

Proportions & Percent Change

7th Grade

Cross-multiplication, the percent proportion and percent change.

PROPORTION — two equal ratios

$$a / b = c / d \rightarrow a \times d = b \times c$$

$$3 / 4 = x / 20 \rightarrow 3 \times 20 = 4x \rightarrow 60 = 4x \rightarrow x = 15$$

Set it up with the same quantity on top of both fractions. Units keep you honest.

THE PERCENT PROPORTION

$$\text{part} / \text{whole} = \% / 100$$

$$\text{"What is 15\% of 80?"} \rightarrow x / 80 = 15 / 100 \rightarrow x = 12$$

$$\text{"12 is what percent of 80?"} \rightarrow 12 / 80 = p / 100 \rightarrow p = 15$$

PERCENT CHANGE

$$\text{change} \div \text{original} \times 100$$

$$\text{£40} \rightarrow \text{£52: change is 12, so } 12 \div 40 \times 100 = 30\% \text{ increase.}$$

Shortcut: multiply by $(1 \pm \text{rate})$

$$+30\% \rightarrow \times 1.30 \cdot -25\% \rightarrow \times 0.75 \cdot 8\% \text{ tax} \rightarrow \times 1.08$$

THE FOUR YOU WILL BE ASKED

Tip	bill $\times$ rate	$\text{£46} \times 0.18 = \text{£8.28}$
Discount	price $\times (1 - \text{rate})$	$\text{£60} \times 0.75 = \text{£45}$
Tax	price $\times (1 + \text{rate})$	$\text{£25} \times 1.07 = \text{£26.75}$
Simple interest	$I = P \times r \times t$	$\text{£500} \times 0.04 \times 3 = \text{£60}$