Name _____

Algebra • Division Patterns with Decimals

To divide a number by 10, 100, or 1,000, use the number of zeros in the divisor to determine how the position of the decimal point changes in the quotient.

	Number of zeros:	Move decimal point:
$147 \div 1 =$ 147	0	0 places to the left
$147 \div 10 =$ 14.7	1	1 place to the left
$147 \div 100 =$ 1.47	2	2 places to the left
$147 \div 1{,}000 =$ 0.147	3	3 places to the left

To divide a number by a power of 10, you can use the exponent to determine how the position of the decimal point changes in the quotient.

	Exponent	Move decimal point:
$97.2 \div 10^0 =$ 97.2	0	0 places to the left
$97.2 \div 10^1 =$ 9.72	1	1 place to the left
$97.2 \div 10^2 =$ 0.972	2	2 places to the left

Complete the pattern.

1. $358 \div 10^0 =$ _____

$358 \div 10^1 =$ _____

$358 \div 10^2 =$ _____

$358 \div 10^3 =$ _____

2. $102 \div 10^0 =$ _____

$102 \div 10^1 =$ _____

$102 \div 10^2 =$ _____

$102 \div 10^3 =$ _____

3. $99.5 \div 1 =$ _____

$99.5 \div 10 =$ _____

$99.5 \div 100 =$ _____

Name _____

Extending Division Patterns

Use patterns to find the quotients.

1. 8,500 ÷ 100 = _____
8,500 ÷ 1,000 = _____
8,500 ÷ 10,000 = _____
8,500 ÷ 100,000 = _____
8,500 ÷ 1,000,000 = _____

2. 123,575 ÷ 10^2 = _____
123,575 ÷ 10^3 = _____
123,575 ÷ 10^4 = _____
123,575 ÷ 10^5 = _____
123,575 ÷ 10^6 = _____

3. 5,000 ÷ 2 = _____
5,000 ÷ 20 = _____
5,000 ÷ 200 = _____
5,000 ÷ 2,000 = _____
5,000 ÷ 20,000 = _____

4. 24,000 ÷ 3 = _____
24,000 ÷ 30 = _____
24,000 ÷ 300 = _____
24,000 ÷ 3,000 = _____

5. _____ ÷ 4 = 9
_____ ÷ 4 = 90
_____ ÷ 4 = 900
_____ ÷ 4 = 9,000
_____ ÷ 4 = 90,000

6. 800 ÷ 100 = _____
800 ÷ 10 = _____
800 ÷ 1 = _____
800 ÷ 0.1 = _____
800 ÷ 0.01 = _____

7. Write Math **Explain** how you used patterns to complete Exercise 5.

_____

_____

_____

8. Stretch Your Thinking Suppose you continue the pattern in Exercise 4. What will be the next three quotients?

_____

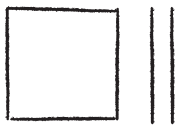
Divide Decimals by Whole Numbers

You can draw a quick picture to help you divide a decimal by a whole number.

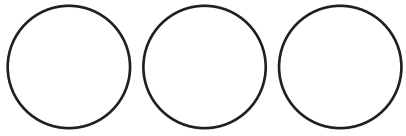
In a decimal model, each large square represents one, or 1. Each bar represents one-tenth, or 0.1.

Divide. 1.2 ÷ 3

Step 1 Draw a quick picture to represent the dividend, 1.2.



Step 2 Draw 3 circles to represent the divisor, 3.



Step 3 You cannot evenly divide 1 into 3 groups. Regroup 1 as 10 tenths. There are 12 tenths in 1.2.

So, 1.2 ÷ 3 = 0.4.

Step 4 Share the tenths equally among 3 groups.

Each group contains 0 ones and 4 tenths.

Divide. Draw a quick picture.

1. 2.7 ÷ 9 = _____

2. 4.8 ÷ 8 = _____

3. 2.8 ÷ 7 = _____

4. 7.25 ÷ 5 = _____

5. 3.78 ÷ 3 = _____

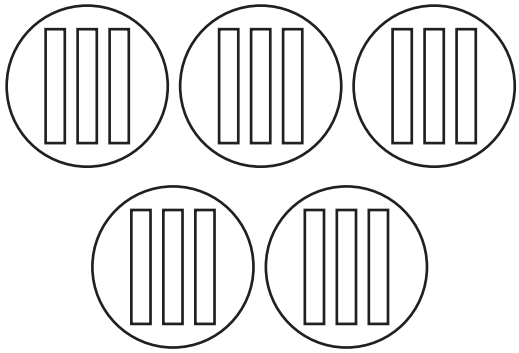
6. 8.52 ÷ 4 = _____

Name _____

Write Division Equations

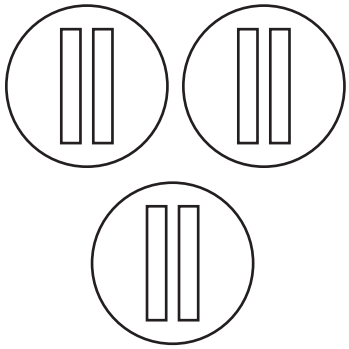
In the models below, a large square represents 1, a bar represents 1 tenth, and a small square represents 1 hundredth. All divisors are whole numbers. Write the division equation each model represents.

1.



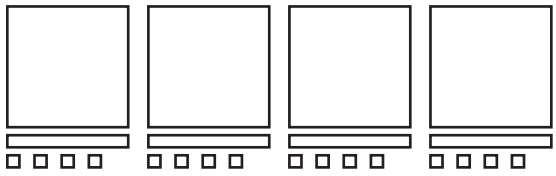
_____

2.



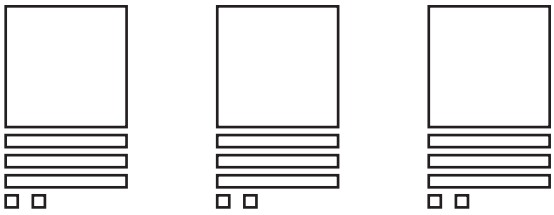
_____

3.



_____

4.



_____

5. Write Math **Explain** how you found the division equation the model in Exercise 1 represents.

_____

_____

_____

_____

_____

Name _____

Estimate Quotients

You can use multiples and compatible numbers to estimate decimal quotients.

Estimate. 249.7 ÷ 31

Step 1 Round the divisor, 31, to the nearest 10.

31 rounded to the nearest 10 is 30.

Step 2 Find the multiples of 30 that the dividend, 249.7, is between.

249.7 is between 240 and 270.

Step 3 Divide each multiple by the rounded divisor, 30.

240 ÷ 30 = 8 270 ÷ 30 = 9

So, two possible estimates are 8 and 9.

Use compatible numbers to estimate the quotient.

1. 23.6 ÷ 7

_____ ÷ _____ = _____

2. 469.4 ÷ 62

_____ ÷ _____ = _____

Estimate the quotient.

3. 338.7 ÷ 49

4. 75.1 ÷ 9

5. 674.8 ÷ 23

6. 61.9 ÷ 7

7. 96.5 ÷ 19

8. 57.2 ÷ 8

Name _____

Compare Estimated Quotients

Estimate each quotient. Then write < or > in the circle to compare each pair of estimates.

1. 76.3 ÷ 8 ◯ 37.5 ÷ 7

2. 3.1 ÷ 4 ◯ 6.4 ÷ 9

3. 654.3 ÷ 82 ◯ 289.5 ÷ 31

4. 98.4 ÷ 4 ◯ 62.8 ÷ 3

5. 276.3 ÷ 9 ◯ 389.4 ÷ 5

6. 329.6 ÷ 7 ◯ 117.5 ÷ 3

7. 8.2 ÷ 12 ◯ 7.3 ÷ 14

8. 726.3 ÷ 18 ◯ 687.5 ÷ 14

9. $46.35 ÷ 3 ◯ $81.35 ÷ 5

10. $7.27 ÷ 13 ◯ $9.08 ÷ 19

11. Write Math Write a pair of decimal division expressions, similar to the ones in Exercises 1–10, so that when you estimate and compare the quotients, you get 9 > 3.

Name _____

Division of Decimals by Whole Numbers

Divide. 19.61 ÷ 37

Step 1 Estimate the quotient.
2,000 hundredths ÷ 40 = 50 hundredths, or 0.50.
So, the quotient will have a zero in the ones place.

```
      0
37)19.61
```

Step 2 Divide the tenths.
Use the estimate. Try 5 in the tenths place.

Multiply. 5 × 37 = 185

Subtract. 196 − 185 = 11

Check. 11 < 37

```
      0 5
37)19.61
  − 18 5
    1 1
```

Step 3 Divide the hundredths.
Estimate: 120 hundredths ÷ 40 = 3 hundredths.

Multiply. 3 × 37 = 111

Subtract. 111 − 111 = 0

Check. 0 < 37

Place the decimal point in the quotient.

```
     0.53
37)19.61
  − 18 5
    1 11
  − 1 11
      0
```

So, 19.61 ÷ 37 = 0.53.

Write the quotient with the decimal point placed correctly.

1. 5.94 ÷ 3 = 198 _____

2. 48.3 ÷ 23 = 21 _____

Divide.

3. 9)61.2

4. 17)83.3

5. 9)7.38

Name _____

Unknown Dividends and Quotients

For each problem, find the quotient for the first box. Then use that quotient as the dividend in the second box. Use the quotient for the second box as the dividend in the third box. Write the final quotient in the last box. The first one has been done for you.

1. 27.84 ÷ 3 = → 9.28 ÷ 2 = → 4.64 ÷ 8 = → 0.58

2. 96.12 ÷ 4 = → _____ ÷ 9 = → _____ ÷ 3 = → _____

3. 86.13 ÷ 11 = → _____ ÷ 3 = → _____ ÷ 9 = → _____

4. 85.02 ÷ 13 = → _____ ÷ 2 = → _____ ÷ 3 = → _____

5. 226.8 ÷ 14 = → _____ ÷ 6 = → _____ ÷ 9 = → _____

6. 117.76 ÷ 8 = → _____ ÷ 4 = → _____ ÷ 4 = → _____

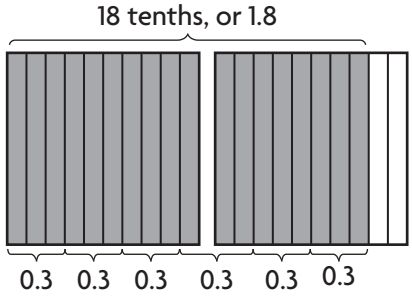
7. 310.5 ÷ 15 = → _____ ÷ 3 = → _____ ÷ 23 = → _____

Name _____

Decimal Division

You can use decimal models to divide tenths.

Divide. 1.8 ÷ 0.3.



Step 1 Shade 18 tenths to represent the dividend, 1.8.

Step 2 Divide the 18 tenths into groups of 3 tenths to represent the divisor, 0.3.

Step 3 Count the groups.

There are 6 groups of 0.3 in 1.8. So, 1.8 ÷ 0.3 = 6.

You can use decimal models to divide hundredths.

Divide. 0.42 ÷ 0.06

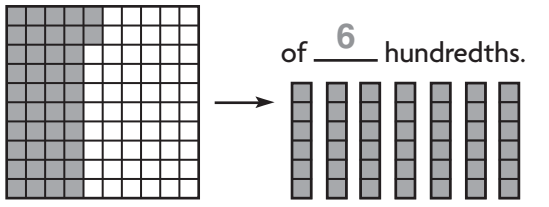
Step 1 Shade 42 squares to represent the dividend, 0.42.

Step 2 Divide the 42 small squares into groups of 6 hundredths to represent the divisor, 0.06.

Step 3 Count the groups.

There are 7 groups of 0.06 in 0.42. So, 0.42 ÷ 0.06 = 7.

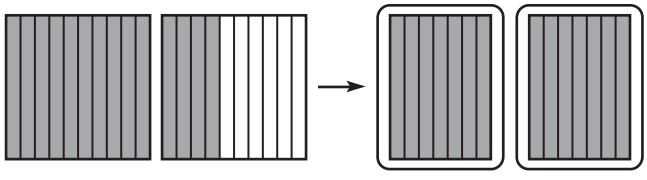
There are 42 shaded squares, or 0.42.



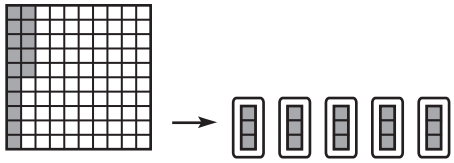
There are 7 groups of 6 hundredths.

Use the model to complete the number sentence.

1. 1.4 ÷ 0.7 = _____



2. 0.15 ÷ 0.03 = _____



Divide. Use decimal models.

3. 2.7 ÷ 0.3 = _____

4. 0.52 ÷ 0.26 = _____

5. 0.96 ÷ 0.16 = _____

Name _____

Decimal Division Matching

Match the division expression in Column A with its quotient in Column B. You may find it helpful to use decimal models.

Column A	Column B
1. 1.4 ÷ 0.2	1
2. 0.78 ÷ 0.13	2
3. 1.5 ÷ 0.5	3
4. 2.4 ÷ 0.6	4
5. 1.48 ÷ 0.74	5
6. 0.64 ÷ 0.08	6
7. 2.7 ÷ 0.3	7
8. 0.75 ÷ 0.15	8
9. 1.2 ÷ 1.2	9

10. **Stretch Your Thinking** One way to divide decimals is to first change the dividend and the divisor to whole numbers. To do so, multiply both the dividend and the divisor by the multiple of 10 that makes the divisor a whole number. Then divide to find the quotient. **Explain** how to use this strategy to find the quotient in Exercise 2.

_____

_____

_____

Name _____

Divide Decimals

You can multiply the dividend and the divisor by the same power of 10 to make the divisor a whole number. As long as you multiply both the dividend and the divisor by the same power of 10, the quotient stays the same.

Example 1: Divide. 0.84 ÷ 0.07

Multiply the dividend, 0.84, and the divisor, 0.07, by the power of 10 that makes the divisor a whole number.

Since 84 ÷ 7 = 12, you know that 0.84 ÷ 0.07 = 12.

0.84 ÷ 0.07 = ?
× 100 × 100
84 ÷ 7 = 12

Example 2: Divide. 4.42 ÷ 3.4

Multiply both the dividend and the divisor by 10 to make the divisor a whole number.

$3.4\overline{)4.42}$ — Multiply 3.4 and 4.42 both by 10 → $34\overline{)44.2}$

Divide as you would whole numbers. Place the decimal point in the quotient, above the decimal point in the dividend.

So, 4.42 ÷ 3.4 = 1.3.

$$\begin{array}{r} 1.3 \\ 34\overline{)44.2} \\ -\ 34 \\ \hline 102 \\ -\ 102 \\ \hline 0 \end{array}$$

Copy and complete the pattern.

1. 54 ÷ 6 = _____
5.4 ÷ _____ = 9
_____ ÷ 0.06 = 9

2. 184 ÷ 23 = _____
18.4 ÷ _____ = 8
_____ ÷ 0.23 = 8

3. 138 ÷ 2 = _____
13.8 ÷ _____ = 69
_____ ÷ 0.02 = 69

Divide.

4. $1.4\overline{)9.8}$

5. $0.3\overline{)0.6}$

6. 3.64 ÷ 1.3

Name _____

Equal or Not Equal?

Write <, >, or = in the circle to make each statement true.

1. 0.6 ÷ 0.05 ◯ 12

2. 0.72 ÷ 0.08 ◯ 0.9

3. 0.3 ÷ 0.3 ◯ 0.1

4. $0.75 ÷ $0.25 ◯ 0.3

5. 0.42 ÷ 0.06 ◯ 7

6. 0.39 ÷ 0.3 ◯ 0.13

7. 6.93 ÷ 0.3 ◯ 9.24 ÷ 0.4

8. 45 ÷ 9 ◯ 4.5 ÷ 0.09

9. 1.17 ÷ 0.3 ◯ 4.68 ÷ 1.2

10. 8.74 ÷ 1.9 ◯ 55.2 ÷ 1.2

11. Write Math **Explain** how you decided which symbol to write in Exercise 10.

_____

_____

_____

_____

12. **Stretch Your Thinking** Without dividing, tell whether the quotient of 4.45 ÷ 1.5 is *greater than*, *less than*, or *equal to* 3.

_____

_____

_____

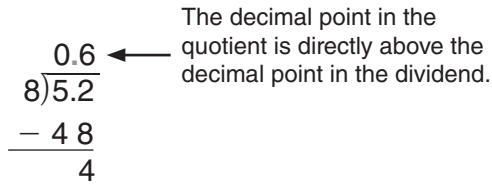
Name _____

Write Zeros in the Dividend

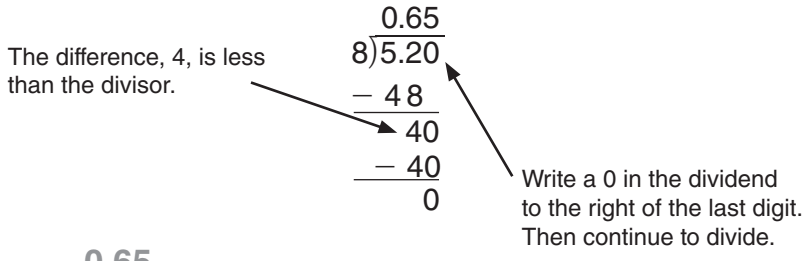
When there are not enough digits in the dividend to complete the division, you can write zeros to the right of the last digit in a decimal number in the dividend. Writing zeros to the right of the last digit will not change the value of the dividend or the quotient.

Divide. 5.2 ÷ 8

Step 1 Divide as you would whole numbers. Place the decimal point in the quotient above the decimal point in the dividend.



Step 2 The difference is less than the divisor. Write a 0 in the dividend to the right of the last digit and continue to divide.



So, 5.2 ÷ 8 = 0.65.

Write the quotient with the decimal point placed correctly.

1. 3 ÷ 0.4 = 75 **2.** 25.2 ÷ 8 = 315 **3.** 60 ÷ 25 = 24 **4.** 8.28 ÷ 0.72 = 115

Divide.

5. $6\overline{)43.5}$ **6.** $1.4\overline{)7.7}$ **7.** $30\overline{)72}$ **8.** $0.18\overline{)0.63}$

Name _____

Which Is the Better Buy?

Divide to find the cost of one unit of each item. Round your answers to the nearest cent. Then determine which item is the better buy.

1. a 6.5-ounce can of tuna for $1.39 or a 3-ounce can of tuna for $0.65

The 6.5-ounce can of tuna costs _____ per ounce.

The 3-ounce can of tuna costs _____ per ounce.

The _____-ounce can of tuna is the better buy.

2. a 2.5-pound bag of sugar for $1.69 or a 4-pound bag of sugar for $2.49

The 2.5-pound of sugar costs _____ per pound.

The 4-pound bag of sugar costs _____ per pound.

The _____-pound bag of sugar is the better buy.

3. a 7.2-ounce box of macaroni for $0.67 or a 13-ounce box of macaroni for $1.28

The 7.2-ounce box of macaroni costs _____ per ounce.

The 13-ounce box of macaroni costs _____ per ounce.

The _____-ounce box of macaroni is the better buy.

4. an 11.5-ounce box of crackers for $2.25 or a 16-ounce box of crackers for $2.99

The 11.5-ounce box of crackers costs _____ per ounce.

The 16-ounce box of crackers costs _____ per ounce.

The _____-ounce box of crackers is the better buy.

Name _____

Problem Solving • Decimal Operations

Rebecca spent $32.55 for a photo album and three identical candles. The photo album cost $17.50 and the sales tax was $1.55. How much did each candle cost?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?
I need to find the cost of each candle.	Rebecca spent $32.55 for a photo album and 3 candles. The photo album cost $17.50. The sales tax was $1.55.	I can use a flowchart and work backward from the total amount Rebecca spent to find the cost of each candle.

Solve the Problem

- Make a flowchart to show the information. Then work backward to solve.

Cost of 3 candles	plus →	Cost of photo album	plus →	Sales tax	equals →	Total spent
3 × cost of each candle	+	$17.50	+	$1.55	=	$32.55

Total spent	minus →	Sales tax	minus →	Cost of photo album	equals →	Cost of 3 candles
$32.55	−	$1.55	−	$17.50	=	$13.50

- Divide the cost of 3 candles by 3 to find the cost of each candle.

  $13.50 ÷ 3 = $4.50

  So, each candle cost $4.50.

Use a flowchart to help you solve the problem.

1. Maria spent $28.69 on one pair of jeans and two T-shirts. The jeans cost $16.49. Each T-shirt cost the same amount. The sales tax was $1.62. How much did each T-shirt cost?

2. At the skating rink, Sean and Patrick spent $17.45 on admission and snacks. They used one coupon for $2 off the admission. The snacks cost $5.95. What is the regular admission cost for one?

Name _____

Money Flow

Solve each problem. Make a flowchart and work backward to help.

1. Madison and Jim paid $21.08 for one large pizza, 2 salads with the same price, and 2 drinks with the same price. The pizza cost $11.70, which was 3 times as much as the cost of one salad. They also used a coupon for $2 off their purchase. What was the cost of one drink?

_____

2. Carla bought a digital camera that cost $91.98. She also bought 2 identical memory cards and a camera case. The camera cost 6 times as much as the case. She paid $127.35, including sales tax of $6.06. What was the cost of each memory card?

_____

3. Lia, Phil, and Cam collect a total of $200.30 for a holiday fundraiser. Phil collects $12.80 more than Lia. Cam collects 3 times as much as Lia. How much does each person collect?

_____

4. While on vacation, Craig bought a pair of sunglasses for $15.98, a hat for $7.99, 5 postcards, and a beach towel. The beach towel cost $0.50 more than half the price of the sunglasses. Craig gave the cashier $40 and got $3.59 in change. Each postcard cost the same. How much did each postcard cost?

_____

5. **Stretch Your Thinking** Draw a flowchart for a money problem similar to the ones in Exercises 1–4. Then write a word problem that can be solved by using your flowchart and working backward.

_____

_____

_____