

Calculating a percentage of a number

We think about percentages every day in terms of discounted prices, or working out GST, or adding 20% to quantities to allow for overlap and wastage.

These examples will show you **3 steps** for calculating a percentage of a number. You need this for trade calculations such as adding to a measurement to allow for overlap, calculating efficiency rates, working out GST.

For more explanation and practice on fractions, decimals and percentages go to:

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/>

Percentages are a way of expressing parts of a whole. The whole = 100%. So if you get all the answers right in a workbook you'll get 100%. If you get half the answers right you'll get 50%.

Per cent means 'out of 100'

So 50% means 50 out of 100 or $\frac{50}{100}$ #

Step 1: CHANGING PERCENTAGES TO DECIMALS

To do calculations involving percentages first change the percentage to a decimal. The place value charts below shows you how to do this.

a) $\frac{50}{100}$ has 5 in the tenths column and 0 in the hundredths column.

Tens	Units	.	Tenths	Hundredths	Thousandths
			$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
	0	.	5	0	

So 50% = 0.50 (which is the same as 0.5)

b) 75% = 75 out of 100

$\frac{75}{100}$ has 7 in the tenths column and 5 in the hundredths column.

Tens	Units	.	Tenths	Hundredths	Thousandths
			$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
	0	.	7	5	

So 75 % = 0.75

c) 12.5 % = 12.5 out of 100

$\frac{12.5}{100}$ has 1 in the tenths column, 2 in the hundredths column and 5 in the thousandths column.

Tens	Units	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1000}$
	0	.	1	2	5

So 12.5% = 0.125

d) $\frac{8}{100}$ has 0 in the tenths column and 8 in the hundredths column.

Tens	Units	.	Tenths $\frac{1}{10}$	Hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1000}$
	0	.	0	8	

So 8% = 0.08

Have a look at the chart below. You should learn these common conversions from fraction to decimal to percentage.

Fraction	Fraction (in its simplest form)	Decimal	Percentage
$\frac{100}{100}$	$\frac{1}{1}$	1.0	100 %
$\frac{50}{100}$	$\frac{1}{2}$	0.5	50%
$\frac{25}{100}$	$\frac{1}{4}$	0.25	25%
$\frac{75}{100}$	$\frac{3}{4}$	0.75	75%
$\frac{20}{100}$	$\frac{1}{5}$	0.2	20%
$\frac{10}{100}$	$\frac{1}{10}$	0.1	10%
$\frac{5}{100}$	$\frac{1}{20}$	0.05	5%
$\frac{33}{100}$	$\frac{1}{3}$	0.33	33.33%
$\frac{67}{100}$	$\frac{2}{3}$	0.67	66.67%

Step 2: CALCULATING A PERCENTAGE OF A NUMBER

Once you've converted a percentage to a decimal you can use your calculator to work out a percentage of a number.

a) What is 10% of 65?

Think to yourself **of** means multiply

$$\begin{aligned} \text{so } & 10\% \times 65 \\ & = 0.1 \times 65 \\ & = 6.5 \end{aligned}$$

b) What is 12.5 % of 876?

$$\begin{aligned} & = 12.5\% \times 876 \\ & = 0.125 \times 876 \\ & = 109.5 \end{aligned}$$

c) What is 15% of 78.44

$$\begin{aligned} & = 15\% \times 78.44 \\ & = 0.15 \times 78.44 \\ & = 11.766 \end{aligned}$$

HINT:

Don't completely rely on your calculator. Sometimes mistakes are made by pushing the wrong numbers or missing a decimal point. Before using the calculator, always estimate in your head what your answer will be. Eg 12.5% will be a bit more than 10%.

Then compare the calculator's answer to your estimate. This can save costly mistakes.

Often you can calculate a percentage in your head if you know its equivalent fraction.

Eg 50% of a number will be half of the number so divide it by 2.

$$\begin{aligned} & 50\% \text{ of } 60 \\ & = 60 \div 2 \\ & = 30 \end{aligned}$$

25 % will be a quarter of the number so divide it by 4.

$$\begin{aligned} & 25\% \text{ of } 700 \\ & = 700 \div 4 \\ & = 175 \end{aligned}$$

10% will be one tenth of the number so divide it by 10.

$$\begin{aligned} & 10\% \text{ of } 71 \\ & = 71 \div 10 \\ & = 7.1 \end{aligned}$$

A quick way of dividing by 10 is to move the decimal point one place to the left.
So 71.0 becomes 7.1

Step 3: CALCULATING A PERCENTAGE AND ADDING IT TO THE WHOLE

You often need to calculate a percentage of a number then add it to the whole.

For example: Add 20% to a roof area to allow for overlap and wastage.

Or add 12.5% (or 15%) to an invoice to allow for GST

You can do this in **2 steps** – *First* find the percentage *then* add it to the whole.

So 20% of 500 m² = 100

500 + 100 = 600 m²

Or you can do this in **1 step** – add 1 to the percentage and multiply it by the original number

Check out the following examples.

- a) Add 20% to a roof area of 160 m²

$$\begin{aligned} 0.2 \times 160 &= 32 \text{ (find 20\%)} \\ + 1 \times 160 &= 160 \text{ (add it to the whole 160)} \\ = 1.2 \times 160 &= 192 \text{ m}^2 \text{ (do it all in one calculation)} \end{aligned}$$

By adding 1 to the percentage, the original sum is automatically added to your answer.

- b) Add 15% to 185

$$15\% = 0.15$$

$$1.15 \times 185 = 212.75$$

- c) Add 12.5 % to \$7000

$$12.5\% = .0.125$$

$$1.125 \times 7000 = \$ 7 875$$