Chapter 5

Divide Decimals

Show What You Know ✔

Check your understanding of important skills.

Name _____

▶ **Division Facts** **Find the quotient.**

1. $6\overline{)24}$ = _____

2. $7\overline{)56}$ = _____

3. $18 \div 9$ = _____

4. $35 \div 5$ = _____

▶ **Estimate with 1-Digit Divisors** **Estimate the quotient.**

5. $6\overline{)253}$

6. $4\overline{)1,165}$

7. $7\overline{)1,504}$

_____

_____

_____

▶ **Division** **Divide.**

8. $34\overline{)785}$

9. $27\overline{)1,581}$

10. $41\overline{)4,592}$

MATH DETECTIVE WITH CARMEN SANDIEGO™

Instead of telling Carmen her age, Sora gave her this clue. Be a Math Detective and find Sora's age.

Clue

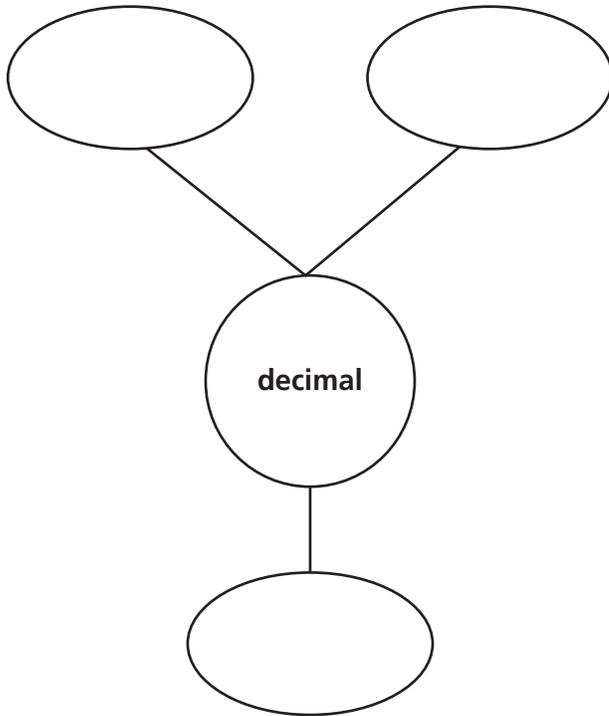My age is 10 more than one-tenth of one-tenth of one-tenth of 3,000.

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Vocabulary Builder

▶ **Visualize It** ●

Complete the bubble map using review words.

(   )   (   )

(**decimal**)

(   )

▶ **Understand Vocabulary** ●

Complete the sentences using the review words.

1. A _____ is a symbol used to separate the ones place from the tenths place in decimal numbers.

2. Numbers that are easy to compute with mentally are called

_____.

3. A _____ is one of ten equal parts.

4. A number with one or more digits to the right of the decimal

point is called a _____.

5. The _____ is the number that is to be divided in a division problem.

6. A _____ is one of one hundred equal parts.

7. You can _____ to find a number that is close to the exact amount.

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Name _____

Division Patterns with Decimals

Essential Question How can patterns help you place the decimal point in a quotient?

🔑 UNLOCK the Problem ► REAL WORLD

The Healthy Wheat Bakery uses 560 pounds of flour to make 1,000 loaves of bread. Each loaf contains the same amount of flour. How many pounds of flour are used in each loaf of bread?

You can use powers of ten to help you find quotients. Dividing by a power of 10 is the same as multiplying by 0.1, 0.01, or 0.001.

- Underline the sentence that tells you what you are trying to find.
- Circle the numbers you need to use.

🔓 One Way Use place-value patterns.

Divide. 560 ÷ 1,000

Look for a pattern in these products and quotients.

$560 \times 1 = 560$ $560 \div 1 = 560$

$560 \times 0.1 = 56.0$ $560 \div 10 = 56.0$

$560 \times 0.01 = 5.60$ $560 \div 100 = 5.60$

$560 \times 0.001 = 0.560$ $560 \div 1{,}000 = 0.560$

So, _____ pound of flour is used in each loaf of bread.

1. As you divide by increasing powers of 10, how does the position of the decimal point change in the quotients?

_____

🔓 Another Way Use exponents.

Divide. $560 \div 10^3$

Look for a pattern. $560 \div 10^0 = 560$

$560 \div 10^1 = 56.0$

$560 \div 10^2 = 5.60$

$560 \div 10^3 = $ _____

> **Remember**
> The zero power of 10 equals 1.
> $10^0 = 1$
> The first power of 10 equals 10.
> $10^1 = 10$

2. Each divisor, or power of 10, is 10 times the divisor before it. How do the quotients compare?

_____

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CONNECT Dividing by 10 is the same as multiplying by 0.1 or finding $\frac{1}{10}$ of a number.

🔑 Example

Liang used 25.5 pounds of tomatoes to make a large batch of salsa. He used one-tenth as many pounds of onions as pounds of tomatoes. He used one-hundredth as many pounds of green peppers as pounds of tomatoes. How many pounds of each ingredient did Liang use?

Tomatoes: 25.5 pounds

Onions: 25.5 pounds ÷ _____   **Green Peppers:** 25.5 pounds ÷ _____

Think: 25.5 ÷ 1 = _____   **Think:** _____ ÷ 1 = _____

      25.5 ÷ 10 = _____   _____ ÷ 10 = _____

                                _____ ÷ 100 = _____

So, Liang used 25.5 pounds of tomatoes, _____ pounds of onions,

and _____ pound of green peppers.

Try This! Complete the pattern.

A   32.6 ÷ 1 = _____

      32.6 ÷ 10 = _____

      32.6 ÷ 100 = _____

B $50.2 \div 10^0 =$ _____

      $50.2 \div 10^1 =$ _____

      $50.2 \div 10^2 =$ _____

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can determine where to place the decimal point in the quotient $47.3 \div 10^2$.

Share and Show 📝

Complete the pattern.

1. $456 \div 10^0 = 456$

    $456 \div 10^1 = 45.6$

    $456 \div 10^2 = 4.56$

    $456 \div 10^3 =$ _____

Think: The dividend is being divided by an increasing power of 10, so the decimal

point will move to the _____ one place for each increasing power of 10.

Name _____

Complete the pattern.

2. $225 \div 10^0 =$ _____

$225 \div 10^1 =$ _____

$225 \div 10^2 =$ _____

$225 \div 10^3 =$ _____

✅ **3.** $605 \div 10^0 =$ _____

$605 \div 10^1 =$ _____

$605 \div 10^2 =$ _____

$605 \div 10^3 =$ _____

✅ **4.** $74.3 \div 1 =$ _____

$74.3 \div 10 =$ _____

$74.3 \div 100 =$ _____

MATHEMATICAL PRACTICES

Math Talk **Explain** what happens to the value of a number when you divide by 10, 100, or 1,000.

On Your Own ....

Complete the pattern.

5. $156 \div 1 =$ _____

$156 \div 10 =$ _____

$156 \div 100 =$ _____

$156 \div 1{,}000 =$ _____

6. $32 \div 1 =$ _____

$32 \div 10 =$ _____

$32 \div 100 =$ _____

$32 \div 1{,}000 =$ _____

7. $16 \div 10^0 =$ _____

$16 \div 10^1 =$ _____

$16 \div 10^2 =$ _____

$16 \div 10^3 =$ _____

8. $12.7 \div 1 =$ _____

$12.7 \div 10 =$ _____

$12.7 \div 100 =$ _____

9. $92.5 \div 10^0 =$ _____

$92.5 \div 10^1 =$ _____

$92.5 \div 10^2 =$ _____

10. $86.3 \div 10^0 =$ _____

$86.3 \div 10^1 =$ _____

$86.3 \div 10^2 =$ _____

H.O.T. **Algebra** **Find the value of *n*.**

11. $268 \div n = 0.268$

$n =$ _____

12. $n \div 10^2 = 0.123$

$n =$ _____

13. $n \div 10^1 = 4.6$

$n =$ _____

Problem Solving REAL WORLD

Use the table to solve 14–16.

14. If each muffin contains the same amount of cornmeal, how many kilograms of cornmeal are in each corn muffin?

_____

15. **H.O.T.** If each muffin contains the same amount of sugar, how many kilograms of sugar, to the nearest thousandth, are in each corn muffin?

_____

16. **H.O.T.** The bakery decides to make only 100 corn muffins on Tuesday. How many kilograms of sugar will be needed?

_____

17. **Write Math** ▶ **Explain** how you know that the quotient $47.3 \div 10^1$ is equal to the product 47.3×0.1.

_____

_____

_____

_____

18. **Test Prep** Ella used 37.2 pounds of apples to make applesauce. She used one-tenth as many pounds of sugar as pounds of apples. How many pounds of sugar did Ella use?

Ⓐ 372 pounds

Ⓑ 3.72 pounds

Ⓒ 0.372 pound

Ⓓ 0.0372 pound

Dry Ingredients for 1,000 Corn Muffins

Ingredient	Number of Kilograms
Cornmeal	150
Flour	110
Sugar	66.7
Baking powder	10
Salt	4.17

SHOW YOUR WORK

FOR MORE PRACTICE:
Standards Practice Book, pp. P101–P102

Divide Decimals by Whole Numbers

Essential Question How can you use a model to divide a decimal by a whole number?

Investigate

Materials ■ decimal models ■ color pencils

Angela has enough wood to make a picture frame with a perimeter of 2.4 meters. She wants the frame to be a square. What will be the length of each side of the frame?

A. Shade decimal models to show 2.4.

B. You need to share your model among _____ equal groups.

C. Since 2 wholes cannot be shared among 4 groups without regrouping, cut your model apart to show the tenths.

There are _____ tenths in 2.4.

Share the tenths equally among the 4 groups.

There are _____ ones and _____ tenths in each group.

Write a decimal for the amount in each group. _____

D. Use your model to complete the number sentence.

$2.4 \div 4 =$ _____

So, the length of each side of the frame will be _____ meter.

Draw Conclusions ....

1. **Explain** why you needed to cut apart the model in Step C.

   _____

   _____

2. **Explain** how your model would be different if the perimeter were 4.8 meters.

   _____

   _____

Make Connections . . . .

You can also use base-ten blocks to model division of a decimal by a whole number.

Materials ■ base-ten blocks

Kyle has a roll of ribbon 3.21 yards long. He cuts the ribbon into 3 equal lengths. How long is each piece of ribbon?

Divide. 3.21 ÷ 3

STEP 1

Use base-ten blocks to show 3.21.

Remember that a flat represents one, a long represents one tenth, and a small cube represents one hundredth.

There are _____ one(s), _____ tenth(s), and

_____ hundredth(s).

STEP 2 Share the ones.

Share an equal number of ones among 3 groups.

There is _____ one(s) shared in each group and _____ one(s) left over.

STEP 3 Share the tenths.

Two tenths cannot be shared among 3 groups without regrouping. Regroup the tenths by replacing them with hundredths.

There are _____ tenth(s) shared in each group and

_____ tenth(s) left over.

There are now _____ hundredth(s).
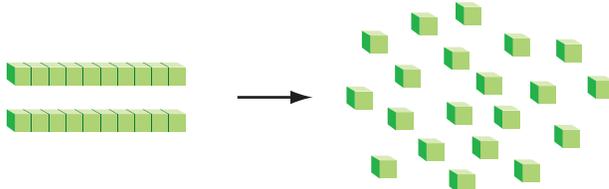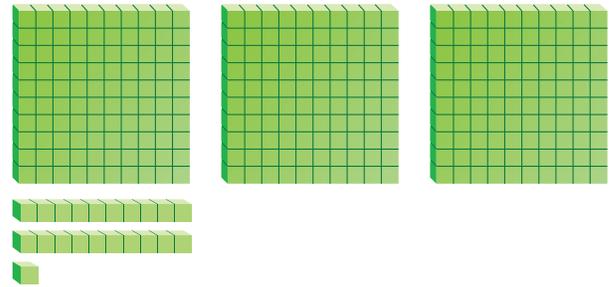
STEP 4 Share the hundredths.

Share the 21 hundredths equally among the 3 groups.

There are _____ hundredth(s) shared in each group

and _____ hundredth(s) left over.

So, each piece of ribbon is _____ yards long.

Math Talk
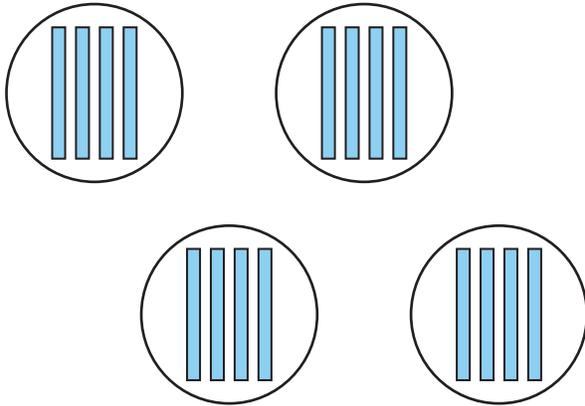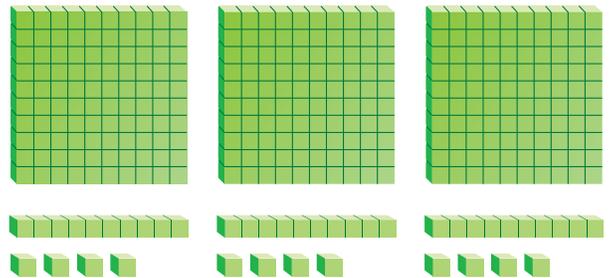
Explain why your answer makes sense.

Name _____

Share and Show MATH BOARD . . . .

Use the model to complete the number sentence.

1. $1.6 \div 4 =$ _____

✓ **2.** $3.42 \div 3 =$ _____

Divide. Use base-ten blocks.

3. $1.8 \div 3 =$ _____

4. $3.6 \div 4 =$ _____

5. $2.5 \div 5 =$ _____

6. $2.4 \div 8 =$ _____

7. $3.78 \div 3 =$ _____

8. $1.33 \div 7 =$ _____

9. $4.72 \div 4 =$ _____

10. $2.52 \div 9 =$ _____
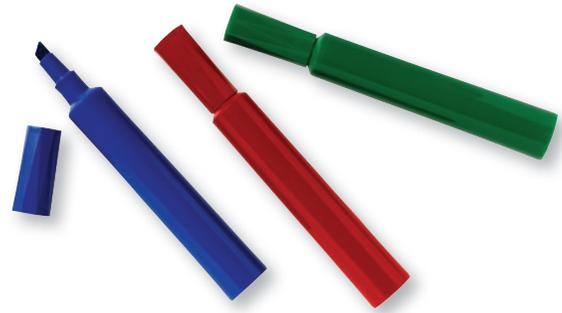
✓ **11.** $6.25 \div 5 =$ _____

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can use inverse operations to find $1.8 \div 3$.

Problem Solving REAL WORLD

H.O.T. What's the Error?

12. Aida is making banners from a roll of paper that is 4.05 meters long. She will cut the paper into 3 equal lengths. How long will each banner be?

Look how Aida solved the problem. Find the error.

Solve the problem and correct the error.

So, Aida said that each banner would be _____ meters long,

but each banner should be _____ meters long.

- **Describe** Aida's error. _____

  _____

  _____

- **What if** the roll of paper were 4.35 meters long? How long would each banner be?

  _____

FOR MORE PRACTICE:
Standards Practice Book, pp. P103–P104

Estimate Quotients

Essential Question How can you estimate decimal quotients?

> ## 🔑 UNLOCK the Problem REAL WORLD

Carmen likes to ski. The ski resort where she goes to ski got 3.2 feet of snow during a 5-day period. The *average* daily snowfall for a given number of days is the quotient of the total amount of snow and the number of days. Estimate the average daily snowfall.

You can estimate decimal quotients by using compatible numbers. When choosing compatible numbers, you can look at the whole-number part of a decimal dividend or rename the decimal dividend as tenths or hundredths.

🔑 **Estimate.** 3.2 ÷ 5

Carly and her friend Marco each find an estimate. Since the divisor is greater than the dividend, they both first rename 3.2 as tenths.

3.2 is _____ tenths.

CARLY'S ESTIMATE	MARCO'S ESTIMATE
30 tenths is close to 32 tenths and divides easily by 5. Use a basic fact to find 30 tenths ÷ 5.	35 tenths is close to 32 tenths and divides easily by 5. Use a basic fact to find 35 tenths ÷ 5.
30 tenths ÷ 5 is _____ tenths or _____.	35 tenths ÷ 5 is _____ tenths or _____.
So, the average daily snowfall is about	So, the average daily snowfall is about
_____ foot.	_____ foot.

1. Whose estimate do you think is closer to the exact quotient?

Explain your reasoning. _____

_____

2. Explain how you would rename the dividend in 29.7 ÷ 40 to choose compatible numbers and estimate the quotient.

_____

_____

Estimate with 2-Digit Divisors

When you estimate quotients with compatible numbers, the number you use for the dividend can be greater than the dividend or less than the dividend.

> ### 🔑 Example
>
> A group of 31 students is going to visit the museum. The total cost for the tickets is $144.15. About how much money will each student need to pay for a ticket?
>
> **Estimate.** $144.15 ÷ 31
>
> **A** **Use a whole number greater than the dividend.**
>
> Use 30 for the divisor. Then find a number close to and greater than $144.15 that divides easily by 30.
>
> $144.15 ÷ 31
>   ↓   ↓
> $150 ÷ 30 = $ _____
>
> So, each student will pay about $ _____ for a ticket.
> _____
>
> **B** **Use a whole number less than the dividend.**
>
> Use 30 for the divisor. Then find a number close to and less than $144.15 that divides easily by 30.
>
> $144.15 ÷ 31
>   ↓   ↓
> $120 ÷ 30 = $ _____
>
> So, each student will pay about $ _____ for a ticket.

3. Which estimate do you think will be a better estimate of the cost

of a ticket? **Explain** your reasoning. _____

_____

_____

Share and Show 🖊️MATH BOARD . . . .

Use compatible numbers to estimate the quotient.

1. 28.8 ÷ 9

_____ ÷ _____ = _____

2. 393.5 ÷ 41

_____ ÷ _____ = _____

Name _____

Estimate the quotient.

3. 161.7 ÷ 7

✓ 4. 17.9 ÷ 9

✓ 5. 145.4 ÷ 21

MATHEMATICAL PRACTICES

Math Talk **Explain** why you might want to find an estimate for a quotient.

On Your Own

Estimate the quotient.

6. 15.5 ÷ 4

7. 394.8 ÷ 7

8. 410.5 ÷ 18

9. 72.1 ÷ 7

10. 32.4 ÷ 52

11. $134.42 ÷ 28

12. 21.8 ÷ 4

13. 3.4 ÷ 5

14. $759.92 ÷ 42

15. 157.5 ÷ 38

16. 379.2 ÷ 6

17. 108.4 ÷ 21

Problem Solving REAL WORLD

Use the table to solve 18–20.

18. Estimate the average daily snowfall for Alaska's greatest 7-day snowfall.

_____

19. How does the estimate of the average daily snowfall for Wyoming's greatest 7-day snowfall compare to the estimate of the average daily snowfall for South Dakota's greatest 7-day snowfall?

_____

_____

Greatest 7-Day Snowfall	
State	**Amount (in inches)**
Alaska	186.9
Wyoming	84.5
South Dakota	112.7

SHOW YOUR WORK

20. **H.O.T.** The greatest monthly snowfall total in Alaska is 297.9 inches. This happened in February, 1953. Compare the daily average snowfall for February, 1953, with the average daily snowfall for Alaska's greatest 7-day snowfall. Use estimation.

_____

_____

21. **Write Math** ▶ **What's the Error?** During a 3-hour storm, it snowed 2.5 inches. Jacob said that it snowed an average of about 8 inches per hour.

_____

_____

_____

22. **Test Prep** A plant grew 23.8 inches over 8 weeks. Which is the best estimate of the average number of inches the plant grew each week?

Ⓐ 0.2 inch   Ⓒ 2 inches

Ⓑ 0.3 inch   Ⓓ 3 inches

FOR MORE PRACTICE:
Standards Practice Book, pp. P105–P106

Name _____

Division of Decimals by Whole Numbers

Essential Question How can you divide decimals by whole numbers?
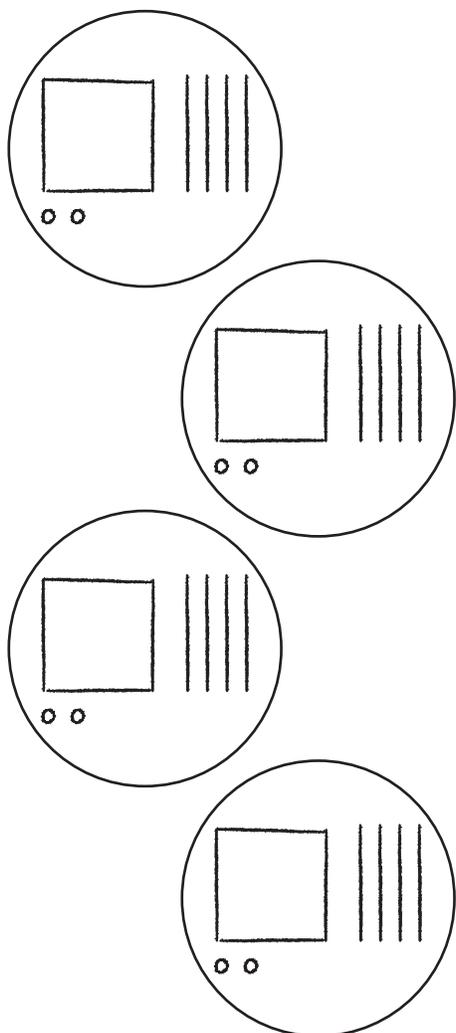
🔑 UNLOCK the Problem ▸ REAL WORLD

In a swimming relay, each swimmer swims an equal part of the total distance. Brianna and 3 other swimmers won a relay in 5.68 minutes. What is the average time each girl swam?

● How many swimmers are part of the relay team?

_____

🔑 One Way Use place value.

MODEL

THINK AND RECORD

STEP 1 Share the ones.

$$4\overline{)5.68}$$ with 1 above, −4

Divide. 5 ones ÷ 4

Multiply. 4 × 1 one(s)

Subtract. 5 ones − 4 ones

Check. _____ one(s) cannot be shared among 4 groups without regrouping.

STEP 2 Share the tenths.

$$4\overline{)5.68}$$ with 1 above, −4

Divide. _____ tenths ÷ 4

Multiply. 4 × _____ tenths

Subtract. _____ tenths − _____ tenths

Check. _____ tenth(s) cannot be shared among 4 groups.

STEP 3 Share the hundredths.

$$4\overline{)5.68}$$ with 1 above, −4, 16, −16

Divide. 8 hundredth(s) ÷ 4

Multiply. 4 × _____ hundredths

Subtract. _____ hundredths − _____ hundredths

Check. _____ hundredth(s) cannot be shared among 4 groups.

Place the decimal point in the quotient to separate the ones and the tenths.

So, each girl swam an average of _____ minutes.

🔒 Another Way Use an estimate.

Divide as you would with whole numbers.

Divide. $40.89 ÷ 47

- Estimate the quotient. 4,000 hundredths ÷ 50 = 80 hundredths, or $0.80

- Divide the tenths.

- Divide the hundredths. When the remainder is zero and there are no more digits in the dividend, the division is complete.

- Use your estimate to place the decimal point. Place a zero to show there are no ones.

$$47\overline{)40.89}$$

So, $40.89 ÷ 47 is _____ .

- **Explain** how you used the estimate to place the decimal point in the quotient.

_____

_____

Try This! Divide. Use multiplication to check your work.

$$23\overline{)79.35}$$

Check.

$$\begin{array}{r} \quad \\ \times \quad 23 \\ \hline \quad \\ + \quad \\ \hline \quad \end{array}$$

Share and Show MATH BOARD ·······································

Write the quotient with the decimal point placed correctly.

1. 4.92 ÷ 2 = 246   _____

2. 50.16 ÷ 38 = 132   _____

214

Name _____

Divide.

3. $5\overline{)8.65}$

4. $3\overline{)2.52}$ ✓

5. $27\overline{)97.2}$ ✓

On Your Own ....

Divide.

6. $6\overline{)8.94}$

7. $5\overline{)3.75}$

8. $19\overline{)55.1}$

9. $23\overline{)52.9}$

10. $8\overline{)\$8.24}$

11. $5\overline{)44.5}$

Practice: Copy and Solve Divide.

12. $3\overline{)\$7.71}$

13. $14\overline{)79.8}$

14. $33\overline{)25.41}$

15. $7\overline{)15.61}$

16. $14\overline{)137.2}$

17. $34\overline{)523.6}$

H.O.T. **Algebra** Write the unknown number for each ■.

18. $■ \div 5 = 1.21$

19. $46.8 \div 1.2 = ■$

20. $34.1 \div ■ = 22$

■ = _____

■ = _____

■ = _____

UNLOCK the Problem REAL WORLD

21. The standard width of 8 lanes in swimming pools used for competitions is 21.92 meters. The standard width of 9 lanes is 21.96 meters. How much wider is each lane when there are 8 lanes than when there are 9 lanes?

(A) 0.30 meter   (C) 2.74 meters

(B) 2.44 meters   (D) 22.28 meters

a. What are you asked to find? _____

b. What operations will you use to solve the problem? _____

c. Show the steps you used to solve the problem.

d. Complete the sentences.

Each lane is _____ meters wide when there are 8 lanes.

Each lane is _____ meters wide when there are 9 lanes.

Since _____ − _____ = _____, the

lanes are _____ meter(s) wider when there are 8 lanes than when there are 9 lanes.

e. Fill in the bubble for the correct answer choice.

22. Robert pays $32.04 for 6 student tickets to the basketball game. What is the cost of each student ticket?

(A) $192.24   (C) $26.04

(B) $53.40   (D) $5.34

23. Jasmine uses 14.24 pounds of fruit for 16 servings of fruit salad. If each serving contains the same amount of fruit, how much fruit is in each serving?

(A) 0.089 pound   (C) 1.76 pounds

(B) 0.89 pound   (D) 17.6 pounds

FOR MORE PRACTICE:
Standards Practice Book, pp. P107–P108

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Name _____

Mid-Chapter Checkpoint

▶ Concepts and Skills

1. Explain how the position of the decimal point changes in a quotient as you divide by increasing powers of 10.

_____

2. Explain how you can use base-ten blocks to find $2.16 \div 3$.

_____

_____

_____

Complete the pattern.

3. $223 \div 1 =$ _____

$223 \div 10 =$ _____

$223 \div 100 =$ _____

$223 \div 1,000 =$ _____

4. $61 \div 1 =$ _____

$61 \div 10 =$ _____

$61 \div 100 =$ _____

$61 \div 1,000 =$ _____

5. $57.4 \div 10^0 =$ _____

$57.4 \div 10^1 =$ _____

$57.4 \div 10^2 =$ _____

Estimate the quotient.

6. $31.9 \div 4$

7. $6.1 \div 8$

8. $492.6 \div 48$

Divide.

9. $5\overline{)4.35}$

10. $8\overline{)9.92}$

11. $61\overline{)207.4}$

Fill in the bubble completely to show your answer.

12. The Westside Bakery uses 440 pounds of sugar to make 1,000 cakes. Each cake contains the same amount of sugar. How many pounds of sugar are used in each cake?

(A) 0.044 pound

(B) 0.44 pound

(C) 4.4 pounds

(D) 44 pounds

13. Elise pays $21.75 for 5 student tickets to the fair. What is the cost of each student ticket?

(A) $4.35

(B) $16.75

(C) $43.40

(D) $108.75

14. Jason has a piece of wire that is 62.4 inches long. He cuts the wire into 3 equal pieces. Which is the best estimate of the length of each piece of wire?

(A) 2 inches

(B) 3 inches

(C) 20 inches

(D) 30 inches

15. Elizabeth uses 33.75 ounces of granola for 15 servings of trail mix. If each serving contains the same amount of granola, how much granola is in each serving?

(A) 0.225 ounce

(B) 2.25 ounces

(C) 18.75 ounces

(D) 33.9 ounces

Name _____

Decimal Division

Essential Question How can you use a model to divide by a decimal?

Investigate

Materials ■ decimal models ■ color pencils

Leigh is making reusable shopping bags. She has 3.6 yards of fabric. She needs 0.3 yard of fabric for each bag. How many shopping bags can she make from the 3.6 yards of fabric?

A. Shade decimal models to show 3.6.

B. Cut apart your model to show the tenths. Separate the tenths into as many groups of 3 tenths as you can.

There are _____ groups of _____ tenths.

C. Use your model to complete the number sentence.

3.6 ÷ 0.3 = _____

So, Leigh can make _____ shopping bags.

Draw Conclusions

1. **Explain** why you made each group equal to the divisor.

_____

_____

2. **Identify** the problem you would be modeling if each strip in the model represents 1.

_____

Remember

The divisor can tell the number of same-sized groups, or it can tell the number in each group.

3. Dennis has 2.7 yards of fabric to make bags that require 0.9 yard of fabric each. **Describe** a decimal model you can use to find how many bags he can make.

_____

_____

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Make Connections ....

You can also use a model to divide by hundredths.

Materials ■ decimal models ■ color pencils

Julie has $1.75 in nickels. How many stacks of $0.25 can she make from $1.75?

STEP 1

Shade decimal models to show 1.75.

There are _____ one(s) and _____ hundredth(s).

STEP 2

Cut apart your model to show groups of 0.25.

There are _____ groups of _____ hundredths.

STEP 3

Use your model to complete the number sentence.

$1.75 \div 0.25 =$ _____
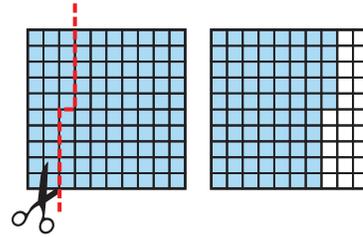
So, Julie can make _____ stacks of $0.25 from $1.75.

Share and Show MATH BOARD ....

Use the model to complete the number sentence.

1. $1.2 \div 0.3 =$ _____
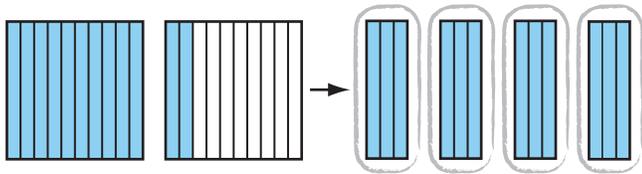
2. $0.45 \div 0.09 =$ _____
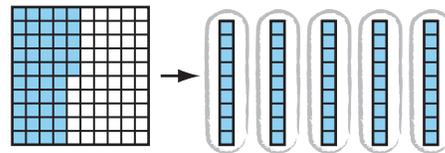
3. $0.96 \div 0.24 =$ _____
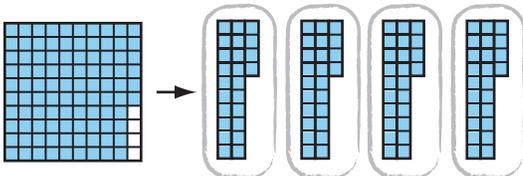
4. $1 \div 0.5 =$ _____
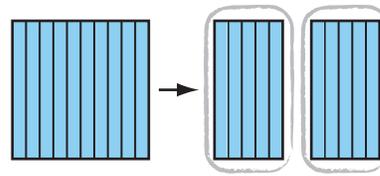
Name _____

Divide. Use decimal models.

5. $1.8 \div 0.6 =$ _____

6. $1.2 \div 0.3 =$ _____

7. $0.24 \div 0.04 =$ _____

8. $1.75 \div 0.35 =$ _____

9. $2 \div 0.4 =$ _____

10. $2.7 \div 0.9 =$ _____

11. $1.24 \div 0.62 =$ _____

12. $0.84 \div 0.14 =$ _____

✔ **13.** $1.6 \div 0.4 =$ _____

Use the model to find the unknown value.

14. $2.4 \div$ _____ $= 3$
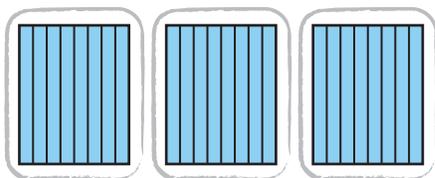
15. _____ $\div 0.32 = 4$
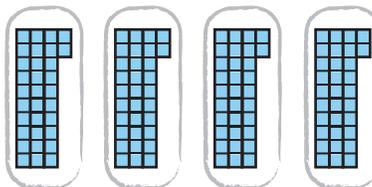
16. H.O.T. Make a model to find $0.6 \div 0.15$. **Describe** your model.

_____

_____

17. **Write Math** **Explain**, using the model, what the equation represents in Exercise 15.

_____

_____

Problem Solving   REAL WORLD

☀ H.O.T. Pose a Problem

18. Emilio buys 1.2 kilograms of grapes. He separates the grapes into packages that contain 0.3 kilogram of grapes each. How many packages of grapes does Emilio make?
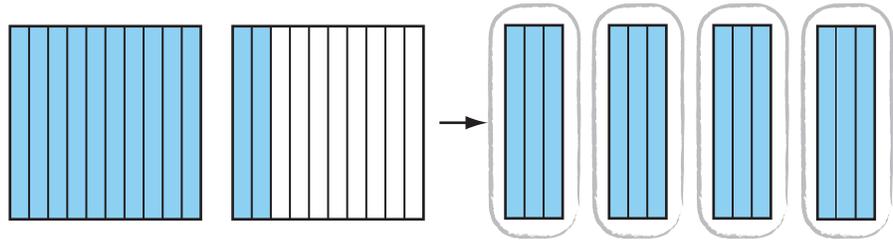
$1.2 \div 0.3 = 4$

Emilio made 4 packages of grapes.

Write a new problem using a different amount for the weight in each package. The amount should be a decimal with tenths. Use a total amount of 1.5 kilograms of grapes. Then use decimal models to solve your problem.

Pose a problem.

_____

_____

_____

_____

_____

_____

_____

Solve your problem. Draw a picture of the model you used to solve your problem.

• **Explain** why you chose the amount you did for your problem.

_____

_____

FOR MORE PRACTICE:
Standards Practice Book, pp. P109–P110

Divide Decimals

Essential Question How can you place the decimal point in the quotient?

When you multiply both the divisor and the dividend by the same power of 10, the quotient stays the same.

divisor		dividend			divisor		dividend	
6	÷	3	= 2		120	÷	30	= 4
↓ × 10		↓ × 10			↓ × 0.1		↓ × 0.1	
60	÷	30	= 2		12	÷	3	= 4
↓ × 10		↓ × 10			↓ × 0.1		↓ × 0.1	
600	÷	300	= 2		1.2	÷	0.3	= 4

🔑 UNLOCK the Problem › REAL WORLD

Matthew has $0.72. He wants to buy stickers that cost $0.08 each. How many stickers can he buy?

- Multiply both the dividend and the divisor by the power of 10 that makes the divisor a whole number. Then divide.

$$0.72 \div 0.08 = \boxed{}$$

$$\downarrow \times 100 \quad \downarrow \times 100$$

$$72 \div 8 = \boxed{}$$

So, Matthew can buy _____ stickers.

- What do you multiply hundredths by to get a whole number?

    _____

1. Explain how you know that the quotient 0.72 ÷ 0.08 is equal to the quotient 72 ÷ 8.

_____

_____

Try This! **Divide.** 0.56 ÷ 0.7

- Multiply the divisor by a power of 10 to make it a whole number. Then multiply the dividend by the same power of 10.

    0.7 × _____ = _____

    0.56 × _____ = _____

- Divide.

$$07.\overline{)5.6}$$

🔒 Example

Sherri hikes on the Pacific Coast trail. She plans to hike 3.72 miles. If she hikes at an average speed of 1.2 miles per hour, how long will she hike?

Divide. $3.72 \div 1.2$

Estimate. _____

STEP 1

Multiply the divisor by a power of 10 to make it a whole number. Then, multiply the dividend by the same power of 10.

$1.2 \times$ _____ $=$ _____

$3.72 \times$ _____ $=$ _____

STEP 2

Write the decimal point in the quotient above the decimal point in the new dividend.

$$12\overline{)37.2}$$

STEP 3

Divide.

$$12\overline{)37.2}$$

So, Sherri will hike _____ hours.

2. **Describe** what happens to the decimal point in the divisor and in the dividend when you multiply by 10.

   _____

3. **Explain** how you could have used the estimate to place the decimal point.

   _____

   _____

Try This!

Divide. Check your answer.

$$0.14\overline{)1.96}$$

Multiply the divisor and the

dividend by _____.

$$
\begin{array}{r}
0.14 \\
\times \quad \square \\
\hline
\square \\
+ \quad \square \\
\hline
\end{array}
$$

Name _____

Share and Show [MATH BOARD] ....

Copy and complete the pattern.

1. $45 \div 9 =$ _____

       $4.5 \div$ _____ $= 5$

       _____ $\div 0.09 = 5$

2. $175 \div 25 =$ _____

       $17.5 \div$ _____ $= 7$

       _____ $\div 0.25 = 7$

3. $164 \div 2 =$ _____

       $16.4 \div$ _____ $= 82$

       _____ $\div 0.02 = 82$

Divide.

✓ **4.** $1.6\overline{)9.6}$

5. $0.3\overline{)0.24}$

✓ **6.** $3.45 \div 1.5$

MATHEMATICAL PRACTICES

Math Talk   **Explain** how you know that your quotient for Exercise 5 will be less than 1.

On Your Own ....

Divide.

7. $0.6\overline{)13.2}$

8. $0.3\overline{)0.9}$

9. $0.26\overline{)1.56}$

10. $0.45\overline{)5.85}$

11. $0.3\overline{)0.69}$

12. $3.6 \div 0.4$

13. $1.26 \div 2.1$

14. $7.84 \div 0.28$

15. $9.28 \div 2.9$

Problem Solving REAL WORLD

Use the table to solve 16—19.

16. Connie paid $1.08 for pencils. How many pencils did she buy?

_____

17. Albert has $2.16. How many more pencils can he buy than markers?

_____

18. How many erasers can Ayita buy for the same amount that she would pay for one notepad?

_____

19. **H.O.T.** Ramon paid $3.25 for notepads and $1.44 for markers. What is the total number of items he bought?

_____

20. **Write Math** **What's the Error?** Katie divided 4.25 by 0.25 and got a quotient of 0.17.

_____

_____

_____

_____

21. **Test Prep** Marcus bought apples that cost $0.45 per pound. He paid $1.35 for the apples. How many pounds of apples did he buy?

Ⓐ 0.3 pound

Ⓑ 2.8 pounds

Ⓒ 3 pounds

Ⓓ 30 pounds

Prices at School Store	
Item	**Price**
Eraser	$0.05
Marker	$0.36
Notepad	$0.65
Pencil	$0.12

SHOW YOUR WORK

FOR MORE PRACTICE:
Standards Practice Book, pp. P111–P112

Write Zeros in the Dividend

Essential Question When do you write a zero in the dividend to find a quotient?

CONNECT When decimals are divided, the dividend may not have enough digits for you to complete the division. In these cases, you can write zeros to the right of the last digit.

UNLOCK the Problem REAL WORLD

The equivalent fractions show that writing zeros to the right of a decimal does not change the value.

$$90.8 = 90 \frac{8 \times 10}{10 \times 10} = 90 \frac{80}{100} = 90.80$$

During a fund-raising event, Adrian rode his bicycle 45.8 miles in 4 hours. Find his speed in miles per hour by dividing the distance by the time.

Divide. 45.8 ÷ 4   **Estimate. 44 ÷ 4 = _____**

STEP 1	STEP 2	STEP 3
Write the decimal point in the quotient above the decimal point in the dividend.	Divide the tens, ones, and tenths.	Write a zero in the dividend and continue dividing.

STEP 1:

$$4\overline{)45.8}$$
(decimal point above)

STEP 2:

$$4\overline{)45.8}$$
$$-\,\_\_$$
$$\_\_$$
$$-\,\_\_$$
$$\_\_$$
$$-\,\_\_$$

STEP 3:

$$4\overline{)45.8\textcolor{orange}{0}}$$
$$-4$$
$$05$$
$$-\ 4$$
$$18$$
$$-16\ \downarrow$$
$$\_\_$$
$$-\,\_\_$$

So, Adrian's speed was _____ miles per hour.

Math Talk   MATHEMATICAL PRACTICES
Explain how you would model this problem using base-ten blocks.

CONNECT When you divide whole numbers, you can show the amount that is left over by writing a remainder or a fraction. By writing zeros in the dividend, you can also show that amount as a decimal.

🔑 **Example** **Write zeros in the dividend.**

Divide. 372 ÷ 15

- Divide until you have an amount less than the divisor left over.
- Insert a decimal point and a zero at the end of the dividend.
- Place a decimal point in the quotient above the decimal point in the dividend.
- Continue dividing.

So, 372 ÷ 15 = _____ .

```
        24.
    15)372.0
      -30
        72
       -60
```

- Sarah has 78 ounces of rice. She puts an equal amount of rice in each of 12 bags. What amount of rice does she put in each bag? **Explain** how you would write the answer using a decimal.

_____

_____

Try This! **Divide. Write a zero at the end of the dividend as needed.**

Divide. 1.23 ÷ 0.06

```
  006.)123.
```

```
        20.
     6)123.0
      -12
        03
       - 0
         30
        -
```

Divide. 10 ÷ 0.8

```
  08.)100.
```

```
   8.)100.
```

Name _____

Share and Show [MATH BOARD] . . . .

Write the quotient with the decimal point placed correctly.

1. $5 \div 0.8 = 625$

2. $26.1 \div 6 = 435$

3. $0.42 \div 0.35 = 12$

4. $80 \div 50 = 16$

Divide.

5. $4\overline{)32.6}$

6. $1.2\overline{)9}$

✓ **7.** $15\overline{)42}$

✓ **8.** $0.14\overline{)0.91}$

Math Talk **MATHEMATICAL PRACTICES**
Explain why you would write a zero in the dividend when dividing decimals.

On Your Own . . . .

Divide.

9. $8\overline{)84}$

10. $2.5\overline{)4}$

11. $5\overline{)16.2}$

12. $0.6\overline{)2.7}$

13. $18 \div 7.5$

14. $34.8 \div 24$

15. $5.16 \div 0.24$

16. $81 \div 18$

Practice: Copy and Solve **Divide.**

17. $1.6\overline{)20}$

18. $15\overline{)4.8}$

19. $0.54\overline{)2.43}$

20. $28\overline{)98}$

21. $1.8 \div 12$

22. $3.5 \div 2.5$

23. $40 \div 16$

24. $2.24 \div 0.35$

Problem Solving REAL WORLD

Solve.

25. Jerry takes trail mix on hikes. A package of dried apricots weighs 25.5 ounces. Jerry divides the apricots equally among 6 bags of trail mix. How many ounces of apricots are in each bag?

   _____

26. **H.O.T.** Amy has 3 pounds of raisins. She divides the raisins equally into 12 bags. How many pounds of raisins are in each bag? Tell how many zeros you had to write at the end of the dividend.

   _____

27. **Write Math** ➤ Find 65 ÷ 4. Write your answer using a remainder, a fraction, and a decimal. Then tell which form of the answer you prefer. **Explain** your choice.

   _____

   _____

   _____

   _____

28. **Test Prep** Todd has a piece of rope that is 1.6 meters long. He cuts the rope into 5 equal pieces. What is the length of each piece?

   (A) 0.8 meter

   (B) 0.32 meter

   (C) 3.2 meters

   (D) 8 meters

Connect to Science

Rate of Speed Formula

The formula for velocity, or rate of speed, is $r = d \div t$, where r represents rate of speed, d represents distance, and t represents time. For example, if an object travels 12 feet in 10 seconds, you can find its rate of speed by using the formula.

$r = d \div t$
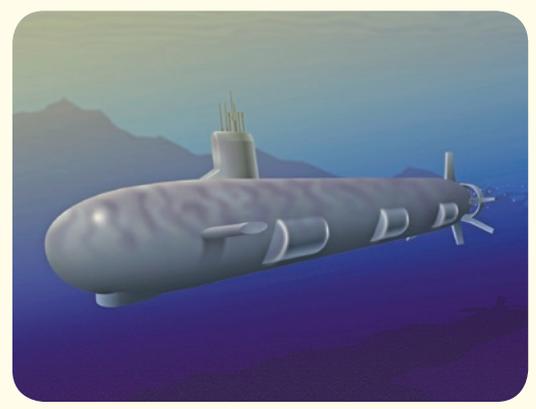
$r = 12 \div 10$

$r = 1.2$ feet per second

Use division and the formula for rate of speed to solve.

29. A car travels 168 miles in 3.2 hours. Find the car's rate of speed in miles per hour.

   _____

30. A submarine travels 90 kilometers in 4 hours. Find the submarine's rate of speed in kilometers per hour.

   _____

FOR MORE PRACTICE:
Standards Practice Book, pp. P113–P114

Problem Solving • Decimal Operations

Essential Question How do you use the strategy *work backward* to solve multistep decimal problems?

🔑 UNLOCK the Problem › REAL WORLD ‹

Carson spent $15.99 for 2 books and 3 pens. The books cost $4.95 each and sales tax was $1.22. Carson also used a coupon for $0.50 off his purchase. If each pen had the same cost, how much did each pen cost?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

• Make a flowchart to show the information. Then using inverse operations, work backward to solve.

Cost of 3 pens	**plus** →	Cost of 2 books	**plus** →	Amount of tax	**minus** →	Amount of Coupon	**equals** →	Total Spent

3 × cost of each pen	+	2 × ☐	+	☐	−	☐	=	☐

Total Spent	**plus** →	Amount of Coupon	**minus** →	Amount of tax	**minus** →	Cost of 2 books	**equals** →	Cost of 3 pens

☐	+	☐	−	☐	−	☐	=	☐
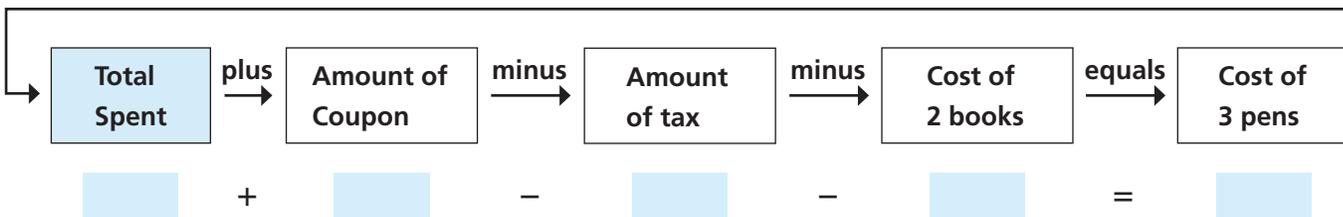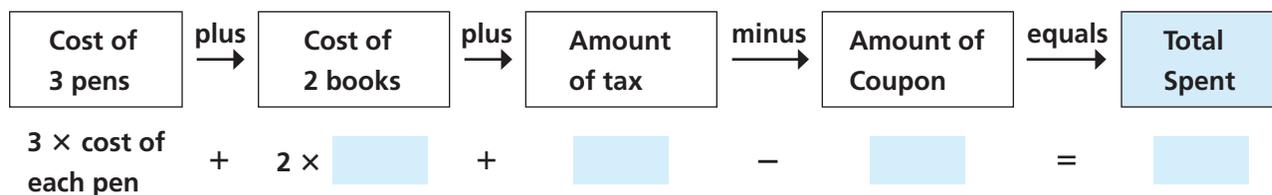
• Divide the cost of 3 pens by 3 to find the cost of each pen.

_____ ÷ 3 = _____

Math Talk **Explain** why the amount of the coupon was added when you worked backward.

So, the cost of each pen was _____.

🔑 Try Another Problem

Last week, Vivian spent a total of $20.00. She spent $9.95 for tickets to the school fair, $5.95 for food, and the rest for 2 rings that were on sale at the school fair. If each ring had the same cost, how much did each ring cost?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

So, the cost of each ring was _____.

Name _____

Share and Show MATH BOARD . . . .

1. Hector spent $36.75 for 2 DVDs with the same cost. The sales tax was $2.15. Hector also used a coupon for $1.00 off his purchase. How much did each DVD cost?

   First, make a flowchart to show the information and show how you would work backward.

   Then, work backward to find the cost of 2 DVDs.

   _____

   Finally, find the cost of one DVD.

   _____

   So, each DVD costs _____.

2. **What if** Hector spent $40.15 for the DVDs, the sales tax was $2.55, and he didn't have a coupon? How much would each DVD cost?

   _____

3. Sophia spent $7.30 for school supplies. She spent $3.00 for a notebook and $1.75 for a pen. She also bought 3 large erasers. If each eraser had the same cost, how much did she spend for each eraser?

   _____

SHOW YOUR WORK

On Your Own . . . .

Choose a STRATEGY

Act It Out
Draw a Diagram
Make a Table
Solve a Simpler Problem
Work Backward
Guess, Check, and Revise

4. The change from a gift purchase was $3.90. Each of 6 students donated an equal amount for the gift. How much change should each student receive?

_____

5. If you divide this mystery number by 4, add 8, and multiply by 3, you get 42. What is the mystery number?

_____

6. H.O.T. A mail truck picks up two boxes of mail from the post office. The total weight of the boxes is 32 pounds. One box is 8 pounds heavier than the other box. How much does each box weigh?

_____

SHOW YOUR WORK

7. Stacy buys 3 CDs in a set for $29.98. She saved $6.44 by buying the set instead of buying the individual CDs. If each CD costs the same amount, how much does each of the 3 CDs cost when purchased individually?

_____

8. A school cafeteria sold 1,280 slices of pizza the first week, 640 the second week, and 320 the third week. If this pattern continues, in what week will the cafeteria sell 40 slices? **Explain** how you got your answer.

_____

_____

_____

9. **Test Prep** While working at the school store, John sold a jacket for $40.00 and notebooks for $1.50 each. If he collected $92.50, how many notebooks did he sell?

Ⓐ 3.5   Ⓒ 35

Ⓑ 6.1   Ⓓ 61

FOR MORE PRACTICE:
Standards Practice Book, pp. P115–P116

✓ 🌴 Chapter Review/Test

▶ Concepts and Skills

Complete the pattern.

1. $341 \div 1 =$ _____

$341 \div 10 =$ _____

$341 \div 100 =$ _____

$341 \div 1{,}000 =$ _____

2. $15 \div 1 =$ _____

$15 \div 10 =$ _____

$15 \div 100 =$ _____

$15 \div 1{,}000 =$ _____

3. $68.2 \div 10^0 =$ _____

$68.2 \div 10^1 =$ _____

$68.2 \div 10^2 =$ _____

Estimate the quotient.

4. $49.3 \div 6$

5. $3.5 \div 4$

6. $396.5 \div 18$

Divide.

7. $6\overline{)3.24}$

8. $5\overline{)6.55}$

9. $26\overline{)96.2}$

10. $1.08 \div 0.4$

11. $8.84 \div 0.68$

12. $7.31 \div 1.7$

13. $9.18 \div 0.9$

14. $12.7 \div 5$

15. $8.33 \div 0.34$

GO Online **Assessment Options**
Chapter Test

Fill in the bubble completely to show your answer.

16. The Orchard Pie Company uses 95 pounds of apples to make 100 pies. Each pie contains the same amount of apples. How many pounds of apples are used in each pie?

(A) 0.095 pound

(B) 0.95 pound

(C) 9.5 pounds

(D) 95 pounds

17. During a special sale, all CDs have the same price. Mr. Ortiz pays $228.85 for 23 CDs. Which is the best estimate of the price of each CD?

(A) $9

(B) $10

(C) $12

(D) $13

18. Ryan earns $20.16 working for 3 hours. How much does he earn per hour?

(A) $60.48

(B) $6.82

(C) $6.72

(D) $6.71

19. Anna hikes 6.4 miles during a 4-day vacation. If she hikes the same distance each day, how many miles does she hike each day?

(A) 1.06 miles

(B) 1.1 miles

(C) 1.4 miles

(D) 1.6 miles

Name _____

Fill in the bubble completely to show your answer.

20. Karina pays $1.92 for pencil erasers. The erasers cost $0.08 each. How many erasers does she buy?

(A) 2.4

(B) 2.5

(C) 24

(D) 25

21. Wyatt has 25.4 ounces of fruit juice. He divides the juice equally into 4 glasses. How much juice is in each glass?

(A) 6 ounces

(B) 6.35 ounces

(C) 6.4 ounces

(D) 6.45 ounces

22. Jacob walks 70.4 feet in 0.2 hour. If he walks at the same rate the whole time, what is his speed in feet per hour?

(A) 352 feet per hour

(B) 140.8 feet per hour

(C) 35.2 feet per hour

(D) 14.08 feet per hour

23. Meghan earns $20.00 by walking dogs. She uses all of her earnings to buy a shirt for $12.85 and some stickers for $0.65 each. How many stickers does she buy?

(A) 4.65

(B) 11

(C) 46

(D) 110

▶ Constructed Response

24. Percy buys tomatoes that cost $0.58 per pound. He pays $2.03 for the tomatoes. How many pounds of tomatoes does he buy? Show your work using words, pictures, or numbers. **Explain** how you know your answer is reasonable.

_____

_____

_____

▶ Performance Task

25. Isabella is buying art supplies. The table at the right shows the prices of the items she wants to buy.

Art Supplies	
Item	**Price**
Glass beads	$0.28 per ounce
Paintbrush	$0.95
Poster board	$0.75
Jar of paint	$0.99

A Isabella spends $2.25 on poster boards. How many poster boards does she buy?

_____

B Isabella spends $4.87 on paintbrushes and paint. How many of each item does she buy? **Explain** how you found your answer.

_____

_____

_____

_____

C Isabella spends less than $14.00 for glass beads, paintbrushes, poster board, and paint. She spends $1.68 on beads and $3.96 on paint. She buys more than 3 poster boards and more than 3 paintbrushes. Find how many ounces of glass beads and how many jars of paint she buys. Then, suggest the number of poster boards and paintbrushes she might buy for the total spent.

_____

_____

_____

_____

Operations with Fractions

Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)

Board operator at a recording studio ▶

The Rhythm Track

Math and music both involve numbers and patterns of change. In music, these patterns are called rhythm. We hear rhythm as a number of beats.

number of beats in 1 measure

kind of note that gets 1 beat

measure   measure   measure   measure

4 quarters = 2 halves = 1 whole = 2 quarters + 4 eighths

Get Started

The time signature at the beginning of a line of music looks like a fraction. It tells the number of beats in each measure and the kind of note that fills 1 beat. When the time signature is $\frac{4}{4}$, each $\frac{1}{4}$ note or quarter note, is 1 beat.

In the music below, different kinds of notes make up each measure. The measures are not marked. Check the time signature. Then draw lines to mark each measure.

Important Facts

$$\circ = \frac{1}{2}$$

$$\stackrel{\,}{} = \frac{1}{4}$$

$$\stackrel{\,}{} = \frac{1}{8}$$

$$\stackrel{\,}{} = \frac{1}{16}$$