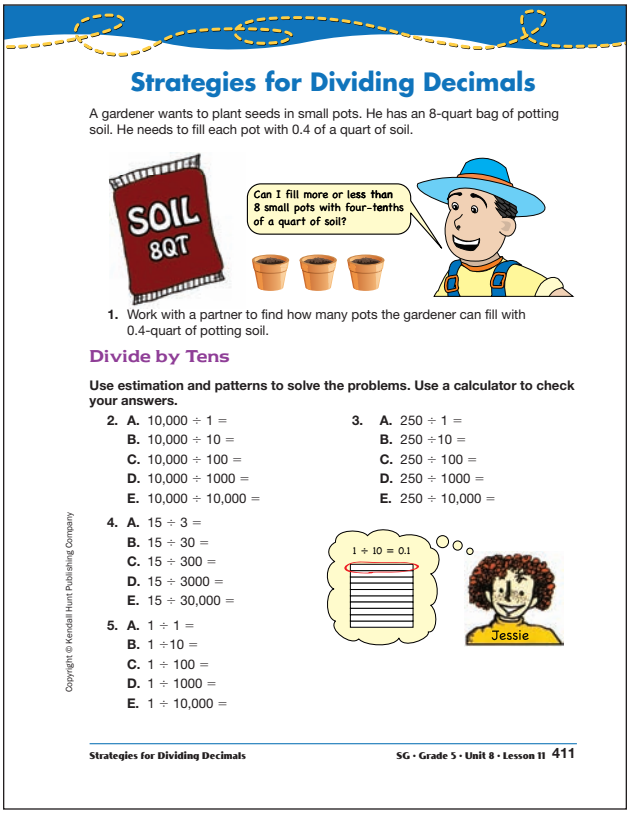

Strategies for Dividing Decimals

A gardener wants to plant seeds in small pots. He has an 8-quart bag of potting soil. He needs to fill each pot with 0.4 of a quart of soil.

1. Work with a partner to find how many pots the gardener can fill with 0.4-quart of potting soil.

Divide by Tens

Use estimation and patterns to solve the problems. Use a calculator to check your answers.

2. **A.** 10,000 ÷ 1 =
   B. 10,000 ÷ 10 =
   C. 10,000 ÷ 100 =
   D. 10,000 ÷ 1000 =
   E. 10,000 ÷ 10,000 =
3. **A.** 250 ÷ 1 =
   B. 250 ÷10 =
   C. 250 ÷ 100 =
   D. 250 ÷ 1000 =
   E. 250 ÷ 10,000 =
4. **A.** 15 ÷ 3 =
   B. 15 ÷ 30 =
   C. 15 ÷ 300 =
   D. 15 ÷ 3000 =
   E. 15 ÷ 30,000 =
5. **A.** 1 ÷ 1 =
   B. 1 ÷10 =
   C. 1 ÷ 100 =
   D. 1 ÷ 1000 =
   E. 1 ÷ 10,000 =

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Strategies for Dividing Decimals (SG pp. 411–418) Questions 1–30

1.* 20 pots; Solution strategies will vary. See Figure 2 in Lesson 11 for examples.

2. **A.** 10,000 ÷ 1 = 10,000
   B. 10,000 ÷ 10 = 1000
   C. 10,000 ÷ 100 = 100
   D. 10,000 ÷ 1000 = 10
   E. 10,000 ÷ 10,000 = 1
3. **A.** 250 ÷ 1 = 250
   B. 250 ÷ 10 = 25
   C. 250 ÷ 100 = 2.5
   D. 250 ÷ 1000 = .25
   E. 250 ÷ 10,000 = .025
4. **A.** 15 ÷ 3 = 5
   B. 15 ÷ 30 = .5
   C. 15 ÷ 300 = 0.05
   D. 15 ÷ 3000 = 0.005
   E. 15 ÷30,000 = 0.0005
5. **A.** 1 ÷ 1 = 1
   B. 1 ÷ 10 = 0.1
   C. 1 ÷ 100 = .01
   D. 1 ÷ 1000 = .001
   E. 1 ÷ 10,000 = .0001

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*Answers and/or discussion are included in the lesson.

6. **A.*** A number gets 10 times smaller each time you divide it by a ten.

   B.* The decimal point moves one place to the left each time you divide by ten.

   C.* Possible response: Dividing a number by a ten is different than multiplying a number by ten. It is the opposite. The number gets larger. When you multiply by a ten, you move the decimal point one place to the right each time you multiply by ten.

   D.* Since dividing is the opposite of multiplying, if you multiply the quotient by the divisor, it should equal the dividend.

7. 20 rows

8. **A.*** 10 tenths

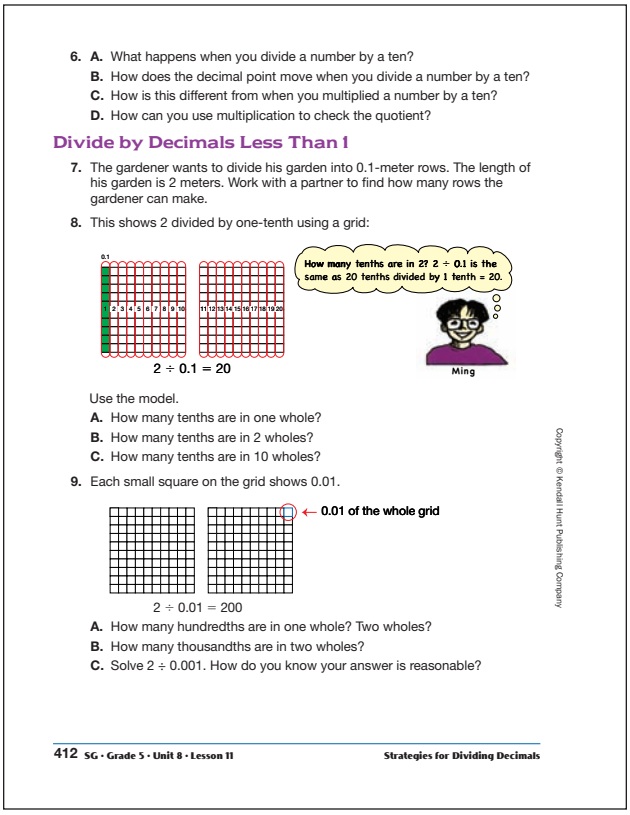
   B.* 20 tenths

   C.* 100 tenths

9. **A.*** 100 hundred hundredths; 200 hundredths

   B.* 2000 thousandths

   C.* 2000; Possible response: Since I know there are 2000 thousandths in 2 flats, I can think 2000 thousandths divided by 1 thousandth, which is 2000. I know that is reasonable because I am trying to find out how many groups of 0.001 are in 2. There will be a lot because one-thousandths are so tiny.



6. **A.** What happens when you divide a number by a ten?
   B. How does the decimal point move when you divide a number by a ten?
   C. How is this different from when you multiplied a number by a ten?
   D. How can you use multiplication to check the quotient?

Divide by Decimals Less Than 1

7. The gardener wants to divide his garden into 0.1-meter rows. The length of his garden is 2 meters. Work with a partner to find how many rows the gardener can make.

8. This shows 2 divided by one-tenth using a grid:

Use the model.
A. How many tenths are in one whole?
B. How many tenths are in 2 wholes?
C. How many tenths are in 10 wholes?

9. Each small square on the grid shows 0.01.

A. How many hundredths are in one whole? Two wholes?
B. How many thousandths are in two wholes?
C. Solve 2 ÷ 0.001. How do you know your answer is reasonable?

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***Answers and/or discussion are included in the lesson.**

Use estimation and patterns to solve the problems. Use a calculator and multiplication to check your answers.

10. **A.** 10 ÷ 1 =
B. 10 ÷ 0.1 =
C. 10 ÷ 0.01 =
D. 10 ÷ 0.001 =
E. 10 ÷ 0.0001 =

11. **A.** 3 ÷ 1 =
B. 3 ÷ 0.1 =
C. 3 ÷ 0.01 =
D. 3 ÷ 0.001 =
E. 3 ÷ 0.0001 =

12. **A.** 10 ÷ 2 =
B. 10 ÷ 0.2 =
C. 10 ÷ 0.02 =
D. 10 ÷ 0.002 =
E. 10 ÷ 0.0002 =

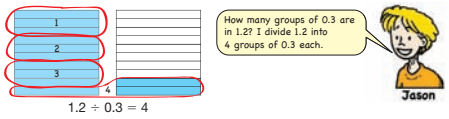
13. **A.** 6 ÷ 2 =
B. 6 ÷ 0.2 =
C. 6 ÷ 0.02 =
D. 6 ÷ 0.002 =
E. 6 ÷ 0.0002 =

14. Can you predict the quotient when you divide a whole number by a decimal less than 1? Will it be more or less than the dividend?

15. **A.** What happens to the quotient when you divide by 0.1, then 0.01, and then 0.001?
B. How is this different from when you divided by 10, 100, and 1000? Why?

Model and Divide

Jason used tenths grids to model 1.2 ÷ 0.3.



1.2 ÷ 0.3 = 4

16. Use base-ten pieces or the tenths grids on the *Grids* page in the *Student Activity Book* to model and solve the division problems.
A. 3.6 ÷ 0.6 =
B. 2.8 ÷ 0.7 =
C. 3 ÷ 0.5 =
D. 3.2 ÷ 0.4 =
E. 2.4 ÷ 0.8 =
F. 1.8 ÷ 0.3 =

17. Julia said, "I know 4 is the same as 40 tenths. It's easier for me to think of 4 ÷ 0.8 as 40 tenths divided by 8 tenths. Then I just think about the fact 40 ÷ 8."
A. Solve 4 ÷ 0.8 Julia's way: 40 tenths ÷ 8 tenths = ?
B. Use base-ten pieces or grids to solve 4 ÷ 0.8. Compare this quotient to your answer in Question A. Does Julia's strategy work?

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10. 10 ÷ 1 = 10
10 ÷ 0.1 = 100
10 ÷ 0.01 = 1000
10 ÷ 0.001 = 10,000
10 ÷ 0.0001 = 100,000

11. 3 ÷ 1 = 3
3 ÷ 0.1 = 30
3 ÷ 0.01 = 300
3 ÷ 0.001 = 3000
3 ÷ 0.0001 = 30,000

12. 10 ÷ 2 = 5
10 ÷ 0.2 = 50
10 ÷ 0.02 = 500
10 ÷ 0.002 = 5000
10 ÷ 0.0002 = 50,000

13. 6 ÷ 2 = 3
6 ÷ 0.2 = 30
6 ÷ 0.02 = 300
6 ÷ 0.002 = 3000
6 ÷ 0.0002 = 30,000

14.* When you divide by a decimal less than 1, the quotient will be more than the dividend.

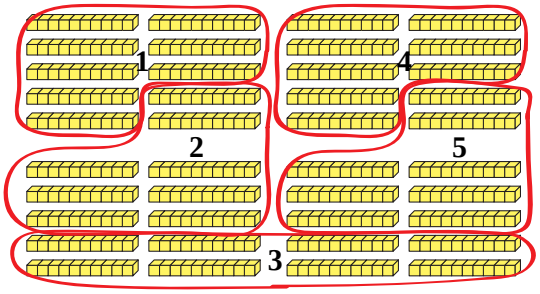
15. **A.*** When you divided by tenths, hundredths, and thousandths, the quotient gets 10 times larger each time.

B.* When you divide by tens, the quotient gets smaller.

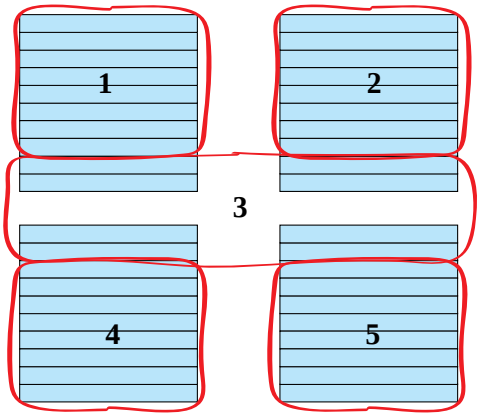
16. **A.** 6 **B.** 4 **C.** 6
D. 8 **E.** 3 **F.** 6

17. **A.** 5

B. Yes, Julie's strategy works. Using base-ten pieces:



Using grids:



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***Answers and/or discussion are included in the lesson.**

18. A. 4

B. 30

C. 4

D. 4

E. 30

F. 7

19. I got the same quotient as Chris.

20. A. 30

B. 30

C. No

D. The quotients are the same.

21. A. 300

B. 300

C. 300

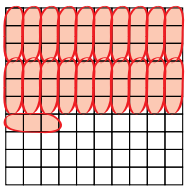
D. All the quotients are the same. Possible response: $(21 \times 100) \div (0.07 \times 100)$ was easiest for me to solve.

D. Yes, $(21 \times 100) \div (0.07 \times 100) = 21 \div 0.07$ is a true statement. The equations on both sides of the equal sign result in 300.

22. Solution strategies will vary. A sample strategy is given for each problem.

A. 5; Thinking about base-ten pieces:
$4.5 \div 0.9 =$
45 tenths ÷ 9 tenths = 5

B. 21; Using hundredths grid:



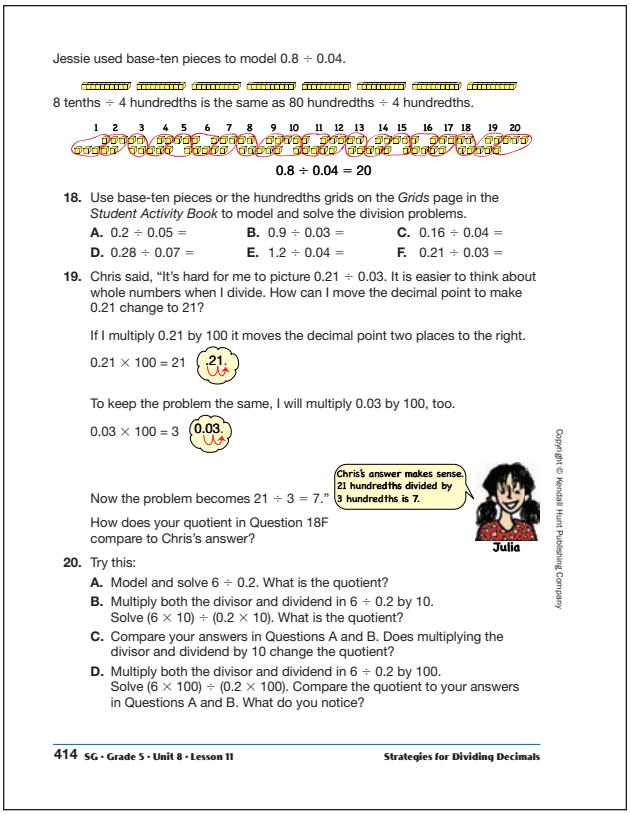
C. 24; I know 0.5 is half. Each whole will have 2 halves, so 12 wholes will have 24 halves.

D. 30; Multiplying both the dividend and divisor by 100:
$(3.6 \times 100) \div (.12 \times 100) =$
$360 \div 12 = 30$

E. 3; 18 hundredths ÷ 6 hundredths = 3

F. 40; Using expanded form:
$1.6 \div 0.04 = (1 + 0.6) \div 0.04$
$=$ (100 hundredths ÷ 4 hundredths) + (60 hundredths ÷ 4 hundredths)
$=25 + 15 = 40$

23. 35 containers



Jessie used base-ten pieces to model 0.8 ÷ 0.04.

8 tenths ÷ 4 hundredths is the same as 80 hundredths ÷ 4 hundredths.

0.8 ÷ 0.04 = 20

18. Use base-ten pieces or the hundredths grids on the *Grids* page in the *Student Activity Book* to model and solve the division problems.

A. 0.2 ÷ 0.05 = **B.** 0.9 ÷ 0.03 = **C.** 0.16 ÷ 0.04 =

D. 0.28 ÷ 0.07 = **E.** 1.2 ÷ 0.04 = **F.** 0.21 ÷ 0.03 =

19. Chris said, "It's hard for me to picture 0.21 ÷ 0.03. It is easier to think about whole numbers when I divide. How can I move the decimal point to make 0.21 change to 21?

If I multiply 0.21 by 100 it moves the decimal point two places to the right.

0.21 × 100 = 21 (21)

To keep the problem the same, I will multiply 0.03 by 100, too.

0.03 × 100 = 3 (0.03)

Chris's answer makes sense. 21 hundredths divided by 3 hundredths is 7.

Julia

Now the problem becomes 21 ÷ 3 = 7."

How does your quotient in Question 18F compare to Chris's answer?

20. Try this:

A. Model and solve 6 ÷ 0.2. What is the quotient?

B. Multiply both the divisor and dividend in 6 ÷ 0.2 by 10. Solve (6 × 10) ÷ (0.2 × 10). What is the quotient?

C. Compare your answers in Questions A and B. Does multiplying the divisor and dividend by 10 change the quotient?

D. Multiply both the divisor and dividend in 6 ÷ 0.2 by 100. Solve (6 × 100) ÷ (0.2 × 100). Compare the quotient to your answers in Questions A and B. What do you notice?

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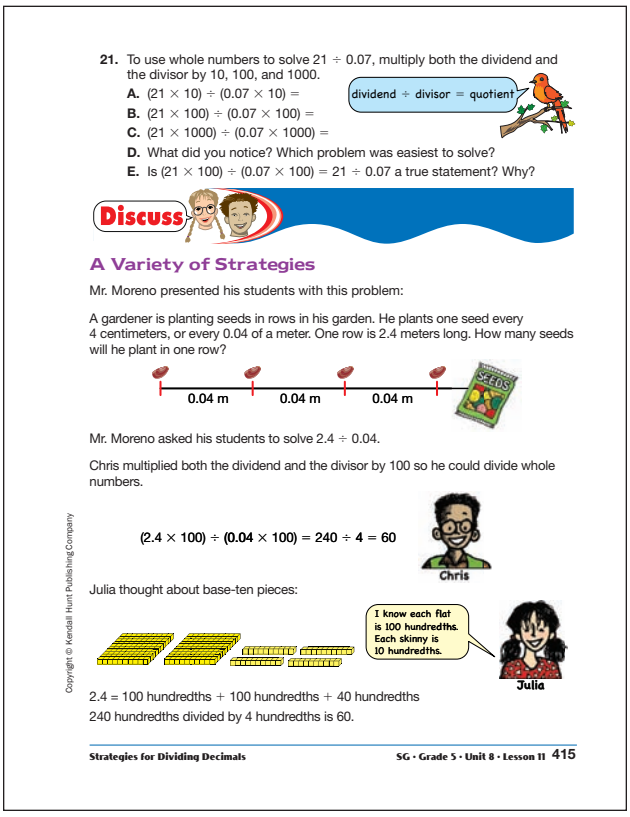

21. To use whole numbers to solve 21 ÷ 0.07, multiply both the dividend and the divisor by 10, 100, and 1000.

dividend ÷ divisor = quotient

A. (21 × 10) ÷ (0.07 × 10) =

B. (21 × 100) ÷ (0.07 × 100) =

C. (21 × 1000) ÷ (0.07 × 1000) =

D. What did you notice? Which problem was easiest to solve?

E. Is (21 × 100) ÷ (0.07 × 100) = 21 ÷ 0.07 a true statement? Why?

Discuss

A Variety of Strategies

Mr. Moreno presented his students with this problem:

A gardener is planting seeds in rows in his garden. He plants one seed every 4 centimeters, or every 0.04 of a meter. One row is 2.4 meters long. How many seeds will he plant in one row?

0.04 m 0.04 m 0.04 m

Mr. Moreno asked his students to solve 2.4 ÷ 0.04.

Chris multiplied both the dividend and the divisor by 100 so he could divide whole numbers.

(2.4 × 100) ÷ (0.04 × 100) = 240 ÷ 4 = 60

Chris

Julia thought about base-ten pieces:

I know each flat is 100 hundredths. Each skinny is 10 hundredths.

Julia

2.4 = 100 hundredths + 100 hundredths + 40 hundredths

240 hundredths divided by 4 hundredths is 60.

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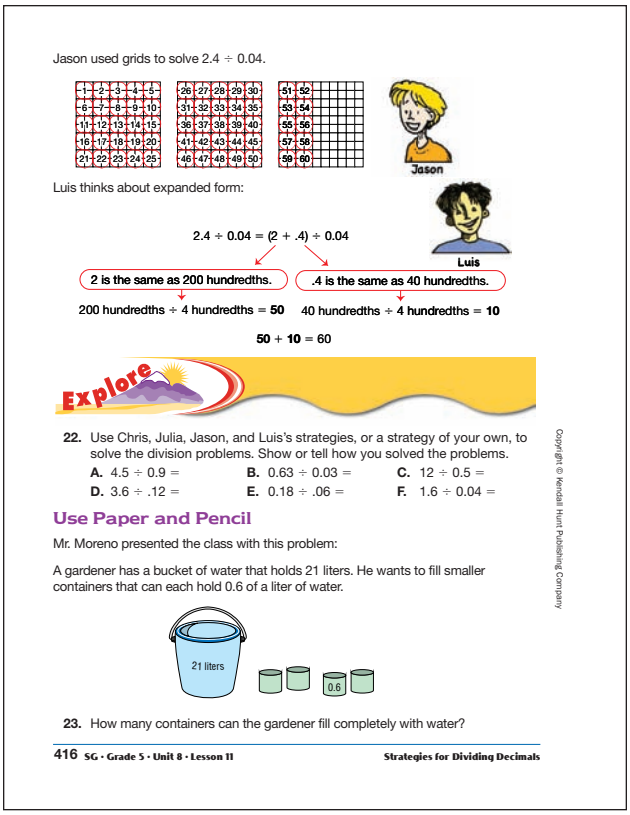

Jason used grids to solve 2.4 ÷ 0.04.

Jason

Luis thinks about expanded form:

Luis

2.4 ÷ 0.04 = (2 + .4) ÷ 0.04

2 is the same as 200 hundredths. .4 is the same as 40 hundredths.

200 hundredths ÷ 4 hundredths = **50** 40 hundredths ÷ 4 hundredths = **10**

50 + **10** = 60

Explore

22. Use Chris, Julia, Jason, and Luis's strategies, or a strategy of your own, to solve the division problems. Show or tell how you solved the problems.

A. 4.5 ÷ 0.9 = **B.** 0.63 ÷ 0.03 = **C.** 12 ÷ 0.5 =
D. 3.6 ÷ .12 = **E.** 0.18 ÷ .06 = **F.** 1.6 ÷ 0.04 =

Use Paper and Pencil

Mr. Moreno presented the class with this problem:

A gardener has a bucket of water that holds 21 liters. He wants to fill smaller containers that can each hold 0.6 of a liter of water.

21 liters

0.6

23. How many containers can the gardener fill completely with water?

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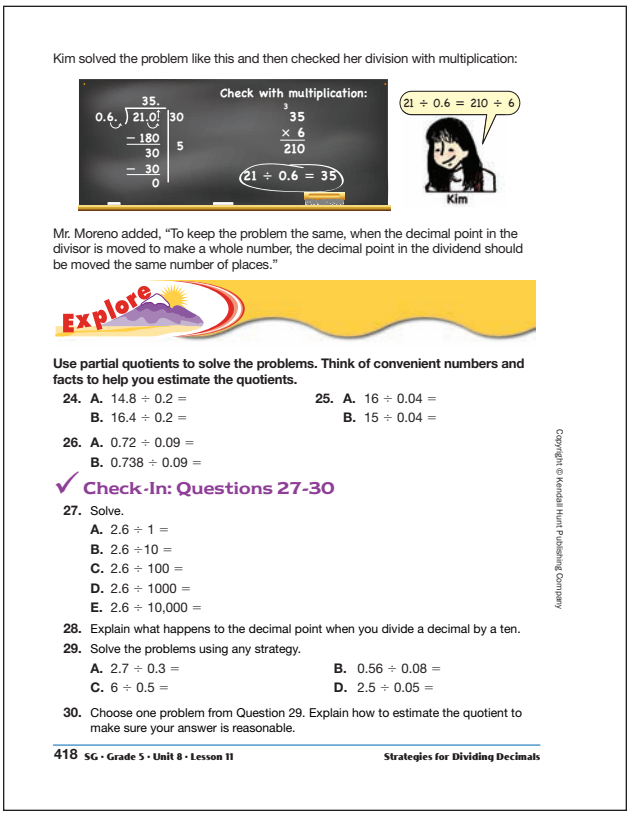

Kim solved the problem like this and then checked her division with multiplication:

Check with multiplication:

Kim

Mr. Moreno added, "To keep the problem the same, when the decimal point in the divisor is moved to make a whole number, the decimal point in the dividend should be moved the same number of places."

Explore

Use partial quotients to solve the problems. Think of convenient numbers and facts to help you estimate the quotients.

24. A. 14.8 ÷ 0.2 = **25. A.** 16 ÷ 0.04 =
B. 16.4 ÷ 0.2 = **B.** 15 ÷ 0.04 =

26. A. 0.72 ÷ 0.09 =
B. 0.738 ÷ 0.09 =

Check-In: Questions 27-30

27. Solve.
A. 2.6 ÷ 1 =
B. 2.6 ÷10 =
C. 2.6 ÷ 100 =
D. 2.6 ÷ 1000 =
E. 2.6 ÷ 10,000 =

28. Explain what happens to the decimal point when you divide a decimal by a ten.

29. Solve the problems using any strategy.
A. 2.7 ÷ 0.3 = **B.** 0.56 ÷ 0.08 =
C. 6 ÷ 0.5 = **D.** 2.5 ÷ 0.05 =

30. Choose one problem from Question 29. Explain how to estimate the quotient to make sure your answer is reasonable.

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24. Possible responses:

A.
$$\begin{array}{r|l} 74. & \\ 0.2.\overline{)14.8!} & 70 \\ -\ 140 & \\ \hline 8 & 4 \\ -\ \ 8 & \\ \hline 0 & \end{array}$$

B.
$$\begin{array}{r|l} 82. & \\ 0.2.\overline{)16.4!} & 80 \\ -\ 160 & \\ \hline 4 & 2 \\ -\ \ 4 & \\ \hline 0 & \end{array}$$

25. A.
$$\begin{array}{r|l} 400. & \\ 0.04.\overline{)16.00!} & 400 \\ -\ 1600 & \\ \hline 0 & \end{array}$$

B.
$$\begin{array}{r|l} 375. & \\ 0.04.\overline{)15.00!} & 300 \\ -\ 1200 & \\ \hline 300 & 50 \\ -\ \ 200 & \\ \hline 100 & 25 \end{array}$$

26. A.
$$\begin{array}{r|l} 8. & \\ 0.09.\overline{)\ .72!} & 8 \\ -\ 72 & \\ \hline 0 & \end{array}$$

B.*
$$\begin{array}{r|l} 8.2 & \\ 0.09.\overline{)0.73!8} & 80 \\ -\ 720 & \\ \hline 18 & 2 \\ -\ \ 18 & \\ \hline 0 & \end{array}$$

27. A. 2.6 ÷ 1 = 2.6
B. 2.6 ÷ 10 = 0.26
C. 2.6 ÷ 100 = 0.026
D. 2.6 ÷ 1000 = 0.0026
E. 2.6 ÷ 10,000 = 0.00026

28. Each time you divide a decimal by ten, the decimal point in the dividend moves one place to the left to make the quotient.

29. A. 9
B. 7
C. 12
D. 50

30. Students' choices of problems to estimate will vary. Sample answer: For Question 29 A, 2.7 ÷ 0.3, 2.7 is about 3 wholes. There are about 3 sets of 0.3 in a whole, so in 3 wholes there would be about 9.

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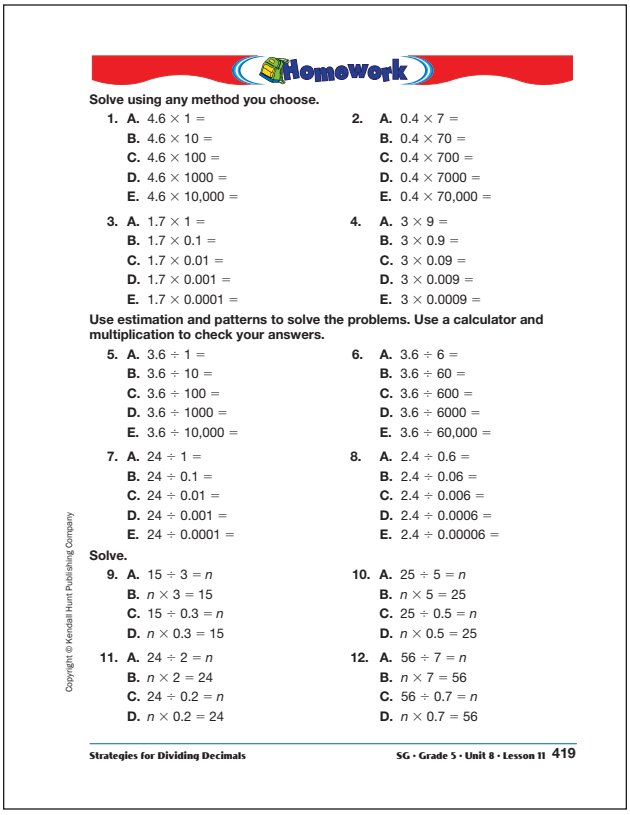
***Answers and/or discussion are included in the lesson.**

Homework (SG p. 419)
Questions 1–12

1. **A.** 4.6 × 1 = 4.6
   B. 4.6 × 10 = 46
   C. 4.6 × 100 = 460
   D. 4.6 × 1000 = 4600
   E. 4.6 × 10,000 = 46,000
2. **A.** 0.4 × 7 = 2.8
   B. 0.4 × 70 = 28
   C. 0.4 × 700 = 280
   D. 0.4 × 7000 = 2800
   E. 0.4 × 70,000 = 28,000
3. **A.** 1.7 × 1 = 1.7
   B. 1.7 × 0.1 = 0.17
   C. 1.7 × 0.01 = 0.017
   D. 1.7 × 0.001 = 0.0017
   E. 1.7 × 0.0001 = 0.00017
4. **A.** 3 × 9 = 27
   B. 3 × 0.9 = 2.7
   C. 3 × 0.09 = 0.27
   D. 3 × 0.009 = 0.027
   E. 3 × 0.0009 = 0.0027
5. **A.** 3.6 ÷1 = 3.6
   B. 3.6 ÷ 10 = .36
   C. 3.6 ÷ 100 = .036
   D. 3.6 ÷ 1000 = .0036
   E. 3.6 ÷ 10,000 = .00036
6. **A.** 3.6 ÷ 6 = .6
   B. 3.6 ÷ 60 = .06
   C. 3.6 ÷ 600 = .006
   D. 3.6 ÷ 6000 = .0006
   E. 3.6 ÷ 60,000 = .00006
7. **A.** 24 ÷ 1 = 24
   B. 24 ÷ 0.1 = 240
   C. 24 ÷ 0.01 = 2400
   D. 24 ÷ 0.001 = 24,000
   E. 24 ÷ 0.0001 = 240,000
8. **A.** 2.4 ÷ 0.6 = 4
   B. 2.4 ÷ 0.06 = 40
   C. 2.4 ÷ 0.006 = 400
   D. 2.4 ÷ 0.0006 = 4000
   E. 2.4 ÷ 0.00006 = 40,000



Homework

Solve using any method you choose.

1. **A.** 4.6 × 1 =
   B. 4.6 × 10 =
   C. 4.6 × 100 =
   D. 4.6 × 1000 =
   E. 4.6 × 10,000 =
2. **A.** 0.4 × 7 =
   B. 0.4 × 70 =
   C. 0.4 × 700 =
   D. 0.4 × 7000 =
   E. 0.4 × 70,000 =
3. **A.** 1.7 × 1 =
   B. 1.7 × 0.1 =
   C. 1.7 × 0.01 =
   D. 1.7 × 0.001 =
   E. 1.7 × 0.0001 =
4. **A.** 3 × 9 =
   B. 3 × 0.9 =
   C. 3 × 0.09 =
   D. 3 × 0.009 =
   E. 3 × 0.0009 =

Use estimation and patterns to solve the problems. Use a calculator and multiplication to check your answers.

5. **A.** 3.6 ÷ 1 =
   B. 3.6 ÷ 10 =
   C. 3.6 ÷ 100 =
   D. 3.6 ÷ 1000 =
   E. 3.6 ÷ 10,000 =
6. **A.** 3.6 ÷ 6 =
   B. 3.6 ÷ 60 =
   C. 3.6 ÷ 600 =
   D. 3.6 ÷ 6000 =
   E. 3.6 ÷ 60,000 =
7. **A.** 24 ÷ 1 =
   B. 24 ÷ 0.1 =
   C. 24 ÷ 0.01 =
   D. 24 ÷ 0.001 =
   E. 24 ÷ 0.0001 =
8. **A.** 2.4 ÷ 0.6 =
   B. 2.4 ÷ 0.06 =
   C. 2.4 ÷ 0.006 =
   D. 2.4 ÷ 0.0006 =
   E. 2.4 ÷ 0.00006 =

Solve.

9. **A.** 15 ÷ 3 = *n*
   B. *n* × 3 = 15
   C. 15 ÷ 0.3 = *n*
   D. *n* × 0.3 = 15
10. **A.** 25 ÷ 5 = *n*
    B. *n* × 5 = 25
    C. 25 ÷ 0.5 = *n*
    D. *n* × 0.5 = 25
11. **A.** 24 ÷ 2 = *n*
    B. *n* × 2 = 24
    C. 24 ÷ 0.2 = *n*
    D. *n* × 0.2 = 24
12. **A.** 56 ÷ 7 = *n*
    B. *n* × 7 = 56
    C. 56 ÷ 0.7 = *n*
    D. *n* × 0.7 = 56

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9. **A.** 15 ÷ 3 = **5**
   B. **5** × 3 = 15
   C. 15 ÷ 0.3 = **50**
   D. **50** × 0.3 = 15
10. **A.** 25 ÷ 5 = **5**
    B. **5** × 5 = 25
    C. 25 ÷ 0.5 = **50**
    D. **50** × 0.5 = 25
11. **A.** 24 ÷ 2 = **12**
    B. **12** × 2 = 24
    C. 24 ÷ 0.2 = **120**
    D. **120** × 0.2 = 24
12. **A.** 56 ÷ 7 = **8**
    B. **8** × 7 = 56
    C. 56 ÷ 0.7 = **80**
    D. **80** × 0.7 = 56

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