

7-3

Ratios with Fractions

You can have a ratio where one term is a fraction. Simplify these ratios by using the steps for complex fractions.

$$\frac{1}{6} \text{ to } 9 \rightarrow \frac{\frac{1}{6}}{9} \rightarrow \frac{1}{6} \div 9 = \frac{1}{6} \times \frac{1}{9} = \boxed{\frac{1}{54}}$$

Example 1

Your neighbor commutes 12 mi to work. You commute $\frac{9}{10}$ mi to school.

$$4 \cancel{0} \times \frac{10}{\cancel{3}} = \frac{40}{3}$$

a. Write the ratio of your neighbor's commute to your commute as a fraction in simplest form.

$$40:3$$

$$12 \div \frac{9}{10} \rightarrow \frac{12}{\frac{9}{10}} \rightarrow \frac{12}{1} \div \frac{9}{10}$$

b. Write the ratio of your commute to your neighbor's commute as a fraction in simplest form.

$$3:40$$

c. How are the ratios from parts (a) and (b) related?

reciprocals

Got It? 1

An athlete runs on a treadmill for $\frac{3}{4}$ h. The athlete then lifts weights for 2 h. Write the ratio of the running time to the weight-lifting time as a fraction in simplest form.

$$\frac{\frac{3}{4}}{2} =$$

$$\frac{\frac{3}{4}}{2} \rightarrow \frac{3}{4} \div \frac{2}{1}$$
$$\frac{3}{4} \times \frac{1}{2} = \boxed{\frac{3}{8}}$$

Example 2

Determine whether each statement is *true* or *false*.

T a. The ratio $\frac{\frac{2}{3} \text{ ft}^2}{\frac{1}{5} \text{ ft}^2}$ is equivalent to $\frac{10}{3}$.

$$\frac{2}{3} \div \frac{1}{5} = \frac{2}{3} \times \frac{5}{1} = \frac{10}{3}$$

T b. The ratio $\frac{\frac{4}{5} \text{ km}^2}{\frac{6}{7} \text{ km}^2}$ is equivalent to $\frac{14}{15}$.

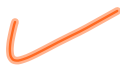
$$\frac{4}{5} \div \frac{6}{7} = \frac{4}{5} \times \frac{7}{6} = \frac{14}{15}$$

F c. The ratio $\frac{\frac{4}{3} \text{ in}^2}{\frac{8}{9} \text{ in}^2}$ is equivalent to $\frac{2}{3}$.

$$\frac{4}{3} \div \frac{8}{9} = \frac{4}{3} \times \frac{9}{8} = \frac{3}{2}$$

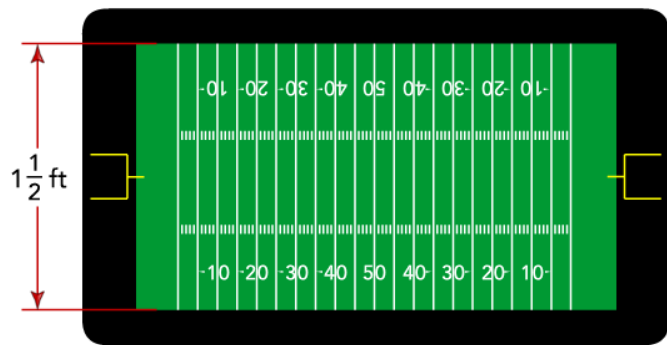
Got It? 2

Write the ratio $\frac{\frac{3}{4} \text{ gal}}{\frac{9}{10} \text{ gal}}$ in simplest form.

$$\frac{3}{4} \div \frac{9}{10} = \frac{\cancel{3}^1}{4} \times \frac{10^{\cancel{5}}}{\cancel{9}_3} = \boxed{\frac{5}{6}}$$


Example 3

A professional football field is $53\frac{1}{3}$ yards wide. Find the ratio of the width of the actual field to the width of the field in the poster as a fraction in simplest form.



① change $53\frac{1}{3}$ yd to feet

$$53\frac{1}{3} \times 3$$

② Write as ratio in simplest form.

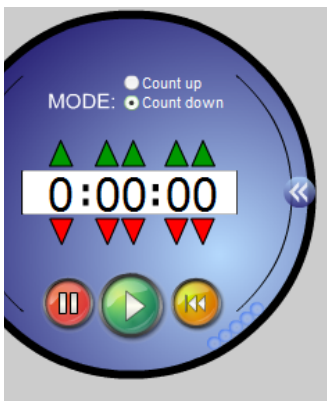
$$\frac{160}{3} \times \frac{3}{1} = 160 \text{ ft}$$

160 ft to $1\frac{1}{2}$ ft

$$\frac{160}{1\frac{1}{2}} = 160 \div 1\frac{1}{2} = \frac{160}{1} \div \frac{3}{2} = \frac{160}{1} \times \frac{2}{3} = \frac{320}{3}$$

Got It? 3

A model boat is $6\frac{1}{4}$ in. wide. The actual boat is $12\frac{1}{2}$ ft wide. What is the ratio of the width of the model boat to the width of the actual boat, in simplest form?



PRACTICE

Do you know **HOW?**

1. A bakery has $\frac{3}{4}$ dozen whole-grain muffins and 6 dozen mixed-berry muffins. Write the ratio of whole-grain muffins to mixed-berry muffins as a fraction in simplest form.

2. Write the ratio $\frac{6\frac{7}{8}}{9}$ in simplest form.

3. A scale model of a van is $4\frac{1}{5}$ feet long. The actual van is $22\frac{2}{5}$ feet long. What is the ratio of the length of the model to the actual length of the van in simplest form?