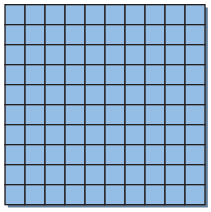
2.4 Adding and Subtracting Decimals

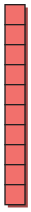
Essential Question

How can you add and subtract decimals?

Base ten blocks can be used to model numbers.



1 one



1 tenth

1 hundredth

1 ACTIVITY: Modeling a Sum

Work with a partner. Use base ten blocks to find the sum.

a. 1.23 + 0.87

Which base ten blocks do you need to model the numbers in the sum? How many of each do you need?

$$\underbrace{\qquad\qquad}_{1.23} + \underbrace{\qquad\qquad}_{0.87}$$

How many of each base ten block do you have when you combine the blocks?

☐ ones ☐ tenths ☐ hundredths

How many of each base ten block do you have when you trade the blocks?

☐ ones ☐ tenths ☐ hundredths

So, 1.23 + 0.87 = ☐.

b. 1.25 + 1.35 **c.** 2.14 + 0.92 **d.** 0.73 + 0.86

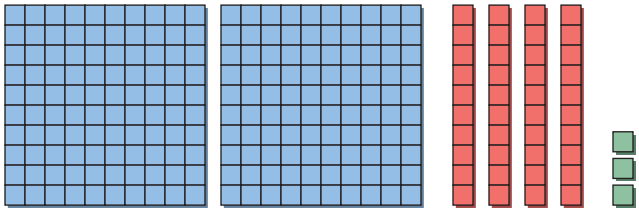
2 ACTIVITY: Modeling a Difference

Work with a partner. Use base ten blocks to find the difference.

a. 2.43 − 0.73

Which number is shown by the model? ☐

Circle the portion of the model that represents 0.73.



So, 2.43 − 0.73 = ☐.

b. 1.86 − 1.26 **c.** 3.72 − 0.5 **d.** 1.58 − 0.09

Adding and Subtracting Decimals

In this lesson, you will

- use models to add and subtract decimals.
- add and subtract decimals.

3 ACTIVITY: Making a Conjecture

Work with a partner.

a. Find each sum or difference.

123 + 87	125 + 135	214 + 92	73 + 86
243 − 73	186 − 126	372 − 50	158 − 9

b. How are the numerical expressions in part (a) related to the numerical expressions in Activities 1 and 2? How are the sums and differences related?

c. **STRUCTURE** There is a relationship between adding and subtracting decimals and adding and subtracting whole numbers. What conjecture can you make about this relationship?

4 ACTIVITY: Using a Place Value Chart

Work with a partner. Use the place value chart to find the sum or difference.

Math Practice

Analyze Conjectures

How can the conjecture you wrote in Activity 3 help you to solve these problems?

Place Value Chart

millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones	and	tenths	hundredths	thousandths	ten-thousandths	hundred-thousandths	millionths
							.						
							.						
							.						

a. 16.05 + 2.94

b. 7.421 + 92.55

c. 38.72 − 8.61

d. 64.968 − 51.167

What Is Your Answer?

5. **MODELING** Describe two real-life examples of when you would need to add and subtract decimals.

6. **IN YOUR OWN WORDS** How can you add and subtract decimals?

Practice Use what you learned about adding and subtracting decimals to complete Exercises 3–4 on page 82.

2.4 Lesson

Check It Out
Lesson Tutorials
BigIdeasMath.com

Key Idea

Adding and Subtracting Decimals

To add or subtract decimals, write the numbers vertically and line up the decimal points. Then bring down the decimal point and add or subtract as you would with whole numbers.

EXAMPLE 1 Adding Decimals

a. Add 8.13 + 2.76.

Estimate $8.13 + 2.76 \approx 8 + 3 = 11$

Line up the decimal points.

$$\begin{array}{r} 8.13 \\ +\ 2.76 \\ \hline 10.89 \end{array}$$

Add as you would with whole numbers.

Reasonable? $10.89 \approx 11$ ✓

Study Tip

Be sure to add or subtract only digits that have the same place value.

b. Add 1.459 + 23.7.

$$\begin{array}{r} {\scriptstyle 1} \\ 1.459 \\ +\ 23.700 \\ \hline 25.159 \end{array}$$

Insert zeros so that both numbers have the same number of decimal places.

EXAMPLE 2 Subtracting Decimals

a. Subtract 5.508 − 3.174.

Estimate $5.508 - 3.174 \approx 6 - 3 = 3$

Line up the decimal points.

$$\begin{array}{r} {\scriptstyle 4\ 10} \\ 5.\cancel{5}\cancel{0}8 \\ -\ 3.1\,7\,4 \\ \hline 2.3\,3\,4 \end{array}$$

Subtract as you would with whole numbers.

Reasonable? $2.334 \approx 3$ ✓

b. Subtract 21.9 − 1.605.

$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 8\ 1\cancel{0}10} \\ 21.\cancel{9}\cancel{0}\cancel{0} \\ -\ 1.6\,0\,5 \\ \hline 20.2\,9\,5 \end{array}$$

Insert zeros so that both numbers have the same number of decimal places.

On Your Own

Now You're Ready
Exercises 5–16

Add or subtract.

1. 4.206 + 10.85
2. 15.5 + 8.229
3. 78.41 + 90.99
4. 6.34 − 5.33
5. 27.9 − 0.905
6. 18.626 − 13.88

EXAMPLE 3 Real-Life Application

Your meal at the school cafeteria costs $3.45. Your friend's meal costs $3.90. You pay for both meals with a $10 bill. How much change do you receive?

Use a verbal model to solve the problem.

$$\text{amount of change} = \text{amount given} - \left(\text{cost of your meal} + \text{cost of friend's meal}\right)$$

$= 10.00 - (3.45 + 3.90)$ Substitute values.

$= 10.00 - 7.35$ Add inside parentheses.

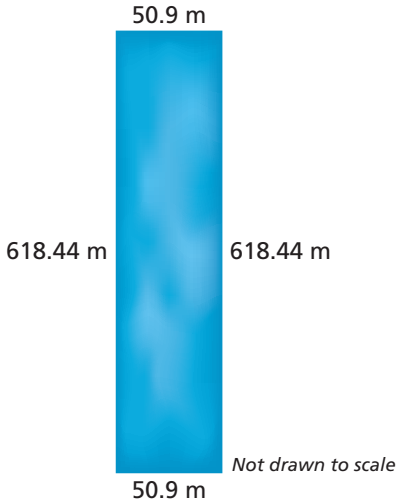
$= 2.65$ Subtract.

So, you receive $2.65.

EXAMPLE 4 Real-Life Application

The Lincoln Memorial Reflecting Pool is approximately rectangular. Its width is 50.9 meters, and its length is 618.44 meters. You walk the perimeter of the pool. About how many meters do you walk?

Draw a diagram and label the dimensions.



Find the sum of the side lengths.

$$\begin{array}{r} {\scriptstyle 112} \\ 618.44 \\ 50.90 \\ 618.44 \\ +\quad 50.90 \\ \hline 1338.68 \end{array}$$

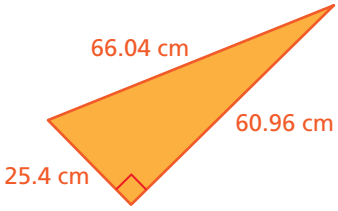
So, you walk about 1339 meters.

On Your Own

Now You're Ready
Exercises 21–26

7. **WHAT IF?** In Example 3, your meal costs $4.10 and your friend's meal costs $3.65. You pay for both meals with a $20 bill. How much change do you receive?

8. Find the perimeter of the triangle.



2.4 Exercises

Check It Out
Help with Homework
BigIdeasMath.com

Vocabulary and Concept Check

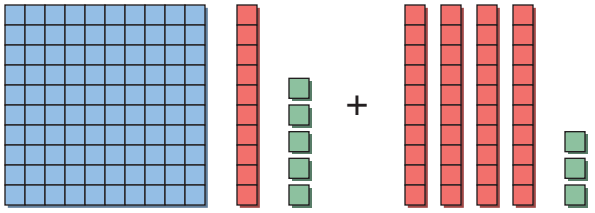
1. **CHOOSE TOOLS** Why is it helpful to estimate the answer before adding or subtracting decimals?

2. **WRITING** When adding or subtracting decimals, how can you be sure to add or subtract only digits that have the same place value?

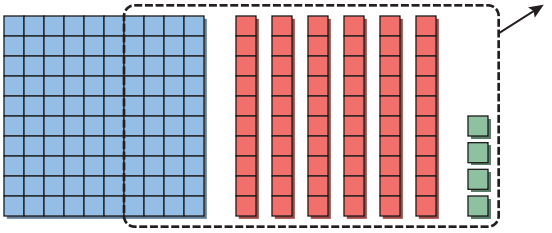
Practice and Problem Solving

Write and evaluate the numerical expression modeled by the base ten blocks.

3.



4.



Add.

1 **5.** 7.82 + 3.209 **6.** 3.7 + 2.774 **7.** 12.829 + 10.07

8. 20.35 + 13.748 **9.** 17.440 + 12.497 **10.** 15.255 + 19.058

Subtract.

2 **11.** 4.58 − 3.12 **12.** 8.629 − 5.309 **13.** 6.98 − 2.614

14. 15.131 − 11.57 **15.** 13.5 − 10.856 **16.** 25.82 − 22.936

ERROR ANALYSIS **Describe and correct the error in the solution.**

17.

$$\begin{array}{r} 6.058 \\ +\ 3.95 \\ \hline 6.453 \end{array}$$

18.

$$\begin{array}{r} 9.5 \\ -\ 7.18 \\ \hline 2.48 \end{array}$$

19. **BREAKFAST** You order the sausage and eggs breakfast, and your friend orders the ham omelet. How much is the bill before taxes and tip?

20. **HAM & CHEESE** How much more does the ham and cheese omelet cost than the cheese omelet?

Evaluate the expression.

3 **21.** $6.105 + 10.4 + 3.075$

22. $22.6 - 12.286 - 3.542$

23. $15.35 + 7.604 - 12.954$

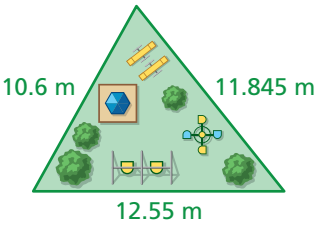
24. $16.5 - 13.45 + 7.293$

25. $25.92 - 18.478 + 8.164$

26. $23.45 + 17.75 - 19.618$

27. **STRUCTURE** When is the sum of two decimals equal to a whole number? When is the difference of two decimals equal to a whole number?

28. **OPEN-ENDED** Write three decimals that have a sum of 27.905.



29. **DAY CARE** A day-care center is building a new outdoor play area. The diagram shows the dimensions in meters. How much fencing is needed to enclose the play area?

30. **HOMEWORK** You work 1.15 hours on English homework and 1.75 hours on math homework. Your science homework takes 1.05 hours less than your math homework. How many hours do you work on homework?

STEM VIDEO

ASTRONOMY An astronomical unit (AU) is the average distance of Earth from the Sun. In Exercises 31–34, use the table that shows the average distance of each planet in our solar system from the Sun.

31. How much farther is Jupiter from the Sun than Mercury?

32. How much farther is Neptune from the Sun than Mars?

33. Estimate the greatest distance between Earth and Uranus.

34. Estimate the greatest distance between Venus and Saturn.

Planet	Average Distance from the Sun (AU)
Mercury	0.387
Venus	0.723
Earth	1.000
Mars	1.524
Jupiter	5.203
Saturn	9.537
Uranus	19.189
Neptune	30.07

35. Critical Thinking The length of a rectangle is twice the width. The perimeter of the rectangle can be expressed as $3 \cdot 13.7$. What is the width?

Fair Game Review What you learned in previous grades & lessons

Multiply. Write the answer in simplest form. *(Section 2.1)*

36. $\frac{7}{10} \times \frac{5}{7}$

37. $\frac{5}{6} \times \frac{3}{10}$

38. $\frac{3}{4} \times \frac{2}{9}$

39. $\frac{2}{5} \times \frac{1}{8}$

40. **MULTIPLE CHOICE** What is the LCM of 6, 12, and 18? *(Section 1.6)*

(A) 6 (B) 18 (C) 36 (D) 72