

Ratios and Proportions

A **proportion** is an equation stating that two ratios are equivalent. Two quantities that form a proportion are **proportional**.

$$\frac{3}{4} = \frac{6}{8}$$

The proportion is read "3 is to 4 as 6 is to 8."

Example 1 Tell whether the ratios form a proportion.

a. $\frac{4}{12}, \frac{6}{18}$

b. $\frac{27}{18}, \frac{30}{21}$

a. Compare the ratios in simplest form.

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

$$\frac{6}{18} = \frac{6 \div 6}{18 \div 6} = \frac{1}{3}$$

The ratios are equivalent.

► So, $\frac{4}{12}$ and $\frac{6}{18}$ form a proportion.

b. Compare the ratios in simplest form.

$$\frac{27}{18} = \frac{27 \div 9}{18 \div 9} = \frac{3}{2}$$

$$\frac{30}{21} = \frac{30 \div 3}{21 \div 3} = \frac{10}{7}$$

The ratios are *not* equivalent.

► So, $\frac{27}{18}$ and $\frac{30}{21}$ do *not* form a proportion.

Practice

Check your answers at BigIdeasMath.com.

Tell whether the ratios form a proportion.

1. $\frac{2}{5}, \frac{3}{15}$ **no**

2. $\frac{6}{8}, \frac{15}{20}$ **yes**

3. $\frac{4}{10}, \frac{2}{6}$ **no**

4. $\frac{9}{12}, \frac{21}{28}$ **yes**

5. $\frac{6}{24}, \frac{7}{28}$ **yes**

6. $\frac{6}{15}, \frac{9}{36}$ **no**

7. $\frac{72}{10}, \frac{36}{8}$ **no**

8. $\frac{38}{14}, \frac{57}{21}$ **yes**

9. $\frac{30}{25}, \frac{16}{12}$ **no**

10. $\frac{45}{27}, \frac{75}{45}$ **yes**

11. $\frac{64}{36}, \frac{56}{38}$ **no**

12. $\frac{72}{32}, \frac{63}{28}$ **yes**

13. **FITNESS** You can do 62 push-ups in 2 minutes. Your friend can do 93 push-ups in 3 minutes. Do these rates form a proportion? Explain.

yes; Both can do 31 push-ups per minute.

14. **KAYAKS** You and your friend rent kayaks. Are the rates for renting a kayak proportional? Explain your reasoning.

no; Your rate was \$11.50 per hour and your friend's rate was \$10 per hour.

	Cost	Hours
You	\$23	2
Friend	\$30	3