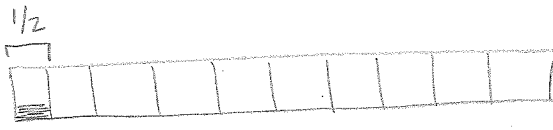


## Lesson 14: The Division Algorithm—Converting Decimal Division into Whole Number Division Using Fractions

### Classwork

#### Opening Exercise

Divide  $\frac{1}{2} \div \frac{1}{10}$ . Use a tape diagram to support your reasoning.



$$1 \text{ unit} = \frac{1}{2}$$

$$\frac{1}{2} \cdot 10 = \frac{10}{2} = 5$$

Relate the model to the invert and multiply rule.

$$\frac{1}{2} \div \frac{1}{10}$$

Write a multiplication sentence

$$\frac{1}{2} \cdot \frac{10}{1} = \frac{10}{2} = 5$$

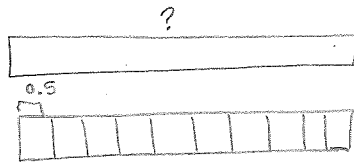
**Example 1**

Evaluate the expression. Use a tape diagram to support your answer.

$$\frac{1}{2} = 0.5 \quad \frac{1}{10} = 0.1$$

$$0.5 \div 0.1$$

5 tenths is 1 tenth of what #?



$$\begin{aligned} 1 \text{ unit} &= 0.5 \\ 10 \text{ units} &= 10 \times 0.5 = 5 \end{aligned}$$

Rewrite  $0.5 \div 0.1$  as a fraction.

$$\frac{0.5}{0.1}$$

Express the divisor as a whole number.

$$\frac{0.5}{0.1} \times \frac{10}{10} = \frac{5}{1} = 5$$

**Exercises 1–3**

Convert the decimal division expressions to fractional division expressions in order to create whole number divisors. You do not need to find the quotients. Explain the movement of the decimal point. The first exercise has been completed for you.

$$\begin{aligned} 1. \quad & 18.6 \div 2.3 \\ & \frac{18.6}{2.3} \times \frac{10}{10} = \frac{186}{23} \\ & 186 \div 23 \end{aligned}$$

I multiplied both the dividend and the divisor by ten, or by one power of ten, so each decimal point moved one place to the right because they grew larger by ten.

$$2. \quad 14.04 \div 4.68$$

$$\frac{14.04}{4.68} \times \frac{100}{100} = \frac{1,404}{468}$$

3.  $0.162 \div 0.036$

$$\frac{0.162}{0.036} \times \frac{1000}{1000} = \frac{162}{36}$$

**Example 2**

Evaluate the expression. First, convert the decimal division expression to a fractional division expression in order to create a whole number divisor.

$25.2 \div 0.72$

$$\frac{25.2}{0.72} \times \frac{100}{100} = \frac{2520}{72}$$

Use the division algorithm to find the quotient.

$$\begin{array}{r} 35 \\ 72 \overline{) 2520} \\ \underline{-214} \phantom{0} \\ 340 \\ \underline{-340} \\ 0 \end{array}$$

$$\begin{array}{r} \checkmark: 35 \\ \times 72 \\ \hline 2520 \end{array}$$

## Exercises 4–7

Convert the decimal division expressions to fractional division expressions in order to create whole number divisors. Compute the quotients using the division algorithm. Check your work with a calculator.

4.  $2,000 \div 3.2$

$$\frac{2000}{3.2} \times \frac{10}{10} = \frac{20000}{32}$$

$$\begin{array}{r} 625 \\ 32 \overline{) 20,000} \\ \underline{-1920} \phantom{0} \\ 80 \phantom{0} \\ \underline{-64} \phantom{0} \\ 160 \\ \underline{-160} \\ 0 \end{array}$$

5.  $3,581.9 \div 4.9$

$$\frac{3,581.9}{4.9} \times \frac{10}{10} = \frac{35,819}{49}$$

$$\begin{array}{r} 731 \\ 49 \overline{) 35,819} \\ \underline{-343} \phantom{0} \\ 151 \phantom{0} \\ \underline{-147} \phantom{0} \\ 49 \phantom{0} \\ \underline{-49} \\ 0 \end{array}$$

## Example 3

A plane travels 3,625.26 miles in 6.9 hours. What is the plane's unit rate?

Represent this situation with a fraction.

$$\frac{3,625.26}{6.9} \times \frac{10}{10} =$$

per hour.

Represent this situation using the same units.

$$\frac{36,252.6}{69}$$

Estimate the quotient.

$$35,000 \div 70$$

$$\frac{35,000}{70} = 500$$

Express the divisor as a whole number.

$$\frac{36,252.6}{69}$$

Use the division algorithm to find the quotient.

$$\begin{array}{r} 525.4 \\ 69 \overline{) 36252.6} \\ \underline{-345} \phantom{0} \\ 175 \phantom{0} \\ \underline{-138} \phantom{0} \\ 372 \phantom{0} \\ \underline{-345} \phantom{0} \\ 276 \phantom{0} \\ \underline{-276} \\ 0 \end{array}$$

Use multiplication to check your work.

$$\begin{array}{r} 525.4 \\ \times 69 \\ \hline 3,425.26 \end{array}$$