# UNIT 1

## Number System Fluency



## Essential Question

HOW can mathematical ideas be represented?

**Chapter 1**

### Compute with Multi-Digit Numbers

The standard algorithm used to multiply and divide whole numbers can be applied to operations with decimals. In this chapter, you will multiply and divide multi-digit decimals.

**Chapter 2**

### Multiply and Divide Fractions

Models and equations can be used to represent real-world situations involving operations with fractions. In this chapter, you will multiply and divide fractions by whole numbers and by fractions.

# Chapter 1

# Compute with Multi-Digit Numbers



## Essential Question

**HOW can estimating be helpful?**

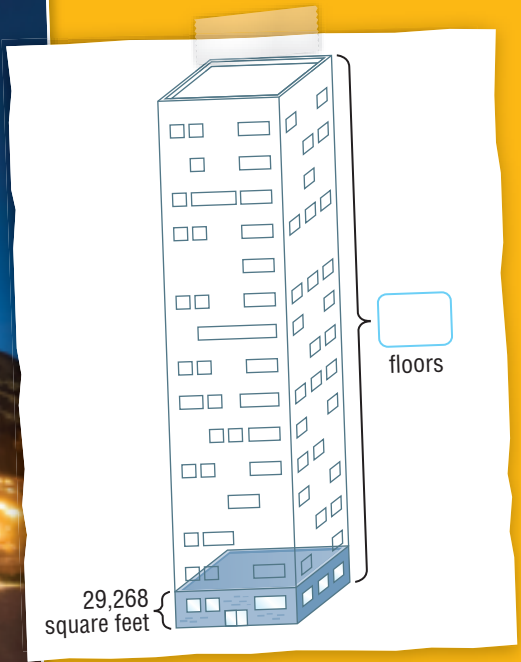
## Common Core GPS

**Content Standards**
MCC6.NS.2, MCC6.NS.3

**Mathematical Practices**
1, 2, 3, 4, 5, 6

## Math in the Real World

**Skyscrapers** A certain skyscraper in Chicago has 1,200,000 square feet of space. On average, there are 29,268 square feet of space on each floor. Estimate to find the number of floors in the building.




**FOLDABLES® Study Organizer**

1. Cut out the correct Foldable from the FL pages in the back of this book.
2. Place your Foldable on the Key Concept page toward the end of this chapter.
3. Use the Foldable throughout this chapter to help you learn about computing with multi-digit numbers.

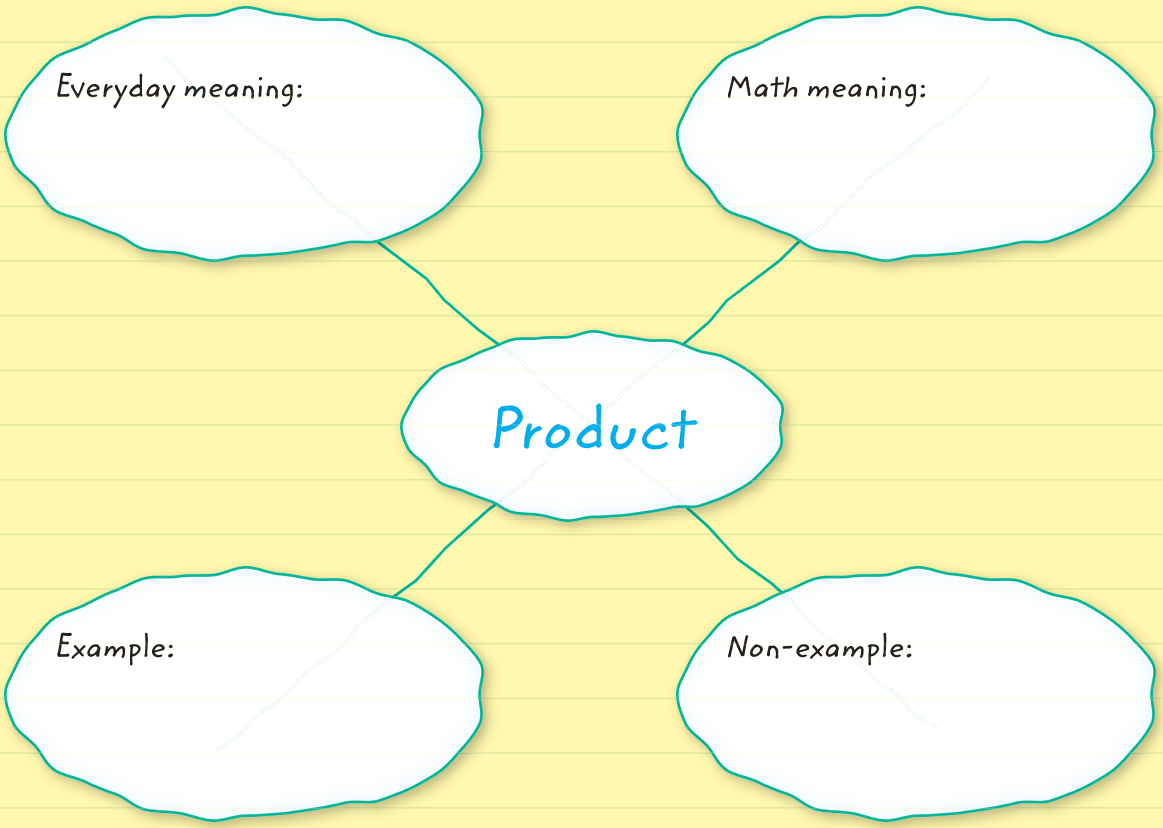
# What Tools Do You Need?

## Vocabulary

compatible numbers

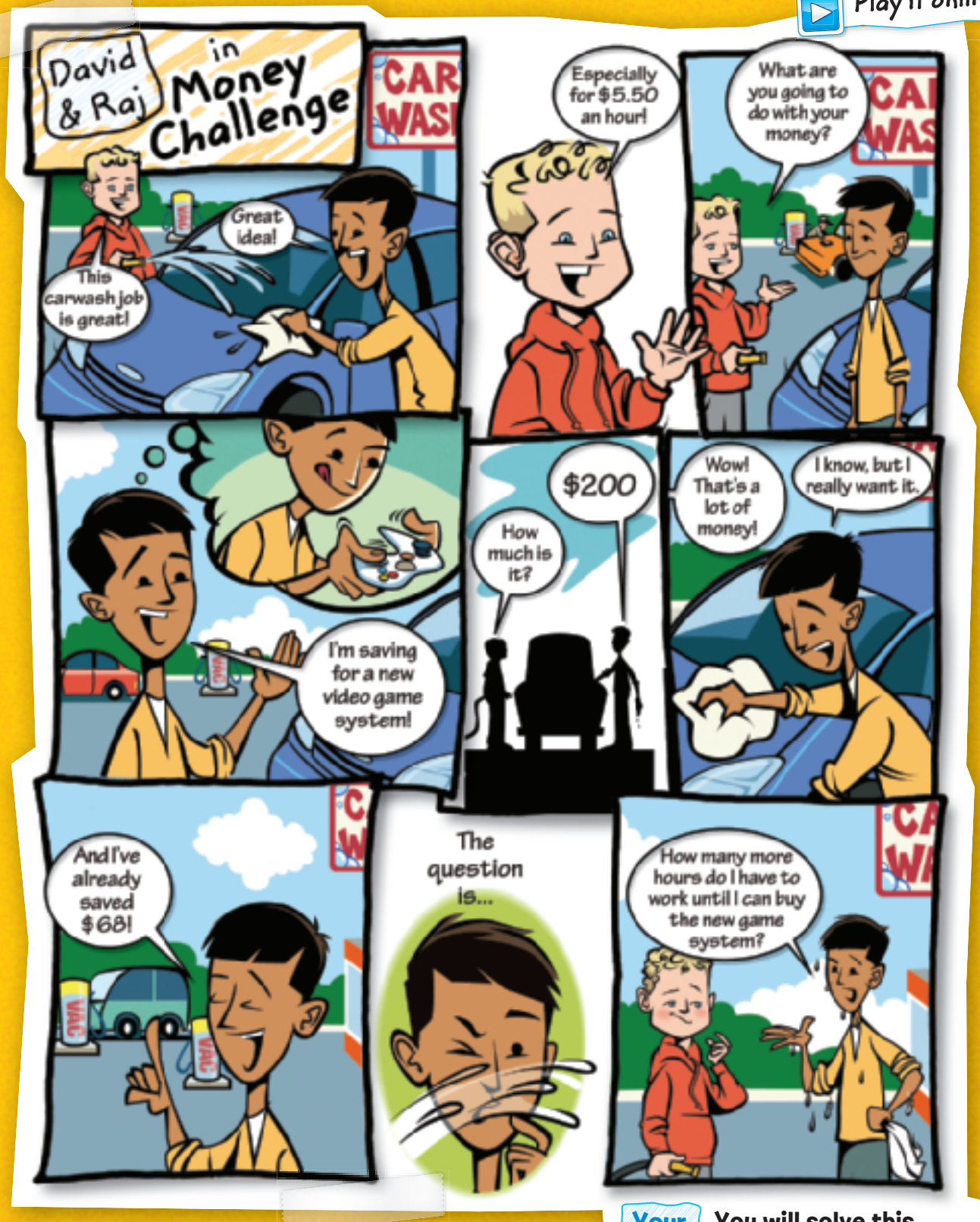
## Review Vocabulary

**Graphic Organizer** One way to remember vocabulary terms is to connect them to an everyday meaning or an example. Use this information to complete the graphic organizer.



# When Will You Use This?

Watch Play it online!




**Your Turn!** You will solve this problem in the chapter.

# Are You Ready?

Try the Quick Check below.
Or, take the Online Readiness Quiz.

## Quick Review

**Common Core Review** MCC4.NBT.5, MCC5.NBT.6

### Example 1

**Find 13 × 15.**

$$\begin{array}{r} 13 \\ \times\ 15 \\ \hline 65 \\ +\ 130 \\ \hline 195 \end{array}$$

Multiply the ones.
Multiply the tens.
Add.

### Example 2

**Find 323 ÷ 17.**

$$\begin{array}{r} 19 \\ 17\overline{)323} \\ -17 \\ \hline 153 \\ -\ 153 \\ \hline 0 \end{array}$$

Divide the tens.
Divide the ones.

## Quick Check

**Multiply** **Find each product.**

**1.** 15 × 20 = _____

**2.** 19 × 51 = _____

**3.** 49 × 22 = _____

Show your work.

**Divide** **Find each quotient.**

**4.** 112 ÷ 8 = _____

**5.** 539 ÷ 11 = _____

**6.** 779 ÷ 19 = _____

**7.** A musician sold 64 million albums in 16 months. She sold the same amount in each month. How many albums did she sell in each month?

_____

## How Did You Do?

**Which problems did you answer correctly in the Quick Check?**
**Shade those exercise numbers below.**

1 2 3 4 5 6 7

# Add and Subtract Decimals

**What You'll Learn**

*Scan the lesson. Predict two things you will learn about adding and subtracting decimals.*

- _____
- _____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

**Content Standards**
MCC6.NS.3

**Mathematical Practices**
1, 2, 3, 4, 5, 6

## Real-World Link

**Swimming** One event in competitive swimming is the women's 100-meter butterfly. The table shows the times of different swimmers at a recent Olympics.

Women's 100-Meter Butterfly

| Swimmer's | Time (s) |
|---|---|
| Lisbeth Trickett | 56.73 |
| Christine Magnuson | ? |
| Gabriella Silva | 58.10 |


**You can use place value charts to compare the results.**

**1.** It took Christine Magnuson 0.37 second longer to finish than Lisbeth Trickett. What was Magnuson's time, in seconds?

| | tens | ones | tenths | hundredths |
|---|---|---|---|---|
| | 5 | 6 | 7 | 3 |
| + | | 0 | 3 | 7 |
| | | | | |

**2.** At a high school meet, a swimmer swam the women's 100-meter butterfly in 72.34 seconds. How many seconds faster did Gabriella Silva swim her race?

| | tens | ones | tenths | hundredths |
|---|---|---|---|---|
| | 7 | 2 | 3 | 4 |
| − | 5 | 8 | 1 | 0 |
| | | | | |

Work Zone

# Add Decimals

To add decimals, line up the decimal points. Then, add digits in the same place-value position.

## Examples

Tutor

**1.** **Find the sum of 23.1 and 5.8.**

Estimate $23.1 + 5.8 \approx 23 + 6$ or 29

$$\begin{array}{r} 23.1 \\ +\ 5.8 \\ \hline 28.9 \end{array}$$

Line up the decimal points.

Add as with whole numbers.

Check for Reasonableness $28.9 \approx 29$ ✓

The sum of 23.1 and 5.8 is 28.9.

**2.** **Find the sum of 29.6 and 14.7.**

Estimate $29.6 + 14.7 \approx$ ☐ + ☐ or ☐

$$\begin{array}{r} \square\square.\square \\ +\ \square\square.\square \\ \hline \square\square.\square \end{array}$$

Line up the decimal points.

Add as with whole numbers.

Check for Reasonableness ☐ ≈ ☐

The sum of 29.6 and 14.7 is ☐.

**Accuracy**

To find an accurate sum or difference, line up the digits based on their place values. Use the decimal point to help align the correct digits before completing the operation.

Show your work.

a. _____

b. _____

c. _____

**Got It?** Do these problems to find out.

**Find each sum.**

**a.** $54.7 + 21.4$ **b.** $14.2 + 23.5$ **c.** $17.3 + 33.5$

# Subtract Decimals

To subtract decimals, line up the decimal points. Then, subtract digits in the same place-value position. You may need to *annex,* or place zeros at the end of a decimal, in order to subtract.

## Examples

Tutor

**3.** **Find the difference of 5.774 and 2.371.**

Estimate $5.774 - 2.371 \approx 6 - 2$ or 4

$$\begin{array}{r} 5.774 \\ -\ 2.371 \\ \hline 3.403 \end{array}$$

Line up the decimal points.

Subtract as with whole numbers.

Check for Reasonableness $3.403 \approx 4$ ✓

So, $5.774 - 2.371 = 3.403$.

**4.** **Find $6 - 4.78$.**

Estimate $6 - 4.78 \approx 6 - 5$ or 1

$$\begin{array}{r} 6.00 \\ -\ 4.78 \\ \hline 1.22 \end{array}$$

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

Check for Reasonableness $1.22 \approx 1$ ✓

So, $6 - 4.78 = 1.22$.

**5.** **Find $23 - 4.216$.**

$$\begin{array}{r} \square\square.\square\square\square \\ -\ \ \square.\square\square\square \\ \hline \square\square.\square\square\square \end{array}$$

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

Subtract as with whole numbers.

So, $23 - 4.216 =$ _____.

**Got It?** **Do these problems to find out.**

**Find each difference.**

**d.** $9.543 - 3.671$ **e.** $\$50.62 - \$39.81$ **f.** $14 - 9.09$

Show your work.

d. _____

e. _____

f. _____

## Example

Tutor

**6.** **Reagan is creating a video. The first video clip was 22.36 minutes long. The second video clip was 17.03 minutes long. What is the total length of the video?**

Estimate $22.36 + 17.03 \approx 22 + 17$ or 39

$$\begin{array}{r} 22.36 \\ +17.03 \\ \hline 39.39 \end{array}$$

Line up the decimal points.

Add as with whole numbers.

Check for reasonableness $39.39 \approx 39$ ✓

So, the video is 39.39 minutes long.

Show your work.

g. _____

**Got It?** **Do this problem to find out.**

**g.** Jonathan is traveling for work. This morning his GPS indicated that the total distance to his destination is 589.4 miles. Before lunch he drove 208.62 miles. How much farther does Jonathan need to travel?

## Guided Practice

Check

**Find each sum or difference.** (Examples 1–5)

**1.** $14.7 + 87.9 =$ _____

Show your work.

**2.** $66.5 - 24.1 =$ _____

**3.** $52.1 - 31.47 =$ _____

**4.** Grayson is making a snack mix for his family camping trip. He added 14.52 ounces of peanuts to 27.35 ounces of granola. How many ounces of snack mix does he have? (Example 6)

**5.** **Building on the Essential Question** How is estimation helpful when adding and subtracting decimals?

### Rate Yourself!

☐ I understand how to add and subtract decimals.

Great! You're ready to move on!

☐ I still have questions about adding and subtracting decimals.

No Problem! Go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Find each sum.** (Examples 1 and 2)

**1.** $7.2 + 9.5 =$ _____

Show your work.

**2.** $1.34 + 2 =$ _____

**3** $54.5 + 48.51 =$ _____

**Find each difference.** (Examples 3–5)

**4.** $5.6 - 3.5 =$ _____

**5.** $97 - 16.98 =$ _____

**6.** $58.67 - 28.72 =$ _____

**7** The table shows the top three finishers in barrel racing. What is the time difference between Nicolas and Sancho? (Example 6)

_____

| Barrel Racing Results | |
|---|---|
| **Rider** | **Time (s)** |
| Nicolas | 14.67 |
| Becki | 15.98 |
| Sancho | 16.40 |

**8.** In two months, Mica spent a total of $305.43 on groceries. She spent $213.20 in the first month. How much did she spend in the second month? (Example 6)

_____

Show your work.

**9.** **Financial Literacy** A hat costs $10.95 and a T-shirt costs $14.20. How much change will you receive if you pay for both items with a $50 bill?

_____

**10.** **Use Math Tools** The 4-by-100 meter relay is a track and field event involving four runners on each team.

**a.** What is the combined time of Carter and Frater?

_____

**b.** How much faster did Powell run his leg of the race than Bolt?

_____

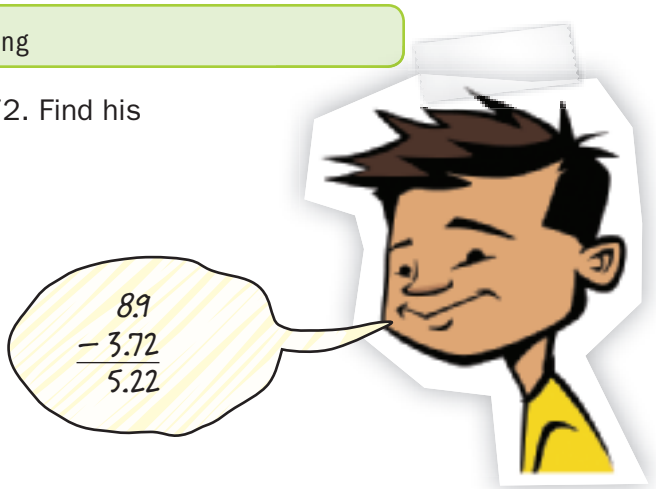
**c.** What is the combined time of all the runners?

_____

| 4 by 100 Meter Times | |
|---|---|
| **Runner** | **Time (s)** |
| Carter | 13.4 |
| Frater | 12 |
| Bolt | 12 |
| Powell | 11.7 |

## H.O.T. Problems Higher Order Thinking

**11. Find the Error** Luis is finding 8.9 − 3.72. Find his mistake and correct it.




**12. Reason Abstractly** Write two different pairs of decimals whose sums are 14.1. One pair should involve regrouping.

**13. Reason Inductively** Explain how you know that the sum of 12.6, 3.1, and 5.4 is greater than 20.

**14. Persevere with Problems** Josie found that 3.28 + 3.28 + 3.28 = 9.84. What is the missing factor in the related multiplication problem 3.28 × ☐ = 9.84? Explain.

**15. Reason Abstractly** Without subtracting 8.5 − 4.64, determine what digit will be in the hundredths place. Explain.

## Georgia Test Practice

**16.** Keira is buying items for her kitchen. The store sells a large mixing bowl for $12.95, a spatula for $8.37, and measuring cups for $9.99. What is the total cost of these items?

Ⓐ $21.32

Ⓑ $29.12

Ⓒ $31.31

Ⓓ $41.31

Name _____ My Homework _____

# Extra Practice

**Find each sum.**

**17.** 4.9 + 3.0 = 7.9

Homework Help

4.9
+3.0
7.9

**18.** 0.796 + 13 = _____

**19.** 15.63 + 24.36 = _____

**Find each difference.**

**20.** 19.86 − 4.94 = _____

**21.** 82 − 67.18 = _____

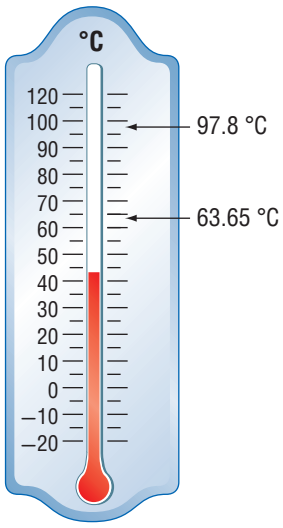
**22.** 14.39 − 12.16 = _____

**23.** **Financial Literacy** The current balance of Tami's checking account is $237.80. Find the new balance after Tami writes a check for $29.95.

Show your work.

**24.** The annual rainfall for Kayston Falls was 50.38 inches in 2012. In 2013, the annual rainfall was 55.76 inches. What is the difference in rainfall between the two years?

**25.** **STEM** The melting point of sodium is 97.8 degrees Celsius. The melting point of potassium is 63.65 degrees Celsius. How much higher is the melting point of sodium?




**26.** **Be Precise** Collin needs three wooden boards to repair his porch. The lengths he needs are 2.2 meters, 2.82 meters, and 4.25 meters. He purchases a board that is 10 meters long and cuts the three sections. How much of the board that Collin purchased will be left?

## Georgia Test Practice

**27.** The table shows the top three finishers for a swimming event. What is the time difference between Kendrick and Andrew?

| Boy's 50 Yard Freestyle | |
|---|---|
| **Swimmer** | **Time (s)** |
| Andrew | 22.63 |
| Kendrick | 22.20 |
| Ty | 22.58 |

Ⓐ 0.38 s  Ⓒ 44.83 s

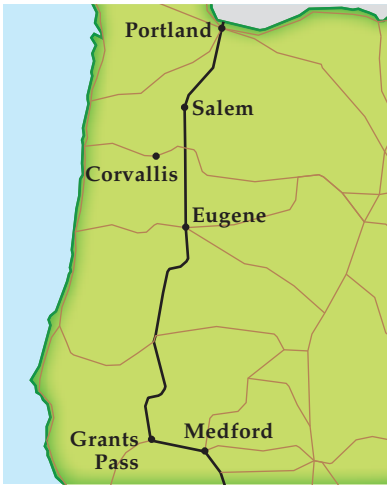
Ⓑ 0.43 s  Ⓓ 45.08 s

**28.** Amaya has a store credit of $50.86. She plans to purchase a video game for $24.97 and a golf club accessory for $6.99. How much store credit will she have left?

Ⓕ $43.87  Ⓗ $25.89

Ⓖ $31.96  Ⓘ $18.90

**29.** **Short Response** Dominic is traveling through the state of Oregon. He drove 66.4 miles from Salem to Eugene and then continued to Medford. The total distance of his trip was 233.25 miles. How far is the distance from Eugene to Medford?




## Common Core Review

**Round each decimal to the nearest whole number.** MCC5.NBT.4

**30.** 4.75 ≈ _____

**31.** 34.1 ≈ _____

**32.** 22.48 ≈ _____

**33.** The table shows the distances Juliana biked several days this week. Which day of the week did she bike the greatest distance? MCC5.NBT.3b

| Day | Distance Biked (mi) |
|---|---|
| Monday | 9.34 |
| Wednesday | 9.47 |
| Thursday | 9.74 |
| Sunday | 9.32 |

**34.** Plot the number 2.78 on the number line below. MCC4.NF.7

Lesson 2

# Estimate Products

**What You'll Learn**

Scan the lesson. List two real-world scenarios in which you would estimate products.

- _____

_____

- _____

_____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

**Content Standards**
Preparation for MCC6.NS.3

**Mathematical Practices**
1, 2, 3, 4, 5

## Real-World Link

Watch

**Skateboarding** The record for the greatest distance traveled on skateboard in 24 hours was set in a recent year by James Peters. He traveled about 7.6 miles per hour.

**1.** Plot 7.6 on the number line.


**2.** What whole number is 7.6 closest to? ☐

**3.** Estimate how many miles James Peters traveled in 24 hours.

☐ × ☐ = _____

**4.** Is your estimate higher or lower than the actual distance he traveled? Explain.

_____

_____

**5.** A new record was set later by Ted McDonald. He traveled about 10.1 miles per hour. About how much farther did Ted McDonald travel?

☐ × 24 = _____

☐ − ☐ = _____

So, Ted McDonald traveled about _____ miles farther.

Work Zone

# Estimate Products Using Rounding

To estimate products of decimals, round each number. First underline the digit to be rounded. Then look at the digit to the right of the place being rounded.

- If the digit is 4 or less, the underlined digit remains the same.
- If the digit is 5 or greater, add 1 to the underlined digit.
- After rounding, all place values to the right of the underlined digit have a value of zero.

After the numbers are rounded, multiply.

**Rounding Decimals**
When rounding decimals, such as 99.96 to the tenths, the 9 must round up. So, 99.96 rounded to the nearest tenth is 100.0.

## Examples

Tutor

**1.** **Estimate 8.7 × 2.8.**

Round to the nearest whole number to make it easier to compute mentally.

$$\begin{array}{rcl} 8.7 & \rightarrow & 9 \\ \times\ 2.8 & \rightarrow & \times\ 3 \\ \hline & & 27 \end{array}$$

Round 8.7 to 9.
Round 2.8 to 3.

The product is about 27.

**2.** **Estimate 42.6 × 37.2.**

Round to the greatest place value to make it easier to compute mentally.

42.6 ≈ ☐

37.2 ≈ ☐

$$\begin{array}{r} \square\square \\ \times\ \square\square \\ \hline \square\square\square\square \end{array}$$

Multiply.

The product is about ☐.

Show your work.

a. _____

b. _____

c. _____

**Got It?** **Do these problems to find out.**

**Estimate each product.**

**a.** 9.6 × 1.8 **b.** 4.2 × 3.1 **c.** 68.4 × 21.3

## Examples

Tutor

**3.** **A greyhound can travel 39.3 miles per hour. At this speed, about how far could a greyhound travel in 6.5 hours?**

$39.3 \rightarrow 40$ Round 39.3 to 40.

$\times\ 6.5 \rightarrow \times\ 7$ Round 6.5 to 7.

$280$

The greyhound could travel about 280 miles in 6.5 hours.

**4.** **Suppose one U.S. dollar is equal to 5.8 Egyptian pounds. About how many Egyptian pounds would you receive for $48.50?**

Round to the greatest place value to make it easier to compute mentally.

$5.8 \approx$ ☐

$48.50 \approx$ ☐

☐☐ Multiply.

$\times$ ☐

☐☐☐

So, $48.50 is equal to about ☐ Egyptian pounds.

**STOP and Reflect**

You could estimate $18.76 \times 5$ by multiplying $19 \times 5$ or by multiplying $20 \times 5$. Which answer will be more exact? Explain below.

**Got It?** **Do these problems to find out.**

Show your work.

**d.** STEM Earth is rotating around the Sun about 18.6 miles per second. About how many miles does it travel in 4.8 seconds?

d. _____

**e.** The average walking speed of a person is 4.8 kilometers per hour. Estimate the number of kilometers could you walk in 3 hours?

e. _____

**f.** STEM A King Palm can grow about 2.1 feet a year. Estimate the height of the King Palm, in yards, after 15 years.

f. _____

## Example

Tutor

**5.** **Patrice has $20 to buy 5 binders. Binders cost $4.29 each. Does she have enough money? Explain your reasoning.**

Estimate.

$5 \times \$4 = \$20$ Estimate 4.29 as 4.

$5 \times \$5 = \$25$ Estimate 4.29 as 5.

The actual cost is between $20 and $25. So, Patrice does not have enough money to buy the binders.

## Guided Practice

Check

**Estimate each product.** (Examples 1 and 2)

**1.** $5.8 \times 4 \approx$ _____

Show your work.

**2.** $13.92 \times 2.7 \approx$ _____

**3.** $94.89 \times 3.11 \approx$ _____

**4.** **Financial Literacy** A grocery store sells American cheese for $3.89 per pound. About how much would 1.89 pounds of the cheese cost? (Examples 3 and 4)

**5.** Greg has 52 megabytes left on his MP3 player. He wants to download 7 songs that each use 7.9 megabytes of memory. He estimates that he will need 56 megabytes of memory. Is his estimate is reasonable? Explain your reasoning. (Example 5)

**6.** **Building on the Essential Question** How do you determine which place value to use when estimating products?

### Rate Yourself!

How confident are you about estimating products? Check the box that applies.

For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Estimate each product.** (Examples 1 and 2)

**1.** $9.7 \times 3.3 \approx$ _____

Show your work.

**2.** $3.4 \times 5.6 \approx$ _____

**3** $17.5 \times 8.4 \approx$ _____

**4.** $44.8 \times 5.1 \approx$ _____

**5.** $28.21 \times 8.02 \approx$ _____

**6.** $71.92 \times 2.01 \approx$ _____

**7.** On average, the U.S. produces 36.5 million tons of fruit each year. About how much fruit does it produce in 2.25 years? (Examples 3 and 4)

**8.** Lisha is making headbands using ribbon. She would like to make 12 headbands. Each one requires 15.5 inches of ribbon. She estimates that she will need to buy 160 inches of ribbon. Is her estimate reasonable? Explain your reasoning. (Example 5)

**9** **Financial Literacy** Hannah's hourly wage at the ice cream shop is $5.85. The table shows the number of hours she worked. She estimates her earnings to be $120. Without calculating her actual earnings, determine if her estimate is more or less than her actual earnings. Explain your reasoning.

| Day | Hours Worked |
|---|---|
| Monday | 3.5 |
| Tuesday | 4.25 |
| Wednesday | 3.75 |
| Thursday | 2.5 |
| Friday | 4.75 |

**10.** STEM A car releases 19.6 pounds of carbon dioxide for every 1 gallon of gasoline burned. Estimate the number of pounds of carbon dioxide released if 14.5 gallons are burned.

**11.** **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.


**a.** How much more does Raj need until he has enough to buy the video game system? _____

**b.** Raj estimates that if he works for 20 hours, he will have enough to buy the video game system. Is he correct? Explain. _____

## H.O.T. Problems Higher Order Thinking

**12.** **Reason Abstractly** Name three decimals with a product that is about 40.

_____

**13.** **Persevere with Problems** A scooter can travel between 22 and 28 miles on each gallon of gasoline. If one gallon of gasoline costs between $3.75 and $3.95 per gallon, about how much will it cost to travel 75 miles? _____

**14.** **Justify Conclusions** Suppose your friend multiplied 1.2 and 2.6 and got 31.2 as the product. Is your friend's answer reasonable? Justify your response.

_____

_____

## Georgia Test Practice

**15.** Green peppers are on sale for $2.89 per pound. Mrs. Moseley bought 1.75 pounds of peppers. About how much did she pay for the peppers?

Ⓐ less than $4

Ⓑ between $5 and $6

Ⓒ between $6 and $7

Ⓓ more than $7

Name _____ My Homework _____

# Extra Practice

**Estimate each product.**

**16.** 26.3 → 26
× 9.7 → × 10
26 × 10 = 260

Homework Help

**17.** 33.6
× 82.1

**18.** 99.1
× 11.2

**19.** STEM A single year on Saturn is equal to 29.4 years on Earth. About how many Earth-years are equal to 3.2 years on Saturn?

**20.** Miguel received a $50 gift card to a bookstore. He would like to buy 3 books that cost $15.75 each including tax. He estimates that he cannot buy all three books because each book costs about $20, and all three books would cost $60. Is his estimate reasonable? Explain your reasoning.

**Use estimation to determine whether each answer is reasonable. If the answer is reasonable, write yes. If not, write no and provide a reasonable estimate.**

**21.** 22.8 × 4.7 = 107.16 _____

**22.** 2.1 × 4.9 × 7.2 = 105.84 _____

**23.** 7.8 × 1.1 × 4.2 = 50 _____

**24.** 43.8 × 2.8 × 3.1 = 371.8 _____

**25.** CCSS **Use Math Tools** The table shows some nutritional facts about orange juice. Estimate each value for 1 quart of orange juice. (*Hint:* 4 cups is equal to 1 quart.)

| Orange Juice (1 cup) | |
|---|---|
| Calories | 112 |
| Vitamin C | 96.9 mg |
| Carbohydrates | 26.8 g |
| Calcium | 22.4 mg |

## Georgia Test Practice

**26.** Mario and Andrew's hourly charge for mowing lawns is shown.

| Mario | Andrew |
|---|---|
| $8.25/h | $5.85/h |

Suppose Mario and Andrew each worked 20 hours. About how much more money did Mario earn?

Ⓐ $30 Ⓒ $60

Ⓑ $40 Ⓓ $70

**27.** **Short Response** Javier bought 4 pencil toppers at the school store for $3.69 each. He estimated how much he needed to pay and gave the cashier $16. Is Javier's estimation reasonable? Explain your reasoning.

_____

**28.** The Student Book Club is ordering 12 copies of a book. The books cost $8.99 each. About how much will the order cost?

Ⓕ $90 Ⓗ $120

Ⓖ $108 Ⓘ $135

**29.** Medina's school lunch menu is shown.

| Friday | | | |
|---|---|---|---|
| Pizza | $1.75 | Fruit Punch | $0.75 |
| Fish and Fries | $2.25 | Milk | $0.80 |
| Salad | $1.15 | Pudding | $0.85 |

Which of the following is a reasonable estimate for the cost of two slices of pizza, a salad, and fruit punch?

Ⓐ $4 Ⓒ $8

Ⓑ $6 Ⓓ $10

## Common Core Review

**Multiply.** MCC5.NBT.5

**30.** $\begin{array}{r} 65 \\ \times\ 18 \\ \hline \end{array}$ _____

**31.** $\begin{array}{r} 15 \\ \times\ 23 \\ \hline \end{array}$ _____

**32.** $\begin{array}{r} 198 \\ \times\ 75 \\ \hline \end{array}$ _____

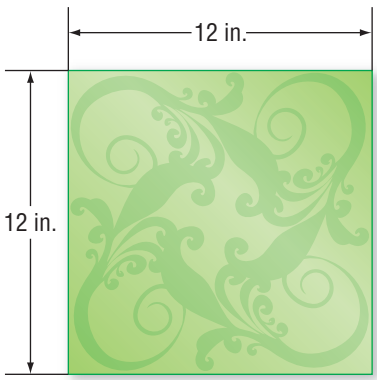
**33.** Marissa spent $15.63 at the bookstore. She paid with a $20 bill.

How much change will she receive? MCC5.NBT.7 _____

_____

**34.** Cristian is placing photos onto scrapbook paper for his photo album. The scrapbook paper is 12 inches long and 12 inches wide. What is the area of the paper?

(*Hint:* area = length × width) MCC4.MD.3 _____



# Multiply Decimals by Whole Numbers

**What You'll Learn**

Scan the lesson. List two headings you would use to make an outline of the lesson.

- _____
- _____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

**Content Standards**
MCC6.NS.3

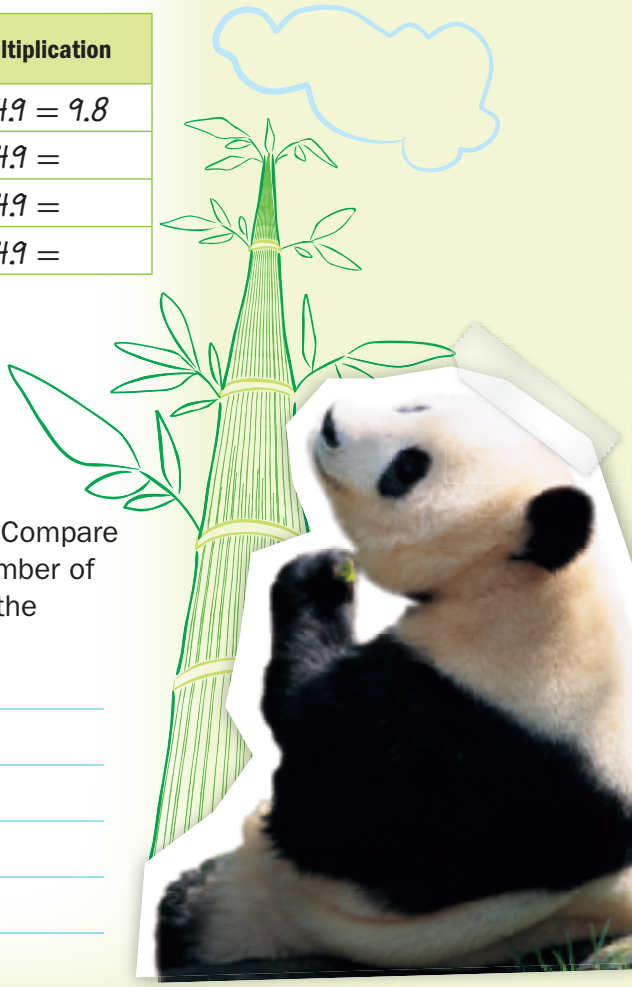
**Mathematical Practices**
1, 3, 4, 5, 6

## Real-World Link

Watch

**Plants** Bamboo is one of the fastest growing plants. It can grow about 4.9 feet in height per day. It is a favorite food of panda bears. You can use repeated addition to find the total height a bamboo plant can grow over a number of days. Complete the table below. The first one is done for you.

| | Number of Days | Repeated Addition | Multiplication |
|---|---|---|---|
| | 2 | $4.9 + 4.9 = 9.8$ | $2 \times 4.9 = 9.8$ |
| 1. | 3 | $+ \quad + \quad =$ | $\times 4.9 =$ |
| 2. | 4 | $+ \quad + \quad + \quad =$ | $\times 4.9 =$ |
| 3. | 5 | $+ \quad + \quad + \quad + \quad =$ | $\times 4.9 =$ |



4. Use the pattern in the table to predict $6 \times 4.9$.

   Check by using repeated addition. _____

   _____

5. **Make a Conjecture** Look back at Exercises 1–4. Compare the number of decimal places in each factor to the number of decimal places in the product. How do you determine the placement of the decimal oint in a product?

   _____

   _____

   _____

   _____

   _____

Work Zone

# Multiply Decimals

Using repeated addition can help you place the decimal point. The whole number represents the number of times the decimal is used as an addend. So, place the decimal point in the product the same number of places from the right as the decimal factor.

## Examples

Tutor

**1.** **Find 4 × 0.83.**

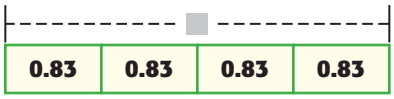
Estimate $4 \times 1 = 4$

$$\begin{array}{r} 0.83 \\ \times\ \ 4 \\ \hline 3.32 \end{array}$$

← two decimal places

Place the decimal point two places from the right.

Check for Reasonableness $3.32 \approx 4$ ✓




4 groups of 0.83

**2.** **Find 3 × 14.2.**

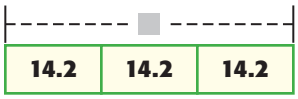
Estimate $3 \times 14 = 42$

$$\begin{array}{r} 14.2 \\ \times\ \ 3 \\ \hline 42.6 \end{array}$$

← one decimal place

Place the decimal point one place from the right.

Check for Reasonableness $42.6 \approx 42$ ✓




3 groups of 14.2

**3.** **Find 4 × 0.95.**

Estimate 4 × ☐ = ☐

Use the bar diagram to find the product.


☐ groups of ☐

$$\begin{array}{r} \square\ \square \\ 0.95 \\ \times\ \ \ \ 4 \\ \hline \square\ \square\ \square \end{array}$$

0.95 has ☐ decimal places.

Place the decimal point ☐ places from the right.

Check for Reasonableness ☐ ≈ ☐ ✓

Show your work.

a. _____

b. _____

c. _____

**Got It?** **Do these problems to find out.**

**a.** $5 \times 0.25$ **b.** $8 \times 4.47$ **c.** $9 \times 2.63$

# Annex Zeros in the Product

If there are not enough decimal places in the product, you need to annex zeros to the left. To annex a zero means to place a zero at the beginning or end of a decimal.

## Examples

Tutor

**4.** **Find 2 × 0.018.**

$$\begin{array}{r} {\scriptstyle 1}\phantom{0} \\ 0.018 \\ \times\quad 2 \\ \hline 0.036 \end{array}$$

← three decimal places

Annex a zero on the left of 36 to make three decimal places.

Check by Adding

$$\begin{array}{r} 0.018 \\ +\,0.018 \\ \hline \square\square\square\square \end{array}$$ ✓

**5.** **Find 4 × 0.012.**

$$\begin{array}{r} 0.012 \\ \times\quad 4 \\ \hline \square\square\square\square \end{array}$$

0.012 has ☐ decimal places.

Annex a ☐ to make ☐ decimal places.

Check by Adding

$$\begin{array}{r} 0.012 \\ 0.012 \\ 0.012 \\ +\,0.012 \\ \hline \square\square\square\square \end{array}$$ ✓

Show your work.

d. _____

e. _____

f. _____

**Got It?** **Do these problems to find out.**

**d.** 3 × 0.02 **e.** 0.12 × 8 **f.** 11 × 0.045

## Example

**6.** **A batch of trail mix calls for 1.2 pounds of dry cereal. Nigela is making 5 batches of trail mix. She already has 2.2 pounds of cereal. How many more pounds of dry cereal does she need?**

**Step 1** Multiply.

$$\begin{array}{r} 1.2 \\ \times\ 5 \\ \hline 6.0 \end{array}$$

← one decimal place

← one decimal place

**Step 2** Subtract.

$$\begin{array}{r} 6.0 \\ -\ 2.2 \\ \hline 3.8 \end{array}$$

So, Nigela will need 3.8 more pounds of dry cereal.

## Guided Practice

**Multiply.** (Examples 1–5)

**1.** $2.7 \times 6 =$ _____

Show your work.

**2.** $0.52 \times 3 =$ _____

**3.** $5 \times 0.09 =$ _____

**4.** $4 \times 0.027 =$ _____

**5.** $0.071 \times 8 =$ _____

**6.** $0.065 \times 18 =$ _____

**7.** A bee hummingbird has a mass of 1.8 grams. How many grams are 6 hummingbirds and a 4-gram nest? (Example 6)

_____

**8.** Justin buys 12 pencils for $0.56 each. He pays with a $10 bill. How much change will he receive? (Example 6)

_____

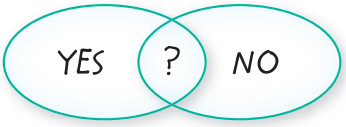
**9.** **Building on the Essential Question** How can estimating products help you to place the decimal correctly? _____

_____

_____

### Rate Yourself!

Are you ready to move on? Shade the section that applies.




For more help, go online to access a Personal Tutor.

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Multiply.** (Examples 1–5)

**1.** $1.2 \times 7 =$ _____

Show your work.

**2.** $0.7 \times 9 =$ _____

**3.** $2 \times 1.3 =$ _____

**4.** $0.8 \times 9 =$ _____

**5.** $3 \times 0.02 =$ _____

**6.** $0.0036 \times 19 =$ _____

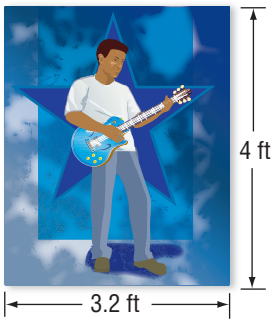
**7** The table shows the number of gallons of gasoline the Beckleys purchased on their road trip. What was the total cost for gas for the trip? (Example 6)

| Fuel | |
|---|---|
| **Number of Gallons** | **Cost per Gallon ($)** |
| 12 | 4.89 |
| 17 | 4.72 |
| 15 | 5.09 |

**8.** Sharon buys 14 folders for $0.75 each. How much change will she receive if she pays with $15? (Example 6) _____

**9** STEM The hottest temperature recorded in the world, in degrees Fahrenheit, can be found by multiplying 13.46 by 10. Find this temperature. Justify your procedure. _____

**10.** CCSPS **Justify Conclusions** Asher recently bought the poster shown at the right. What is its area? Explain your reasoning to a classmate. (*Hint:* Use area = length × width.) _____



**11.** **Use Math Tools** The thickness of each type of coin is shown in the table. How much thicker is a stack of a dollar's worth of nickels than a dollar's worth of quarters? Explain your answer.

| Coin | Thickness (mm) |
|---|---|
| penny | 1.55 |
| nickel | 1.95 |
| dime | 1.35 |
| quarter | 1.75 |

## H.O.T. Problems Higher Order Thinking

**12.** **Model with Mathematics** Write a real-world problem involving multiplication by a decimal factor. Then solve the problem.

**13.** **Persevere with Problems** Discuss two different ways to find the value of the expression $5.4 \times 1.17 \times 100$ that do not require you to first multiply $5.4 \times 1.17$.

**14.** **Reason Inductively** Use the product of $123 \times 47$ to find the product of $123 \times 0.47$. Explain the difference in the two products.

**15.** **Construct an Argument** Your friend thinks that $1.5 \times 8 = 1.20$ because you do not count the zero when placing the decimal point. Is your friend correct? Justify your reasoning.

## Georgia Test Practice

**16.** Anita bought 3 bags of sugar. Each bag weighed 36.8 ounces. How many ounces of sugar did she buy?

Ⓐ 11.04 Ⓒ 110.4

Ⓑ 73.6 Ⓓ 120.8

Name _____ My Homework _____

# Extra Practice

**Multiply.**

**17.** $1.7 \times 5 =$ 8.5

Homework Help

3
1.7
× 5
8.5

**18.** $0.9 \times 4 =$ _____

**19.** $2.4 \times 8 =$ _____

**20.** $3 \times 0.5 =$ _____

**21.** $7 \times 0.012 =$ _____

**22.** $0.0198 \times 75 =$ _____

**23.** The mass of a certain monarch butterfly is 0.56 gram. What is the mass of 4 monarch butterflies?

Show your work.

**24.** The height of Mount Everest, in meters, can be found by multiplying 8.85 by 1,000. Find the height of Mount Everest. Explain your answer.

**25.** A sheet of printer paper is 8.5 inches by 11 inches. What is the area of the paper? (*Hint:* area = length × width)

**26.** Sofia bought 12 pens for $0.59 each. She paid with a $10 bill. How much change will she receive?

**27.** CCSPS **Be Precise** One kilometer is about 0.62 mile. It is 12 kilometers from Noah's house to the ice skating rink. About how many miles is it from Noah's house to the ice skating rink?

## Georgia Test Practice

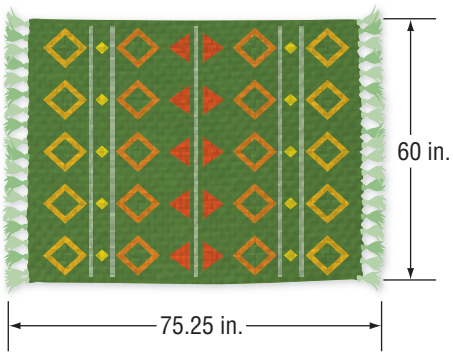
**28. Short Response** The school store is selling the following items.

| Item | Price |
|---|---|
| Pennant | $2.49 |
| Bumper Sticker | $1.79 |
| Magnet | $0.89 |

If Miguel buys two pennants, two bumper stickers, and four magnets, how much will he spend for all the items?

_____

**29. Short Response** Find the area of the rug shown.




_____

**30.** The table shows the admission prices to an amusement park.

| Admission Prices | One-Day Pass | Two-Day Pass |
|---|---|---|
| **Adult** | $39.59 | $43.99 |
| **Child (ages 3–9)** | $30.59 | $33.99 |

What is the total price of one-day passes for two adults and three children?

Ⓐ $140.36 Ⓑ $170.95 Ⓒ $179.95 Ⓓ $189.95

## Common Core Review

**Round each decimal to the nearest whole number.** MCC5.NBT.4

**31.** 5.7 ≈ _____ **32.** 0.05 ≈ _____ **33.** 13.49 ≈ _____

**34.** Use number patterns and powers of ten to complete the table. MCC5.NBT.2

| Factor | | Factor | | Product |
|---|---|---|---|---|
| 2.9 | × | 10 | = | |
| 3.44 | × | | = | 344 |
| | × | 100 | = | 870 |
| 10.25 | × | | = | 102.5 |
| 156.23 | × | 10 | = | |

**35.** Several students from Southbend Middle School are visiting the Smithsonian American Art Museum. Mrs. Mabika divided the students into 5 equal groups. There are 3 boys and 4 girls in each group. Fill in the missing numbers to find the total number of students. MCC5.OA.2

☐ × (☐ + 4) = ☐ students

# Multiply Decimals by Decimals

**What You'll Learn**

Scan the lesson. List two real-world scenarios in which you would multiply a decimal by a decimal.

- _____
- _____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

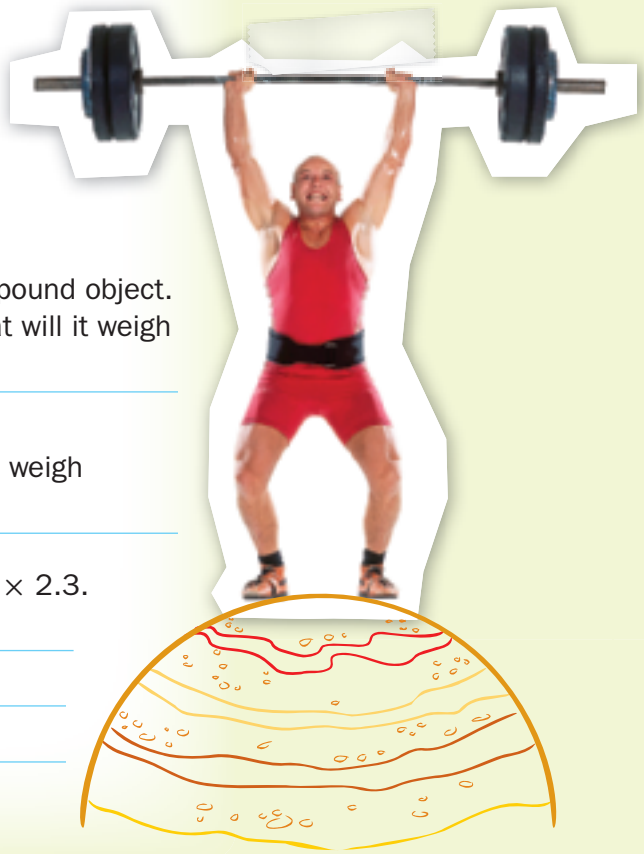
**Content Standards**
MCC6.NS.3

**Mathematical Practices**
1, 2, 3, 4, 5, 6

## Real-World Link

**Planets** The table shows the weight of a 1-pound object on each planet.

| Planet | Weight (Pounds) |
|---|---|
| Mercury | 0.3 |
| Venus | 0.9 |
| Earth | 1 |
| Mars | 0.3 |
| Jupiter | 2.3 |
| Saturn | 1 |
| Uranus | 0.8 |
| Neptune | 1.1 |



1. A 0.5-pound object weighs one half as much as a 1-pound object. If a cheeseburger weighs a half pound on Earth, what will it weigh on Jupiter? _____

2. What would a barbell that weighs 5 pounds on Earth weigh on Jupiter? _____

3. Use the results from Exercises 1 and 2 to find 0.05 × 2.3. Explain your answer. _____

Work Zone

# Multiply Decimals

When multiplying a decimal by a decimal, multiply as with whole numbers. To place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

**STOP and Reflect**

How is the product of $4.2 \times 6.7$ similar to the product of $42 \times 67$? How are they different? Explain below.

## Examples

Tutor

**1.** **Find $3.6 \times 0.05$.**

Estimate $3.6 \times 0.05 \rightarrow 4 \times 0$ or $0$

$$\begin{array}{r} 3.6 \quad \leftarrow \text{one decimal place} \\ \times\ 0.05 \quad \leftarrow \text{two decimal places} \\ \hline 0.180 \quad \leftarrow \text{three decimal places} \end{array}$$

The product is 0.180 or 0.18.

Once you place the decimal point, you can drop the zero at the right.

**2.** **Find $0.112 \times 7.2$.**

Estimate $0.112 \times 7.2 \approx$ ☐ $\times$ ☐ or ☐

0.112 has ☐ decimal places.

7.2 has ☐ decimal place.

So the product has ☐ + ☐, or ☐ decimal places.

$$\begin{array}{r} 0.112 \\ \times\ 7.2 \\ \hline \square\square\square \\ +\ \square\square\square \\ \hline \square\square\square\square \end{array}$$

The product is _____.

Check for reasonableness _____ $\approx$ _____ ✓

**Got It?** **Do these problems to find out.**

**a.** $5.7 \times 2.8$ **b.** $4.12 \times 0.05$ **c.** $0.014 \times 3.7$

Show your work.

a. _____

b. _____

c. _____

# Annex a Zero

If there are not enough decimal places in the product, you need to annex zeros to the left.

## Examples

Tutor

**3.** **Find 1.4 × 0.067.**

$$\begin{array}{r} 0.067 \\ \times\ \ 1.4 \\ \hline 268 \\ +\ 67 \\ \hline 0.0938 \end{array}$$

← three decimal places

← one decimal place

← Annex a zero to make four decimal places.

**4.** **Find 0.45 × 0.053.**

The product will have ☐ decimal places. Annex zeros, if needed.

$$\begin{array}{r} 0.\ \ 4\ \ 5 \\ \times\ \ 0.\ \ 0\ \ 5\ \ 3 \\ \hline \square\ \ \square\ \ \square \\ +\ \ \square\ \ \square\ \ \square \\ \hline \square\ \ \square\ \ \square\ \ \square\ \ \square\ \ \square \end{array}$$

Check Multiply related whole numbers.

$$\begin{array}{r} 4\ \ 5 \\ \times\ \ 5\ \ 3 \\ \hline \square\ \ \square\ \ \square \\ +\ \square\ \ \square\ \ \square \\ \hline \square\ \ \square\ \ \square\ \ \square \end{array}$$

Move the decimal to the left 5 places. What is the number? _____

Is the answer the same? ☐

**Got It?** **Do these problems to find out.**

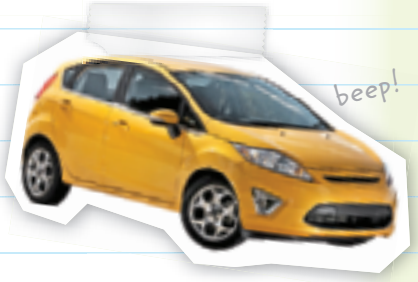
**d.** 0.04 × 0.32 **e.** 0.26 × 0.205 **f.** 1.33 × 0.06

Show your work.

d. _____

e. _____

f. _____




## Example

Watch Tutor

**5.** **A certain car can travel 28.45 miles with one gallon of gasoline. The gasoline tank can hold 11.5 gallons. How many miles can this car travel on a full tank of gas? Justify your answer.**

Estimate $28.45 \times 11.5 \rightarrow 30 \times 12$ or 360

$$\begin{array}{r} 28.45 \quad \leftarrow \text{two decimal places} \\ \times\ 11.5 \quad \leftarrow \text{one decimal place} \\ \hline 14225 \\ 2845 \\ +\ 2845 \\ \hline 327.175 \quad \leftarrow \text{The product has three decimal places.} \end{array}$$

The car could travel 327.175 miles. Since $327.175 \approx 360$, the answer is reasonable.

## Guided Practice

Check

**Multiply.** (Examples 1–4)

Show your work.

**1.** $0.6 \times 0.5 =$ _____

**2.** $27.43 \times 1.089 =$ _____

**3.** $0.98 \times 7.3 =$ _____

**4.** $2.7 \times 1.35 =$ _____

**5.** $0.03 \times 0.09 =$ _____

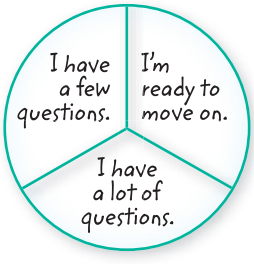
**6.** $0.04 \times 2.12 =$ _____

**7.** A mile is equal to approximately 1.609 kilometers. How many kilometers is 2.5 miles? Justify your answer. (Example 5) _____

**8.** **Building on the Essential Question** Why is estimating not as helpful when multiplying very small numbers such as 0.007 and 0.053? _____

### Rate Yourself!

Are you ready to move on? Shade the section that applies.




For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Multiply.** (Examples 1–4)

**1.** $0.7 \times 0.4 =$ _____

Show your work.

**2.** $0.4 \times 3.7 =$ _____

**3** $0.52 \times 2.1 =$ _____

**4.** $6.2 \times 0.03 =$ _____

**5.** $14.7 \times 11.361 =$ _____

**6.** $0.28 \times 0.08 =$ _____

**7** **STEM** A giraffe can run up to 46.93 feet per second. How far could a giraffe run in 1.8 seconds? Justify your answer. (Example 5)

Show your work.

**8.** A nutrition label indicates that one serving of apple crisp oatmeal has 2.5 grams of fat. How many grams of fat are there in 3.75 servings? Justify your answer. (Example 5)

**9** **Financial Literacy** Pears cost $0.92 per pound and apples cost $1.10 per pound. Mr. Bonilla bought 3.75 pounds of pears and 2.1 pounds of apples. How much did he pay for the pears and apples? Explain your answer.

**Multiply.**

**10.** $25.04 \times 3.005 =$ _____

**11.** $1.03 \times 1.005 =$ _____

**12.** $5.12 \times 4.001 =$ _____

**13.** **Use Math Tools** Complete the graphic organizer to show the relationship between decimal factors and their products.

| × | 2 | 0.2 | 0.02 | 0.002 |
|---|---|---|---|---|
| 3 | 6 | 0.6 | 0.06 | |
| 0.3 | | 0.06 | 0.006 | 0.0006 |
| 0.03 | 0.06 | 0.006 | | |
| 0.003 | | 0.0006 | | |

How do you determine the number of zeros to annex in the product of 0.002 and 0.003? _____

## H.O.T. Problems Higher Order Thinking

**14.** **Reason Abstractly** Write a multiplication problem in which the product is between 0.05 and 0.75. _____

**15.** **Justify Conclusions** Place the decimal point in the answer to make it correct. Explain your reasoning. $3.9853 \times 8.032856 = 32013341...$

**16.** **Construct an Argument** Determine whether the following statement is *always, sometimes,* or *never* true. Give examples to justify your answer.

*The product of two decimals less than 1 is less than either of the factors.*

**17.** **Reason Inductively** Is the product of $0.4 \times 1.8$ greater than or less than 0.4? Explain your reasoning. _____

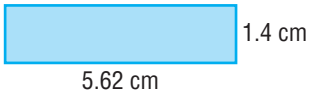
**18.** **Persevere with Problems** Evaluate the expression $0.3(3 - 0.5)$. _____

## Georgia Test Practice

**19.** What is the area of the rectangle?

Ⓐ $14.04\ cm^2$ Ⓒ $8.992\ cm^2$

Ⓑ $10.248\ cm^2$ Ⓓ $7.868\ cm^2$



Name _____ My Homework _____

# Extra Practice

**Multiply.**

**20.** $1.5 \times 2.7 =$ 4.05

Homework Help

$$\begin{array}{r} 1.5 \\ \times\ 2.7 \\ \hline 105 \\ +30 \\ \hline 4.05 \end{array}$$

**21.** $3.1 \times 0.8 =$ _____

**22.** $2.4 \times 3.48 =$ _____

**23.** $5.04 \times 3.2 =$ _____

**24.** $27.4 \times 33.68 =$ _____

**25.** $0.451 \times 0.05 =$ _____

**26.** Katelyn has a vegetable garden that measures 16.75 feet in length and 5.8 feet in width. Find the area of the garden. Justify your answer.

_____

_____

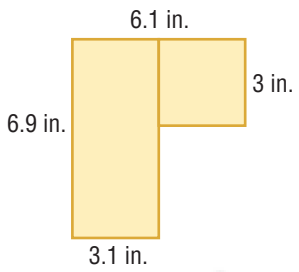
**27.** **Use Math Tools** Find examples of decimals in a newspaper or magazine, on television, or on the Internet. Write a real-world problem in which multiplies decimals.

_____

_____

**28.** **Be Precise** Find the area of the figure at the right. Justify your procedure.

_____




Show your work.

**29.** Junnie walked for 2.5 hours at a speed of 3.2 miles per hour. Maurice walked for 1.8 hours at a speed of 4.1 miles per hour. (*Hint:* Distance equals speed times time.)

**a.** Who walked farther? _____

_____

**b.** How much farther did that person walk? _____

_____

## Georgia Test Practice

**30.** The grocery store is selling bananas for $0.35 per pound. How much will Zack pay for 3.6 pounds of bananas?


Ⓐ $1.26
Ⓑ $1.40
Ⓒ $3.95
Ⓓ $12.60

**31.** A turtle can walk up to 0.69 mile per hour. At this rate, how far could a turtle walk in 1.75 hours?

Ⓕ 0.1208 miles
Ⓖ 1.2075 miles
Ⓗ 2.44 miles
Ⓘ 12.075 miles

**32.** **Short Response** A soccer ball and 12 golf balls have a total mass of 1 kilogram. The mass of each golf ball is about 0.046 kilogram. What is the mass of the soccer ball?

_____

**33.** **Short Response** Renaldo can rollerblade 9.7 miles per hour. At this rate, how far will he rollerblade in 0.75 hour?

_____

## Common Core Review

**Divide.** MCC5.NBT.6

**34.** 60 ÷ 12 = _____

**35.** 96 ÷ 8 = _____

**36.** 750 ÷ 15 = _____

**37.** Logan has 20 action figures. He is shipping them to a friend. He can fit 3 action figures in a box. How many boxes will he need? MCC5.NBT.6

_____

**38.** Three friends are dividing the cost of a kite equally. The kite costs $15.75. How much will each person pay? MCC5.NBT.7


_____

# Inquiry Lab
## Multiply by Powers of Ten

**Inquiry** **HOW can number patterns be used to multiply by powers of 10?**

**Content Standards**
MCC6.NS.3
**Mathematical Practices**
1, 3, 5

**Planets** Each planet in our solar system orbits around the Sun at a different distance from the Sun. Mercury orbits at an average distance of 28.6 million miles. One million is 1,000,000. What is 28.6 × 1,000,000?

What do you know? _____

What do you need to know? _____

## Investigation

Numbers like 10, 100, and 1,000 are called *powers of 10* because they can be obtained by raising 10 to a power.

**Step 1** Look for a pattern. Complete the table.

| Decimal | | Power of 10 | | Product |
|---|---|---|---|---|
| 28.6 | × | 0.1 | = | 2.86 |
| 28.6 | × | 1 | = | 28.6 |
| 28.6 | × | 10 | = | 286 |
| 28.6 | × | 1,000 | = | 28,600 |

Move the decimal point the _____ number of places as the number of zeros in the power of 10.

Move the decimal point to the _____ when multiplying by a power of 10 that is less than 1.

Move the decimal point to the _____ when multiplying by a power of 10 that is greater than 1.

**Step 2** Determine how many zeros are in 1,000,000 and move the decimal point in 28.6 the appropriate number of places.

There are ☐ zeros in 1,000,000.

28.6 million = 28.6 × 1,000,000
= 28.600000
= 28,600,000

Move the decimal point ☐ places to the right.

## Analyze

**Use Math Tools** **Work with a partner to complete the tables.**

| | Decimal | | Power of 10 | | Product |
|---|---|---|---|---|---|
| | 12.4 | × | 0.1 | = | 1.24 |
| 1. | 12.4 | × | 0.01 | = | |
| 2. | 12.4 | × | 0.001 | = | |
| 3. | 12.4 | × | 0.0001 | = | |

| | Decimal | | Power of 10 | | Product |
|---|---|---|---|---|---|
| | 1.24 | × | 1 | = | 1.24 |
| 4. | 1.24 | × | 10 | = | |
| 5. | 1.24 | × | 100 | = | |
| 6. | 1.24 | × | 1,000 | = | |
| 7. | 1.24 | × | 10,000 | = | |
| 8. | 1.24 | × | 100,000 | = | |
| 9. | 1.24 | × | 1,000,000 | = | |
| 10. | 1.24 | × | 10,000,000 | = | |

11. **Reason Inductively** How can you find the product of a number and power of 10 without using paper and pencil or a calculator? _____

12. **Reason Inductively** The product of 13.6 and a power of 10 is 13,600. What is the power of 10? Explain. _____

## Reflect

13. **Use Math Tools** Suppose you plan to purchase 10 items that each cost $4.95. Explain how to use mental math to find the cost of the 10 items.

14. Inquiry HOW can number patterns be used to multiply by powers of 10?

# Look for a Pattern

**Content Standards**
MCC6.NS.3

**Mathematical Practices**
1, 3, 4, 8

## Case #1 Dance Party

The Student Government is organizing a spring dance. They plan to decorate with helium-filled balloons. The cost of the balloons is shown in the table.

*What is the cost of 6 bags of balloons?*

| Number of Bags | Total Cost ($) |
|---|---|
| 1 | 4.75 |
| 2 | 9.50 |
| 3 | 14.25 |
| 4 | 19.00 |

### 1 Understand *What are the facts?*

The table shows the cost of the balloons. Six bags of balloons are needed.

### 2 Plan *What is your strategy to solve this problem?*

Look for a pattern in the table. Each bag costs $4.75.

### 3 Solve *How can you apply the strategy?*

Complete the table to find the cost of 6 bags of balloons.

| Number of Bags | Total Cost ($) |
|---|---|
| 1 | 4.75 |
| 2 | 9.50 |
| 3 | 14.25 |
| 4 | 19.00 |
| 5 | |
| 6 | |

+ 4.75
+ 4.75
+ 4.75
+ 4.75
+ 4.75

So, six bags of balloons cost $_____.

### 4 Check *Does the answer make sense?*

Use multiplication to check your answer. $4.75 \times 6 =$ _____ ✓

## Analyze the Strategy

Tutor

**Reason Inductively** How would the results change if the store offered a discount of $0.50 for each bag of balloons? _____

## Case #2 Virtual DJ

The Student Government is hiring a DJ for the spring dance. They expect the dance to last for 5 hours. The cost to hire DJ Trax is shown in the table.

How much will it cost to hire DJ Trax for the dance?

| Cost to Hire DJ Trax | |
|---|---|
| Number of Hours | Total Cost ($) |
| 1 | 125.50 |
| 2 | 251.00 |
| 3 | 376.50 |

## 1 Understand

**Read the problem. What are you being asked to find?**

I need to _____.

**Underline key words and values in the problem. What information do you know?**

The cost to hire DJ Trax is $ _____ for 1 hour, $ _____ for 2 hours, and $ _____ for 3 hours.

**Is there any information that you do *not* need to know?**

I do not need to know _____.

## 2 Plan

**Choose a problem-solving strategy.**

I will use the _____ strategy.

## 3 Solve

**Use your problem-solving strategy to solve the problem.**

Describe the pattern. Then complete the table.

The cost to hire DJ Trax _____ by $ _____ for each hour.

| Cost to Hire DJ Trax | | | | |
|---|---|---|---|---|
| Number of Hours | 1 | 2 | 3 | 4 |
| Total Cost ($) | 125.50 | 251.00 | 376.50 | |

So, it will cost $ _____ to hire DJ Trax for 5 hours.

## 4 Check

**Use information from the problem to check your answer.**

$ _____ × ☐ = $ _____

**Collaborate** Work with a small group to solve the following cases. Show your work on a separate piece of paper.

## Case #3 Gaming

The table below shows the cost of a subscription to the Action Gamers Channel.

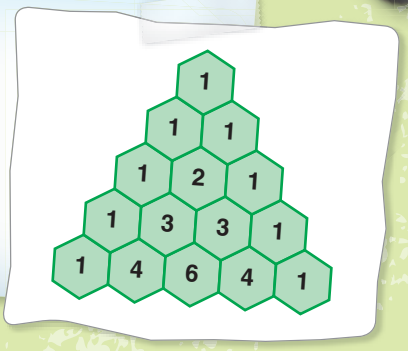
| Action Gamers Channel Prices | |
|---|---|
| **Number of Months** | **Total Cost ($)** |
| 1 | 7.95 |
| 2 | 15.90 |
| 3 | 23.85 |

What is the cost of a 6-month subscription?

## Case #4 Number Theory

The diagram to the right is known as Pascal's Triangle.

If the pattern continues, what will the numbers in the next row be from left to right?




## Case #5 Number Sense

Describe the pattern below. Then find the next three numbers.

3, 6.5, 11, 16.5, 23, ____, ____, ____

Circle a strategy below to solve the problem.

- Make a model.
- Make a table.
- Solve a simpler problem.
- Guess, check, and revise.

## Case #6 Games

Claudio is purchasing a new gaming system. One Web site sells the system for $240 and the games for $45.99 each.

What is the total cost if Claudio purchases the system and 3 games?

# Mid-Chapter Check

## Vocabulary Check

1. Define *product*. Give an example of two whole number factors with a product of 9.

## Skills Check and Problem Solving

**Find each sum or difference.** (Lesson 1)

2. $42.7 + 52.12 =$ _____

3. $4.7 - 3.28 =$ _____

4. $8.37 - 0.015 =$ _____

**Multiply.** (Lessons 3 and 4)

5. $2.3 \times 5 =$ _____

6. $3.4 \times 5.2 =$ _____

7. $1.2 \times 0.015 =$ _____

8. The table shows a list of walking trails in the United States. Latisha walked the KATY Trail 6 days last week. How many miles did she walk in a week. (Lesson 3)

| Location | Length of Trail (mi) |
|---|---|
| Florida Trail (FL) | 4.8 |
| Long Path (NJ) | 3.3 |
| Ohio & Erie Canal Trail (OH) | 4.3 |
| KATY Trail (MO) | 5.7 |
| Point Reyes National Seashore (CA) | 5.0 |

9. **Be Precise** The length of a pool table is 7.1 feet and the width is 3.6 feet. Find the area of the surface of the pool table by multiplying the length by the width. (Lesson 4)

10. **Georgia Test Practice** Ashton used 12.6 gallons of gasoline to drive his car on a weekend trip. He averaged 21.5 miles per gallon. About how many miles did he travel? (Lesson 2)

Ⓐ 20 miles
Ⓑ 200 miles
Ⓒ 350 miles
Ⓓ 400 miles

Lesson 5

# Divide Multi-Digit Numbers

**What You'll Learn**

*Scan the lesson. Predict two things you will learn about dividing multi-digit numbers.*

- _____

_____

- _____

_____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

**Content Standards**
MCC6.NS.2

**Mathematical Practices**
1, 2, 3, 4, 5, 6

## Vocabulary Start-Up

Vocab

When one number is divided by another, the result is called a *quotient*. The *dividend* is the number that is divided and the *divisor* is the number used to divide another number.

**Label the division problem with the correct vocabulary term: quotient, dividend, and divisor.**

$$\begin{array}{r} 3 \leftarrow \square \\ \square \rightarrow 80\overline{)240} \leftarrow \square \end{array}$$

## Real-World Link

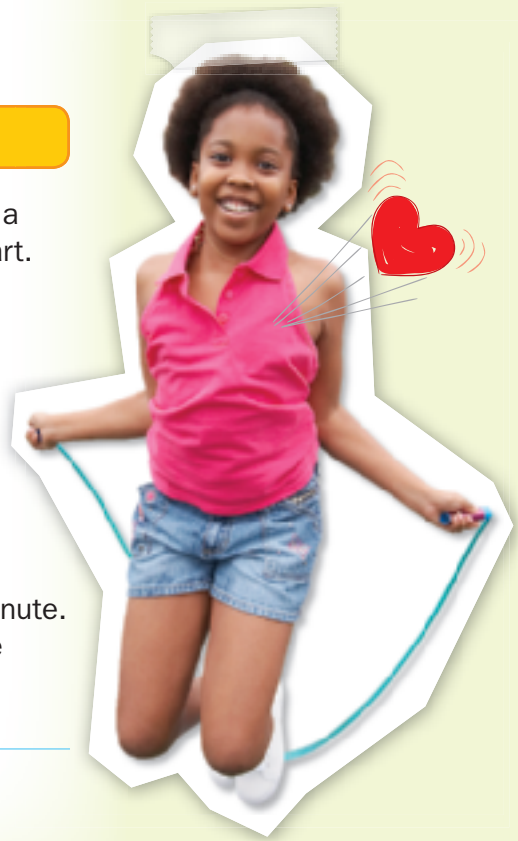
**Circulation** When you are at rest it takes about 60 seconds for a single blood cell to travel around your body and back to your heart.

1. In 120 seconds, about how many times does a single blood cell travel around your body and back to your heart? Write the dividend, divisor, and quotient in the diagram below.

$$\begin{array}{r} \square \leftarrow \text{quotient} \\ \text{divisor} \rightarrow \square\overline{)\square} \leftarrow \text{dividend} \end{array}$$

2. Camila's target heart rate should be about 200 beats per minute. Estimate the number of times Camila's heart will beat in one second if her heart is working at this rate. Explain.

_____



Rolf Bruderer/Blend Images/Getty Images

Work Zone

# Divide Three-Digit Dividends

In this lesson, you will divide multi-digit numbers. Use estimation to help you place the first digit in the quotient.

## Examples

Tutor

**1.** **Find 351 ÷ 9.**

Estimate 360 ÷ 9 = 40. So, the first digit is in the tens place.

Write 351 ÷ 9 as $9\overline{)351}$.

$$\begin{array}{r} 39 \\ 9\overline{)351} \\ -27 \\ \hline 81 \\ -81 \\ \hline 0 \end{array}$$

Divide each place-value position from left to right.

Since 81 − 81 = 0, there is no remainder.

So, 351 ÷ 9 is 39.

Check Compare 39 to the estimate. 39 ≈ 40 ✓

**2.** **Find $31\overline{)878}$.**

Estimate 900 ÷ 30 = 30. So, the first digit is in the tens place.

$$\begin{array}{r} 28 \text{ R10} \\ 31\overline{)878} \\ -62 \\ \hline 258 \\ -248 \\ \hline 10 \end{array}$$

Divide each place-value position from left to right.

Since 258 − 248 = 10 and 10 < 31, 10 is the remainder.

So, $31\overline{)878}$ is 28 R10.

Check 28 R10 ≈ 30 ✓

Show your work.

**Got It?** **Do these problems to find out.**

**Find each quotient.**

**a.** 768 ÷ 8

**b.** $16\overline{)318}$

a. _____

b. _____

# Divide Four-Digit Dividends

The steps for dividing three-digit dividends and four-digit dividends are the same.

## Examples

Tutor

**3.** **Find 6,493 ÷ 75.**

Estimate $6{,}400 \div 80 = 80$

$$\begin{array}{r} 86 \text{ R43} \\ 75\overline{)6{,}493} \\ -600 \\ \hline 493 \\ -450 \\ \hline 43 \end{array}$$

Divide each place-value position from left to right.

Check for Reasonableness $86 \text{ R43} \approx 80$ ✓

The quotient of 6,493 ÷ 75 is 86 R43.

**4.** **The average person has 1,460 dreams a year. What is the average number of dreams a person has each night?**

Find 1,460 ÷ 365.

Estimate $1{,}600 \div 400 = 4$

$$\begin{array}{r} 4 \\ 365\overline{)1{,}460} \\ -1{,}460 \\ \hline 0 \end{array}$$

Check for Reasonableness $4 = 4$ ✓

The average number of dreams a person has each night is 4.

**Got It?** **Do these problems to find out.**

**c.** Find $56\overline{)4{,}321}$.

**d.** Find $91\overline{)8{,}465}$.

**e.** To promote its opening weekend, a water park gave the local middle school 1,050 free tickets. The middle school has 350 students. Each student will receive the same number of tickets. How many tickets will each student receive?

**Check Your Answer**

You can check division with a remainder. Multiply the quotient by the divisor. Then add the remainder.

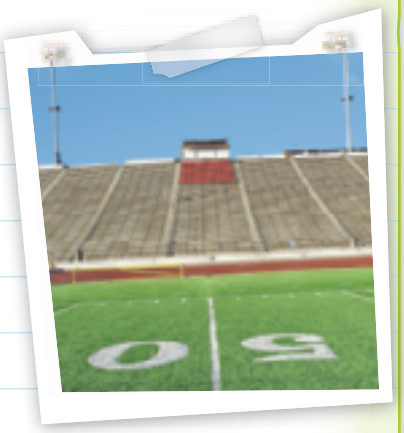
$$\begin{array}{r} 86 \\ \times\ 75 \\ \hline 6{,}450 \end{array} \qquad \begin{array}{r} 6{,}450 \\ +\ \ 43 \\ \hline 6{,}493 \end{array}$$

Show your work.

c. _____

d. _____

e. _____



## Example

Tutor

**5.** **The total number of seats in a college stadium is 54,912. There are 44 sections and each section has an equal number of seats. How many seats are in each section?**

Divide 54,912 by 44.

$$
\begin{array}{r}
1{,}248 \\
44\overline{)54{,}912} \\
-44 \\
\hline
109 \\
-88 \\
\hline
211 \\
-176 \\
\hline
352 \\
-352 \\
\hline
0
\end{array}
$$

Divide each place-value position from left to right.

There are 1,248 seats in each section.

## Guided Practice

Check

**Find each quotient.** (Examples 1–4)

**1.** $8\overline{)736}$

Show your work.

**2.** $11\overline{)620}$

**3.** $19\overline{)7{,}814}$

**4.** $37\overline{)3{,}511}$

**5.** Zach bought two new jet skis for $15,480. He will make 36 equal payments. How much will each payment be?

(Example 5) _____

**6.** **Building on the Essential Question** How is estimation helpful when dividing multi-digit numbers?

_____

_____

_____

_____

### Rate Yourself!

How well do you understand dividing multi-digit numbers? Circle the image that applies.


For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Find each quotient.** (Examples 1–3)

**1.** 174 ÷ 6 =

Show your work.

**2.** 453 ÷ 8 =

**3.** 645 ÷ 43 =

**4.** 299 ÷ 21 =

**5** $62\overline{)8{,}090}$

**6.** $31\overline{)2{,}480}$

**7.** $34\overline{)5{,}780}$

**8.** $16\overline{)3{,}482}$

**9** A tour bus travels 2,160 miles in 36 hours. What is the average distance the bus travels in one hour? (Example 4)

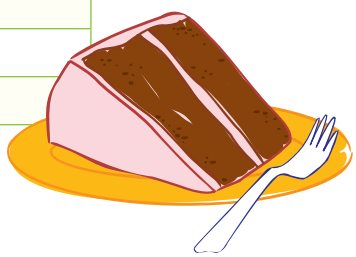
Show your work.

**10.** A charity sold 475 tickets to a dinner auction. If the charity raised $16,625 in ticket sales, what was the cost of one ticket? (Example 5)

**11.** A city phone book has 86 pages filled with residents' names. There are a total of 15,050 names in the book. Each page has an equal number of names on it. How many names are on each page? (Example 5)

**12.** CCSPS **Use Math Tools** The table shows the number of servings for different size cakes at Mimi's Bakery. Suppose a high school graduation expected 2,889 guests. How many X-large sheet cakes should the school order? Explain how you solved.

| Mimi's Bakery | |
|---|---|
| **Sheet Cake Size** | **Number of Servings** |
| Small | 30 |
| Medium | 60 |
| Large | 90 |
| X-Large | 120 |



**13.** **Be Precise** How many 8-ounce cups can be filled from 9 gallons of juice? (*Hint:* There are 128 ounces in one gallon.)

Show your work.

**14.** **Be Precise** Water stations will be placed every 600 meters of a fifteen kilometer race. How many water stations will be needed? (*Hint:* There are 1,000 meters in one kilometer.)

## H.O.T. Problems Higher Order Thinking

**15.** **Model with Mathematics** Write and solve a real-word problem that involves a two-digit divisor and a four-digit dividend.

**16.** **Persevere with Problems** If the divisor is 40, what is the least three-digit dividend that would give a remainder of 4?

**17.** **Justify Conclusions** Can the remainder in a division problem ever equal the divisor? Why or why not?

**18.** **Reason Abstractly** Use the digits 2, 4, and 8 one time each in the following problem.

$\square\square,\square\square 00 \div \square 0 = 30$

## Georgia Test Practice

**19.** The table shows the mileage Karla drove on her trip. She drove for a total of 24 hours. What is the average speed she drove?

Ⓐ 55 mph
Ⓑ 60 mph
Ⓒ 65 mph
Ⓓ 70 mph

| Karla's Trip | |
|---|---|
| Day | Miles |
| 1 | 486 |
| 2 | 316 |
| 3 | 638 |

Name _____ My Homework _____

# Extra Practice

**Find each quotient.**

**20.** 182 ÷ 7 = 26

Homework Help

$$\begin{array}{r} 26 \\ 7\overline{)182} \\ -\,14 \\ \hline 42 \\ -\,42 \\ \hline 0 \end{array}$$

**21.** 345 ÷ 6 = _____

**22.** 792 ÷ 33 = _____

**23.** 811 ÷ 79 = _____

**24.** $44\overline{)2{,}876}$

**25.** $26\overline{)4{,}340}$

**26.** $33\overline{)9{,}537}$

**27.** $19\overline{)4{,}257}$

**28.** A city library has 9,440 nonfiction books. The librarian wants to divide the books evenly among 80 shelves. How many books will be on each shelf?

Show your work.

**29.** A concession stand manager ordered 20,280 souvenir cups. He wants to divide the cups evenly among the 24 concession stands. How many cups will each concession stand receive?

**30.** **Use Math Tools** The table shows the average weight of animals. How many more tons does a blue whale weigh than an African elephant? Explain how you solved. (*Hint:* There are 2,000 pounds in one ton.)

| Animal Weights | |
|---|---|
| **Animal** | **Weight (pounds)** |
| African Elephant | 15,000 |
| Blue Whale | 238,000 |
| Great White Shark | 5,000 |
| Lowland Gorilla | 500 |

## Georgia Test Practice

**31.** The dance team recently purchased 25 pairs of new boots for $1,350. What was the price of each pair of boots?

Ⓐ $50 Ⓒ $55

Ⓑ $54 Ⓓ $60

**32.** **Short Response** A toy factory assembles 19,824 toy castles over a 12-hour period of time. The same number of castles is assembled every hour. How many toy castles were assembled each hour?

_____

**33.** The school auditorium holds 1,711 people. There are 59 seats in each row. How many rows of seats are in the auditorium?

Ⓕ 23 rows Ⓗ 29 rows

Ⓖ 25 rows Ⓘ 39 rows

**34.** **Short Response** The Carson Corporation distributed 58,992 sales fliers equally to 24 different cities. How many sales fliers were sent to each city?

_____

## Common Core Review

**Divide mentally.** MCC4.NBT.6

**35.** 300 ÷ 5 = _____

**36.** 4,800 ÷ 8 = _____

**37.** 4,200 ÷ 6 = _____

**38.** The maple tree in Logan's backyard is 58.6 feet tall. Plot 58.6 on the number line below. Then round 58.6 to the nearest whole number. MCC4.NF.7

_____


**39.** There are 75 students attending a field trip. Each van will seat 8 students. How many vans will be needed? MCC4.NBT.6

_____

**40.** Mr. Maxwell is shipping 80 video games. Each box will hold 12 games. How many boxes will be needed? MCC4.NBT.6

_____

Lesson 6

# Estimate Quotients

**What You'll Learn**

Scan the lesson. List two headings you would use to make an outline of the lesson.

- _____
- _____

**Essential Question**

HOW can estimating be helpful?

**Vocabulary**

compatible numbers

**Common Core GPS**

**Content Standards**
MCC6.NS.2

**Mathematical Practices**
1, 3, 4, 5

## Vocabulary Start-Up

**To determine what a compatible number is, first you must determine what compatible means. Fill in the table below.**

| Definition: | Example: |
|---|---|
| **compatible** | |
| What would make numbers compatible? | Non-Example: |

## Real-World Link

**Remote Control** Latasha and her two sisters want to buy their little brother a remote control helicopter. The helicopter costs $28.90. They decided to split the cost equally.

1. What number that is a multiple of 3 is close to $28.90? Explain.

2. Use your answer from Exercise 1 to determine about how much each person will pay. Explain.

Work Zone

# Estimate by Rounding Dividends

To estimate quotients of decimals, use rounding and compatible numbers. **Compatible numbers** are numbers that are easy to divide mentally.

## Examples

Tutor

**1.** **Estimate 11.75 ÷ 3.**

Round the dividend, 11.75, to a whole number.

The divisor is 3. So, round 11.75 to a whole number that is a multiple of 3.

$3\overline{)11.75} \rightarrow 3\overline{)12}$ Using multiples of 3, 12 is closest to 11.75

So, 11.75 ÷ 3 is about 4.

**2.** **The Jenkins family bought five tickets to a charity auction. The receipt shows the total cost of the tickets. Estimate the cost of each ticket. Justify your answer.**


$5\overline{)61.25} \rightarrow 5\overline{)60}$ Round 61.25 to 60.

Each ticket costs about $12.
Since 5 × 12 = 60 and 60 ≈ 61.25, the answer is reasonable.

Show your work.

**Got It?** **Do these problems to find out.**

**Estimate each quotient.**

**a.** 49.3 ÷ 7

**b.** $25\overline{)98.1}$

**c.** Suppose the Jenkins family decided to purchase 6 tickets for a total price of $64.50 using a discount. Estimate the cost of each ticket. Justify your answer.

a. _____

b. _____

c. _____

# Estimate by Rounding Divisors

You can also estimate quotients of decimals by rounding the divisors. Choose compatible numbers that are easy to divide mentally.

## Examples

Tutor

**3.** **Estimate 32 ÷ 3.9.**

Round the divisor, 3.9, to a whole number.

The dividend is 32. So, round 3.9 to a whole number that is a factor of 32.

$3.9\overline{)32} \rightarrow 4\overline{)32}$ Round 3.9 to 4 since 32 and 4 are compatible numbers.

So, 32 ÷ 3.9 is about 8.

Check by Multiplying $3.9 \times 8 = 31.2$

$31.2 \approx 32$ ✓

**4.** **Estimate 56 ÷ 6.8.**

Round the divisor, ☐, to a whole number.

The dividend is ☐.

So, round 6.8 to a whole number that is a _____ of 56.

Round 6.8 to ☐.

$6.8\overline{)56} \rightarrow$ ☐$\overline{)56}$

So, 56 ÷ 6.8 is about ☐.

Check by Multiplying $6.8 \times$ ☐ = ☐

☐ ≈ 56 ✓

**STOP and Reflect**

How does the division fact $63 \div 9 = 7$ help you to estimate the quotient of $63 \div 8.4$? Answer below.

**Got It?** **Do these problems to find out.**

**Estimate each quotient.**

**d.** 54 ÷ 9.16

**e.** $10.75\overline{)99}$

Show your work.

d. _____

e. _____

## Example

Tutor

**5.** STEM **A Pacific Leatherback turtle can have a mass of up to 704.4 kilograms. An Olive Ridley turtle can have a mass of up to 49.9 kilograms. About how many times heavier is the Pacific Leatherback turtle? Explain why your answer is reasonable.**

$49.9\overline{)704.4} \rightarrow 50\overline{)700}$ $\quad\begin{array}{r}14\\ \\ \\ \end{array}$ Round 49.9 to 50 and 704.4 to 700.

The Pacific Leatherback is about 14 times heavier than the Olive Ridley turtle.

Check for Reasonableness Since $50 \times 14 = 700$, and $700 \approx 704.4$, your answer is reasonable. ✓

Show your work.

**Got It?** **Do this problem to find out.**

**f.** There are approximately 250.9 million cars in the United States. Spain has approximately 25.1 million cars. About how many times more cars does the U.S. have than Spain? Explain why your answer is reasonable.

f. _____

## Guided Practice

Check

**Estimate each quotient.** (Examples 1, 3, and 4)

**1.** $25 \div 4.7 \approx$ _____

**2.** $40.79 \div 7 \approx$ _____

**3.** $38.1\overline{)984.76} \approx$ _____

Show your work.

**4.** STEM The average yearly precipitation for Gulfport, Mississippi, is 65.3 inches. About how much precipitation does the area receive each month? Explain why your answer is reasonable. (Example 2)

**5.** Mauricio bought 6.75 yards of fabric for a total of $47.50. About how much was the cost per yard? Explain why your answer is reasonable. (Example 5)

**6.** **Building on the Essential Question** When is it helpful to estimate quotients? _____

### Rate Yourself!

How confident are you about estimating quotients? Shade the ring on the target.


For more help, go online to access a Personal Tutor.

Tutor

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Estimate each quotient.** (Examples 1, 3, and 4)

**1.** $32.4 \div 3 \approx$ _____

**2.** $76.2 \div 18.4 \approx$ _____

**3.** $11.4\overline{)35.7} \approx$ _____

Show your work.

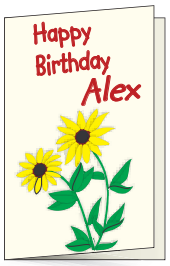
**4. Financial Literacy** Emily spent a total of $38.04 on four CDs. If each CD cost the same amount, what is a reasonable amount for the cost of each CD? Explain why your answer is reasonable. (Example 2)

**5** A recipe for a smoothie calls for 0.75 pound of strawberries. If Kerry has 3.15 pounds of strawberries, how many batches of the recipe can she make? (Example 5)

**6. Financial Literacy** For each handmade greeting card Jacqui sells, she makes a profit of $0.35. In one week, she made a profit of $42. She sells the cards for $0.75 each.

**a.** About how many greeting cards did Jacqui sell that week?

**b.** About how much did she earn before paying expenses?




**7** CCSPS **Justify Conclusions** The average cow produces about 53 pounds of milk per day. If one gallon of milk weighs about 8.5 pounds, estimate the number of gallons of milk a cow produces each day. Explain why your estimate is reasonable.

**8.** When full, a 22-gallon gas tank holds 129.8 pounds of gasoline. Estimate the weight of one gallon of gasoline. If it costs $91.30 to fill the gas tank, estimate the cost per gallon.

9. **Use Math Tools** Use estimation and mental math to find the four missing quantities from the receipt. _____

_____

**Precious Pets** Receipt

| Qty | Description | Unit Price | Total |
|---|---|---|---|
| ■ | Hamster cage | $35.99 | $35.99 |
| ■ | Exercise wheel | $5.29 | $10.58 |
| ■ | Softwood bedding | $6.29 | $25.16 |
| ■ | Hamster food | $4.59 | $36.72 |
| | | Total | $108.45 |

## H.O.T. Problems Higher Order Thinking

10. **Model with Mathematics** Write a real-world division problem involving decimals in which you would use compatible numbers to estimate the quotient. _____

_____

_____

11. **Persevere with Problems** Determine where to place the decimal point in the dividend and divisor so that the quotient is between 23 and 25.

16023 ÷ 654

_____

12. **Reason Inductively** Explain how you know which compatible numbers to use when estimating the quotient of a division problem involving decimals. Support your answer with an example. _____

_____

_____

## Georgia Test Practice

13. Approximately 243.0 million people live in Indonesia. The population of Germany is about 82.2 million. About how many times more people live in Indonesia than in Germany?

Ⓐ about 2 times
Ⓑ about 3 times
Ⓒ about 20 times
Ⓓ about 30 times

Name _____ My Homework _____

# Extra Practice

**Estimate each quotient.**

**14.** 54 ÷ 9.4 ≈ _____

Homework Help

$9.4\overline{)54} \rightarrow 9\overline{)54}$ (6)

**15.** 45.8 ÷ 23.6 ≈ _____

**16.** $23.3\overline{)119}$ ≈ _____

**17.** The average annual snowfall in King Salmon, Alaska, is 45.9 inches. The snow season lasts about 7 months of the year. About how much snow does the area receive on average each month? Explain why your answer is reasonable.

_____

_____

**18.** Scientists at the zoo recently studied an anaconda that weighs 8,643.2 ounces. The average weight of the common rat is 11.8 ounces. About how many times heavier is the anaconda than the common rat? Explain why your answer is reasonable.

_____

_____

**19.** CCSPS **Justify Conclusions** Aurelia would like to save $474.72 in a year to purchase a new video camera. She estimates she needs to save $40 per month. Explain why her estimate is reasonable.

_____

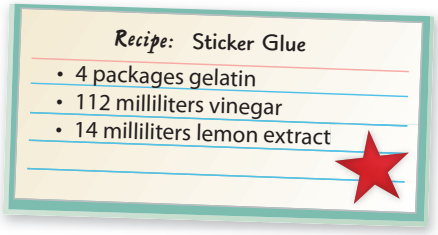
_____

**20.** A piggy bank containing only quarters has a mass of 850 grams when empty and 7,822 grams when filled. If a quarter weighs 5.6 grams, estimate the amount of money inside the piggy bank.

_____

_____

**21.** Melanie is making homemade stickers. She uses the recipe shown to create the glue for the stickers.




**a.** She has 545 milliliters of vinegar. Which is a more reasonable estimate for the number of batches she can make, 5 or 7? Explain your answer.

_____

_____

**b.** About how many times as many milliliters of vinegar are needed than lemon extract? _____

## Georgia Test Practice

**22.** The table shows the average breakdown of body weight for a 130-pound person.

| Body Part | Weight (ounces) |
|---|---|
| Water | 896 |
| Muscle | 720 |
| Skeleton | 240 |
| Head | 128 |
| Skin | 96 |

About how many times as great is the weight of water than the weight of skin?

Ⓐ about 9 Ⓒ about 13

Ⓑ about 11 Ⓓ about 15

**23.** **Short Response** For a craft activity at a day care, each child will need 1.75 yards of ribbon. If there are 25 yards of ribbon available, estimate the number of children that can participate.

_____

**24.** The following advertisement was in the local newspaper.

| Bike Country | |
|---|---|
| 26" Bike | $135.99 |
| Folding Bike Rack | $43.95 |
| Seat Covers | $6.59 |
| Bike Lock | $12.89 |
| Helmet | $29.49 |

The cost of a 26″ bike is equal to about how many bike locks?

Ⓕ about 7 Ⓗ about 9

Ⓖ about 8 Ⓘ about 10

**25.** **Short Response** Rewrite the following division problem using compatible numbers, so the quotient is a whole number.

**485.87 ÷ 71.54**

_____

## Common Core Review

**Find each quotient.** MCC5.NBT.7

**26.** 8.4 ÷ 10 = _____

**27.** $100\overline{)14.7}$ = _____

**28.** 94.5 ÷ 100 = _____

**29.** Describe the number pattern below. Then find the next three numbers.

7,345.6; 734.56; 73.456; MCC5.NBT.2 _____; _____; _____

_____

**30.** The movie theater sold 825 tickets to fill 3 theaters. Each theater has an equal number of seats. How many seats are in each theater?

MCC4.NBT.6 _____

# Divide Decimals by Whole Numbers

**What You'll Learn**

Scan the lesson. List two real-world scenarios in which you would divide decimals by whole numbers.

- _____

_____

- _____

_____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

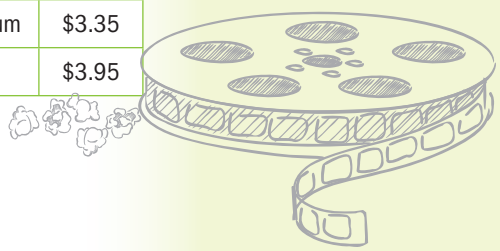
**Content Standards**
MCC6.NS.3

**Mathematical Practices**
1, 3, 4, 5, 6

## Real-World Link

**Movies** Charlotte, Aaron, Maddie, and Catie went to the movies and ordered snacks from the menu shown.

| Cinema 15 | | |
|---|---|---|
| Popcorn | small | $2.45 |
| | large | $5.60 |
| Candy | small | $2.25 |
| | large | $3.20 |
| Drink | small | $2.75 |
| | medium | $3.35 |
| | large | $3.95 |



**1.** How much did they pay for four small popcorns?

_____ × 4 = _____

**2.** What is the total cost for two small packages and one large package of candy?

_____

**3.** How much do four medium drinks cost?

_____ × 4 = _____

**4.** What is the total cost for Exercises 1–3?

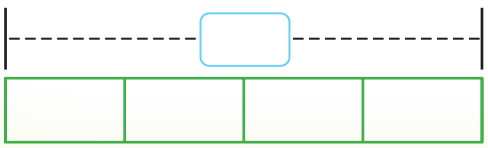
Popcorn $ ☐.☐

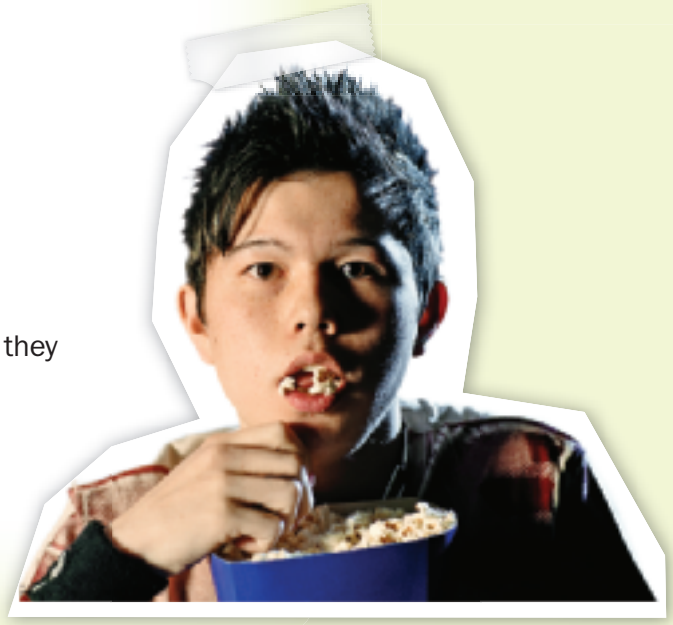
Candy $ ☐.☐

Drinks + $ ☐.☐

$ ☐.☐

**5.** Estimate how much each person should pay if they split the total cost evenly.







David Leahy/Taxi/Getty Images

Work Zone

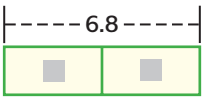
## Divide a Decimal by a 1-Digit Number

When dividing a decimal by a whole number, divide as with whole numbers. Then place the decimal in the quotient directly above its place in the dividend.

### Example

Tutor

**1.** **Find 6.8 ÷ 2.** Estimate $6 \div 2 = 3$




$$\begin{array}{r} 3.4 \\ 2\overline{)6.8} \\ -\,6 \\ \hline 0\,8 \\ -\,8 \\ \hline 0 \end{array}$$

6 ones divided by 2 is 3 ones.

8 tenths divided by 2 is 4 tenths.

$6.8 \div 2 = 3.4$ Compared to the estimate, the quotient is reasonable.

Show your work.

a. _____

b. _____

c. _____

**Got It?** Do these problems to find out.

**a.** $7.5 \div 3$ **b.** $3.5 \div 7$ **c.** $9.8 \div 2$

**Checking Answers**

To check that the answer is correct, multiply the quotient by the divisor. In Example 2, $0.55 \times 14 = 7.7$. ✓

## Divide a Decimal by a 2-Digit Number

The decimal point in the quotient is placed directly above its place in the dividend. In real-world situations where the division does not result in a remainder of zero, round the quotient to a specified place.

### Example

Tutor

**2.** **Find 7.7 ÷ 14.** Estimate $10 \div 10 = 1$

$$\begin{array}{r} 0.55 \\ 14\overline{)7.70} \\ -\,7\,0 \\ \hline 70 \\ -\,70 \\ \hline 0 \end{array}$$

Place the decimal point.

Annex a zero and continue dividing.

$7.7 \div 14 = 0.55$ Compared to the estimate, the quotient is reasonable.

**Got It?** Do these problems to find out.

**d.** $9.48 \div 15$ **e.** $3.49 \div 4$ **f.** $55.08 \div 17$

Show your work.

d. _____

e. _____

f. _____

## Example

Tutor

**3.** **Lin is mailing a care package to his brother. The table gives the cost for mailing packages. If Lin's care package weighs 3 pounds, how much is the cost per pound?**

| Weight (Pounds) | Cost ($) |
|---|---|
| 1 | 4.80 |
| 2 | 5.63 |
| 3 | 6.74 |
| 4 | 7.87 |

To find the cost per pound, divide $6.74 by 3.

$$
\begin{array}{r}
2.246 \\
3\overline{)6.740} \\
-\,6 \\
\hline
07 \\
-\,06 \\
\hline
14 \\
-\,12 \\
\hline
20 \\
-\,18 \\
\hline
2
\end{array}
$$

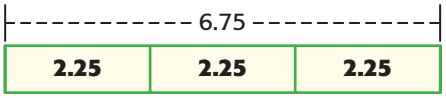
← Place the decimal point after dividing to thousandths.

Annex a zero and continue dividing.

The remainder will never be zero.

Round 2.246 to 2.25 because hundredths are the smallest denomination used in money. It costs about $2.25 per pound to mail the package.

Check Use a bar diagram and multiplication to check your work.




$2.25 \times 3 = 6.75$

$6.75 \approx 6.74$ ✓

**Dividing Money**

When dividing money, it is sometimes necessary to divide to the thousandths place and then round to the hundredths.

**Got It?** Do this problem to find out.

**g.** Find the cost per pound of a two-pound and four-pound package.

g. _____

## Example

Tutor

**4.** **Ryan and his brother are sharing the cost of a video game. The video game costs $28.60. If Ryan saved $20 to buy the game, how much does he have left after paying his share?**

**Step 1** Determine how much Ryan will pay.

$$\begin{array}{r} 14.30 \\ 2\overline{)28.60} \\ -\ 2 \\ \hline 08 \\ -\ 8 \\ \hline 06 \\ -\ 6 \\ \hline 0 \end{array}$$

Place the decimal point.

Ryan's share is $14.30.

**Step 2** Determine how much Ryan will have left.

$$\begin{array}{r} \$20.00 \\ -\ \$14.30 \\ \hline \$5.70 \end{array}$$

So, Ryan has $5.70 left.

**Got It?** **Do this problem to find out.**

**h.** Kristen and her two friends are sharing the cost of a funnel cake. The funnel cake costs $5.49. If Kristen has $2.00, how much will she have left after she pays her share?

Show your work.

h. _____

## Guided Practice

Check

**Divide. Round to the nearest tenth if necessary.** (Examples 1 and 2)

**1.** 3.6 ÷ 4 = _____

**2.** 12.32 ÷ 22 = _____

**3.** 69.904 ÷ 34 = _____

Show your work.

**4.** Light travels 5.88 trillion miles in one year. How far will light travel in one month? (Examples 1 and 3) _____

**5.** Four dozen bagels costs $30.00. How much change will you receive if you pay for a dozen bagels with a ten-dollar bill? (Examples 2 and 4) _____

**6.** **Building on the Essential Question** How can estimating quotients help you to place the decimal correctly? _____

### Rate Yourself!

How confident are you about dividing decimals by whole numbers? Check the box that applies.

For more help, go online to access a Personal Tutor.

Tutor

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Divide. Round to the nearest tenth if necessary.** (Examples 1 and 2)

**1.** 39.39 ÷ 3 = _____

Show your work.

**2.** 7.24 ÷ 7 = _____

**3** 118.5 ÷ 5 = _____

**4.** 11.4 ÷ 19 = _____

**5.** 55.2 ÷ 46 = _____

**6.** 336.752 ÷ 31 = _____

**7.** The Gonzalez family is taking a cruise that costs $3,082.24 for a family of four. How much does it cost per person? (Example 3)

Show your work.

_____

**8.** Find the average height of the buildings shown in the table. (*Hint:* To find the average, add the values and divide by the number of values.) (Example 4)

_____

| World's Tallest Buildings (thousands of feet) | | | | |
|---|---|---|---|---|
| 1.667 | 1.483 | 1.483 | 1.451 | 1.381 |

**9** CCSPS **Be Precise** Mr. Jamison will stain the deck in his backyard. The deck has an area of 752.4 square feet. If the deck is 33 feet long, how wide is it? Justify your procedure. _____

_____

**10.** CCSPS **Be Precise** The Verrazano-Narrows Bridge in New York City is 4.26 thousand feet long and is the seventh longest suspension bridge in the world. There are 3 feet in a yard. How long is the bridge in yards? Justify your procedure. _____

_____

Jeremy Edwards/Vetta/Getty Images

**11.** The Student Council is raising money by selling bottled water at a band competition. The table shows the prices for different brands. Which brand costs the least per bottle? Explain your reasoning. _____

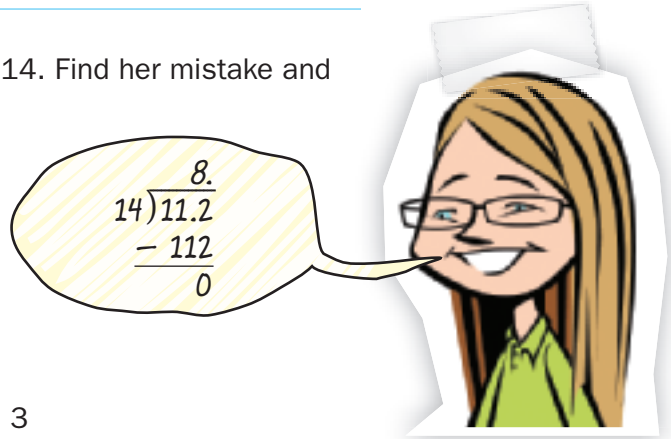
| Cost of Bottled Water (20 oz bottles) | | |
|---|---|---|
| Brand A | 6-pack | $3.45 |
| Brand B | 12-pack | $5.25 |
| Brand C | 24-pack | $10.99 |

## H.O.T. Problems Higher Order Thinking

**12.** **Persevere with Problems** Find each of the following quotients. Then find a pattern and explain how you can use this pattern to mentally divide 0.0096 by 3.

844 ÷ 2  0.844 ÷ 2  84.4 ÷ 2  0.0844 ÷ 2  8.44 ÷ 2  0.00844 ÷ 2

**13.** **Find the Error** Amanda is finding 11.2 ÷ 14. Find her mistake and correct it. _____




**14.** **Reason Inductively** Is the quotient 2.7 ÷ 3 greater than or less than 1? Explain.

**15.** **Use Math Tools** Explain how you can use estimation to place the decimal point in the quotient 42.56 ÷ 22.

## Georgia Test Practice

**16.** The Patterson family bought steak for a family picnic. They paid $71.94 for 6 pounds of ribeye steak. What was the price per pound?

Ⓐ $1.20  Ⓒ $10.99

Ⓑ $9.99  Ⓓ $11.99

Name _____ My Homework _____

# Extra Practice

**Divide. Round to the nearest tenth if necessary.**

**17.** 36.8 ÷ 2 = 18.4

Homework Help

$$\begin{array}{r} 18.4 \\ 2\overline{)36.8} \\ -2 \\ \hline 16 \\ -16 \\ \hline 08 \\ -8 \\ \hline 0 \end{array}$$

**18.** 124.2 ÷ 9 = _____

**19.** 6.271 ÷ 4 = _____

**20.** 10.22 ÷ 14 = _____

**21.** 59.84 ÷ 32 = _____

**22.** 751.2 ÷ 25 = _____

**23.** The Franklin Middle School jazz band plans to have a car wash to raise $468.75 for a new sound system. In the past, they washed an average of 125 cars at each car wash. What should they charge per car so they reach their goal?

Show your work.

**24.** Marcel Park is weeding the rectangular vegetable garden. The garden has an area of 599.5 square feet. If the garden is 22 feet wide, how long is the garden? Justify your procedure.

**25.** **Use Math Tools** The table shows the prices for different party toy packages from the Tomtown Toy Company. Which item costs the least per toy? Explain your reasoning.

| Cost of Party Toy Packages | | |
|---|---|---|
| Dominoes | 6-pack | $3.98 |
| Peg Games | 12-pack | $9.99 |
| Mini Footballs | 24-pack | $17.98 |

## Georgia Test Practice

**26.** The table shows the number of subscribers to several Internet providers.

| Internet Provider | Subscribers (millions) |
|---|---|
| Company A | 2.45 |
| Company B | 3.12 |
| Company C | 2.83 |

If Company B earned $119 million last month, about how much did each subscriber pay?

Ⓐ $30 Ⓒ $50

Ⓑ $40 Ⓓ $60

**27. Short Response** Tanner and three neighborhood friends are buying a basketball hoop that costs $249.84. If the cost is divided equally, how much will each person pay?

**28. Short Response** Marvin completed 8 rounds of a trivia game and earned 94.4 points. If he earned the same number of points each round, how many points did he earn each round?

## Common Core Review

**Add or subtract mentally. Use compensation.** MCC5.NBT.7

**29.** 0.47 + 0.36 = _____

**30.** 26.5 − 9.3 = _____

**31.** 29.4 + 1.7 = _____

**32.** Use <, >, or = to compare 34.3 and 34.32. MCC5.NBT.3b

**33.** A king cobra has a mass of 8.845 kilograms. Round the mass to the nearest tenth kilogram. MCC5.NBT.4

**34.** The same king cobra is 4.237 meters long. Round the length to the nearest meter. MCC5.NBT.4

Martin Harvey/Digital Vision/Getty Images

Lesson 8

# Divide Decimals by Decimals

**What You'll Learn**

Scan the lesson. Predict two things you will learn about dividing decimals by decimals.

- _____
- _____

**Essential Question**

HOW can estimating be helpful?

**Common Core GPS**

**Content Standards**
MCC6.NS.3

**Mathematical Practices**
1, 3, 4, 5

## Real-World Link

**Art** An art studio has 36 gallons of acrylic paint. They separate it into 9 containers. How many gallons are in each container?

| Division Problem | Quotient |
|---|---|
| 36 ÷ 9 | |

**Use the division problem to find patterns and complete the tables below. Then use these patterns to describe the dividends, divisors, and quotients in each set.**

1.

| Division Problem | Quotient |
|---|---|
| 36 ÷ 0.9 | 40 |
| 36 ÷ 0.09 | 400 |
| 36 ÷ 0.009 | 4,000 |
| 36 ÷ 0.0009 | |

2.

| Division Problem | Quotient |
|---|---|
| 3.6 ÷ 9 | 0.4 |
| 0.36 ÷ 9 | 0.04 |
| 0.036 ÷ 9 | 0.004 |
| 0.0036 ÷ 9 | |

3.

| Division Problem | Quotient |
|---|---|
| 3.6 ÷ 0.9 | 4 |
| 0.36 ÷ 0.09 | 4 |
| 0.036 ÷ 0.009 | 4 |
| 0.0036 ÷ | 4 |

Ian Shaw/Riser/Getty Images

Work Zone

# Divide by Decimals

When dividing by decimals, change the divisor into a whole number. To do this, multiply both the divisor and the dividend by the same power of 10. Then divide as with whole numbers.

## Examples

Tutor

**1.** **Find 1.71 ÷ 0.9.** Estimate $2 \div 1 = 2$

Multiply by 10 to make a whole number.

$0.9\overline{)1.71}$ → $9\overline{)17.1}$

Multiply by the same number, 10.

$$\begin{array}{r} 1.9 \\ 9\overline{)17.1} \\ -\ 9 \\ \hline 81 \\ -\ 81 \\ \hline 0 \end{array}$$

Place the decimal point.

Divide as with whole numbers.

1.71 divided by 0.9 is 1.9. Compared to the estimate, the quotient is reasonable.

Check $1.9 \times 0.9 = 1.71$ ✓

**2.** **Find 2.64 ÷ 0.6.** Estimate ☐ ÷ ☐ = ☐

$0.6\overline{)2.64}$

Multiply 0.6 by ☐ to make a whole number.

Multiply the dividend, ☐, by the same power of 10.

☐

$0.6\overline{)2.64}$ Place the decimal point in the quotient.

☐ Divide as with whole numbers.

☐

☐

Show your work.

a. _____

b. _____

c. _____

2.64 divided by 0.6 is ☐.

Compared to the estimate, is the quotient reasonable? _____

**Got It?** **Do these problems to find out.**

**a.** 54.4 ÷ 1.7 **b.** 8.424 ÷ 0.36 **c.** 0.0063 ÷ 0.007

# Zeros in the Quotient and Dividend

Line up the numbers by place value as you divide. Annex zeros in the quotient in order to keep digits with the correct place value. Annex zeros in the dividend to continue dividing after the decimal point.

## Examples

Tutor

**3.** **Find 52 ÷ 0.4.**

$0.4\overline{)52.0}$

Multiply each by 10.

$$\begin{array}{r} 130. \\ 4\overline{)520.} \\ -\ 4 \\ \hline 12 \\ -\ 12 \\ \hline 00 \end{array}$$

Place the decimal point.

Write a zero in the ones place of the quotient because 0 ÷ 4 = 0.

So, 52 ÷ 0.4 = 130.

**4.** **Find 0.009 ÷ 0.18.**

$0.18\overline{)0.009}$

Multiply each by 100.

$$\begin{array}{r} 0.05 \\ 18\overline{)0.90} \\ -\ 0 \\ \hline 09 \\ -\ 00 \\ \hline 90 \\ -\ 90 \\ \hline 0 \end{array}$$

Place the decimal point.

9 tenths divided by 18 is 0, so write a 0 in the tenths place.

Annex a 0 in the dividend and continue to divide.

So, 0.009 ÷ 0.18 is 0.05.

**5.** **Find 11.2 ÷ 0.07.**

Multiply 0.07 and 11.2 by ☐.

$0.07\overline{)11.20}$

Place the decimal point in the quotient.

Divide as with whole numbers.

**Got It?** **Do these problems to find out.**

**d.** 5.6 ÷ 0.014 **e.** 6.24 ÷ 200 **f.** 0.4 ÷ 25

**Checking Answers**

You can always check your answer to a division problem by multiplying the quotient by the divisor.

Show your work.

d. _____

e. _____

f. _____

## Example

Tutor

**6.** **How many times as many Internet users are there in Japan than in Spain? Round to the nearest tenth.**

| Internet Users in 2008 (millions) | |
|---|---|
| China | 1,321.9 |
| United States | 301.1 |
| Japan | 127.4 |
| France | 63.7 |
| Spain | 40.4 |
| Canada | 33.4 |

Find $127.4 \div 40.4$.

$$40.4\overline{)127.4} \rightarrow 404\overline{)1274.00}$$

$$\begin{array}{r} 3.15 \\ 404\overline{)1274.00} \\ -\ 1212 \\ \hline 620 \\ -\ 404 \\ \hline 2160 \\ -\ 2020 \\ \hline 140 \end{array}$$

To the nearest tenth, $127.4 \div 40.4 = 3.2$. So, there are about 3.2 times as many Internet users in Japan than in Spain.

## Guided Practice

Check

**Divide.** (Examples 1–5)

**1.** $3.69 \div 0.3 =$ _____

**2.** $0.0338 \div 1.3 =$ _____

**3.** $2.943 \div 2.7 =$ _____

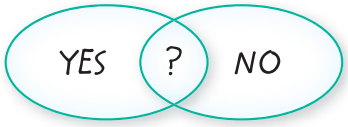
Show your work.

**4.** Alicia bought 5.75 yards of fleece fabric to make blankets for a charity. She needs 1.85 yards of fabric for each blanket. How many blankets can Alicia make with the fabric she bought? (Example 6)

**5.** **Building on the Essential Question** When is it helpful to round the quotient to the nearest hundredth?

### Rate Yourself!

Are you ready to move on? Shade the section that applies.




For more help, go online to access a Personal Tutor.

Tutor

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

# Independent Practice

Go online for Step-by-Step Solutions eHelp

**Divide.** (Examples 1–5)

**1.** 1.44 ÷ 0.4 = _____

Show your work.

**2.** 16.24 ÷ 0.14 = _____

**3** 0.6 ÷ 0.0024 = _____

**4.** 96.6 ÷ 0.42 = _____

**5.** 13.5 ÷ 0.03 = _____

**6.** 0.12 ÷ 0.15 = _____

**7.** CCSPS **Use Math Tools** The average person's *stride length,* the distance covered by one step, is approximately 2.5 feet long. How many steps would the average person take to travel 50 feet? (Example 6)

_____

**8.** STEM Alaska has a coastline of about 6.64 thousand miles. Florida has about 1.35 thousand miles of coastline. How many times more coastline does Alaska have than Florida? Round to the nearest tenth if necessary. Justify your procedure.

_____

**9.** CCSPS **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.


**a.** How many hours does Raj need to work to earn the remainder of the money he needs to buy the video game system? _____

**b.** Suppose Raj receives a raise for his hard work and now earns $6.25 per hour. How many hours would he need to work to earn $132?

_____

**10.** A necklace is being made with beads that are 1.25 centimeters in diameter each. The necklace is 30 centimeters long. How many beads are needed? _____

**11** **Use Math Tools** Use the table that shows popular sports car colors in North America.

| Popular Sports Car Colors | |
|---|---|
| **Color** | **Portion of Responses** |
| Silver | 0.2 |
| Blue | 0.16 |
| Black | 0.14 |
| Red | 0.09 |
| Other | 0.41 |

**a.** How many times more respondents chose silver than red? Round to the nearest tenth if necessary.

_____

**b.** How many times more respondents chose either silver or black than red? Round to the nearest tenth if necessary.

_____

## H.O.T. Problems Higher Order Thinking

**12.** **Persevere with Problems** Find two positive decimals $a$ and $b$ that make the following statement true. Then find two positive decimals $a$ and $b$ that make the statement false.

*If $a < 1$ and $b < 1$, then $a \div b < 1$.*

_____

_____

**13.** **Which One Doesn't Belong?** Identify the problem that does not have the same quotient as the other three. Explain your reasoning.

| | | | |
|---|---|---|---|
| $49 \div 7$ | $4.9 \div 7$ | $0.49 \div 0.7$ | $0.049 \div 0.07$ |

_____

_____

## Georgia Test Practice

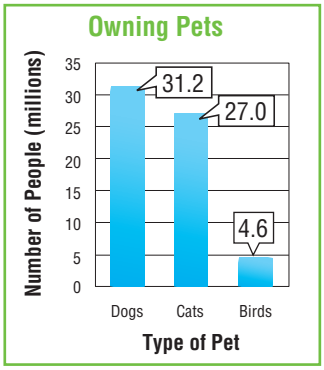
**14.** To the nearest tenth, how many times as many people in the U.S. own dogs as own birds?

Ⓐ 6.8

Ⓑ 12.2

Ⓒ 26.6

Ⓓ 35.8



Name _____ My Homework _____

# Extra Practice

**Divide.**

**15.** 0.68 ÷ 3.4 = 0.2

Homework Help

$$3.4\overline{)0.68}\quad 0.2,\ -68,\ 0$$

**16.** 2.07 ÷ 0.9 = _____

**17.** 0.16728 ÷ 3.4 = _____

**18.** 1.08 ÷ 2.7 = _____

**19.** 8.4 ÷ 0.02 = _____

**20.** 0.242 ÷ 0.4 = _____

**21.** A submarine sandwich 1.5 feet long is cut into 0.25-foot pieces. How many pieces will there be?

Show your work.

**22.** **Use Math Tools** Find examples of decimals in a newspaper or magazine. Write a real-world problem in which you would divide decimals.

**23.** The table shows the five most populated countries in the world. How many times as many people live in China than in the United States? Round to the nearest tenth if necessary.

| Most Populated Countries | |
|---|---|
| **Country** | **Approximate Population (billions)** |
| China | 1.325 |
| India | 1.13 |
| United States | 0.304 |
| Indonesia | 0.235 |
| Brazil | 0.19 |

**24.** **Justify Conclusions** Lake Superior, along the U.S.-Canadian border, has a maximum depth of 1.333 thousand feet. There are 5,280 feet in one mile. How deep is Lake Superior in miles? Round to the nearest hundredth if necessary. Explain your answer.

## Georgia Test Practice

**25.** Ava paid $4.90 for 2.5 pounds of walnuts. What is the cost of one pound of walnuts?

Ⓐ $0.96

Ⓑ $1.76

Ⓒ $1.86

Ⓓ $1.96

**26.** **Short Response** Max bicycled 6.25 miles in 30.5 minutes. On average, how far did he bicycle each minute? Round to the nearest tenth.

_____

**27.** The table shows the approximate number of people in the world who speak either Spanish or French.

| Language | Speakers (billions) |
|---|---|
| Spanish | 0.425 |
| French | 0.129 |

To the nearest tenth, how many times as many people speak Spanish as French?

Ⓕ 0.2

Ⓖ 1.1

Ⓗ 0.3

Ⓘ 3.3

**28.** **Short Response** About 24.8 million people live in Texas. About 0.6 million people live in Vermont. How many times as many people live in Texas than in Vermont? Round to the nearest tenth if necessary.

_____

## Common Core Review

**Fill in each ◯ with <, >, or = to make a true sentence.** MCC4.NF.2

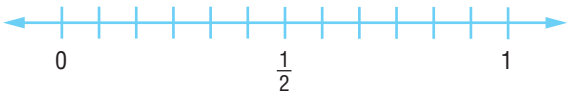
**29.** $\frac{2}{4}$ ◯ $\frac{5}{8}$

**30.** $\frac{6}{12}$ ◯ $\frac{5}{10}$

**31.** $\frac{1}{2}$ ◯ $\frac{6}{14}$

**32.** Plot the fraction $\frac{7}{12}$ on the number line. Is $\frac{7}{12}$ closer to 0, $\frac{1}{2}$, or 1?

MCC4.NF.2 _____




**33.** Lily spent $\frac{1}{6}$ of her free time practicing soccer and $\frac{5}{12}$ of her free time playing a video game. What fraction of her free time did she spend on these two activities? MCC5.NF.2

_____

# 21ST CENTURY CAREER in Design

## Sports Equipment Designer

Do you have a passion for sports and a strong interest in science? Are you a creative thinker who always has new ideas or better ways of doing things? If so, then you should consider a career designing sports equipment. Sports equipment designers combine creativity and engineering principles to create equipment that is cutting edge and helps improve athletic performance. They design everything from baseball bats and football to lacrosse protective gear and racing wheelchairs.



College & Career READINESS

Explore college and careers at ccr.mcgraw-hill.com

## Is This the Career for You?

Are you interested in a career as a sports equipment designer? Take some of the following courses in high school.

- Algebra
- Biology
- Calculus
- Computer Science
- Physics

Find out how math relates to a career in Design.

## Gaining a Competitive Edge

**When a punter kicks a football, the ball has both horizontal motion and vertical motion. The table shows these values when a football is kicked at 25 meters per second.**

**Use the information in the table to solve each problem. Assume that each football is kicked at 25 meters per second. Round to the nearest tenth if necessary.**

1. The *hang time,* or time that a football is in the air, of a football that is kicked at a 27° angle is given by $0.204 \times 11.3$. What is the approximate hang time? _____

2. How much greater is the hang time of a football that is kicked at a 62° angle than one that is kicked at a 45° angle? Use the expressions $0.204 \times 22.1$ and $0.204 \times 17.7$.

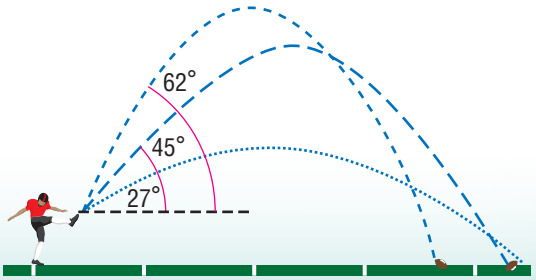
3. The final distance from the punter to a football kicked at a 27° angle is approximately $22.3 \times 11.3 \times 0.2$. What is the distance from the punter to the football?

4. Find the distance of a football that is kicked at an angle of 62° if the distance is found by using the expression $11.7 \times 22.1 \times 0.2$. _____

5. The hang time of a football is about 3 seconds. Find $3 \div 0.204$ to determine the vertical motion of the football. _____

6. A football reaches its maximum height in $y \div 9.8$ seconds. A football is kicked at a 62° angle. At the same time, another football is kicked at a 27° angle. Which reaches its maximum height first? Explain.

| Punting A Football | | |
|---|---|---|
| Angle of Kick | Horizontal Motion (m/s) | Vertical Motion (m/s) |
| | *x* | *y* |
| 27° | 22.3 | 11.3 |
| 45° | 17.7 | 17.7 |
| 62° | 11.7 | 22.1 |




## Career Project

**It's time to update your career portfolio! Choose a piece of sports equipment and describe how it has changed over the past 20 years. List the reasons for the changes.**

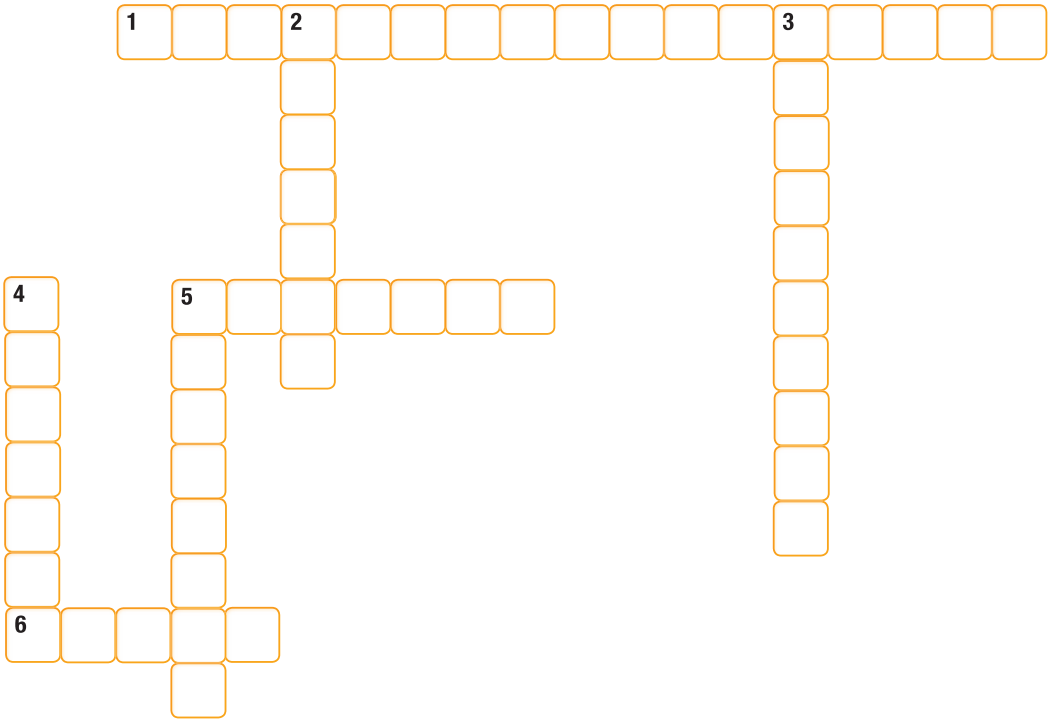
Suppose you are an employer hiring a sports equipment designer. What questions would you ask a potential employee?

- _____
- _____
- _____

# Chapter Review

## Vocabulary Check

**Write the correct term for each clue in the crossword puzzle.**




**Across**

1. easy to divide mentally
5. a number that has a digit in the tenths place, hundredths place, or beyond
6. to find an approximate value for a number

**Down**

2. the answer to a multiplication problem
3. a number with more than one digit
4. the number by which the dividend is being divided
5. a number that is being divided

# Key Concept Check

## Use Your FOLDABLES

**Use your Foldable to help review the chapter.**

Tape here

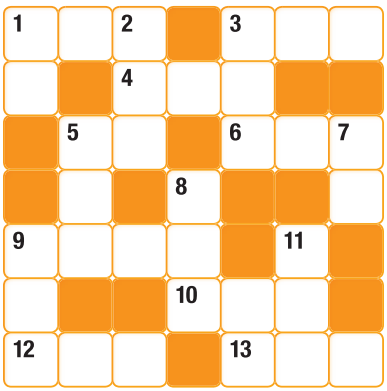
### Divide with Decimals

Examples

Examples

## Got it?

**Complete the cross number puzzle by solving the problems.**




**Across**

**1.** 34.5 × 14

**3.** 569.6 ÷ 3.2

**4.** 18.5 × 40

**5.** 50.4 ÷ 2.4

**6.** 562.39 + 304.61

**9.** 42.5 × 116

**10.** 339.2 × 2.5

**12.** 1,584 ÷ 4.5

**13.** 1,218 ÷ 6

**Down**

**1.** 24.3 + 15.7

**2.** 21.2 × 17.5

**3.** 33.75 × 3.2

**5.** 146.53 + 92.47

**7.** 2,628 ÷ 36.5

**8.** 24 × 4.5

**9.** 263.4 + 199.6

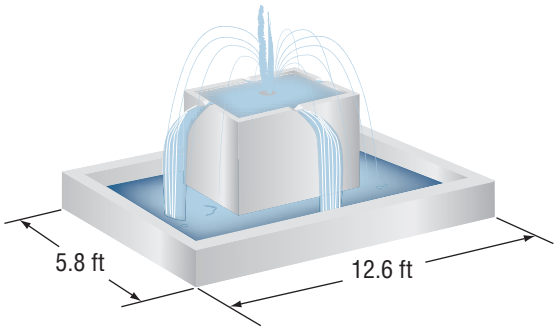
**11.** 35.2 × 25

# Problem Solving

**1.** A car travels 57.9 miles per hour for 3.2 hours. Estimate the number of miles driven. (Lesson 1)

**2.** A loaf of bread costs $1.79. How much would five loaves cost? (Lesson 3)

**3.** What is the area of the base of the fountain below? (Lesson 4)




**4.** A marathon race is 26.2 miles long. Lacey ran the marathon in 3.6 hours. On average, how many miles did she run per hour? Round to the nearest tenth. (Lesson 8)

**5.** The speed of light is $1.86 \times 100{,}000$ miles per second. Write this number in standard form. (Lesson 4)

**6.** How many dimes are in $8,590? (Lesson 7)

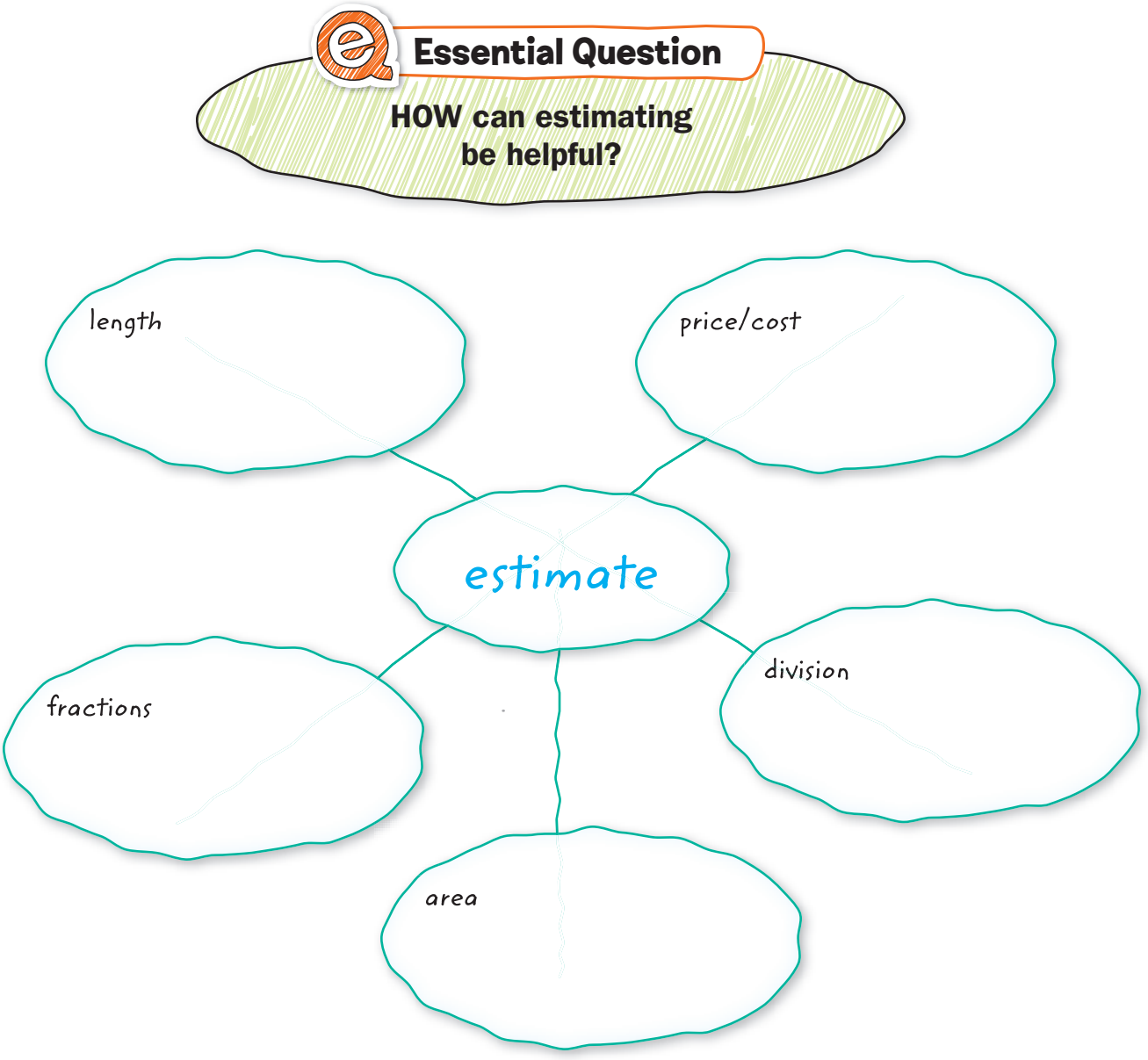
**7.** CCSPS **Use Math Tools** The table shows the height of members of Evan's family. His sister, Cindy, is 0.8 times his height. Which is a reasonable height for Cindy: about 4 feet, 4.5 feet, or 6 feet? Explain. (Lesson 4)

| Family Member | Height (ft) |
|---|---|
| Evan | 5.75 |
| Grace | 5.5 |
| Jasper | 6.25 |
| Tron | 5.25 |

# Reflect

## Answering the Essential Question

**Use what you learned about computing with multi-digit numbers to complete the graphic organizer.**




**Answer the Essential Question.** HOW can estimating be helpful?