



# Dividing Numbers that Result in a Decimal

Let's find quotients that are not whole numbers.

## 12.1 Math Talk: Dividing by 4

Find the value of each quotient mentally.

- $80 \div 4$

- $12 \div 4$

- $1.2 \div 4$

- $81.2 \div 4$



## 12.2 Whole Numbers No More

Here is how Lin calculated  $62 \div 5$ .

$$\begin{array}{r}
 5 \overline{) 62} \\
 \underline{- 5} \phantom{0} \\
 12 \\
 \underline{- 10} \\
 2
 \end{array}
 \qquad
 \begin{array}{r}
 \phantom{0}12 \\
 5 \overline{) 62} \\
 \underline{- 5} \phantom{0} \\
 12 \\
 \underline{- 10} \\
 2
 \end{array}
 \qquad
 \begin{array}{r}
 \phantom{0}12. \\
 5 \overline{) 62.0} \\
 \underline{- 5} \phantom{0} \\
 12 \\
 \underline{- 10} \\
 20 \\
 \underline{- 20} \\
 0
 \end{array}
 \qquad
 \begin{array}{r}
 \phantom{0}12.4 \\
 5 \overline{) 62.0} \\
 \underline{- 5} \phantom{0} \\
 12 \\
 \underline{- 10} \\
 20 \\
 \underline{- 20} \\
 0
 \end{array}$$

1. Discuss with your partner:
  - a. In the third step, Lin drew a vertical dashed line to the right of the 2 in 62. What do you think that line is for?
  - b. She also wrote a point and a 0 to the right of 62. Then she put a 0 after the remainder of 2. What do you think the zeros are for?
  - c. Lin subtracted 5 groups of 4 from 20. What value does the 4 in the quotient represent?
  - d. What value did Lin find for  $62 \div 5$ ?
2. Use long division to find the value of each expression. Then pause so your teacher can review your work.
  - a.  $126 \div 8$
  - b.  $90 \div 12$



3. Use long division to show that:

$5 \div 4$ , or  $\frac{5}{4}$ , is 1.25.

$4 \div 5$ , or  $\frac{4}{5}$ , is 0.8.

$1 \div 8$ , or  $\frac{1}{8}$ , is 0.125.



### Are you ready for more?

Noah said we cannot use long division to calculate  $10 \div 3$  because there will always be a remainder.

1. What do you think Noah meant by “there will always be a remainder”? Explain your reasoning.
2. What do you think is the value of  $10 \div 3$ ?



## 12.3

# Using Long Division to Divide Decimals

Use long division to answer each question.

1. What is the value of  $53.8 \div 4$ ?
2. Five students raised \$77.40 for a charity. If everyone raised the same amount, how much money did each student raise?

## Lesson 12 Summary

We can use long division to find quotients even when the numbers involved are not whole numbers. Here is the long-division calculation of  $86 \div 4$ , which results in a decimal quotient.

$$\begin{array}{r}
 21.5 \\
 4 \overline{) 86} \\
 \underline{- 8} \phantom{0} \\
 6 \phantom{0} \\
 \underline{- 4} \phantom{0} \\
 20 \\
 \underline{- 20} \\
 0
 \end{array}$$

The calculation shows that, after removing 4 groups of 21, there are 2 ones remaining. We can continue dividing by writing a 0 to the right of the 2 and thinking of that remainder as 20 tenths, which can then be divided into 4 groups.

To show that the quotient we are working with now is in the tenths place, we put a decimal point to the right of the 1 (which is in the ones place) at the top. It may also be helpful to draw a vertical line to separate the ones and the tenths.

There are 4 groups of 5 tenths in 20 tenths, so we write 5 in the tenths place at the top. The calculation likewise shows  $86 \div 4 = 21.5$ .