# Introduction to Percentages %

The term 'per cent' means one out of a hundred. In mathematics percentages are used to describe parts of a whole – the whole being made up of a hundred equal parts. The percentage symbol % is used commonly to show that the number is a percentage, less commonly the abbreviation 'pct' may be used.

Percentages are used frequently in all walks of life. "30% increase in fuel prices this winter", "20% off all shoes", "79% of people in the UK have an Internet connection", "50% extra free".

Understanding percentages is a key skill that will potentially save you time, money and make you more employable.

The grid below has 100 cells

- Each cell is equal to 1% of the whole (the red cell is 1%).
- Two cells are equal to 2% (the green cells).
- Five cells are equal to 5% (the blue cells).
- Twenty five cells (purple cells) are equal to 25% of the whole or one quarter (¼).
- Fifty cells (yellow cells) are equal to 50% of the whole or half (½).
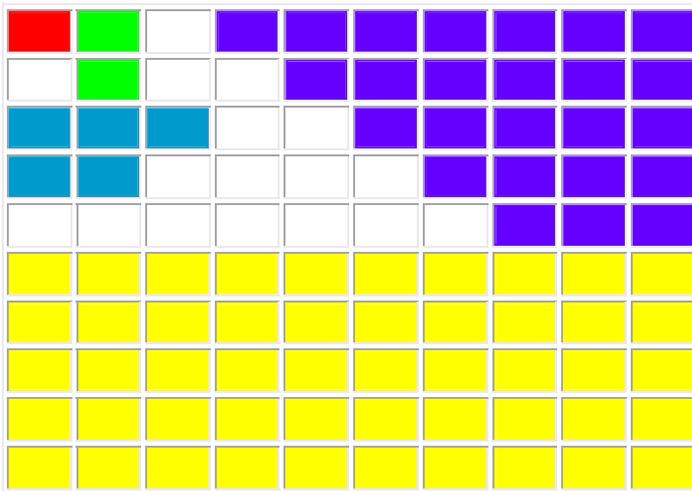
How many unshaded (white) cells are there? What is the percentage of unshaded cells?

Finding the Percentage

There are lots of reasons why you may want to find the percentage of a number. Let's suppose that you want to buy a new laptop computer for £500 - you have checked local suppliers and one company has offered to give you 20% off the price. How much will the laptop cost taking into account the discount offered?

As we have already discovered, percentages are ways of dividing the whole into 100 equal parts. The whole can be anything, an amount of money, a length of time, your body weight - the whole is simply the whole amount of something or 100%. In this example the whole is £500 - the cost of the laptop before discount.

One percent of £500 is therefore £500 ÷ 100. That is £5. 1% of £500 = £5.

Once you have worked out what 1% is equal to you can multiply it by the percentage you are looking for, in this case 20%. So £5 × 20 = £100. Therefore 20% of £500 = £100. The laptop computer will therefore cost £500 – 20% which is £500 - £100 = £400.

The easy way to work out 1% of any number:
1% is the whole (whatever that may be) divided by 100. When we divide something by 100 we simply move the place values two columns to the right, if you have read our '**numbers**' page you will be familiar with place values for how we write numbers. A quick recap:

£500 or just 500 is made up of 5 hundreds, no tens and no units. £500 also has no pence (cents if you are working in dollars) so could be written as £500.00 no tenths or hundredths.

Hundreds	Tens	Units	Point	Tenths	Hundredths
5	0	0	.	0	0

When we divide by 100 we simply move our number two columns to the right. So 500 divided by 100 = 005, or 5. We don't need leading 0s so we can get rid of them.

Hundreds	Tens	Units	Point	Tenths	Hundredths
0	0	5	.	0	0

This rule applies to all numbers, so £327 divided by 100 is £3.27. Which is the same as saying that £3.27 is 1% of £327. £1 divided by 100 = £0.01 one pence. There are one hundred pence in a pound (and one hundred cents in a dollar). 1p is therefore 1% of £1.

Once you have mastered dividing by 100 to work out 1% of the whole you can use a calculator or your memory of the multiplication tables to multiply your answer to the percentage you are looking for..

Working with Percentages

We calculated a 20% discount in the example above and then subtracted this from the whole to work out how much a new laptop would cost.

As well as taking a percentage away we can also add a percentage to a number. For example: George is promoted and with that comes a 5% pay-rise. Currently George earns £24,000 a year, how much will he earn after his pay-rise?

As before, the first thing to do is work out 1% of the whole. The whole in this example is George's current salary, £24,000. 1% of £24,000 is £240. We then multiply our 1% number by 5, to find 5%. £240 × 5 = £1,200. George is going to be £1,200 a year better off after his promotion and his new salary will be £24,000 + £1,200 = £25,200.

Percentages as Decimals

As a percent is a fraction of a whole (the whole is always 100%) it can be written as a decimal. To write a percentage as a decimal simply divide it by 100. 50% becomes 0.5. 20% becomes 0.2. 1% becomes 0.01 and so on. We can calculate percentages using this knowledge. 50% is the same as a half, so 50% of 10 is 5 - as five is half of 10 (10 ÷ 2). The decimal of 50% is 0.5. So another way of finding 50% of 10 is to say 10 × 0.5 - that is 10 halves.

Therefore 20% of 50 is the same as saying 50 × 0.2. Which equals 10.
17.5% of 380 = 380 × 0.175. Which equals 66.5.
George's salary increase as above was 5% of £24,000. £24,000 × 0.05 = £1,200.

Working out Percentages of a Whole

So far we have looked at the basics of percentages, how to add or subtract a percentage from a whole. Sometimes it is useful to be able to work out the actual percentages of a whole.

For example, let's suppose an organisation employs 9 managers, 12 administrators, 5 accountants, 3 human resource professionals, 7 cleaners and 4 catering staff. What percentage of each type of staff does it employ?

To start to solve this problem we need to know the whole, the whole is the total number of staff in the organisation. We can find this by adding together the different types of staff. 9 managers + 12 administrators + 5 accountants + 3 HR professionals + 7 cleaners + 4 catering staff: a total of 40 members of staff. Our whole is therefore 40.

For each category of staff we now need to work out the percentage, the sum we need to do is:

Staff in Category ÷ Whole

Starting with Managers

9 Managers ÷ 40 = 0.225 - That is an odd number, can it be right? Yes it is right but there is one more step - to convert this number to a percentage it needs to be multiplied by 100. Multiplying by 100 is the same as diving by a hundred except you move the numbers the other way on the place values scale. So 0.225 becomes 22.5. 22.5% of the organisations employees are Managers.

We do the same calculation for Administrators:

12 Administrators ÷ 40 = 0.3. $0.3 \times 100 = 30\%$.

Then for 5 Accountants 5 ÷ 40 = 0.125. $0.125 \times 100 = 12.5\%$.

3 HR Professionals ÷ 40 = 0.075. $0.075 \times 100 = 7.5\%$.

7 Cleaners ÷ 40 = 0.175. $0.175 \times 100 = 17.5\%$.
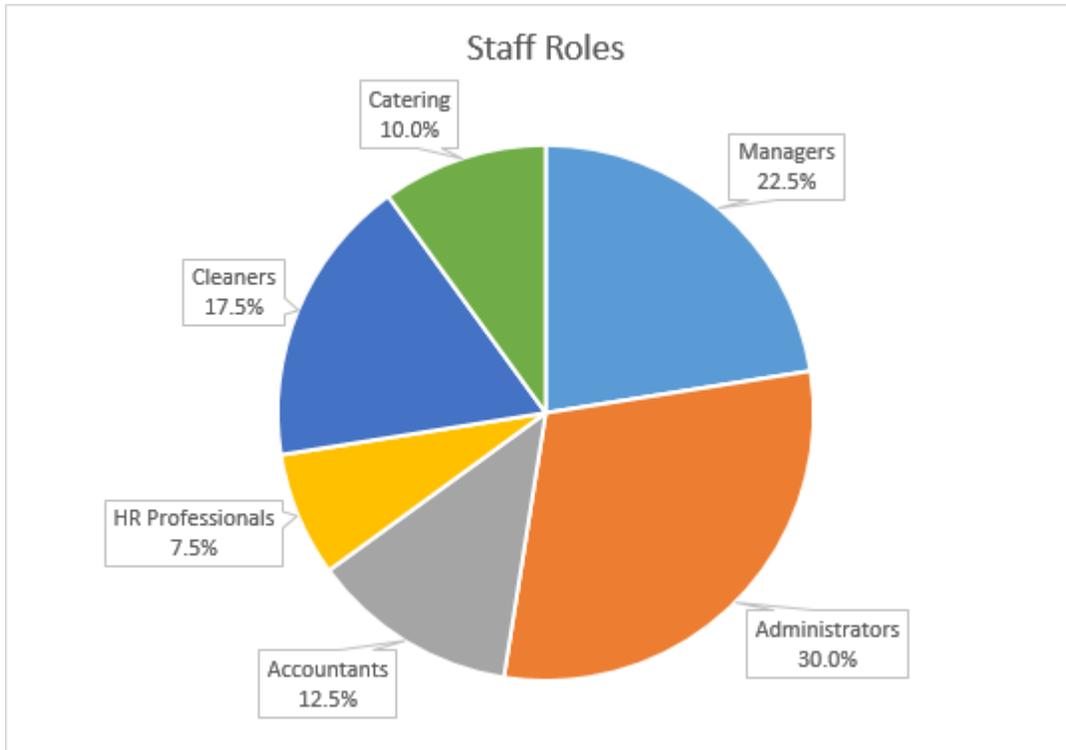
4 Catering staff ÷ 40 = 0.1. $0.1 \times 100 = 10\%$.

When you have finished calculating your percentages it is a good idea to add them together to make sure that they equal 100%. If they don't then check your calculations.

In summary we can say that the organisation is made up of:

Roles	Number of Staff	% of Staff
Managers	9	22.5%
Administrators	12	30%
Accountants	5	12.5%
HR Professionals	3	7.5%
Cleaners	7	17.5%
Catering	4	10%
Total	40	100%

It can be useful to show data representing a whole on a pie chart. You can quickly see the proportions of categories of staff in the example.

Staff Roles

Find more at: