



Percentages



every percent question is a multiplication once you decide what the whole is

Percent is just a fraction with 100 underneath

- per cent means per hundred, so 37 percent is $\frac{37}{100}$ and nothing more. Turn it into a decimal the moment you see it: 0.37
- the word OF means multiply. 37 percent of 250 is 0.37×250
- the word IS marks the part, and the words OF THE marks the whole. Naming those two before touching the arithmetic settles most of these questions
- a percent on its own is meaningless until you know what it is a percent of. Half the wrong options in this topic are the right percent of the wrong base

The four you actually need

a percent of a number

$$P = \frac{p}{100} \times N$$

what percent one number is of another

$$p = \frac{\text{part}}{\text{whole}} \times 100$$

percent change, always over the OLD value

$$p = \frac{\text{new-old}}{\text{old}} \times 100$$

the multiplier form, an increase of p percent

$$\text{new} = \text{old} \times \left(1 + \frac{p}{100}\right)$$



the arrow is the CHANGE from A to B, but the percent is measured against A, the value you started at, never against B

the multiplier form is the one to memorise: an increase of 15 percent multiplies by 1.15, a decrease of 15 percent multiplies by 0.85

Worked: percent increase *

Q. a town's recycling rose from 250 tonnes a month to 320 tonnes a month. What was the percent increase?

- the change: $320 - 250 = 70$ tonnes
- divide by the OLD value, not the new one: $\frac{70}{250} = 0.28$
- multiply by 100: $0.28 \times 100 = 28$

Answer a 28 percent increase

Multipliers worth knowing by sight

Up 25 percent
multiply by 1.25

Down 25 percent
multiply by 0.75

Up 8 percent twice
multiply by 1.08 and again by 1.08

Down to 40 percent
multiply by 0.40, a fall of 60 percent