MYP MATHEMATICS

Percentages

Percentages

In mathematics, percentage represents a number, an amount, or rate of something, expressed as if it is part of a total that is 100.

For example: $50\% = \frac{50}{100}$

Percentage sign

Converting percentages into fractions & decimals

It is important to note that we can write a whole as 100%.

$$100\% = \frac{100}{100} = 1$$

You can always multiply or divide a number or expression by 1 and the value of it remains the same. This gives us a great tool to convert fractions into percentages and vice versa.

Let's say you have 23% and you want to convert this into a fraction.

$$23\% = \frac{23\%}{100\%} = \frac{23}{100}$$

Cancel the percentage signs

Or you have a fraction like $\frac{2}{5}$ *and you want to convert this into percentages.*

$$\frac{2}{5} = \frac{2}{5} \times 100\% = \frac{2}{5} \times \frac{100}{1}\% = \frac{200}{5}\% = 40\%$$

Or you have a decimal like 0.24 and you want to convert this into percentages.

$$0.24 = 0.24 \times 100\,\% = 24\%$$

A part of a whole

If you are trying to find out a certain percentage of an amount you just need to write it as fraction and multiply with the amount given.

For example: 20% of $36.

$$20\% \; of \; \$36 = \frac{20}{100} \times \$36 = \frac{20}{100} \times \frac{\$36}{1} = \frac{72}{10} = \$7.2$$

Replace ´of ` with a multiplication sign

Percentage increase & decrease

Method 1- Two steps calculation

Using this method, we

- find the increase then add it to the original quantity, or
- find the decrease then subtract it from the original quantity.

For example:

Increase 40 by 10%.

Step 1- $10\%\ of\ 40 = \frac{10}{100} \times 40 = \frac{10}{100} \times \frac{40}{1} = 4$

Step 2- Add 4 to 40, and 40+4=44

For example:

Decrease 40 by 10%.

Step 1- $10\%\ of\ 40 = \frac{10}{100} \times 40 = \frac{10}{100} \times \frac{40}{1} = 4$

Step 2- Subtract 4 from 40, and 40-4=36

Method 2- Using a `multiplier´

The original amount is 100% of the quantity. Find the increase/decrease after change and express as a decimal, then multiply this with the original amount.

For example:

Increase 40 by 10%.

Find the multiplier $100\% + 10\% = 110\% = 1.1$

Multiply it with the original amount $1.1 \times 40 = 44$

For example:

Decrease 40 by 10%.

Find the multiplier $100\% - 10\% = 90\% = 0.9$

Multiply it with the original amount $0.9 \times 40 = 36$

Expressing the change as a percentage

Find the change & write a fraction as $\frac{\textbf{change}}{\textbf{original amount}}$ *, then convert into percentages.*

For example: During a sale, the price of a lounge suite dropped from $1500 to $1200. What was the percentage decrease in price?

Solution:

The change = $1500- $1200= $300

The fraction is $\frac{\$300}{\$1500} = \frac{1}{5}$

Convert this into percentages $\frac{1}{5} \times 100\% = 20\%$ *, means the price is dropped by 20% during this sale.*