1. After 10 weeks, how much will Jordan have earned?

2. What happens to each $1-bill when it is multiplied by 10?

3. What happens to each other bill when it is multiplied by 10?

4. When you multiply by 10, does each digit shift to the right or left?

5. How many places does each digit shift?
6. After 100 weeks, how much will Jordan have earned?

7. What happens to each $1-bill when it is multiplied by 100?

8. What happens to each digit when it is multiplied by 100?

9. When you multiply by 100, does each digit shift to the right or left?

10. How many places does each digit shift?

11. After 1,000 weeks, how much will Jordan have earned?

12. What happens to each $1-bill when it is multiplied by 1,000?

13. What happens to each digit when it is multiplied by 1,000?

14. When you multiply by 1,000, does each digit shift to the right or left?

15. How many places does each digit shift?
See the Shift in Motion

Isabel earns $325 a week. Three students can show how the digits shift at the board when we multiply her earnings.

Complete each exercise.

16. Suppose Isabel works for 10 weeks. Find her earnings.

\[
\begin{array}{c}
\underline{3} \quad \underline{2} \quad \underline{5} \\
\times 10 \\
\end{array}
\]

$325 shifts ___ place(s) to the ___. It gets 10 times as great.

17. Suppose Isabel works for 100 weeks. Find her earnings.

\[
\begin{array}{c}
\underline{3} \quad \underline{2} \quad \underline{5} \\
\times 100 \\
\end{array}
\]

$325 shifts ___ places to the ___. It gets 100 times as great.

18. Suppose Isabel works for 1,000 weeks. Find her earnings.

\[
\begin{array}{c}
\underline{3} \quad \underline{2} \quad \underline{5} \\
\times 1,000 \\
\end{array}
\]

$325 shifts ______ places to the ___. It gets 1,000 times as great.

Complete each exercise.

19. \(567 \times 10 = \) ______

20. \(38 \times 1,000 = \) ______

21. \(912 \times 100 = \) ______

22. \(700 \times 10 = \) ______

23. The Skyway Express train travels about 800 miles a day. How far does it travel in 10 days?

24. If there are 30 days in April, about how far will the train travel during the month of April?
4–1
Class Activity

Shifts With Decimal Amounts

It costs $0.412 (41 and 2/10 cents) for a factory to make a Red Phantom marble. The money is shown here.

Answer each question about the cost of making different numbers of Red Phantom marbles.

25. How much does it cost to make 10 Red Phantom Marbles?

26. What happens to each coin when it is multiplied by 10?

27. What happens to each digit?

28. When you multiply by 10, does each digit shift to the right or left?

29. How many places does each digit shift?
30. How much does it cost to make 100 Red Phantom Marbles?

31. What happens to each coin when you multiply by 100?

32. What happens to each digit?

33. When you multiply by 100, does each digit shift to the right or left?

34. How many places does each digit shift?

35. How much does it cost to make 1,000 Red Phantom Marbles?

36. What happens to each coin when you multiply by 1,000?

37. What happens to each digit?

38. When you multiply by 1,000, does each digit shift to the right or left?

39. How many places does each digit shift?
Patterns in Multiplying With Zeros

Discuss patterns you see across each row and down each column. Then state the Big Idea for multiplying numbers with zeros.

<table>
<thead>
<tr>
<th>×</th>
<th>3</th>
<th>30</th>
<th>300</th>
<th>3,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 × 3 = 6</td>
<td>2 × 30 = 6 × 10 = 60</td>
<td>2 × 300 = 6 × 100 = 600</td>
<td>2 × 3,000 = 6 × 1,000 = 6,000</td>
</tr>
<tr>
<td>20</td>
<td>20 × 3 = 2 × 10 × 3 = 6 × 10 = 60</td>
<td>20 × 30 = 2 × 10 × 3 × 10 = 600</td>
<td>20 × 300 = 2 × 10 × 3 × 100 = 6,000</td>
<td>20 × 3,000 = 2 × 10 × 3 × 1,000 = 60,000</td>
</tr>
<tr>
<td>200</td>
<td>200 × 3 = 2 × 100 × 3 = 6 × 100 = 600</td>
<td>200 × 30 = 2 × 100 × 3 × 10 = 6,000</td>
<td>200 × 300 = 2 × 100 × 3 × 100 = 60,000</td>
<td>200 × 3,000 = 2 × 100 × 3 × 1,000 = 600,000</td>
</tr>
<tr>
<td>2,000</td>
<td>2,000 × 3 = 2 × 1,000 × 3 = 6 × 1,000 = 6,000</td>
<td>2,000 × 30 = 2 × 1,000 × 3 × 10 = 60,000</td>
<td>2,000 × 300 = 2 × 1,000 × 3 × 100 = 600,000</td>
<td>2,000 × 3,000 = 2 × 1,000 × 3 × 1,000 = 6,000,000</td>
</tr>
</tbody>
</table>

40. Big Idea: ____________________________

Solve.

41. 60 × 3 = 180
42. 60 × 30 = 1,800
43. 600 × 30 = 18,000
44. 600 × 300 = 180,000
45. 6,000 × 30 = 180,000
Dear Family,

Your child worked with multiplication and division problems in Unit 1. Unit 4 of *Math Expressions* guides students as they deepen and extend their mastery of these operations. The main goal of this unit is to enhance skills in multiplying and dividing with whole numbers and decimal numbers. Some additional goals are:

- to solve real-world application problems,
- to use patterns as an aid in calculating,
- to use estimation to check the reasonableness of answers,
- to understand how to convert fractions to decimals, and
- to interpret remainders.

Your child will learn and practice techniques such as Rectangle Sections, Expanded Notation, and Shift Patterns to gain speed and accuracy in multi-digit and decimal multiplication and division. Money examples will be used in multiplication and division with decimals.

Your child will learn to round and estimate, and then adjust the estimated number. Remainders will be interpreted in real-world contexts, and expressed as fractions or decimals. Students will divide by decimal numbers, and learn to distinguish between multiplication and division when there are decimal numbers.

Throughout Unit 4, your child will solve real-world application problems that require multi-digit multiplication and division. Your child may need more work with the multiplication table, so please support practice with the Target and Multiplication Tables and Division Cards.

If you have any questions, please call or write to me.

Sincerely,

Your Child’s Teacher
Estimada familia:

Su niño ya ha estudiado problemas de multiplicación y división en años anteriores. La Unidad 4 de Math Expressions guía a los estudiantes mientras profundizan y amplían su dominio de estas operaciones. El objetivo principal de la unidad es reforzar las destrezas de multiplicación y división con números enteros y decimales. Algunos objetivos adicionales son:

- resolver problemas con aplicaciones a la vida diaria,
- usar patrones de ayuda para hacer cálculos,
- usar la estimación para comprobar si las respuestas son razonables,
- comprender cómo se convierten las fracciones a decimales, e
- interpretar los residuos.

Su niño aprenderá y practicará técnicas como secciones de rectángulos, notación extendida y patrones de desplazamiento para poder hacer las multiplicaciones y divisiones de números de varios dígitos y decimales con mayor rapidez y exactitud. En las multiplicaciones y divisiones con decimales se usará dinero.

Su niño aprenderá a redondear y estimar, y luego a ajustar el número estimado. Los residuos se interpretarán dentro de contextos de la vida diaria y se expresarán como fracciones o decimales. Los estudiantes dividirán por números decimales y aprenderán a distinguir entre la multiplicación y la división con números decimales.

En la Unidad 4 su niño resolverá problemas con aplicaciones a la vida diaria que requieren multiplicación y división de números de varios dígitos. Tal vez su niño necesite más práctica con la tabla de multiplicar. Por favor apoye a su niño con la práctica de las tablas de multiplicar y las tarjetas de divisiones.

Si tiene alguna duda o comentario, por favor comuníquese conmigo.

Atentamente,
El maestro su niño
Solve With Rectangle Sections

Think about finding the area of this rectangle \((\text{Area} = \text{length} \times \text{width})\). It would be difficult to find \(43 \times 67\) in one step. But if you broke the rectangle into smaller \textbf{Rectangle Sections}, then you could do it.

When you multiply larger numbers, you often need to break the problem into smaller parts. The products of these smaller parts are called \textbf{partial products}. After you find all the partial products, you can add them together.

1. Explain how Rectangle Sections are used to solve the problem below.

\[
\begin{array}{|c|c|c|}
\hline
43 & 60 & 7 \\
\hline
40 & 60 & 2,400 \\
\hline
3 & 60 & 180 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|}
\hline
40 & 7 & 280 \\
\hline
3 & 7 & 21 \\
\hline
\end{array}
\]

\[
40 \times 60 = 2,400 \\
40 \times 7 = 280 \\
3 \times 60 = 180 \\
3 \times 7 = 21 \\
\]

2. Use Rectangle Sections to solve the multiplication problem below.

\[
\begin{array}{|c|c|c|}
\hline
39 & 54 \\
\hline
\end{array}
\]
Look at the Expanded Notation method of solving below. Diagrams A and B both show the Expanded Notation method. Diagram B only shows the results of the steps.

3. How is this method like the Rectangle Sections? How is it different?

\[
\begin{array}{c}
43 \times 67 \\
A \\
43 = 40 + 3 \\
\times 67 = 60 + 7 \\
40 \times 60 = 2,400 \\
3 \times 60 = 180 \\
7 \times 40 = 280 \\
7 \times 3 = 21 \\
\hline
2,881
\end{array}
\]
\[
\begin{array}{c}
B \\
\times 67 \\
2,400 \\
180 \\
280 \\
21 \\
\hline
2,881
\end{array}
\]

4. This rectangle shows the same problem. Can you relate the rectangle sections (a, b, c, d) to the 4 partial products shown in the Expanded Notation method above? Draw a line connecting each rectangle section to the partial product it shows.

Solve. Use any method you like.

5. There are 32 cattle cars on today’s train to Detroit. Each car holds 28 cows. How many cows are on the train?

6. Maria jogs 21 miles every week. If there are 52 weeks in a year, how many miles does Maria jog in a year?
Methods for Two-Digit Multiplication

Look at the multiplication problem shown here. It is solved with another rectangle method called Rectangle Rows.

1. Explain the steps of the Rectangle Rows method.

2. How is the Rectangle Rows method alike and different from the Rectangle Sections method you used yesterday?

Use the Rectangle Rows method to solve each problem.

3. $28 \times 34$

4. $59 \times 73$
Here, $43 \times 67$ is solved with a method we call the **Short Cut**.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2$</td>
<td>$67$</td>
<td>$2$</td>
<td>$67$</td>
<td>$2$</td>
</tr>
<tr>
<td></td>
<td>$67$</td>
<td>$67$</td>
<td>$67$</td>
<td>$67$</td>
</tr>
<tr>
<td>$\times 43$</td>
<td>$\times 43$</td>
<td>$\times 43$</td>
<td>$\times 43$</td>
<td>$\times 43$</td>
</tr>
<tr>
<td>$1$</td>
<td>$201$</td>
<td>$201$</td>
<td>$0$</td>
<td>$201$</td>
</tr>
<tr>
<td></td>
<td>$2,680$</td>
<td>$2,680$</td>
<td>$2,881$</td>
<td>$2,881$</td>
</tr>
</tbody>
</table>

5. Explain the different steps of this method.

6. Why do we begin Step 3 by putting a zero in the ones place?

7. How is the Short Cut method like the Rectangle Rows method? How is it different?
Discuss Multiplication Methods

Below are the four multiplication methods your class has tried. Discuss these questions about the methods.

8. How do the 4 partial products in the two top methods relate to the 2 partial products in the two bottom methods?

9. For the Short Cut method, one way starts with the tens and one way starts with the ones. Could we do the other methods by starting with the ones? Explain why or why not.

Rectangle Sections

<table>
<thead>
<tr>
<th>43 \times 67</th>
<th>60</th>
<th>+7</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 \times 60 = 2400</td>
<td>40 \times 7 = 280</td>
<td></td>
</tr>
<tr>
<td>3 \times 60 = 180</td>
<td>3 \times 7 = 21</td>
<td></td>
</tr>
</tbody>
</table>

Expanded Notation

\[
\begin{align*}
67 &= 60 + 7 \\
43 &= 40 + 3 \\
40 \times 60 &= 2,400 \\
40 \times 7 &= 280 \\
3 \times 60 &= 180 \\
3 \times 7 &= 21 \\
2,881 &= 2,680 + 201 \\
\end{align*}
\]

Rectangle Rows

<table>
<thead>
<tr>
<th>43 \times 67</th>
<th>67</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 \times 67</td>
<td>2 \times 43</td>
</tr>
<tr>
<td>\times 40</td>
<td>\times 43</td>
</tr>
<tr>
<td>2,680</td>
<td>2,680</td>
</tr>
<tr>
<td>+201</td>
<td>+201</td>
</tr>
<tr>
<td>2,881</td>
<td>2,881</td>
</tr>
</tbody>
</table>

Short Cut

Multiply by Tens First

\[
\begin{align*}
67 \times 40 &= 2,680 \\
+201 &= 2,881 \\
\end{align*}
\]

Multiply by Ones First

\[
\begin{align*}
67 \times 2 &= 134 \\
3 \times 43 &= 129 \\
+201 &= 2,881 \\
\end{align*}
\]

Solve.

10. \[ 94 \times 36 \]
11. \[ 73 \times 45 \]
12. \[ 69 \times 82 \]
13. \[ 58 \times 70 \]
Work Backward

Some problems are easiest to solve if you work backward.

Suppose you want to solve this problem: Julian has 5 times as many baseball cards as Carla. Carla has 8 times as many cards as Pete. Pete has 6 cards. How many cards does Julian have?

Answer these questions to solve the problem by working backward.

1. How many cards does Pete have?

2. Carla has 8 times as many cards as Pete. How many cards does Carla have?

3. Julian has 5 times as many cards as Carla. How many cards does Julian have?

4. Look back and check. Write the steps of your check.

Work backward to solve each problem.

5. Barbara spent half of her money at the mall. Then she spent half of what was left at the video store. She had $37 when she came home. How much money did Barbara have when she started at the mall?

6. Paul gave Brenda one third of his pretzels. Brenda shared her pretzels equally with Edwin. Edwin had 40 pretzels. How many pretzels did Paul have before he gave Brenda the pretzels?

7. A number is multiplied by 12 and then that result is doubled. The final result is 288. What is the number?

8. You multiply a number by 10 and then divide the result by 5. The final result is 90. Find the starting number.
Multiply Three-Digit Numbers

1. Below are the four multiplication methods your class has tried. Discuss advantages and disadvantages of each method. Which methods seem better for these problems with larger numbers? Why?

---

**Rectangle Sections**

![Rectangle Sections Diagram]

**Expanded Notation**

\[
967 = 900 + 60 + 7
\]

\[
\begin{align*}
200 & \times 900 = 180,000 \\
200 & \times 60 = 12,000 \\
200 & \times 7 = 1,400 \\
40 & \times 900 = 36,000 \\
40 & \times 60 = 2,400 \\
40 & \times 7 = 280 \\
3 & \times 900 = 2,700 \\
3 & \times 60 = 180 \\
3 & \times 7 = 21 \\
\hline
\end{align*}
\]

\[
234,981
\]

---

**Rectangle Rows**

![Rectangle Rows Diagram]

**Short Cut**

Multiply by Hundreds First

\[
\begin{align*}
967 & \times 200 \\
\hline
193,400 \\
\end{align*}
\]

Multiply by Ones First

\[
\begin{align*}
967 & \times 243 \\
\hline
193,400 \\
38,680 \\
+ 2,901 \\
\hline
234,981 \\
\end{align*}
\]

or

\[
\begin{align*}
967 & \times 243 \\
\hline
193,400 \\
38,680 \\
+ 2,901 \\
\hline
234,981 \\
\end{align*}
\]

---

Multiply With Larger Numbers 251
Word Problems With Large Numbers

Two scientists went to Egypt to measure some of the ancient monuments there. Help them figure out the information they need to know.

Solve.

2. The Sphinx is a huge statue with the body of a lion and the head of a human. It was built thousands of years ago and still sits in the middle of the desert. The Sphinx is about 80 yards long. If there are 3 feet in a yard, how long is the Sphinx in feet?

3. The base of the Great Pyramid is a square about 150 feet on each side. How many square feet of ground does it cover?

4. Some of the blocks used to build the pyramids weigh up to 14 tons. If a ton is equal to 2,000 pounds, how much does one of these large blocks weigh in pounds?

5. If we include the end zones, a football field is 360 feet by 160 feet. What is the area of a football field in square feet?

6. The largest Egyptian pyramid covers an area as large as 10 football fields. What area is covered by the largest Egyptian pyramid?

7. The scientists stayed in Egypt for a year and traveled about 145 miles each day. If there are 365 days in a year, how far did they travel that year?
Patterns With Fives

1. Write an answer to the Puzzled Penguin.

Dear Math Students:
I know that when you multiply two numbers together, the product has the same number of zeros as the two factors. For example, $60 \times 20$ is 1,200. There are two zeros in the factors (60 and 20) and two zeros in the product (1,200).

I am confused about one thing. I know that $50 \times 2$ is 100, and I am quite sure that $50 \times 4$ is 200. In these two problems, there is only one zero in the factors, but there are two zeros in the product. The pattern I learned does not seem to be true in these cases.

Did I make a mistake somewhere?

Thank you.

Puzzled Penguin

2. Find each product to complete the chart below. One factor in each problem contains a 5. Discuss the patterns you see for the number of zeros in each product. How does the number of zeros in the product relate to the number of zeros in the factors?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$5 \times 20$</td>
<td>$5 \times 2 \times 10$</td>
<td>$10 \times 10$</td>
<td></td>
</tr>
<tr>
<td>$50 \times 40$</td>
<td>$5 \times 10 \times 4 \times 10$</td>
<td>$20 \times 100$</td>
<td></td>
</tr>
<tr>
<td>$50 \times 600$</td>
<td>$5 \times 10 \times 6 \times 100$</td>
<td>$30 \times 1,000$</td>
<td></td>
</tr>
<tr>
<td>$500 \times 800$</td>
<td>$5 \times 100 \times 8 \times 100$</td>
<td>$40 \times 10,000$</td>
<td></td>
</tr>
</tbody>
</table>
3. Find each product to complete the chart below. Again, one factor in each problem contains a 5. How does the number of zeros in the product relate to the number of zeros in the factors?

<table>
<thead>
<tr>
<th>Product</th>
<th>Equation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5 \times 30$</td>
<td>$5 \times 3 \times 10$</td>
<td>$15 \times 10$</td>
</tr>
<tr>
<td>$50 \times 50$</td>
<td>$5 \times 10 \times 5 \times 10$</td>
<td>$25 \times 100$</td>
</tr>
<tr>
<td>$50 \times 700$</td>
<td>$5 \times 10 \times 7 \times 100$</td>
<td>$35 \times 1,000$</td>
</tr>
<tr>
<td>$500 \times 900$</td>
<td>$5 \times 100 \times 9 \times 100$</td>
<td>$45 \times 10,000$</td>
</tr>
</tbody>
</table>

4. Explain why the product sometimes has an “extra” zero.

- **Solve Fives-Pattern Problems**

Decide how many zeros there will be. Then solve.

<table>
<thead>
<tr>
<th>Product</th>
<th>Equation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$80 \times 5$</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$70 \times 5$</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>$90 \times 50$</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>$60 \times 50$</td>
<td></td>
</tr>
</tbody>
</table>

Solve.

9. Ernesto and his sister Dora are playing a computer game. Ernesto has earned 236 points so far. His sister has earned 50 times as many points. How many points has Dora earned?

- **10. Mount Whitney is the tallest mountain in the lower 48 states of the United States. It is about 14,500 feet tall. Mount Everest is the tallest mountain in the world. It is twice as tall as Mount Whitney. About how tall is Mount Everest?**
Computation Practice

Multiply. Use a separate sheet of paper or work on your MathBoard.

1. \[35 \times 90\]
2. \[74 \times 40\]
3. \[67 \times 41\]
4. \[18 \times 72\]
5. \[82 \times 76\]
6. \[96 \times 43\]
7. \[153 \times 79\]
8. \[216 \times 74\]
9. \[653 \times 89\]
10. \[584 \times 75\]
11. \[213 \times 479\]
12. \[406 \times 124\]

Practice With Word Problems

Solve.

13. The planet Mercury has a diameter of 3,100 miles. Neptune’s diameter is 10 times Mercury’s diameter. What is Neptune’s diameter?

14. A movie theater has 16 rows of seats, with 36 seats in each row. What is the total number of seats in the theater?

15. A large package of toothpicks contains 425 toothpicks. If Kerry buys 24 packages, how many toothpicks will she have?

16. Paolo’s car can travel 285 miles on each tank of gasoline. How many miles can the car travel on 20 tanks of gasoline?

17. Farmer Ruben’s rectangular wheat field is 789 meters by 854 meters. What is the area of this wheat field?
Estimate Products

You can estimate to check if an answer is reasonable or to see when an exact answer is not needed. You estimate to find about how many or about how much.

Carrie wants to estimate $411 \times 87$. She rounds each factor to its greatest place and then multiplies. $411 \times 87$ is about 36,000.

Estimate each product.

1. $68 \times 41$
2. $62 \times 619$
3. $57 \times 829$
4. $309 \times 513$

Sometimes you need to overestimate to be sure you have enough.

Mr. Poy is planning a trip for 64 students. The cost will be $19 per student. To be sure he allows enough money in the budget, he overestimates. He rounds each factor up and then multiplies. By overestimating, he knows that $1,400 is more than he needs.

Solve. Decide whether to estimate, overestimate, or find the exact answer.

5. There are 21 crates of oranges. Each crate weighs 195 pounds. About how many pounds of oranges are there?

6. Akule’s family uses an average of 597 gallons of water per day. About how many gallons will they use in one month?

7. Ms. Long has 12,000 cans of juice. There are 543 students, and there are 18 school days in May. Is there enough for every student to get one can of juice each school day in May? Explain.

8. Erin is making programs for a play. Each program has 9 sheets of paper. Last year, 445 programs were used. Erin wants to overestimate to be sure she has enough paper. How many sheets of paper should she order?
Decimals in Money Situations

The Ruiz children had a yard sale. They sold some old toys. They made a table to show how many toys they sold and how much money they earned.

<table>
<thead>
<tr>
<th>toy</th>
<th>price</th>
<th>calculation</th>
<th>amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>jump ropes</td>
<td>9 cents</td>
<td>$0.09 \times 3 = 27 cents</td>
<td>$0.27</td>
</tr>
<tr>
<td>marbles</td>
<td>2 cents</td>
<td>$0.02 \times 4 = 8 cents</td>
<td>$0.08</td>
</tr>
<tr>
<td>toy cars</td>
<td>12 cents</td>
<td>$0.12 \times 6 = 72 cents</td>
<td>$0.72</td>
</tr>
<tr>
<td>puzzles</td>
<td>30 cents</td>
<td>$0.30 \times 5 = 150 cents</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

1. How did they know the number of decimal places in each product?

2. How much money did they earn?

Mia saves the change from her lunch money each day. She gets $0.34 in change, and she has been saving it for 26 days. Mia used the steps below to find how much money she has saved so far.

**Step 1** Multiply by the number in the ones place (6).

\[
6 \times 0.04 = 6 \times 4 \text{ cents} = 24 \text{ cents} = 0.24 \\
6 \times 0.30 = 6 \times 30 \text{ cents} = 180 \text{ cents} = 1.80 
\]

**Step 2** Multiply by the number in the tens place (2 tens = 20).

\[
20 \times 0.04 = 20 \times 4 \text{ cents} = 80 \text{ cents} = 0.80 \\
20 \times 0.30 = 20 \times 30 \text{ cents} = 60 \text{ dimes} = 6.00 
\]

**Step 3** Add the partial products.

\[8.84\]

3. How many decimal places are there in the decimal factor (0.34)?
   How many decimal places are there in the answer?

UNIT 4 LESSON 7

Multiply Decimals by Whole Numbers 257
A bead factory spends $0.346 to make each crystal bead. The steps below show how Antonio finds the total amount the factory spends to make 222 crystal beads.

\[
\begin{align*}
\text{Step 1} & : \text{Multiply by the number in the ones place.} \quad 2 \times 0.346 = 0.692 \\
\text{Step 2} & : \text{Multiply by the number in the tens place.} \quad (2 \text{ tens } = 20; 0.692 \text{ shifts 1 place left.}) \quad 20 \times 0.346 = 6.920 \\
\text{Step 3} & : \text{Multiply by the number in the hundreds place.} \quad (2 \text{ hundreds } = 200; 0.692 \text{ shifts 2 places left.}) \quad 200 \times 0.346 = 69.200 \\
\text{Step 4} & : \text{Add the partial products.} \quad 0.692 + 6.920 + 69.200 = 76.812
\end{align*}
\]

4. How many decimal places are there in the decimal factor (0.346)? How many decimal places are there in the answer?

5. Describe the relationship between the number of decimal places you have seen in a decimal product and the number of decimal places in its decimal factor.

### Decimals in Other Situations

6. The owners of the Seven Seas Spice Company want to sell twice as much spice in the future as they do now. The table shows how much spice they sell in a week now and how much they want to sell in the future. Explain how to get the answers by adding.

<table>
<thead>
<tr>
<th>Spice</th>
<th>Now</th>
<th>Future</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloves</td>
<td>0.3 ton</td>
<td>0.6 ton</td>
<td>because 0.3 + 0.3 = 0.6</td>
</tr>
<tr>
<td>Cinnamon</td>
<td>0.004 ton</td>
<td>0.008 ton</td>
<td>because 0.004 + _____ = _____</td>
</tr>
<tr>
<td>Ginger</td>
<td>0.007 ton</td>
<td>0.014 ton</td>
<td>because _____ + _____ = _____</td>
</tr>
<tr>
<td>Pepper</td>
<td>0.6 ton</td>
<td>1.2 tons</td>
<td>because _____ + _____ = _____</td>
</tr>
</tbody>
</table>

7. Look at the number of decimal places in each decimal factor and the number of decimal places in each product. What pattern do you see?

8. Is this the same pattern you saw in problems 1–4?
Multiply With Decimals

Look at the patterns you have developed in exercises 1–8.

9. State the Big Idea for multiplying a whole number times a decimal number.

Find each product.

10. \(0.8 \times 6\)  
11. \(0.3 \times 40\)  
12. \(0.005 \times 9\)  
13. \(0.14 \times 32\)  
14. \(0.43 \times 64\)

Solve.

15. Jesse bought 3 aquariums. Each holds 8.75 gallons of water. How many gallons of water will they hold altogether?

16. Jesse wants to buy 24 angelfish. Each angelfish costs $2.35. What will be the total cost of the angelfish?

17. There are three goldfish in one of Jesse’s aquariums. Gus is the smallest. He weighs only 0.98 ounce. Ella weighs 3 times as much as Gus. What is Ella’s weight?

18. Otto weighs 7 times as much as Gus. What is Otto’s weight?
Zero Patterns in Decimal Places

You have seen patterns in multiplying by multiples of 10. You have seen patterns in multiplying by decimals. You can use these two patterns together. The table below shows how you can multiply decimals by whole numbers, using:

• ones, tens, and hundreds
• tenths, hundredths, and thousandths

<table>
<thead>
<tr>
<th>x</th>
<th>0.3</th>
<th>0.03</th>
<th>0.003</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 \times 0.3 = 2 \times 3 \times 0.1 = 6 \times 0.1 = 0.6</td>
<td>2 \times 0.03 = 2 \times 3 \times 0.01 = 6 \times 0.01 = 0.06</td>
<td>2 \times 0.003 = 2 \times 3 \times 0.001 = 6 \times 0.001 = 0.006</td>
</tr>
<tr>
<td>20</td>
<td>20 \times 0.3 = 2 \times 10 \times 3 \times 0.1 = 60 \times 0.1 = 6.0</td>
<td>20 \times 0.03 = 2 \times 10 \times 3 \times 0.01 = 60 \times 0.01 = 0.60</td>
<td>20 \times 0.003 = 2 \times 10 \times 3 \times 0.001 = 60 \times 0.001 = 0.060</td>
</tr>
<tr>
<td>200</td>
<td>200 \times 0.3 = 2 \times 100 \times 3 \times 0.1 = 600 \times 0.1 = 60.0</td>
<td>200 \times 0.03 = 2 \times 100 \times 3 \times 0.01 = 600 \times 0.01 = 6.00</td>
<td>200 \times 0.003 = 2 \times 100 \times 3 \times 0.001 = 600 \times 0.001 = 0.600</td>
</tr>
</tbody>
</table>

Find each product using the method shown in the table above.

1. \(4 \times 0.2 = \) 
2. \(5 \times 0.6 = \) 
3. \(40 \times 0.07 = \) 
4. \(300 \times 0.3 = \) 
5. \(200 \times 0.08 = \)
Shifts With Decimals

Leon earns $213 a month. The money is shown here. He will save some of it every month.

Answer the questions about the different savings plans.

1. If he saves 0.1 of his earnings, how much will he save each month?

2. What happens to each bill?

3. What happens to each digit?

4. When you multiply by 0.1, does each digit shift to the right or left?

5. How many places does each digit shift?
6. If he saves 0.01 of his earnings, how much will he save each month?

7. What happens to each bill?

8. What happens to each digit?

9. When you multiply by 0.01, does each digit shift to the right or left?

10. How many places does each digit shift?

11. If he saves 0.001 of his earnings, how much will he save each month?

12. What happens to each bill?

13. What happens to each digit?

14. When you multiply by 0.001, does each digit shift to the right or left?

15. How many places does each digit shift?
See the Shift in Motion

Marla earns $324 a month. She will save some of her money every month. Three students can show how the digits shift at the board.

Complete each exercise.

16. Suppose Marla saves 0.1 of $324 every month.

\[
\begin{array}{c}
324 \times 0.1 = 32.4
\end{array}
\]

$324 shifts ______ place(s) to the _______. It becomes _______ as much.

17. Suppose Marla saves 0.01 of $324 every month.

\[
\begin{array}{c}
324 \times 0.01 = 3.24
\end{array}
\]

$324 shifts ______ place(s) to the _______. It becomes _______ as much.

18. Suppose Marla saves 0.001 of $324 every month.

\[
\begin{array}{c}
324 \times 0.001 = 0.324
\end{array}
\]

$324 shifts ______ place(s) to the _______. It becomes _______ as much.

Multiply.

19. \(24 \times 0.1 = _______\)

20. \(24 \times 0.01 = _______\)

21. \(24 \times 0.001 = _______\)

22. \(689 \times 0.1 = _______\)

23. \(689 \times 0.01 = _______\)

24. \(689 \times 0.001 = _______\)
**Shifts When Both Factors Are Decimals**

Multiply by one tenth. Think about what it means to take one tenth of another part. You can think about money.

25. $0.1 \times 0.4 = \underline{\quad}$ Think: What is one tenth of one tenth? Then, what is one tenth of four tenths?

26. $0.1 \times 0.04 = \underline{\quad}$ Think: What is one tenth of one hundredth? Then, what is one tenth of four hundredths?

27. How many places did the 4 shift each time you multiplied? \underline{\quad} In which direction? \underline{\quad}

28. Look at your answers. What pattern do you see in the number of decimal places in the products? How is it related to the number of places in the two factors?

---

Multiply by one hundredth. Think about what it means to take one hundredth of another part.

29. $0.01 \times 0.4 = \underline{\quad}$ Think: What is one hundredth of one tenth? Then, what is one hundredth of four tenths?

30. $0.01 \times 0.04 = \underline{\quad}$ Think: What is one hundredth of one hundredth? Then, what is one hundredth of four hundredths?

31. How many places did the 4 shift each time you multiplied? \underline{\quad} In which direction? \underline{\quad}

32. Look at your answers. What pattern do you see in the number of decimal places in the products? How is it related to the number of places in the two factors?
33. How could you express the Big Idea about the number of decimal places in the product when you multiply a decimal number by another decimal number? Is it the same as the Big Idea for multiplying a decimal number by a whole number?

34. To multiply by 2 tenths or 2 hundredths, you could think of 2 tenths as \( 2 \times 0.1 \) and 2 hundredths as \( 2 \times 0.01 \).

\[
0.2 \times 0.4 = (2 \times \underline{\hspace{1cm}}) \times 0.4 = 2 \times (0.1 \times 0.4) = 2 \times 0.04 = \underline{\hspace{1cm}}
\]

\[
0.02 \times 0.4 = (2 \times \underline{\hspace{1cm}}) \times 0.4 = 2 \times (0.01 \times 0.4) = 2 \times 0.004 = \underline{\hspace{1cm}}
\]

Is your Big Idea about the number of decimal places in the product still true? \underline{\hspace{1cm}}

Use the shift pattern to solve each multiplication. Check to see if the Big Idea works.

35. \( 0.2 \times 0.4 = \underline{\hspace{1cm}} \quad 36. \quad 0.2 \times 0.04 = \underline{\hspace{1cm}} \)

37. \( 0.2 \times 0.004 = \underline{\hspace{1cm}} \quad 38. \quad 0.02 \times 0.4 = \underline{\hspace{1cm}} \)

39. \( 0.02 \times 0.04 = \underline{\hspace{1cm}} \quad 40. \quad 0.02 \times 0.004 = \underline{\hspace{1cm}} \)

41. \( 0.002 \times 0.4 = \underline{\hspace{1cm}} \quad 42. \quad 2 \times 0.4 = \underline{\hspace{1cm}} \)
Using the Big Idea you just discovered, solve each multiplication.

43. \(0.3 \times 0.4 = \) 
44. \(0.3 \times 0.04 = \)

45. \(0.3 \times 0.004 = \)
46. \(0.03 \times 0.4 = \)

47. \(0.03 \times 0.04 = \)
48. \(0.03 \times 0.004 = \)

49. \(0.003 \times 0.4 = \)
50. \(3 \times 0.4 = \)

Solve.

51. Benjamin bought 6.2 pounds of rice. Each pound cost $0.90. How much did he spend on rice?

52. Sabrina walks 0.85 mile to school. Kirk walks only 0.3 as far as Sabrina. How far does Kirk walk to school?

53. Isabel wrote 4 letters to her pen pals. For each letter she bought a stamp. Each stamp cost $0.60. How much did she spend on stamps?

54. Maura rode her bike 5 laps around the block. Each lap is 0.45 mile. How many miles did she ride?

55. Kim bought 2 pounds of baked turkey that cost $5.98 per pound. What was the total cost?
Compare Whole Number and Decimal Multipliers

Complete each sentence.

<table>
<thead>
<tr>
<th>Whole Number Multipliers</th>
<th>Decimal Number Multipliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When you multiply by 10, the number gets _____ times as big. The places shift _____ place(s) to the ______.</td>
<td>2. When you multiply by 0.1, the number gets _____ as big. The places shift _____ place(s) to the ______.</td>
</tr>
<tr>
<td>3. When you multiply by 100, the number gets _____ times as big. The places shift _____ place(s) to the ______.</td>
<td>4. When you multiply by 0.01, the number gets _____ as big. The places shift _____ place(s) to the ______.</td>
</tr>
<tr>
<td>5. When you multiply by 1,000, the number gets _____ times as big. The places shift _____ place(s) to the ______.</td>
<td>6. When you multiply by 0.001, the number gets _____ as big. The places shift _____ place(s) to the ______.</td>
</tr>
</tbody>
</table>

7. How is multiplying by 10 or 100 or 1,000 like multiplying by 0.1 or 0.01 or 0.001? How is it different?

For each exercise, discuss the shift. Then find each product.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>3.6</td>
<td></td>
<td>9.</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>× 10</td>
<td></td>
<td></td>
<td>× 0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12.</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>× 1,000</td>
</tr>
</tbody>
</table>
Extend and Apply the Big Idea

Zeros at the end of a decimal number do not change the value of the number. Remember this as you explore the Big Idea about the number of decimal places in a product.

These exercises all have an “extra” zero in the product because of the 5-pattern. Complete each multiplication.

16. $0.5 \times 2 = \underline{1.0}$
17. $0.08 \times 0.5 = \underline{0.04}$
18. $0.06 \times 0.05 = \underline{0.003}$
19. $0.4 \times 0.5 = \underline{0.2}$

20. Does the Big Idea about the product having the same number of decimal places as the two factors still work? __________

These problems are all the same, but are expressed in different ways. Multiply.

21. $3 \times 3 = \underline{9}$
22. $3.0 \times 3 = \underline{9.0}$
23. $3.0 \times 3.0 = \underline{9.0}$
24. $3.00 \times 3.00 = \underline{9.00}$

25. Does the Big Idea about the product having the same number of decimal places as the two factors still work? Do your answers all mean the same thing? __________

Solve.

26. Ada and her family are canoeing in the wilderness. They carry the canoe along trails between lakes. Their map gives each trail distance in rods. They know that a rod is equal to 5.5 yards. Find each trail distance in yards.

Black Bear Trail; 8 rods __________________________
Wild Flower Trail; 9.3 rods __________________________
Dark Cloud Trail; 24.1 rods __________________________

27. The world’s largest diamond is the Star of Africa, which is 530.2 carats. A carat is about 0.2 gram. What is the weight of the Star of Africa in grams? __________________________
Review of Rounding

Round each number.

1. Round 42 to the nearest ten. Which ten is closer to 42? 50
   42
   40

2. Round 762 to the nearest hundred. Which hundred is closer to 762? 800
   762
   700

3. Round 0.86 to the nearest tenth. Which tenth is closer to 0.86? 0.9
   0.86
   0.8

4. Round 0.263 to the nearest hundredth. Which hundredth is closer to 0.263? 0.27
   0.263
   0.26

Round to the nearest ten.

5. 46 _______  6. 71 _______  7. 85 _______  8. 928 _______

Round to the nearest hundred.


Round to the nearest tenth.

13. 0.73 _______  14. 0.91 _______  15. 0.15 _______  16. 0.483 _______

Round to the nearest hundredth.

17. 0.532 _______ 18. 0.609 _______  19. 0.789 _______  20. 0.165 _______
Explore Estimation in Multiplication

For each exercise, round the factors and multiply mentally to find the estimated answer. After finding all the estimated answers, go back and find each exact answer.

<table>
<thead>
<tr>
<th>Estimated Answer</th>
<th>Exact Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. $24 \times 39 \approx ______$</td>
<td>$24 \times 39 = ______$</td>
</tr>
<tr>
<td>22. $151 \times 32 \approx ______$</td>
<td>$151 \times 32 = ______$</td>
</tr>
<tr>
<td>23. $0.74 \times 0.21 \approx ______$</td>
<td>$0.74 \times 0.21 = ______$</td>
</tr>
<tr>
<td>24. $12.3 \times 3.7 \approx ______$</td>
<td>$12.3 \times 3.7 = ______$</td>
</tr>
</tbody>
</table>

25. Is there more than one way to round these numbers? Why are some exact answers closer to the estimated answer than others?


Use Estimation to Check Answers

26. Tanya did these multiplications on her calculator.

$24.5 \times 4 = 98$  
$0.56 \times 30 = 1.68$  
$15.2 \times 2.03 = 30.856$

$0.09 \times 143 = 12.87$  
$0.74 \times 12.02 = 88.948$  
$9.03 \times 6.9 = 623.07$

How can she use estimation to see if each answer makes sense? Which answers are clearly wrong?


Name ___________________________ Date ___________________________
Ordinary Estimations and Safe Estimations

Dear Math Students:

Yesterday I went to the store to buy 8 bottles of juice for a party. Each bottle cost $2.48 so I rounded to the nearest dollar, which is $2.00. My estimate for the total cost was $8 \times $2.00 = $16.00. I had $18.00 in my picket, so I thought everything was fine. When I went to the cashier to pay, I found out that I didn’t have enough money. I was very embarrassed.

Is there something wrong with my math? Maybe estimation isn’t very helpful when you’re buying things. What do you think?

Thank you.

Puzzled Penguin


For each problem below, decide whether you need to make a safe estimate or an ordinary estimate. Estimate the answer, and then find the exact answer. Estimates will vary.

28. Michelle and Stacy walked 9.95 miles every day for 14 days. How far did they walk altogether?

Safe estimate or ordinary estimate? __________

Estimate: __________  Exact answer: __________

29. Mrs. Reno is planning to buy 3 bicycles for her children. Each bicycle costs $144.78, including the tax. How much will Mrs. Reno need to buy all 3 bicycles?

Safe estimate or ordinary estimate? __________

Estimate: __________  Exact answer: __________

30. Each bag of soil in the Green Thumb Garden Center weighs 6.89 kilograms. There are 21 bags. What is the total weight of the bags?

Safe estimate or ordinary estimate? __________

Estimate: __________  Exact answer: __________

Practice With Decimals

Suppose you know that \(234 \times 48 = 11,232\). Use this to find each product.

1. \(23.4 \times 4.8 = \) ______
2. \(0.234 \times 4.8 = \) ______
3. \(0.234 \times 0.48 = \) ______
4. \(0.48 \times 2.34 = \) ______
5. \(48 \times 23.4 = \) ______
6. \(4.8 \times 2.34 = \) ______
7. \(23.4 \times 0.048 = \) ______
8. \(2.34 \times 0.048 = \) ______
9. \(234 \times 4.8 = \) ______
10. \(48 \times 0.234 = \) ______

Find each product. You may need a separate sheet of paper.

11. \(46 \times 0.9 = \) __________
12. \(75 \times 0.8 = \) __________
13. \(97 \times 0.04 = \) __________
14. \(64 \times 0.05 = \) __________
15. \(0.346 \times 127 = \) __________
16. \(597 \times 0.284 = \) __________
17. \(4.59 \times 57.3 = \) __________
18. \(0.924 \times 0.865 = \) __________

Round to the nearest tenth.

19. \(0.68 \) ______
20. \(0.93 \) ______
21. \(0.841 \) ______
22. \(0.092 \) ______

Round to the nearest hundredth.

23. \(0.492 \) ______
24. \(0.218 \) ______
25. \(0.907 \) ______
26. \(0.569 \) ______
Solve Word Problems

27. Marcus sails his boat 94.5 miles every day. If he sails for 25 days, how far will he travel in all?

28. The distance around a circle (the circumference) is about 3.14 times the diameter. If a circular table has a diameter of 36 inches, what is the circumference?

29. Nina is reading about red kangaroos. She found out that a male red kangaroo usually weighs about 66 kilograms, and a female red kangaroo usually weighs about 26.5 kilograms. One kilogram is about 2.2 pounds. What is the weight of a male red kangaroo in pounds?

30. What is the weight of a female red kangaroo in pounds?

31. A printer has 395 ink colors and 254 styles of letters (fonts). How many different combinations are possible?

32. Jodie wants to buy a ticket for every basketball game this season. Tickets cost $16.50 each, and there are 15 games this season. How much will Jodie spend on tickets?
Use Calculation, Estimation, or Mental Math

There are different ways that you can solve problems depending upon the type of answer that you need.

- If the problem asks for an exact answer then you need to do the calculation.
  
  **USE CALCULATION**
  
  The cost of a movie ticket is $6.25. If 7 friends go to the movies, how much money will they need?
  
  \[ 7 \times 6.25 = 43.75 \]

- If a question uses words such as *about*, *approximately*, *almost*, *nearly*, or *enough*, then you can estimate your answer.
  
  **USE ESTIMATION**
  
  Hector earns $8.05 per hour. Last week he worked 19.5 hours. About how much did he earn?
  
  \[ 19.5 \times 8.05 \approx 20 \times 8 = 160 \]
  
  Hector earned about $160.

- For some problems, you can use mental math.
  
  **USE MENTAL MATH**
  
  Angela is training for a race. Last week she ran 400 meters 15 times. How many meters did she run altogether?
  
  \[ 15 \times 400 = 15 \times 4 \times 100 = 60 \times 100 = 6,000 \text{ meters} \]

For each question, write whether to use calculation, estimation, or mental math. Then solve.

1. The Math Club is selling packs of paper for $1.95. The first week they sold 125 packs. The next week they sold 376 packs and the third week they sold 408 packs. About how much money did they collect in all?

2. The Math Club ordered 2,000 packs of paper. Each pack contains 150 sheets of paper. How many sheets is this in all?

3. **On the Back** Write and solve three multiplication word problems. Solve at least one by estimating.
Compare Division Methods

An airplane travels the same distance every day. It travels 3,822 miles in a week. Compare these methods of dividing that can be used to find how many miles the airplane travels each day.

Rectangle Sections

```
7 | 3,822
- 3,500
  322
```

Digit-By-Digit

```
5
7 | 3,822
  -3,522
    322
```

Expanded Notation

```
\[
\begin{array}{c}
500 \\
7 | 3,822 \\
- 3,500 \\
  322
\end{array}
\quad \begin{array}{c}
40 \\
7 | 3,822 \\
- 3,500 \\
  322
\end{array}
\quad \begin{array}{c}
6 \quad 546 \\
7 | 3,822 \\
- 3,500 \\
  322
\end{array}
\]
```

- Put in only one digit at a time.
- Show the zeroes in the place values.
**Division Problems**

Solve.

1. A farmer has 2,106 cows and 9 barns. If the farmer divides the cows into equal groups, how many cows will he put in each barn?

2. A sidewalk covers 3,372 square feet. If the sidewalk is 4 feet wide, what is its length?

3. Olivia has $8. Her mother has $4,784. How many times as much money does Olivia’s mother have as Olivia?

4. A potter can make 2,513 different kinds of pots and bowls by combining different shapes and colors. If he knows how to make 7 different shapes, how many colors does the potter have?

**Work With Remainders**

This problem might seem unfinished. The leftover number at the bottom is called the **remainder**. We can write the answer like this: 567 R 2

5. Could there be a remainder of 9 for the problem? Why or why not?

6. What is the largest possible remainder when dividing by 8?

Complete each division and give the remainder.

7. $6 \div 5,380$

8. $7 \div 6,747$

9. $5 \div 4,914$
Find the Mean

The mean is one way to describe a set of data. The mean, sometimes called the average, is a measure of central tendency.

The mean is the size of each of \( n \) equal groups made from \( n \) data values.

Stephan found the mean of this data set: 40, 162, 100, 38.

- Step 1: \( 40 + 162 + 100 + 38 = 340 \)
- Step 2: \( 340 \div 4 = 85 \)

The mean is 85.

1. Discuss what steps Stephan took and why they give the mean.

Find the mean for each set of data.

2. 24, 27, 25, 24

3. 13, 17, 14, 18, 15, 14, 14

4. 1, 1, 4, 2, 1, 3, 1, 4, 2, 1

5. 350, 400, 450, 100, 500

Solve.

6. Jan's cousins are 144 cm, 150 cm, 131 cm, 160 cm, and 150 cm tall. What is the mean height of Jan's cousins?

7. Mia's math test scores were 96, 80, 100, and 100. What was Mia's average math test score?

8. There are 1,010 students at Ridge School. At Valley School, there are 851 students. At Park School, there are 860 students. What is the mean number of students for the three schools?

9. On the Back Write and solve two problems that involve finding the mean.
Division With Decimal Amounts

Three friends set up a lemonade stand and made $20.25. They will share the money equally. Study the steps below to see how much money each person should get.

When the $20 is split 3 ways, each person gets $6. There is $2 left.

We change the $2 to 20 dimes and add the other 2 dimes. There are 22 dimes.

When we split 22 dimes 3 ways, each person gets 7 dimes. There is 1 dime left.

We change the dime to 10 cents and add the other 5 cents. Now we split 15 cents 3 ways.

\[
\begin{array}{c|c|c|c}
6 & 6.7 & 6.75 \\
\hline
3\overline{)20.25} & 3\overline{)20.25} & 3\overline{)20.25} \\
18 & 18 & 18 \\
\hline
2 & 2.2 & 2.2 \\
2 & 2.1 & 2.1 \\
0 & .1 & .15 \\
2 & & .15 \\
\end{array}
\]

Solve each decimal division exercise on a separate sheet of paper.

1. \(8\overline{)47.68}\)  
2. \(9\overline{)58.68}\)  
3. \(6\overline{)316.2}\)

Solve.

4. Imelda has 8.169 meters of rope. She wants to cut it into 3 equal pieces to make jump ropes for her 3 friends. How long will each jump rope be?

5. Tonio has 7.47 pounds of rabbit food. He will divide it equally among his 9 rabbits. How much food will each rabbit get?

6. Discuss how dividing a decimal number is like dividing a whole number.
Use multiplication to help you solve these problems.

7. \(32 \div 8 = \) _____
   \(8 \times \) _____ = 32
   \(8 \div 32\)

8. \(3.2 \div 8 = \) _____
   \(8 \times \) _____ = 3.2
   \(8 \div 3.2\)

9. \(0.32 \div 8 = \) _____
   \(8 \times \) _____ = 0.32
   \(8 \div 0.32\)

10. \(0.032 \div 8 = \) _____
    \(8 \times \) _____ = 0.032
    \(8 \div 0.032\)

Solve using mental math. Check using multiplication.

11. \(6.3 \div 9 = \) _____
    12. \(0.15 \div 3 = \) _____

13. \(4.8 \div 6 = \) _____
    14. \(0.021 \div 7 = \) _____

**Add Zeros to the Dividend**

Jun must run 6.65 miles every day for practice. She knows that if she runs half of that distance and back again she will have run enough miles. How far should Jun run before she turns around to run back?

\[
\begin{array}{c}
3.325 \\
2)6.650 \\
-6 \\
_____ \\
0.6 \\
\underline{0.6} \\
0.05 \\
\underline{0.04} \\
0.010 \\
\underline{0.010}
\end{array}
\]

She adds a zero to the end of the decimal number.

This allows her to finish solving the problem.

15. Discuss whether adding zeros to the end of a decimal number changes its value.

16. Discuss whether adding zeros to whole numbers like 27 changes the value.

17. What is the rule about where you can add zeros without changing the value?

Solve each exercise. You may need a separate sheet of paper.

18. \(6 \div 54.75\)

19. \(5 \div 141.2\)

20. \(8 \div 310\)
Write Fractions as Decimals

Fractions and decimals are both ways to show parts of a whole.

1. Divide 100 pennies into 4 equal parts.  
2. Divide 100 pennies into 8 equal parts.

3. Write one fourth of a dollar as a decimal number: _____
4. Write one eighth of a dollar as a decimal number: _____

Use long division to write each fraction as a decimal.

5. \( \frac{1}{4} \div 1.00 \)  
6. \( \frac{2}{4} \div 2.00 \)  
7. \( \frac{3}{4} \div 3.00 \)  
8. \( \frac{1}{8} \div 8.100 \)

9. \( \frac{2}{8} \div 8.200 \)  
10. \( \frac{3}{8} \div 8.300 \)  
11. \( \frac{4}{8} \div 8.400 \)  
12. \( \frac{5}{8} \div 8.500 \)

13. \( \frac{6}{8} \div 8.600 \)  
14. \( \frac{7}{8} \div 8.700 \)

Use these number lines to discuss questions 15 and 16.

15. What patterns do you see?

16. Which decimal numbers are equal in value?
4–14
Class Activity

17. Divide 100 pennies into 5 equal parts.

18. Use long division to find the decimal numbers for fifths.

19. Make a number line showing the decimal numbers and fractions for fifths.

20. Divide 100 pennies into 3 equal parts. 21. Divide 100 pennies into 6 equal parts.

22. Use long division to find the decimal numbers for thirds and sixths.

23. Fill in the number line showing the decimal numbers and fractions for sixths.

284 UNIT 4 LESSON 14 Express Fractions as Decimals
Word Problems

In baseball and softball, a batting average describes how well a player hits. (It is not a mean even though it is called an average!) A player’s batting average is a fraction with the number of hits over the number of at bats. These fractions are usually written as decimals with three places.

Solve. Give the batting average as a fraction and as a decimal.

24. In the first four games of the season, Lauryn got 3 hits in 9 at bats. What was her batting average?

25. Felicia is on a softball team. In her first 8 at bats, she got 5 hits. What was her batting average?

26. On Saturday, Allie played baseball with her family. She had 3 at bats and got 2 hits. What was her batting average?

Solve.

27. Carl’s baseball team had a picnic. The coach bought $3\frac{1}{2}$ pounds of potato salad for the picnic, paying $2.25 per pound. How much did the potato salad cost?

28. At the team picnic, the players raced on an obstacle course that the coach planned. The first part of the race was on a trail $\frac{3}{8}$ mile long. The second part was on a park road 0.4 mile long. What was the total length of the race?
Problems Involving Means

The mean (average) of a data set is the equal group that describes the data set.

To find it:

- Add all of the numbers in the data set.
- Divide the total by the number of items in the data set.

Tyra is training for a race. She ran these distances last week:

\[ 3\frac{1}{2} \text{ miles}, 3\frac{1}{4} \text{ miles}, 4\frac{1}{8} \text{ miles}, 4 \text{ miles}, \text{ and } 3\frac{2}{5} \text{ miles}. \]

To find the mean, she wrote all the fractions in decimal form and then added them and divided by 5. Tyra's mean training distance was 3.655 miles.

Solve. Change fractions to decimals if it is easier.

1. Tyra drinks a lot of water on the day of a race. At the last race she drank \(1\frac{1}{2}\) cups, \(1\frac{7}{8}\) cups, and \(3\frac{2}{5}\) cups. What was the mean amount of water that Tyra drank?

2. Sam works at a deli counter. His boss asked him to find the mean weight of the next four customer orders. The orders were: \(1\frac{1}{4}\) pounds of ham, \(1\frac{1}{2}\) pounds of cheese, 2 pounds of turkey, and \(2\frac{3}{4}\) pounds of roast beef. What was the mean weight? Try to solve this with fractions.

3. Tony and his friends sold snacks at the school play to raise money for the Drama Club. They collected $12.50 for muffins, $3.75 for apples, $5.60 for cranberry juice, $12.50 for soft pretzels, $16.00 for frozen yogurt, and $1.40 for carrot sticks. What was the mean amount of money collected?
Experiment With Two-Digit Divisors

When we divide by a two-digit number, we build the unknown factor place by place just as we did before. But now we must estimate each number in the answer.

There are 2,048 sheep being sent on a train. Each railroad car holds 32 sheep.

To find how many railroad cars are needed for the sheep, divide 2,048 by 32.

Here are three methods to divide 2,048 by 32. Discuss the steps in each method. Discuss how the methods are alike and different.

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Look at exercises 1–3. Would you round the divisor up or down to estimate the first number? Complete each exercise, using any method you choose.

1. $79 \div 4032$
2. $21 \div 1533$
3. $18 \div 1061$

Does Estimation Always Work?

Complete exercise 4 as a class. Does the rounding give you a correct estimate of the first digit? Does it give you a correct estimate of the next digit? Discuss what you can do to finish the problem.

4. $54 \div 3509$

Complete and discuss each exercise below. Use any method you choose.

5. $74 \div 3651$
6. $42 \div 3231$
7. $23 \div 1892$
Underestimating

Here are two ways to divide 5,185 \div 85. Discuss each method and answer the questions as a class.

\[
\begin{array}{c|c}
\text{(90)} & 5 \\
85 & 5,185 \\
4 & 25 \\
\hline
93 & \text{What does this number tell us?}
\end{array}
\quad
\begin{array}{c|c}
\text{(90)} & 10 \\
85 & 5,185 \\
4 & 25 \\
\hline
935 & \text{What does this number tell us?}
\end{array}
\]

How do we know that the first estimated number is not right? What number should we try next? Solve the problem using that number.

1. When we estimate with a number that is too big (overestimate), we have to erase and change the number. When we estimate with a number that is too small (underestimate), do we always have to erase? Explain your answer.

How do we know that the first estimated number is not right this time? Do we need to erase, or could we just finish solving the problem? Try it.

2. When we estimate with a number that is too big (overestimate), we have to erase and change the number. When we estimate with a number that is too small (underestimate), do we always have to erase? Explain your answer.

Solve each division. You may need to adjust one or both of the estimated numbers.

\[
\begin{align*}
2. & \quad 56 \div 4,032 \\
3. & \quad 77 \div 4,791 \\
4. & \quad 18 \div 798
\end{align*}
\]
Think about what kind of divisor is most likely to lead to an estimated number that is wrong. Test your idea by doing the first step of each problem below.

5. \(41 \div 2,583\)  
6. \(34 \div 1,525\)  
7. \(29 \div 928\)  
8. \(16 \div 1,461\)

9. What kind of divisor is most likely to lead to an estimated number that is wrong? How can you adjust for these cases?

Mixed Practice With Adjusted Estimates

Solve. You may need a separate sheet of paper.

10. Hector picked 1,375 oranges in his fruit orchard. He will pack them in crates to take to the market. Each crate holds 24 oranges.

   How many crates will Hector fill? _____________
   How many oranges will be left over? _____________

11. The skateboards at the Speed Demon Shop sell for $76 each. This week the shop owner sold $5,396 worth of skateboards.

   How many skateboards were sold? _____________

12. Ashley’s dog Tuffy eats 21 ounces of dog food for each meal. Ashley has 1,620 ounces of food in the house.

   How many meals will Tuffy have before Ashley needs to buy more food? _____________
   How many ounces of food will be left after the last meal? _____________
Decide What to Do With the Remainder

When you divide to solve a problem, you need to decide what to do with the remainder to answer the question.

Think about each of these ways to use a remainder. Solve each problem. Show your work.

Sometimes you ignore the remainder.

1. The gift-wrapping department of a store has a roll of ribbon 1,780 inches long. It takes 1 yard of ribbon (36 inches) to wrap each gift.

How many gifts can be wrapped?

Why do you ignore the remainder?

Sometimes you round up to the next whole number.

2. There are 247 people traveling to the basketball tournament by bus this year. Each bus holds 52 people.

How many buses will be needed?

Why do you round up?

Sometimes you use the remainder to form a fraction.

3. The 28 students in Mrs. Colby’s class will share 98 slices of pizza equally at the class picnic.

How many slices will each student get?

Look at the division shown here. Explain how to get the fraction after you find the remainder.
Sometimes you use a decimal number instead of the remainder.

Suppose 16 friends earned $348 at a car wash, and they want to divide the money equally. To find how much each person will get, one of the friends divided as shown here. Each friend will get $21.75.

4. A rectangular garden has an area of 882 square meters. The long side of the garden is 35 meters long. How long is the short side?

Sometimes the remainder is the answer to the problem.

5. A bagel shop has 138 bagels to be packed into boxes of 12 to be sold. The extra bagels are for the workers.

How many bagels will the workers get? ________________

Why is the remainder the answer?

► Practice Solving Problems Involving Remainders

Solve.

6. At the Cactus Flower Cafe, all the tips are divided equally among the waiters. Last night the 16 waiters took in $1,108. How much did each waiter get in tips?

7. A gardener needs to move 2,150 pounds of dirt. He can carry 98 pounds in his wheelbarrow. How many trips will he need to make with the wheelbarrow?
Solve.

8. Mia must work 133 hours during the month of May. There are 21 working days in May this year. How many hours per day will Mia work if she works the same number of hours each day?

9. Colored markers cost 78 cents each. Pablo has $8.63 in his pocket. How many colored markers can Pablo buy?

10. A meat packer has 180 kilograms of ground meat. He will divide it equally into 50 packages. How much will each package weigh?

11. In volleyball there are 12 players on the court. If 75 people all want to play volleyball at a gym that has more than enough courts, how many of them must sit out at one time?

12. At the Fourth of July celebration, 1,408 ounces of lemonade will be shared equally by 88 people. How many ounces of lemonade will each person get?

13. Armando needs quarters to ride the bus each day. He took $14.87 to the bank and asked to have it changed into quarters. How many quarters did he get?

14. On the Back Write and solve two division word problems. Each problem should use a different way to interpret the remainder.
Use Money to See Shift Patterns

Jordan earns $243 a week. The money is shown here.

Jordan’s Earnings in Dollars

$243 \div 1 = $243

Answer each question about how much Jordan earns in coins.

1. How many dimes ($0.10) does he earn?

2. What happens to each dollar? Why?

3. What happens to the number showing Jordan’s earnings?

4. When you divide by 0.1, does each digit shift right or left?

5. How many places does each digit shift?
6. How many pennies ($0.01) does he earn?

7. What happens to each dollar?

8. What happens to the number showing Jordan's earnings?

9. When you divide by 0.01, does each digit shift right or left? Why?

10. How many places does each digit shift? Why?

11. How many tenths of a cent ($0.001) does he earn?

12. What happens to each dollar?

13. What happens to the number showing Jordan's earnings? Why?

14. When you divide by 0.001, does each digit shift right or left? Why?

15. How many places does each digit shift? Why?

**Jordan's Earnings in Pennies**

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\[ 243 \div 0.01 = 24,300 \]

**Jordan's Earnings in Tenths of a Cent**

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\[ 243 \div 0.001 = 243,000 \]
Relate Decimal Division to Multiplication

Solve.

16. Mrs. Moreno made 1 liter of grape jelly. She will pour it into jars that each hold 0.1 of a liter. How many jars will she need?

Think: How many tenths are there in 1 whole? _______

Complete the equation: 1 ÷ 0.1 = _______

This answer is the same as 1 × _______

17. Mr. Moreno made 2 liters of spaghetti sauce. He will also pour it into jars that each hold 0.1 of a liter. How many jars will he need?

Think: How many tenths are there in 1 whole? _______

In 2 wholes? _______

Complete the equation: 2 ÷ 0.1 = _______

This answer is the same as 2 × _______

18. The Morenos made a kiloliter of fruit punch for a large party. They will pour it into punch bowls that each hold 0.01 kiloliter. How many bowls will they need?

Think: How many hundredths are there in 1 whole? _______

Complete the equation: 1 ÷ 0.01 = _______

This answer is the same as 1 × _______

19. Why do we get a larger number when we divide by a decimal number that is less than one?

Show your work.
20. Change Decimal Divisors to Whole Numbers

It is easier to divide when the divisor is a whole number. We can change the divisor to a whole number by using the strategy below.

Discuss each step used to find $6 \div 0.2$.

Understand the Division Problem

**Step 1:** We know that $6 \div 0.2$ can be written as a fraction: $6 \div 0.2 = \frac{6}{0.2}$

**Step 2:** We can make an equivalent fraction with a whole number divisor by multiplying the numerator and denominator by 10. Now we can divide 60 by 2.

$6 \times 10 = \frac{60}{2} = 30$

21. Why will the answer to $60 \div 2$ be the same as the answer to $6 \div 0.2$?

Dear Math Students:

One of my friends says that dividing a number by one tenth (0.1) is the same as multiplying the number by 10. He also says that dividing by one hundredth (0.01) is the same as multiplying by 100. He thinks this is also true for one thousandth, one millionth, and so on.

Is he right? I don’t see how this can be true. Usually multiplication gives us a larger number, and division gives us a smaller number. So this would be very strange. Can you explain it?

Thank you.

Puzzled Penguin
UNIT 4 LESSON 18 Divide Whole Numbers by Decimal Numbers

Solve with long division.

**Step 1:** We can multiply both numbers by 10 in long division format. First, put a decimal point after the whole number.

**Step 2:** Then we multiply both numbers by 10, which moves the decimal points one place to the right. We add zeros if necessary:

**Step 3:** We don’t have to draw arrows. A little mark called a caret (^) shows where we put the “new” decimal points. Now we divide 60 by 2, just as we did with equivalent fractions.

22. Why does moving both decimal points the same number of places give us the same answer?

23. Suppose you want to find \( \frac{6}{0.02} \).

   By what number can you multiply 0.02 to get a whole number?

   Describe and show how to move the decimal points to solve \( \frac{6}{0.02} \) by long division.

24. Suppose you want to find \( \frac{6}{0.002} \).

   Describe and show how to move the decimal points to solve \( \frac{6}{0.002} \).

25. \( 0.5 \div 45 \)

26. \( 0.07 \div 56 \)

27. \( 0.8 \div 496 \)

28. \( 0.65 \div 910 \)

29. On the Back Explain why your method for exercise 24 is right.
Use Money to See Shift Patterns

It costs $0.312 (31 cents and \( \frac{2}{10} \) cent) to make one Cat's Eye Marble. The money is shown here.

Cost of a Cat's Eye Marble

\[
\begin{array}{cccc}
\$ & 0 & . & 3 & 1 & 2 \\
\end{array}
\]

\[
\begin{array}{c}
\div 1 \\
\$0.312 \div 1 = \$0.312
\end{array}
\]

Answer each question about the different coins.

1. How many dimes ($0.10) does it cost to make one Cat's Eye Marble? Why?

2. What happens to the number that shows the cost?

3. When you divide by 0.1 does each digit shift to the right or left? Why?

4. How many places does each digit shift? Why?
5. How many cents ($0.01) does it cost to make one Cat’s Eye Marble? Why?

6. What happens to the number that shows the cost?

7. When you divide by 0.01, does each digit shift to the right or left? Why?

8. How many places does each digit shift? Why?

9. How many tenths of a cent ($0.001) does it cost to make one Cat’s Eye Marble?

10. What happens to the number that shows the cost?

11. When you divide by 0.001, does each digit shift to the right or left? Why?

12. How many places does each digit shift? Why?

13. Compare the shift pattern in this lesson with the shift pattern in Lesson 18. Is the shift pattern for dividing by decimals the same when the product (dividend) is a decimal number as when the product (dividend) is a whole number? Why or why not?
3-4

Name ____________________________ Date ____________________________

UNIT 4 LESSON 19 Divide With Two Decimal Numbers

► Change Decimal Divisors to Whole Numbers

What happens when there are two decimal numbers? We can use the same strategy as before, changing the divisor to a whole number.

Discuss each step used to find $0.06 \div 0.2$.

Understand the Division Problem

**Step 1:** We know we can write $0.06 \div 0.2$ as a fraction:

$$0.06 \div 0.2 = \frac{0.06}{0.2}$$

**Step 2:** We can make an equivalent fraction with a whole number divisor by multiplying the numerator and denominator by 10. Now we divide 0.6 by 2.

$$\frac{0.06 \times 10}{0.2 \times 10} = \frac{0.6}{2} = 2 \frac{0.6}{10}$$

14. Why does $0.06 \div 0.2$ give the same answer as $0.6 \div 2$?

Solve With Long Division

**Step 1:** We can show this multiplication by 10 in a long division problem. First, we set up the problem:

$$0.2 \overline{)0.06}$$

**Step 2:** Then we multiply both numbers by 10, which moves the decimal points one place to the right. We add zeros if necessary:

$$0.2 \overline{)0.6}$$

**Step 3:** We don’t have to draw arrows. The caret (^) shows where each “new” decimal point belongs. Now we divide 0.6 by 2, just as we did with equivalent fractions.

$$0.2 \overline{)0.6}$$

15. Why does moving both decimal points the same number of places give us the same answer?
16. How would you solve \(0.06 \div 0.02\) with long division? What number do you need to multiply by to make 0.02 a whole number?

\[
\begin{array}{cccc}
& & 0 & \underline{.2} \\
0.02 & ) & 0 & .6 \\
\end{array}
\]

17. How would you solve \(0.06 \div 0.002\) with long division? What number do you need to multiply by to make 0.002 a whole number?

\[
\begin{array}{cccc}
& & 0 & \underline{0.3} \\
0.002 & ) & 0 & .6 \\
\end{array}
\]

Solve each division problem. Show your work.

18. \(0.9 \div 7.2\)

19. \(0.04 \div 0.364\)

20. \(0.6 \div 0.372\)

21. \(0.14 \div 7.28\)

22. A sand and gravel company has 12.6 tons of gravel to haul today. Each truck can carry 0.9 ton of gravel. How many trucks will be needed?

23. Mountain climbers are climbing a trail that is 3.15 miles long. They can climb about 0.45 mile a day. How many days will it take them to reach the top?
Divisibility Rules for 2, 5, and 10

A number is divisible by another number if the remainder is zero when the first number is divided by the second number.

45 is divisible by 5 because the remainder is zero. \( \frac{45}{5} = 9 \)

36 is not divisible by 5 because the remainder is not zero. \( \frac{36}{5} = 7 \text{ R} 1 \)

Here are rules you can use to test for divisibility without dividing.

<table>
<thead>
<tr>
<th>Rule</th>
<th>Example</th>
<th>Example</th>
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<tbody>
<tr>
<td>A number is divisible by 2 if the ones digit is 0, 2, 4, 6, or 8.</td>
<td>136 is divisible by 2. 283 is not divisible by 2.</td>
<td></td>
</tr>
<tr>
<td>A number is divisible by 5 if the ones digit is 0 or 5.</td>
<td>1,760 is divisible by 5. 506 is not divisible by 5.</td>
<td></td>
</tr>
<tr>
<td>A number is divisible by 10 if the ones digit is 0.</td>
<td>790 is divisible by 10. 809 is not divisible by 10.</td>
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</table>

Complete the table. Use a check mark to show divisibility.

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<tr>
<th></th>
<th>24</th>
<th>65</th>
<th>110</th>
<th>108</th>
<th>137</th>
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Even numbers are divisible by 2. Odd numbers are not divisible by 2.

Answer each question.

4. Write 5 numbers between 50 and 100 that are divisible by 5.

5. If a number is divisible by 10, what other numbers is it divisible by? Why?

6. On The Back Challenge: Write numbers that are divisible by 3. Find a pattern and write a rule. Test your rule.
Place-Value Concepts in Division

Dear Math Students:
Today I am going to the store with my friend to buy some greeting cards that cost 75 cents each. I have $19.50 to spend. I want to know how many greeting cards I can buy. I solved the problem as shown below, but my friend said it was wrong. He said that if you moved the decimal points two places to the right, then both numbers will get bigger and so your answer will be too big. Is he right? Why or why not?

\[ 0.75 \div 19.50 = 0.75, \quad 19.50 \div 75 = 1.950 \]

Thank you.
Puzzled Penguin

1. Write a response to the Puzzled Penguin.

Suppose you know that \(1,715 \div 35 = 49\). Use this to solve each problem.

2. \(35 \div 17.15\)
3. \(35 \div 171.5\)
4. \(0.35 \div 0.1715\)

5. \(35 \div 17,150\)
6. \(3.5 \div 1,715\)
7. \(0.35 \div 1,715\)

8. \(3.5 \div 17.15\)
9. \(0.35 \div 1.715\)
Mixed Division Practice

Solve.

10. The Clark family is having a big lawn party. They have 196 chairs, and they want to put 8 chairs at each table. How many chairs will be left over?

11. Liam needs to buy 640 eggs for a soccer breakfast. If eggs come in cartons of 18, how many cartons should he buy?

12. Jacob made $507 this year delivering newspapers. How much money did he make each month?

13. Ms. Uhura is making 12 skating costumes. She has 21 m of ribbon. How much ribbon can she use on each costume?

14. A class trip will cost $358.40. There are 28 students in the class. How much will the trip cost per student?
Solve.

15. The Ramsey family collects and sells maple syrup. Last month they collected 57.8 liters of syrup. They will pour it into bottles that hold 0.85 of a liter. How many bottles will the Ramseys fill?

16. Kyle spent $22.94 on postage stamps today. Each stamp cost 37 cents ($0.37). How many stamps did Kyle buy?

Solve.

17. 0.6\(\overline{54}\)  
18. 0.08\(\overline{72}\)  
19. 0.5\(\overline{45}\)  
20. 0.04\(\overline{28}\)

21. 9\(\overline{65}\)  
22. 0.07\(\overline{49}\)  
23. 8\(\overline{76}\)  
24. 0.05\(\overline{34.5}\)

25. 7\(\overline{395}\)  
26. 0.6\(\overline{141}\)  
27. 33\(\overline{3,028}\)  
28. 0.045\(\overline{41.85}\)

29. On the Back Write and solve a division problem that uses a whole number and a decimal number.
 Decimal Multiplication or Decimal Division?

For each problem, decide whether you need to multiply or divide. Then solve.

1. A certain turtle can walk 0.2 mile in one hour. How far can the turtle walk in 12 hours? How far can it walk in 0.5 hour?

2. Gus runs 3.6 miles during running practice. He takes a sip of water for every 0.9 mile that he runs. How many sips does Gus take during his running practice?

3. Every year about 135 of the cows on Dixie’s Dairy Farm have calves. This year only 0.6 as many cows had calves. How many cows had calves this year?

4. A box of oatmeal holds 1.2 pounds. Each bowl of oatmeal holds 0.08 pound. How many bowls of oatmeal can you get from a box?

5. A rectangular patio has an area of 131.52 square meters. The width of the patio is 9.6 meters. What is its length?
Results of Operations With Whole Numbers and Decimal Numbers

In the equations below, $a$ and $b$ are whole numbers greater than 1, and $d$ is a digit so that $0.d$ is a decimal number less than 1. Answer each question.

6. If $b \times a = c$, is $c$ greater or less than $a$? Why?

7. If $0.d \times a = c$, is $c$ greater or less than $a$? Why?

8. If $a \div b = c$, is $c$ greater or less than $a$? Why?

9. If $a \div 0.d = c$, is $c$ greater or less than $a$? Why?

Answer each question without trying to find the value.

10. Which is greater, $42 \times 356$ or $356 \div 42$? How do you know?
11. Which is greater, \(0.65 \times 561\) or \(561 \div 0.65\)? How do you know?

12. Which is greater, \(832 \div 67\) or \(832 \div 0.67\)? How do you know?

13. Which is greater, \(738 \times 66\) or \(738 \times 0.66\)? How do you know?

Make Predictions

Solve.

14. Farmer Ortigoza has 124.6 acres of land. Farmer Ruben has 0.8 times as much land.
   
   Does Farmer Ruben have more or less than 124.6 acres? 
   
   How many acres does Farmer Ruben have?

15. Mee Young has 48 meters of crepe paper. She will cut it into strips that are each 0.6 meter long.
   
   Will Mee Young get more or fewer than 48 strips?
   
   How many strips will Mee Young get?
Solve.

16. Roberto can lift 115 pounds. His friend Vance can lift 0.9 of that amount.

Can Vance lift more or less than 115 pounds? ______

How many pounds can Vance lift? ______

17. The Daisy Cafe served 18 liters of hot chocolate today. Each serving was in a cup that held 0.2 liter.

Did the cafe serve more or fewer than 18 cups of hot chocolate? ______

How many cups did the cafe serve? ______

► Mixed Practice

Solve.

18. 0.5 \times 3 = _____  
19. 0.007 \times 6 = _____  
20. 0.4 \times 0.8 = _____  

21. \begin{array}{rcl} 6 \) & \underline{\times} & 5.1 \\ \end{array} 
22. \begin{array}{rcl} 4 \) & \underline{\times} & 22.8 \\ \end{array} 
23. \begin{array}{rcl} 27 \) & \underline{\div} & 8.91 \\ \end{array} 
24. \begin{array}{rcl} 34 \) & \underline{\div} & 1.564 \\ \end{array} 

25. \begin{array}{rcl} 28 \) & \underline{\times} & 0.63 \\ \end{array} 
26. \begin{array}{rcl} 0.35 \) & \underline{\times} & 94 \\ \end{array} 
27. \begin{array}{rcl} 78.6 \) & \underline{\times} & 49 \\ \end{array} 
28. \begin{array}{rcl} 215 \) & \underline{\times} & 37 \\ \end{array} 

29. \begin{array}{rcl} 0.8 \) & \underline{\div} & 7.52 \\ \end{array} 
30. \begin{array}{rcl} 0.03 \) & \underline{\div} & 0.285 \\ \end{array} 
31. \begin{array}{rcl} 0.42 \) & \underline{\div} & 15.12 \\ \end{array} 
32. \begin{array}{rcl} 1.9 \) & \underline{\div} & 1.634 \\ \end{array}
Mixed Real-World Applications

Solve.

41. The Fox Theater has 19 rows of seats with 26 seats in each row. There are 498 people standing in line to see a movie.

   How many people will get in? __________

   How many people will have to wait until the next movie? __________

42. Polly bought 12 beach balls for her beach party. She spent $23.64. How much did each beach ball cost?

   ________________________________

43. All of the 245 fifth graders at Breezy Point School are going on a trip to the aquarium. Each van can carry 16 students.

   How many vans will be needed for the trip? __________

44. Today Aaliyah ran 4.5 miles per hour for three fourths (0.75) of an hour.

   How far did Aaliyah run today? __________

45. On the Back Write and solve two word problems involving decimals. One should require multiplication and one should require division.