} + 3\frac{3}{4} = 6\frac{1}{4}\text{ km}$
$6\text{ km} \longrightarrow 6 \times 1{,}000\text{ m} = 6{,}000\text{ m}$
$\frac{1}{4}\text{ km} \longrightarrow \frac{1}{4} \times 1{,}000\text{ m} = 250\text{ m}$
$6{,}000\text{ m} + 250\text{ m} = 6{,}250\text{ m}$

Students could also convert to meters first, and then add.

Saturday:

$2\text{ km} \longrightarrow 2 \times 1{,}000\text{ m} = 2{,}000\text{ m}$
$\frac{1}{2}\text{ km} \longrightarrow \frac{1}{2} \times 1{,}000\text{ m} = 500\text{ m}$
$2{,}000\text{ m} + 500\text{ m} = 2{,}500\text{ m}$

Sunday:

$3\text{ km} \longrightarrow 3 \times 1{,}000\text{ m}$
$\frac{3}{4}\text{ km} \longrightarrow \frac{3}{4} \times 1{,}000\text{ m} = 750\text{ m}$
$3{,}000\text{ m} + 750\text{ m} = 3{,}750\text{ m}$

Altogether:

$2{,}500\text{ m} + 3{,}750\text{ m} = 6{,}250\text{ m}$

8 Milk at first:

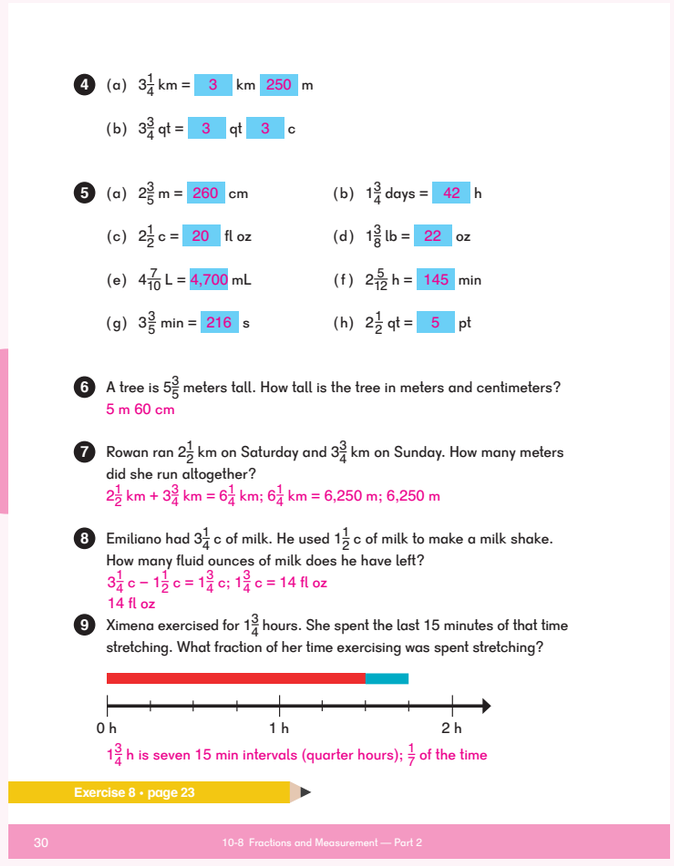
$3\text{ c} \longrightarrow 3 \times 8\text{ fl oz} = 24\text{ fl oz}$
$\frac{1}{4}\text{ c} \longrightarrow \frac{1}{4} \times 8\text{ fl oz} = 2\text{ fl oz}$
$24\text{ fl oz} + 2\text{ fl oz} = 26\text{ fl oz}$

Milk used:

$1\text{ c} \longrightarrow 8\text{ fl oz}$
$\frac{1}{2}\text{ c} \longrightarrow \frac{1}{2} \times 8\text{ fl oz} = 4\text{ fl oz}$

Milk left:

$26\text{ fl oz} - 12\text{ fl oz} = 14\text{ fl oz}$



4 (a) $3\frac{1}{4}$ km = 3 km 250 m

(b) $3\frac{3}{4}$ qt = 3 qt 3 c

5 (a) $2\frac{3}{5}$ m = 260 cm (b) $1\frac{3}{4}$ days = 42 h

(c) $2\frac{1}{2}$ c = 20 fl oz (d) $1\frac{3}{8}$ lb = 22 oz

(e) $4\frac{7}{10}$ L = 4,700 mL (f) $2\frac{5}{12}$ h = 145 min

(g) $3\frac{3}{5}$ min = 216 s (h) $2\frac{1}{2}$ qt = 5 pt

6 A tree is $5\frac{3}{5}$ meters tall. How tall is the tree in meters and centimeters?
5 m 60 cm

7 Rowan ran $2\frac{1}{2}$ km on Saturday and $3\frac{3}{4}$ km on Sunday. How many meters did she run altogether?
$2\frac{1}{2}$ km + $3\frac{3}{4}$ km = $6\frac{1}{4}$ km; $6\frac{1}{4}$ km = 6,250 m; 6,250 m

8 Emiliano had $3\frac{1}{4}$ c of milk. He used $1\frac{1}{2}$ c of milk to make a milk shake. How many fluid ounces of milk does he have left?
$3\frac{1}{4}$ c – $1\frac{1}{2}$ c = $1\frac{3}{4}$ c; $1\frac{3}{4}$ c = 14 fl oz
14 fl oz

9 Ximena exercised for $1\frac{3}{4}$ hours. She spent the last 15 minutes of that time stretching. What fraction of her time exercising was spent stretching?

$1\frac{3}{4}$ h is seven 15 min intervals (quarter hours); $\frac{1}{7}$ of the time

Exercise 8 • page 23

30 10-8 Fractions and Measurement — Part 2

9 Express the part and the whole in the same units:

$1\text{ h} \longrightarrow 60\text{ min}$
$\frac{3}{4}\text{ h} \longrightarrow \frac{3}{4} \times 60\text{ min} = 45\text{ min}$
$60\text{ min} + 45\text{ min} = 105\text{ min}$
$\frac{15}{105} = \frac{1}{7}$

Exercise 8 • page 23

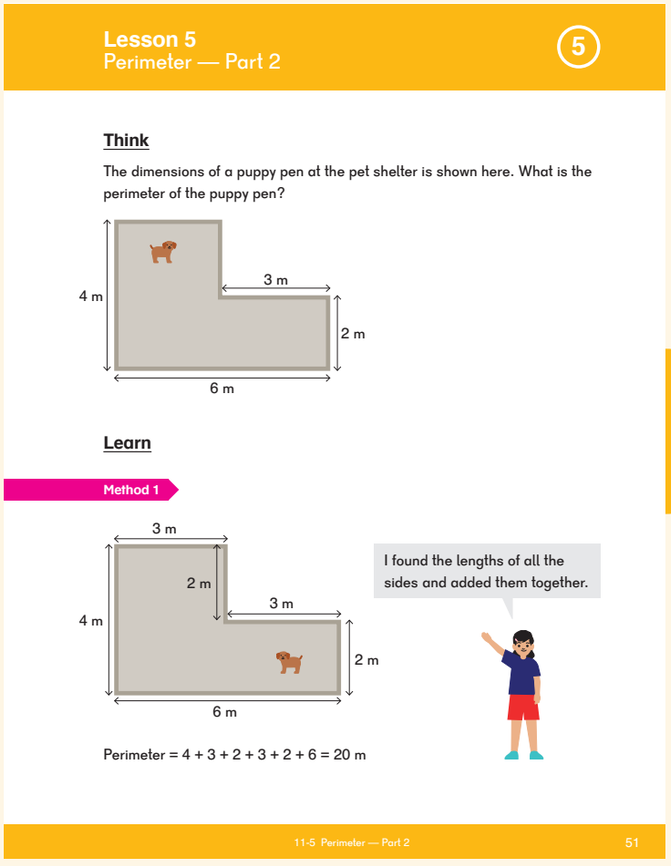
Lesson 5 Perimeter — Part 2

Objective

- Find the perimeter of composite figures.

Lesson Materials

- Grid Paper (BLM)
- Toothpicks



Think

Pose the **Think** problem and have students try to solve the problem independently. Provide students with toothpicks to make the puppy pen, or Grid Paper (BLM) to draw it.

Learn

Have students compare their solutions from **Think** with the ones shown in the textbook. Discuss the two methods shown.

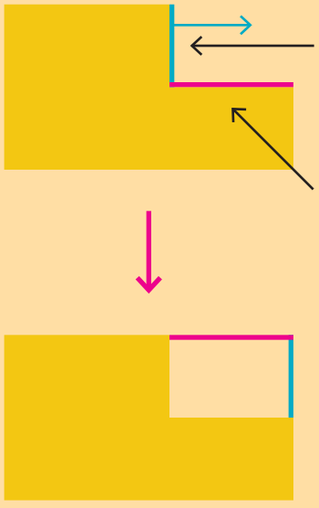
Method 1

Mei knows that she can find the perimeter of a figure by adding up all the side lengths. Ask students how she found the missing lengths.

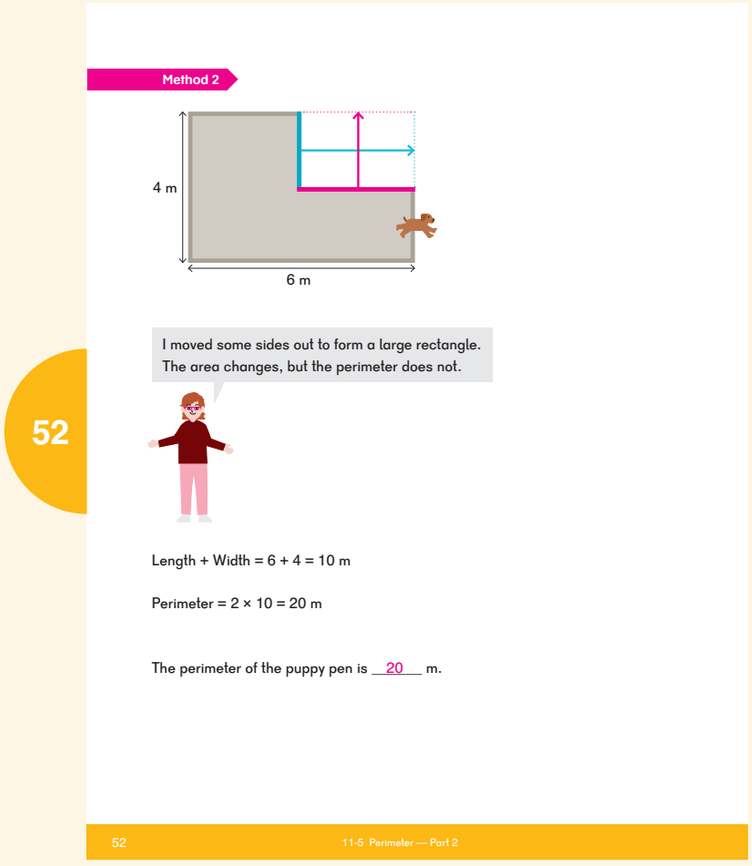
Method 2

Emma moves the two sides out. This allows her to find the perimeter using fewer calculations, since the perimeter is the same as the perimeter of a rectangle with side lengths of 4 m and 6 m.

To help students understand this, have them make the figure with toothpicks. Each toothpick represents 1 m. Have them move the toothpicks as shown in the textbook. Ask students, "What do you notice? Do you notice you have the same length on the top and the bottom?"



Using this method, students should see that the area changes, but the perimeter remains the same.



Do

❶—❹ Discuss the problems and given examples with students as necessary.

❷ The answer key uses Method 2 from **Learn**. If students use Method 1 from **Learn**, the measurement of the left side would be:

$5 - 2\frac{1}{2} = 2\frac{1}{2}$ ft

The bottom side would be:

$9 - 2\frac{1}{4} = 6\frac{3}{4}$ ft

The measurement of the perimeter would be:

$9 + 5 + 6\frac{3}{4} + 2\frac{1}{2} + 2\frac{1}{4} + 2\frac{1}{2} = 28$ ft

Alex asks students which method's calculations are easier. They should see that Method 2 results in fewer calculations.

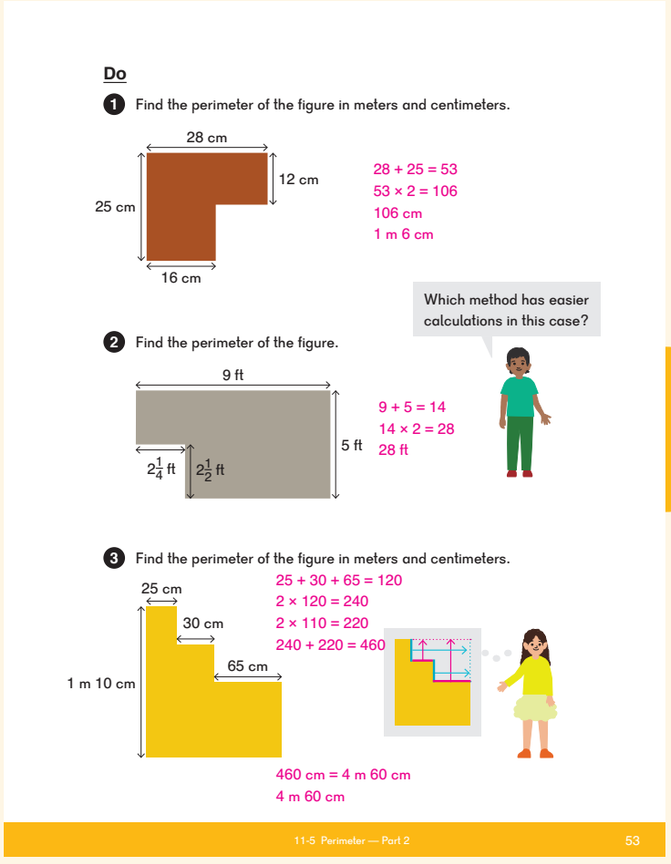
❸ Method 2 from **Learn** is further developed in this problem. Students are not able to determine the measurement of the right side of the figure, and will need to consider moving the sides out. Sofia's thought bubble gives the hint to do that.

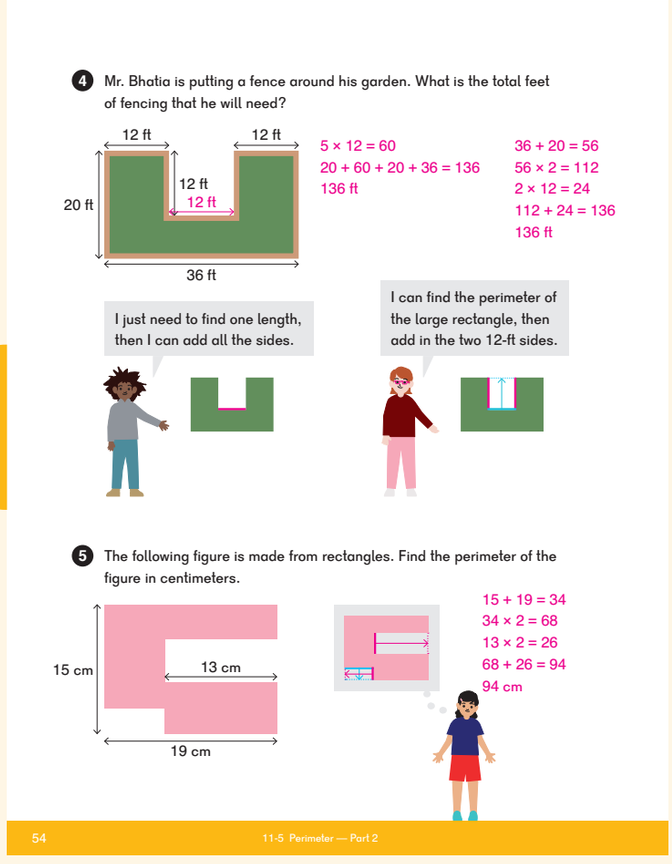
❹ Discuss the two methods that Dion and Emma use to solve the problem.

Ask students how Dion can find the measurement of the missing side length (36 – 12 – 12 = 12). The missing pink length is 12 feet.

Ask students which two 12 ft sides Emma needs to add. They should see that the two pink sides are not included in her calculation of the perimeter of the large rectangle. She will need to add them to the perimeter.

❺ Mei thinks of the entire figure as a rectangle and adds in two sides that have the length of 13 cm. If students struggle, allow them to draw the figure on graph paper to scale, and count the units of the perimeter.





Objectives

- Express mixed numbers in hundredths as two-place decimals.
- Express two-place decimals greater than 1 as mixed numbers in hundredths.
- Express a decimal number to hundredths as the sum of place values in expanded form.

Lesson Materials

- Place-value discs: ones, tenths, and hundredths
- Place-value cards: ones, tenths, and hundredths
- Blank Hundredths Grid (BLM)

Think

Allow students to choose between place-value cards, discs, or the Blank Hundredths Grids (BLM) to represent the amounts of water the pets require and then answer the question.

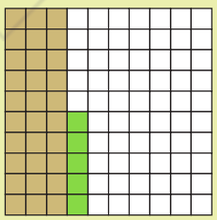
Record strategies on the board and discuss the methods students used.

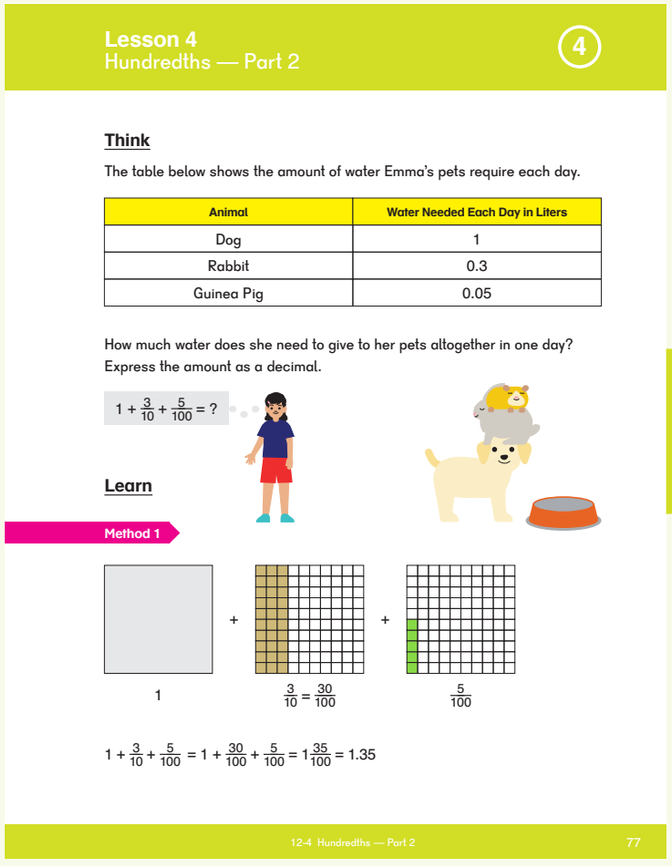
Learn

Have students compare their solutions from **Think** with the ones shown in the textbook. Discuss the two methods shown.

Method 1

Students may also have drawn the sum of 3 tenths and 5 hundredths on one grid:





Lesson 4
Hundredths — Part 2

4

Think

The table below shows the amount of water Emma's pets require each day.

Animal	Water Needed Each Day in Liters
Dog	1
Rabbit	0.3
Guinea Pig	0.05

How much water does she need to give to her pets altogether in one day? Express the amount as a decimal.

$1 + \frac{3}{10} + \frac{5}{100} = ?$

Learn

Method 1

1 + $\frac{3}{10}$ = $\frac{30}{100}$ + $\frac{5}{100}$

$1 + \frac{3}{10} + \frac{5}{100} = 1 + \frac{30}{100} + \frac{5}{100} = 1\frac{35}{100} = 1.35$

12-4 Hundredths — Part 2 77

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This method allows students to see how the decimals relate to fractions.

Method 2

This method emphasizes the place value of each digit in the decimal.

Use the questions about digits and their values from the textbook as examples when working with the **Do** problems.

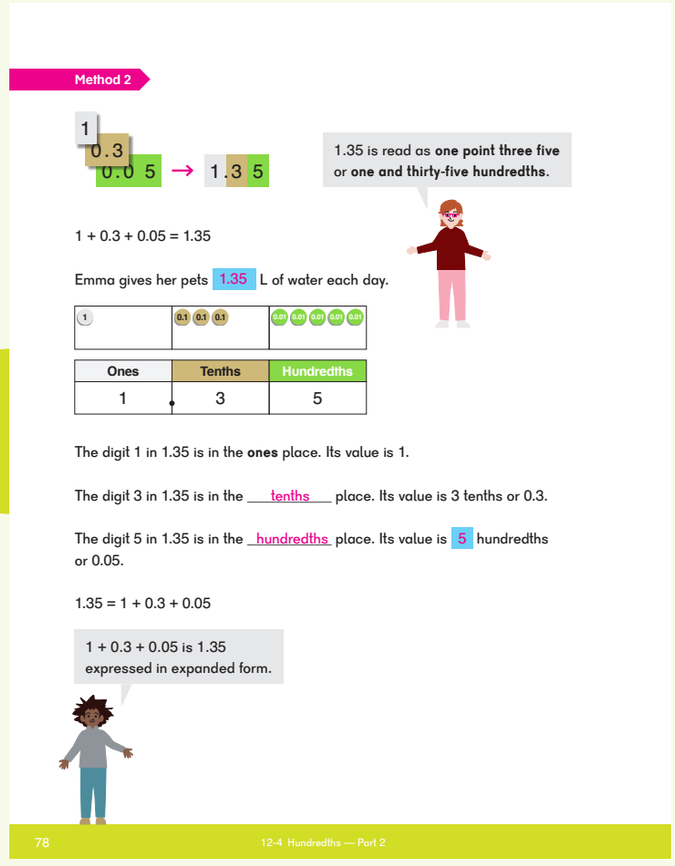
Dion reminds students of the term "expanded form." Students should relate decimals to their knowledge of place values in whole numbers. Just as we wrote whole numbers in expanded form, we can do the same with decimals.

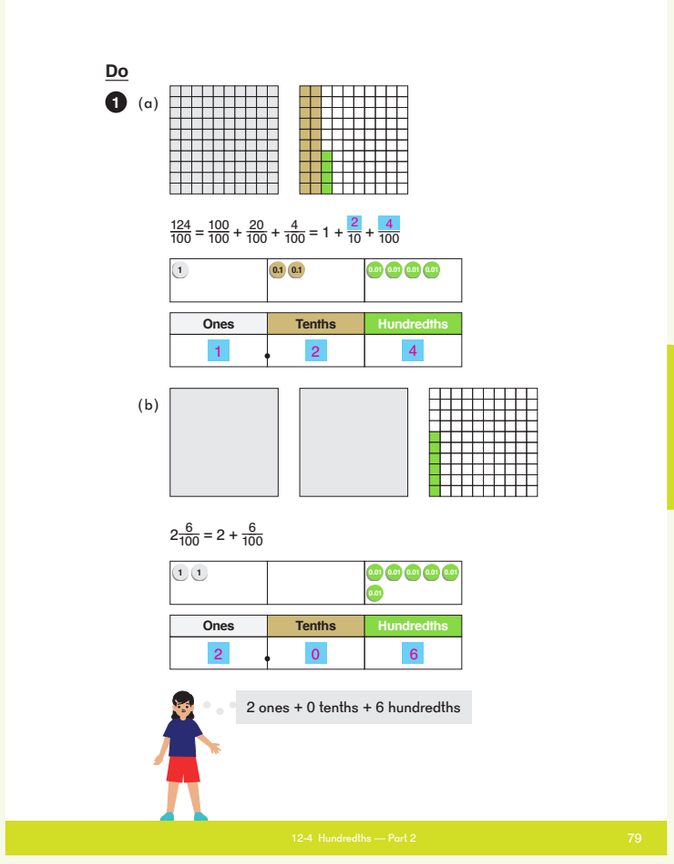
Note the way to write a decimal as fraction in expanded form is not $1.35 = 1 + \frac{35}{100}$ but $1.35 = 1 + \frac{3}{10} + \frac{5}{100}$. The emphasis is on place value.

Do

❶—❸ Students should be able to work these problems independently.

❶ This problem presents multiple ways to understand the same decimal. Students who can easily convert between these methods have mastered the place value of decimals and their connection to fractions.

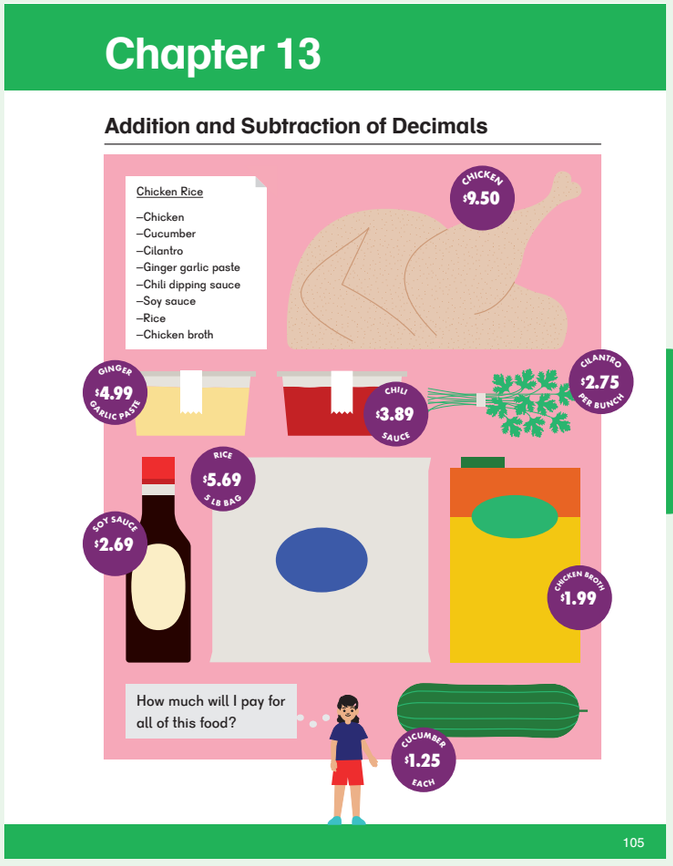




Chapter Opener

Objective

- Review addition and subtraction of money and consider ways to add or subtract decimals.



Have students discuss Mei's question. Ask them to recall what they have learned about adding money and how that relates to what they now know about decimals.

Students should understand that the decimal point is always between the dollars and cents. When we add money, we are adding cents to cents and dollars to dollars. If there are more than 100 cents, we can convert cents to dollars or dollars and cents.

Continue to Lesson 1.

Lesson 1 Adding and Subtracting Tenths

Objective

- Add and subtract decimals with tenths using mental math.

Lesson Materials

- Place-value discs: ones and tenths

Think

Provide students with place-value discs and use them to solve the **Think** problems. They should write an equation for each problem.

Discuss the methods students used.

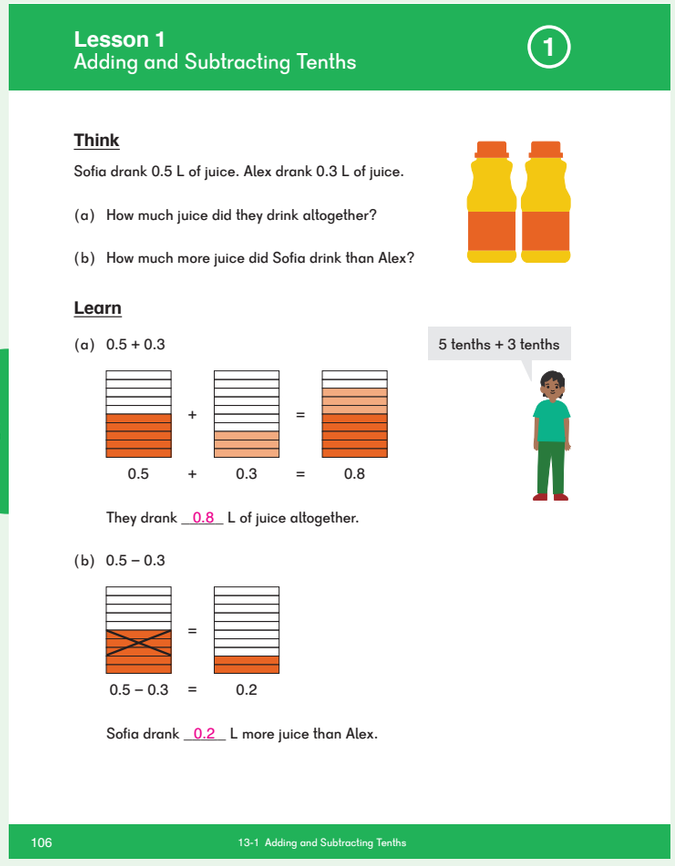
Learn

Students should see that it is easy to add (and subtract) the decimals in these problems as we are adding and subtracting like units, tenths.

Alex thinks it is easy to add and subtract decimals by thinking of the tenths as units: 5 tenths and 3 tenths.

(b) Just as in earlier grades when students subtracted 3 dogs from 5 dogs, 3 cm from 5 cm, and 3 thousands from 5 thousands, they can subtract 3 tenths from 5 tenths: 5 tenths – 3 tenths = 2 tenths.

Have students compare their solutions from **Think** with the ones shown in the textbook.



Do

❶—❹ Discuss these problems with students. Have them use the place-value discs to help solve the problems if necessary.

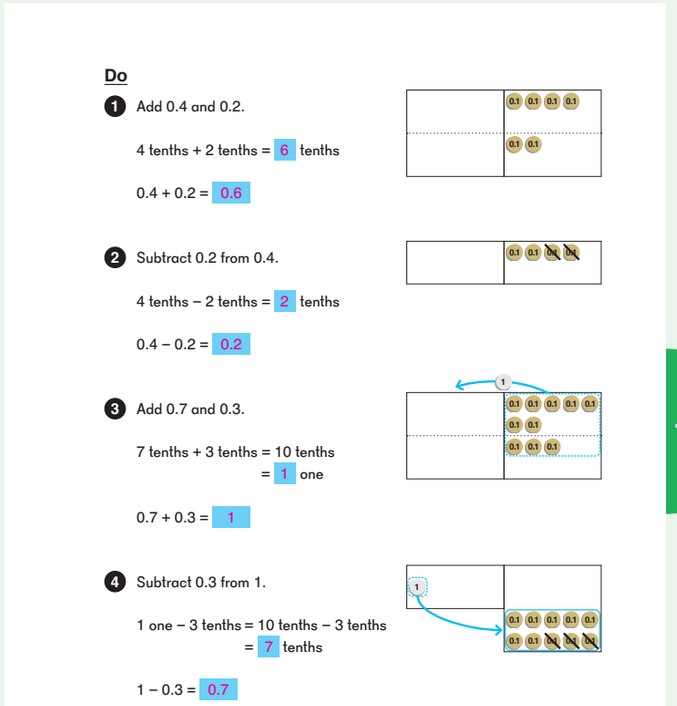
❸ Students should see that 10 tenths can be regrouped as 1 one (similar to regrouping 10 ones as 1 ten).

❹ Students can think in terms of the place value units. 1 one is regrouped as 10 tenths.

❻ Just as 13 ones – 7 ones is 6 ones, 13 tenths – 7 tenths is 6 tenths.

❼—❽ Students should be able to solve these problems independently.

Exercise 1 • page 79



Do

❶ Add 0.4 and 0.2.

4 tenths + 2 tenths = 6 tenths

0.4 + 0.2 = 0.6

❷ Subtract 0.2 from 0.4.

4 tenths – 2 tenths = 2 tenths

0.4 – 0.2 = 0.2

❸ Add 0.7 and 0.3.

7 tenths + 3 tenths = 10 tenths
= 1 one

0.7 + 0.3 = 1

❹ Subtract 0.3 from 1.

1 one – 3 tenths = 10 tenths – 3 tenths
= 7 tenths

1 – 0.3 = 0.7

13-1 Adding and Subtracting Tenths 107

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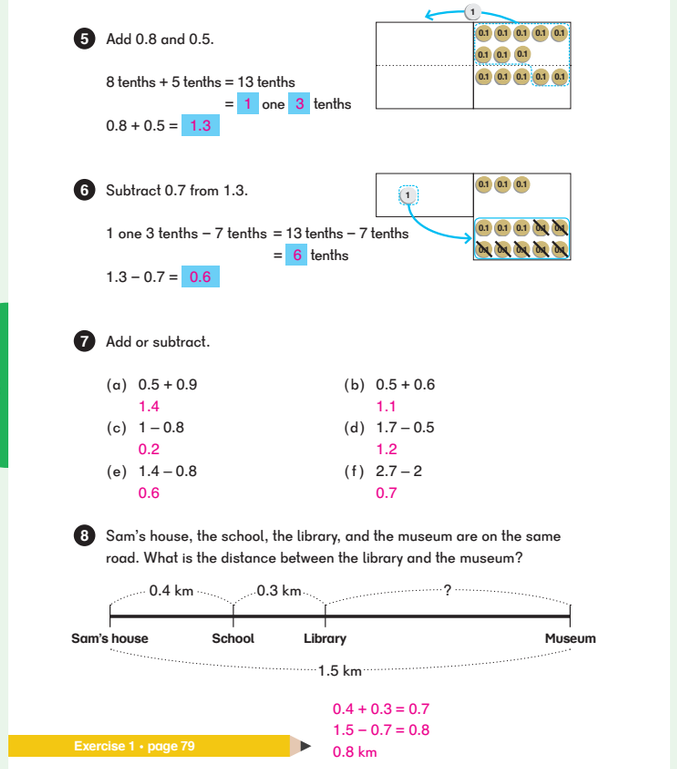

❺ Add 0.8 and 0.5.

8 tenths + 5 tenths = 13 tenths
= 1 one 3 tenths

0.8 + 0.5 = 1.3

❻ Subtract 0.7 from 1.3.

1 one 3 tenths – 7 tenths = 13 tenths – 7 tenths
= 6 tenths

1.3 – 0.7 = 0.6

❼ Add or subtract.

(a) 0.5 + 0.9
1.4

(b) 0.5 + 0.6
1.1

(c) 1 – 0.8
0.2

(d) 1.7 – 0.5
1.2

(e) 1.4 – 0.8
0.6

(f) 2.7 – 2
0.7

❽ Sam's house, the school, the library, and the museum are on the same road. What is the distance between the library and the museum?

0.4 km, 0.3 km, ?
Sam's house, School, Library, Museum
1.5 km

0.4 + 0.3 = 0.7
1.5 – 0.7 = 0.8
0.8 km

Exercise 1 • page 79

108 13-1 Adding and Subtracting Tenths

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Lesson 1 The Size of Angles

Objectives

- Express $\frac{1}{4}$ turns, $\frac{1}{2}$ turns, $\frac{3}{4}$ turns, and complete turns in degrees.
- Find the measure in degrees of the angles of set squares.

Lesson Materials

- Paper Circles (BLM)
- Set squares

Think

Provide students with Paper Circles (BLM) and set squares. Ask students to find the right angles on the set squares. Ask them to recall what they have learned about a circle (center, radius, and diameter).

Have students build the angle circles as directed in **Think**, and complete the **Think** questions.

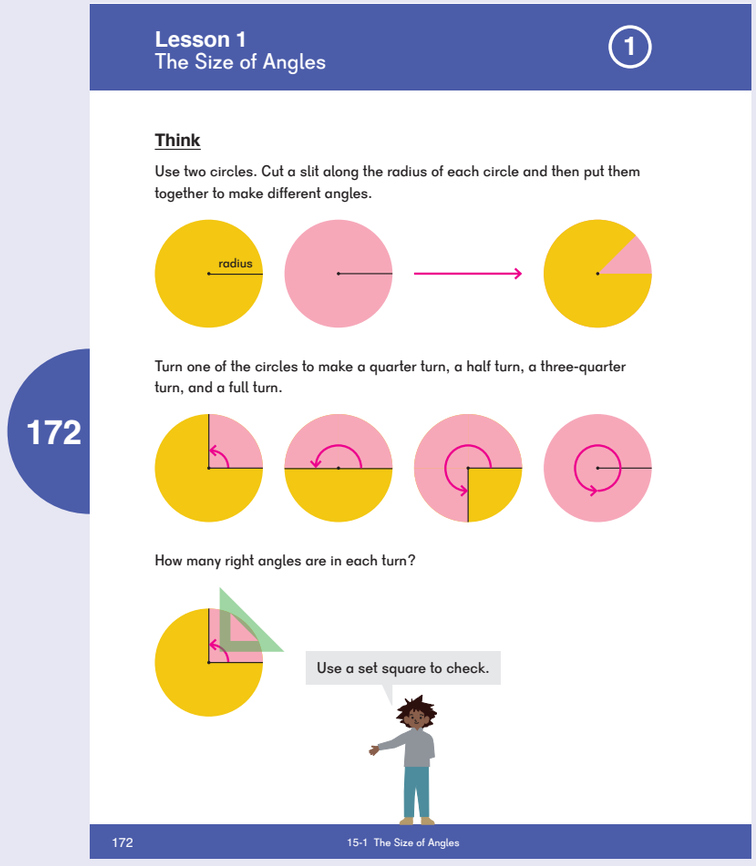
Learn

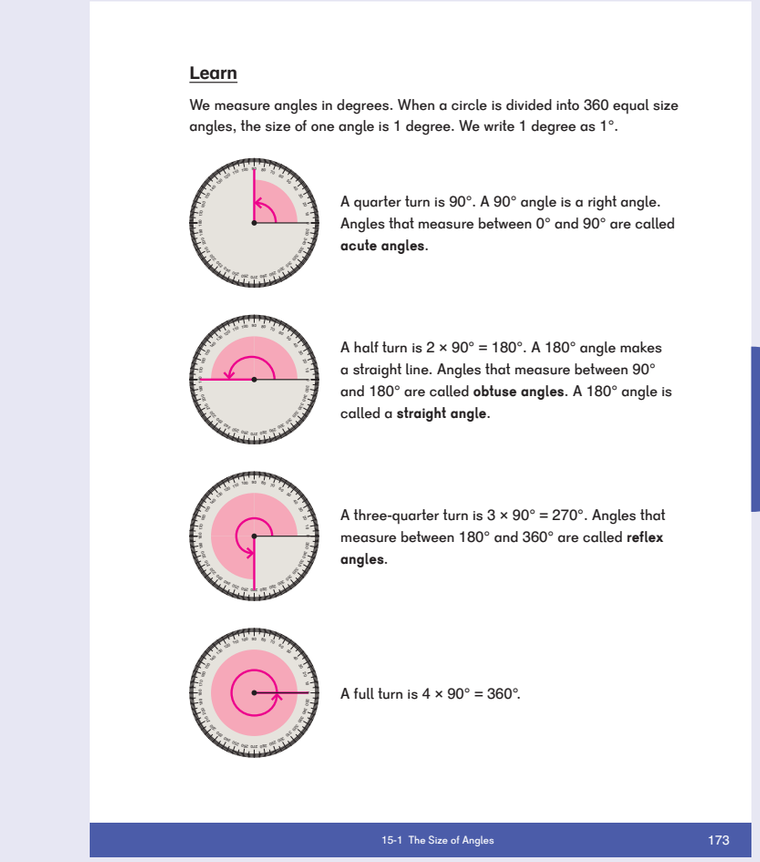
Discuss the different examples in **Learn**. Help students see how the turns are related to the number of degrees in a circle and the number of right angles.

Students can see that a $\frac{1}{2}$ turn, or 180° turn, makes a straight line, which is the diameter of a circle.

Introduce the terms in bold in **Learn**, as well as the degree symbol.

Students should see that the size of the angle depends on how big a turn or rotation is from one side to the other. Have students show different angles with their angle circles and say whether they are acute, obtuse, or reflex angles.





Lesson 4 Quadrilaterals

Objective

- Classify quadrilaterals based on the number of parallel sides.

Lesson Materials

- Compasses or rulers
- Paper
- Quadrilaterals (BLM)
- Set squares

Think

Provide students with set squares and have them complete the **Think** tasks. They can use a set square and a ruler to prove which sides of the figures have parallel lines, and which form right angles.

The shapes are included in Quadrilaterals (BLM) for students to cut out and sort or classify in different ways. Examples: quadrilaterals with parallel sides, quadrilaterals with perpendicular sides, quadrilaterals with right angles, quadrilaterals without right angles, etc.

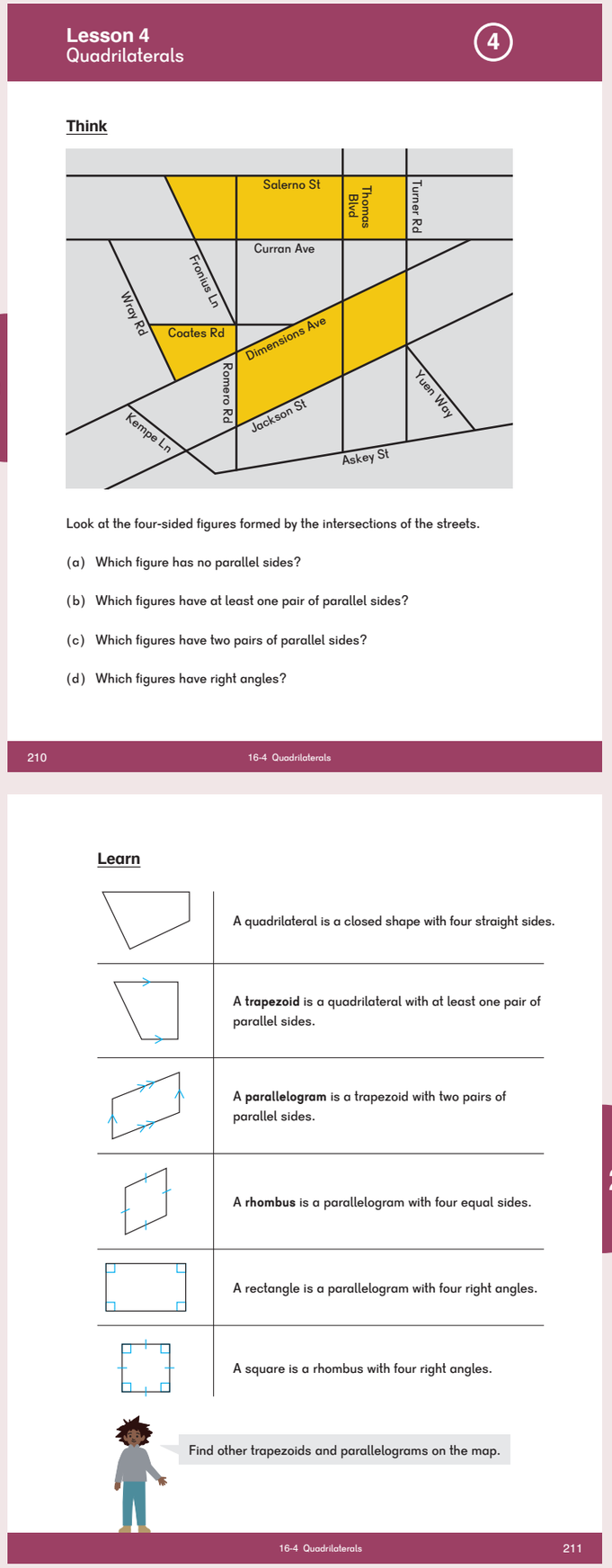
Learn

Discuss the concepts in the textbook.

Ask students:

- "Can you make a parallelogram with only three right angles? Two?" (No. A parallelogram will have either 0 or 4 right angles.)
- "Is a square a trapezoid? Why or why not?" (Since a square is a parallelogram, it is a trapezoid.)
- "Are all parallelograms trapezoids?" (Yes.)
- "Are all trapezoids parallelograms?" (No.)

Ensure students understand that a square is also a rectangle because it has four right angles. It is also a rhombus because it has four equal sides and opposite sides are parallel.



Lesson 4
Quadrilaterals
4

Think

Look at the four-sided figures formed by the intersections of the streets.

(a) Which figure has no parallel sides?

(b) Which figures have at least one pair of parallel sides?

(c) Which figures have two pairs of parallel sides?

(d) Which figures have right angles?

210 16-4 Quadrilaterals

210

Learn

	A quadrilateral is a closed shape with four straight sides.
	A **trapezoid** is a quadrilateral with at least one pair of parallel sides.
	A **parallelogram** is a trapezoid with two pairs of parallel sides.
	A **rhombus** is a parallelogram with four equal sides.
	A rectangle is a parallelogram with four right angles.
	A square is a rhombus with four right angles.

Find other trapezoids and parallelograms on the map.

16-4 Quadrilaterals 211

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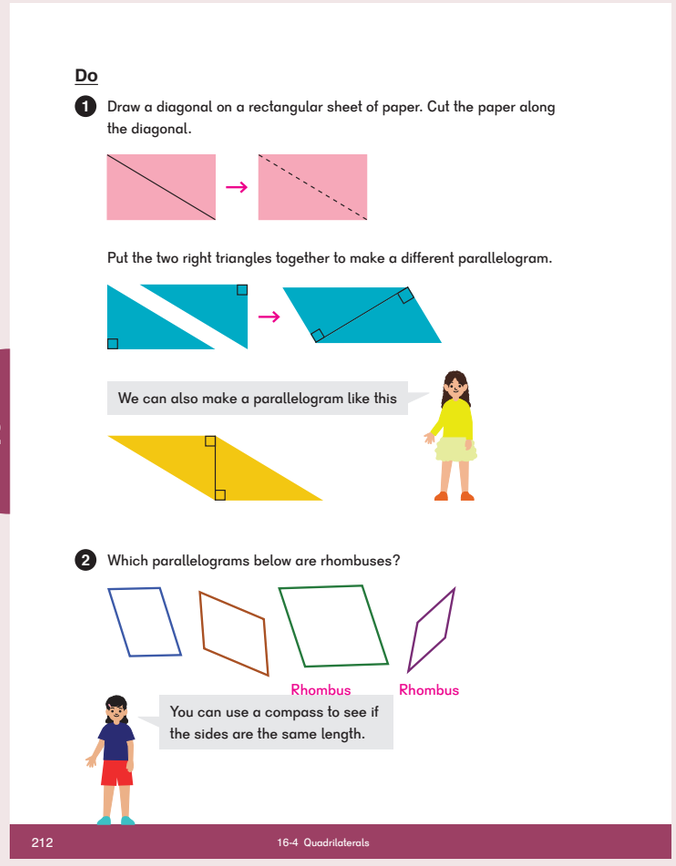
Do

1. Students should fold and cut their paper as shown in the textbook.

2—3. Provide students with compasses or rulers to verify if the sides are the same length.

4. Since it is given that these are parallelograms, and, by definition, parallelograms have two pairs of parallel sides, students can deduce that:

   AB || DC and BC || AD
   EF || HG and EH || FG



Do

1 Draw a diagonal on a rectangular sheet of paper. Cut the paper along the diagonal.

Put the two right triangles together to make a different parallelogram.

We can also make a parallelogram like this

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2 Which parallelograms below are rhombuses?

Rhombus Rhombus

You can use a compass to see if the sides are the same length.

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3 Compare the lengths of the sides of this parallelogram.

A B D C

(a) Which sides have the same length?
AB and DC, AD and BC

(b) What can you say about the lengths of the opposite sides of a parallelogram?
They are the same length.

Are opposite sides the same length for all trapezoids?

No, for example the trapezoid in Learn.

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4 Identify and name the parallel sides of the parallelograms below.

A B D C

AB || DC
AD || BC

F E G H

EF || HG
EH || FG

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5 Since it is given that these are trapezoids, and trapezoids have at least one pair of parallel sides, then KL || NM and PS || QR.

6 Provide students with compasses. They can use the compass to check the distance between the lines to determine which lines are parallel to each other, and thus, which lines form trapezoids and parallelograms.

Activity

▲ Mapmaking

Materials: Rulers, set squares, paper, protractors

On a full-sized sheet of paper, have students create their own maps similar to the one in the textbook. They should make enough roads or paths that intersect so that they end up with several quadrilaterals. They should also make some of the roads parallel to each other and identify different types of trapezoids.

They can shade in the different quadrilaterals they find. To practice measuring angles, have them measure and label the angles created by the roads or paths they have drawn.

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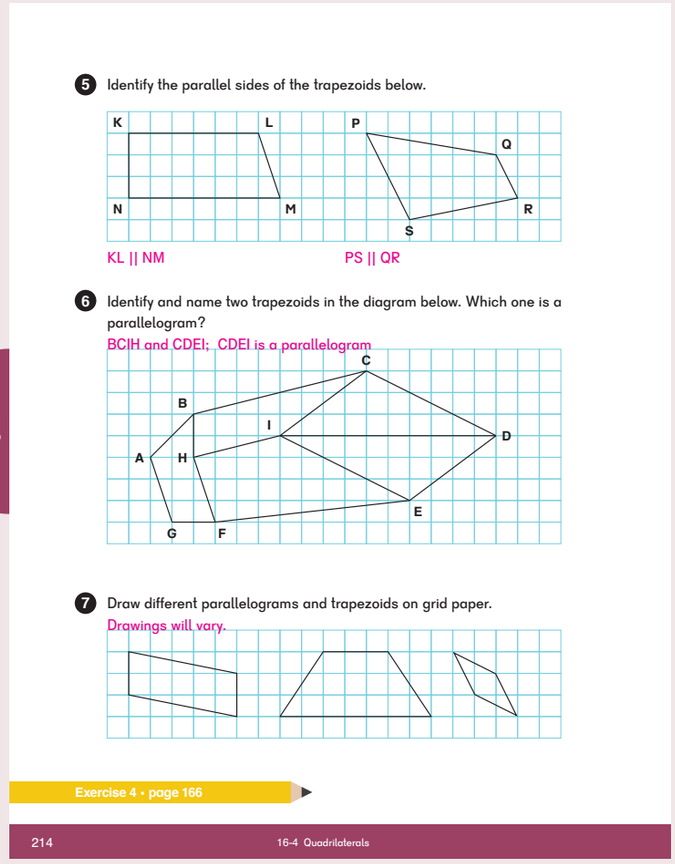

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5 Identify the parallel sides of the trapezoids below.

KL || NM PS || QR

6 Identify and name two trapezoids in the diagram below. Which one is a parallelogram?

BCIH and CDEI; CDEI is a parallelogram

7 Draw different parallelograms and trapezoids on grid paper.

Drawings will vary.

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