## 5.2 Proportions p.172

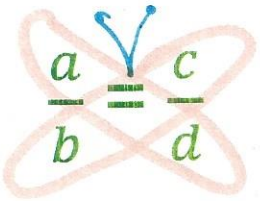
**Proportion:** an equation stating that two ratios are equivalent (fraction)

ex: $\frac{25}{10} = \frac{5}{2}$ (divide) $\quad \frac{1}{3} = \frac{3}{9}$ (multiply)

**Proportional:** two quantities that form a proportion are said to be proportional

**Cross Products Property:** (x) in a proportion, the cross products are equal

aka: The butterfly method




$ad = bc$

Tell whether the ratios from a proportion. Write yes or no.

1. $\frac{6}{4} \stackrel{?}{=} \frac{8}{12}$ (72, 32) — NO

2. $\frac{2}{5} \stackrel{?}{=} \frac{12}{30}$ (60, 60) — yes

3. $\frac{25}{35} \stackrel{?}{=} \frac{10}{14}$ (350, 350; $\frac{5}{7}$, $\frac{5}{7}$) — yes

4. $\frac{7}{2} \stackrel{?}{=} \frac{1}{6}$ (42, 2) — no

Tell whether x and y are proportional:

1.

| x | y |
|---|---|
| $\frac{1}{2}$ | 3 |
| 1 | 6 |
| $\frac{3}{2}$ | 9 |
| 2 | 12 |

~~* cross multiply every ratio in the table~~

~~* reduce each ratio~~

* $\frac{y}{x}$ (divide each ratio)

$\frac{3}{\frac{1}{2}}$ (0.5) $\frac{6}{1}$ $\frac{9}{\frac{3}{2}}$ (1.5) $\frac{12}{2}$ — yes

6 6 6 6

6 is called the constant of proportionality (aka unit rate)

$\frac{y}{x} = k \qquad y = kx$

Divide $\frac{y}{x}$ to see if there is a K.
if yes, what does K equal?

2.

| x | 1 | 2 | 4 | 6 |
|---|---|---|---|---|
| y | 12 | 24 | 48 | 72 |

$\frac{12}{1}$ $\frac{24}{2}$ $\frac{48}{4}$ $\frac{72}{6}$

yes;
K = 12

3.

| x | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| y | 7 | 8 | 9 | 10 |

$\frac{7}{1}$ $\frac{8}{2}$ $\frac{9}{3}$ $\frac{10}{4}$

no

Tell whether the two rates form a proportion:

1. 7 inches in 9 hours; 42 inches in 54 hours

$\frac{\text{inches}}{\text{hours}}$ $\frac{7}{9} \overset{?}{=} \frac{42}{54}$ (378 / 378) yes

2. 440 calories in 4 servings; 3 servings and 300 calories

$\frac{\text{calories}}{\text{servings}}$ $\frac{440}{4} \overset{?}{=} \frac{300}{3}$ no

3. 66 wins in 82 games; 99 wins in 123 games

$\frac{\text{wins}}{\text{games}}$ $\frac{66}{82} \overset{?}{=} \frac{99}{123}$ yes

4. You swim your first four laps in 24 minutes. You complete 16 laps in 12 minutes. Is the number of laps proportional to your time?

$\frac{\text{laps}}{\text{min}}$ $\frac{4}{24} \overset{?}{=} \frac{16}{12}$ no

5. You read the first 20 pages of a book in 25 minutes. In the next 45 minutes, you read 36 pages. Is the number of pages read proportional to your time?

$\frac{\text{pages}}{\text{minutes}}$ $\frac{20}{25} \overset{?}{=} \frac{36}{45}$ yes