Rates / Ratios / Proportions

Ratio - compares 2 things.
written as $\frac{1}{2}$ or 1:2 or 1 to 2.

Part to Part → cannot be written as a fraction unless you change it to part to whole

Part to whole → write as fraction + reduce

Rate - a ratio that cannot be written as a fraction because the units are different enough that they cannot be compared.

i.e. Km / hr Desks / students
salary / hr

Proportion - Two ratios which are equal to each other. often as two equal fractions. Usually you need to solve the equation to find the missing numerator or denominator. i.e $\frac{3}{6} = \frac{x}{12}$

Unit Rate - A rate with a denominator of one.
A rate can be converted to a unit rate by dividing the numerator by the denominator.
i.e 8 peaches for $4 so
$\frac{\$4}{8} = \frac{0.5}{1}$ so $0.50 per peach

How to Tell if Ratios are Proportional?

Method 1:
Reduce Fractions

$\frac{16}{40}$ and $\frac{20}{50}$

$\frac{16}{40} \div 8 = \frac{2}{5}$ and $\frac{20}{50} \div 10 = \frac{2}{5}$

✓ yes

method 2:
cross product

$\frac{16}{40}$ and $\frac{20}{50}$

$40 \cdot 20$ and $16 \cdot 50$

$800 = 800$ ✓ yes

method 3:
Divide and Compare decimals

$\frac{16}{40}$ and $\frac{20}{50}$

$= 0.4$ $= 0.4$

✓ yes

Proportion Word Problems

i.e The ratio of boys to girls in a class is 6 to 4. There are 20 girls in the class. How many boys are in the class?

$\frac{\text{Boys}}{\text{Girls}} \rightarrow \frac{6}{4} = \frac{x}{20}$

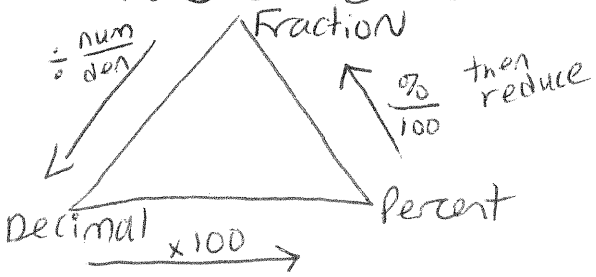
$6 \cdot 20 = 4 \cdot x$

$\frac{120}{4} = \frac{4x}{4}$

$30 = x$

∴ there are 30 Boys

Percent Review



Percent of a Number

40% of 300

$= .40 \times 300$

$= 120$

Finding 100% of a Number

If 12% of a group is 6 people, how many people are in the group in all.

$$\frac{12\%}{6} = \frac{100\%}{x}$$

$$12 \cdot x = 6 \cdot 100$$

$$\frac{12x}{12} = \frac{600}{12}$$

$$x = 50 \text{ people}$$

Interest

- The money you pay to borrow money
- The money you get for investing money

use the formula $I = PRT$ where I = Interest, P = Principal, R = rate in decimal form, T = Time in years

i.e You borrow $8,400 for 10 years at a rate of 9.5%. Find the interest

$I = PRT$

$= 8400(0.095)(10)$

$= \$5548$

$I = ?$

$P = 8,400$

$R = 9.5\% \Rightarrow 0.095$

$T = 10$ years

Three Ways to Represent Proportional Relationships.

1- Equation

$Y = Kx$ ← independent variable

Y → total dependent variable

K → constant of proportionality or slope or rate of change or unit rate → Find by using $K = \frac{y}{x}$

2- Table of Values

→ same as $Y = mx$

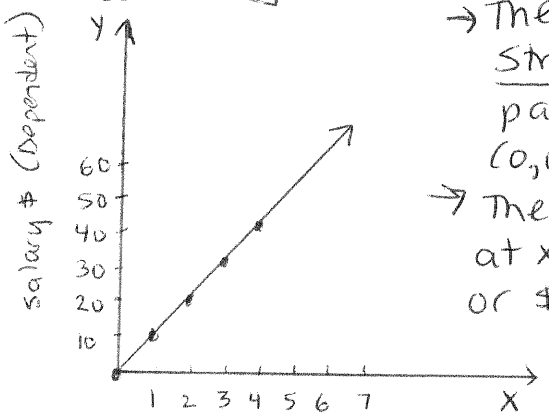
Hours (x) Independent	Dollars (y) Dependent
0	0
1	10
2	20
3	30
4	40

$$K = \frac{y}{x}$$

$$= \frac{40}{4}$$

$K = \$10$ / hour

3- Graph



→ The graph is a straight line passing through (0,0)

→ The unit rate is at $x = 1$ so (1, 10) or $10.

Other