Lesson - Percentages

Year: Year 5

Hello, I am Otto! Percentages are everywhere. Shops put them on sale signs, phones show them on the battery icon and sports teams use them to describe results. The word per cent means out of one hundred, and it lets us compare amounts that are measured out of different totals. In this chapter you link percentages, fractions and decimals and find simple percentages of amounts.

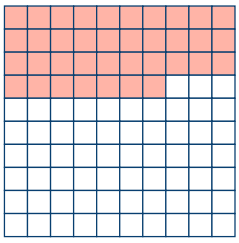
Starter activity

Look at a phone, tablet or laptop battery. It shows a percentage such as 60%. This means 60 out of every 100 parts of the battery are full. If the battery is cut into 100 tiny pieces, 60 of them are filled. How many pieces are empty? Think about this as you read: the full part and the empty part always add to 100%.

What does per cent mean?

Definition: per cent

Per cent means "out of one hundred". We write it with the symbol **%**. So 37% means 37 out of 100, which is $\frac{37}{100}$ or 0.37. The whole thing is always 100%.



The 10 by 10 grid is one whole made of 100 squares. 37 squares are shaded, so 37% of the grid is shaded and 63% is not shaded.

Example 1

A hundred-square has 23 squares shaded red. Write the shaded part as a percentage, a fraction and a decimal.

23 out of 100 squares are shaded. As a percentage that is **23%**, as a fraction it is $\frac{23}{100}$ and as a decimal it is **0.23**.

Percentages, fractions and decimals

Rule: converting

To change a percentage to a fraction, write it over 100 and simplify. To change a

percentage to a decimal, divide by 100 (move the digits two places to the right). To change a decimal to a percentage, multiply by 100 (move the digits two places to the left).

Percentage	Fraction	Decimal
50%	$\frac{1}{2}$	0.5
25%	$\frac{1}{4}$	0.25
75%	$\frac{3}{4}$	0.75
10%	$\frac{1}{10}$	0.1
20%	$\frac{1}{5}$	0.2
40%	$\frac{2}{5}$	0.4
80%	$\frac{4}{5}$	0.8
1%	$\frac{1}{100}$	0.01

Example 2

Write 45% as a fraction in simplest form and as a decimal.

45% = $\frac{45}{100}$. Divide top and bottom by 5 to get $\frac{9}{20}$. As a decimal, 45 ÷ 100 = **0.45**.

Method: fraction to percentage

1. Find a number that you can multiply the denominator by to make 100.
2. Multiply the numerator by the same number.
3. The new numerator is the percentage.

Example 3

Write $\frac{7}{20}$ as a percentage.

20 × 5 = 100, so multiply the top by 5 too: 7 × 5 = 35. So $\frac{7}{20}$ = $\frac{35}{100}$ = **35%**.

Watch out

A percentage is not always a whole number, but at Year 5 you work with whole percentages. Do not forget that 5% is 0.05, not 0.5. The decimal 0.5 is 50%. Check by asking: is 5% a small part or half?

Finding a percentage of an amount

Key fact: simple percentages

50% is one half, so divide by 2. 25% is one quarter, so divide by 4. 10% is one tenth, so divide by 10. 20% is one fifth, so divide by 5. 1% is one hundredth, so divide by 100.

Method: percentage of an amount using 10%

1. Find 10% by dividing the amount by 10.
2. Multiply 10% by the number of tens in the percentage. For example 30% is 3 × 10%.
3. For 5% halve the 10% value, for 1% divide the 10% value by 10.

Example 4

Find 30% of £60.

10% of £60 = £60 ÷ 10 = £6. 30% is three times that: 3 × £6 = **£18**.

Example 5

A coat costs £80. In a sale it is reduced by 25%. How much is the sale price?

25% is one quarter: £80 ÷ 4 = £20. That is the amount taken off. Sale price = £80 − £20 = **£60**.

Comparing and ordering

Method: ordering fractions, decimals and percentages

1. Change every number to a percentage (or every number to a decimal).
2. Compare the percentages as you would compare whole numbers.
3. Write the original numbers in order.

Example 6

Put in order, smallest first: $\frac{3}{5}$, 0.58, 62%.

$\frac{3}{5} = \frac{60}{100}$ = 60%. 0.58 = 58%. 62% stays the same. The order is 58%, 60%, 62%, so **0.58, $\frac{3}{5}$, 62%**.

Did you know?

The word "percent" comes from the Latin per centum, meaning "by the hundred". The Romans already used fractions with denominator 100 when they collected taxes. Today you see percentages in weather reports, on food labels and in sports statistics:

a basketball player with 75% free throws scores 3 out of every 4 tries.

Otto's tip

Always check that your answer makes sense. 50% is half, so 50% of 80 must be 40. If your answer for 10% of an amount is bigger than the amount, something has gone wrong!