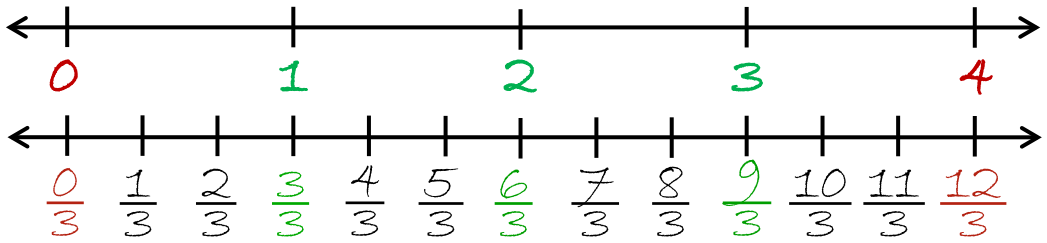
Division with Fractions

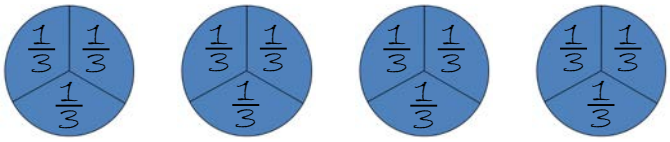
Objective 1 Perform Division with Fractions

Suppose we are given the problem $4 \div \frac{1}{3}$. This problem is asking you how many one-thirds will go into a 4?

Consider the number lines below. Notice that it takes "twelve-thirds" or $\frac{12}{3}$ to make a 4.



We can demonstrate this visually using the following diagram.



We can see there are **12** one-thirds in 4-wholes, where each whole contains 3 one-thirds.

We can arithmetically calculate $4 \div \frac{1}{3}$ by multiplying 4 by the reciprocal of $\frac{1}{3}$. The reciprocal of $\frac{1}{3}$ represents the number of one-thirds in 1 whole. The reciprocal of $\frac{1}{3}$ is 3 since there are 3 one-thirds in 1 whole.

When dividing a quantity by a fraction, multiply the quantity by the reciprocal of the fraction.

$$4 \div \frac{1}{3} = 4 \cdot 3 = 12$$

Change division of the fraction to multiplication by its reciprocal.

Example 1: Divide.

a) $-\frac{6}{7} \div \frac{3}{14}$

$$-\frac{6}{7} \cdot -$$

b) $-4 \div \frac{8}{5}$

$$-\frac{4}{1} \cdot -$$

c) $\frac{3}{4} \div 2$

$$\frac{3}{4} \div \frac{2}{1}$$

Answer the following homework questions.

In Exercises 1 – 9, perform the indicated operations.

1) $\frac{2}{3} \div \frac{3}{10}$

2) $\frac{4}{5} \div \frac{3}{10}$

3) $\frac{64}{9} \div \frac{8}{27}$

4) $\frac{40}{69} \div \frac{25}{46}$

5) $\frac{17}{30} \div \frac{17}{30}$

6) $\frac{16x}{5} \div \frac{4x}{10}$

7) $\frac{6x^2}{5a^2} \div \frac{18x}{7a}$

8) $\frac{2}{3} \div \left(\frac{2}{5}\right)^2 \div \frac{x}{y}$

9) $\frac{3c}{4a} \div \frac{c}{a} \div \frac{3c}{4a}$

Example 2: Divide.

a) $\dfrac{\frac{7}{6}}{\frac{4}{5}}$ $\quad\quad$ $\dfrac{7}{6} \div \dfrac{4}{5}$

b) $\dfrac{\frac{xy^2}{z}}{\frac{y}{z}}$ $\quad\quad$ $\dfrac{xy^2}{z} \div \dfrac{y}{z}$

c) $\dfrac{\frac{3a}{5b^3}}{\frac{a^3}{10b^2}}$

Answer the following homework questions.

In Exercises 10 – 15, perform the indicated operations.

10) $4 \div \frac{1}{2}$

11) $\frac{1}{2} \div 4$

12) $\frac{4}{9} \div \left(-\frac{2}{3}\right) + \frac{4}{3}$

13) $\frac{7}{10} \div \frac{1}{4} - \frac{2}{5}$

14) $3 \div 6 \cdot \frac{1}{2}$

15) $3 \div \left(\frac{3}{4}\right)^2 \div 6$