Lesson 5.2

You may use calculators during this unit!

Learning Targets:

- Determine whether ratios form a proportion
- Determine whether two quantities are proportional
- Identify proportional relationships

Proportions

A **proportion** is an equation stating that two ratios are equivalent.

Two quantities that form a proportion are **Proportional.**

$$\frac{2}{3} = \frac{4}{6}$$

These two ratios are Proportional.

Must have = sign

- **Determine Whether Ratios Form a Proportion**

Tell whether $\frac{6}{4}$ and $\frac{8}{12}$ form a proportion.

Does $\frac{6}{4}$ equal $\frac{8}{12}$?

$$\frac{6}{4} = \frac{6 \div 2}{4 \div 2} = \frac{3}{2}$$

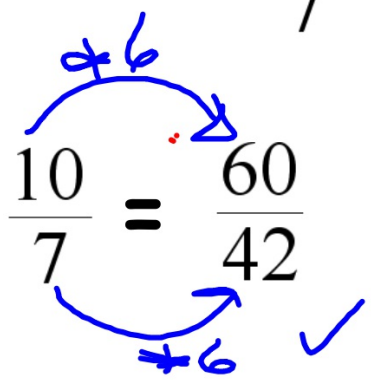
$$\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

$\frac{6}{4} \neq \frac{8}{12}$?

∴ No, not proportional

- **Determine Whether Ratios Form a Proportion**

Tell whether $\frac{10}{7}$ and $\frac{60}{42}$ form a proportion.



✓

$\frac{10}{7} = \frac{10}{7}$ ✓

1. Simplify
2. multiply or divide

280 = 280

$$\frac{8}{14} = \frac{20}{35}$$

Cross Products

$\frac{4}{7} \stackrel{?}{=} \frac{4}{7}$ ✓

Yes

- **Determine Whether Two Quantities Are Proportional**

Tell whether x and y are proportional.

Birdhouses Built, x	1	2	4	6
Nails Used, y	12	24	48	72

$\overset{?}{\frac{1}{12}} = \frac{2}{24} = \frac{4}{48} = \frac{6}{72}$ Yes

$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$

• Determine Whether Two Quantities Are Proportional

Tell whether x and y are proportional.

x	y
6	4
12	9
18	12

Compare each ratio
x to y in simplest form

$\frac{6}{4} = \frac{12}{9} = \frac{18}{12}$?

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

No

- **Determine Whether Two Quantities Are Proportional Using Cross Products**

Cross Products

In the proportion $\frac{a}{b} = \frac{c}{d}$, the products $a \cdot d$ and $b \cdot c$ are called **cross products**.

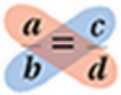
Cross Products Property

Words The cross products of a proportion are equal.

Numbers

$2 \cdot 6 = 3 \cdot 4$

Algebra



$ad = bc$,
where $b \neq 0$ and $d \neq 0$

- Determine Whether Two Quantities Are Proportional

Using Cross Products

240

$$\frac{10}{4} = \frac{60}{24}$$

240

Yes

45

$$\frac{9}{20} = \frac{3}{5}$$

60

NO

• Identify Proportional Relationships

You swim your first 4 laps in 2.4 minutes. You complete 16 laps 12 minutes. Is the number of laps proportional to your time?

Method 1: Compare unit rates.

$\frac{\ell}{\text{min}}$ $\quad \frac{4}{2.4} \stackrel{?}{=} \frac{16}{12}$ $\quad$ NO

$$\frac{1\frac{2}{3}\ell}{1\text{ min}} = \frac{1\frac{1}{3}\ell}{1\text{ min}}$$

• Identify Proportional Relationships

You swim your first 4 laps in 2.4 minutes. You complete 16 laps in 12 minutes. Is the number of laps proportional to your time?

Method 2: Use the Cross Products Property.

48 38.4

$\frac{4}{2.4} = \frac{16}{12}$

No

- **Identify Proportional Relationships**

You run the first 3 laps around the gym in 1.5 minutes. You complete 24 laps in 12 minutes. Is the number of laps proportional to your time?

Homework

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#5-17 odd

21, 22, and 26