Lesson - Decimals and percentages

Year: Year 6

Decimals and percentages are used in money, measures and sales. In Year 6 you multiply and divide decimals and find percentages of amounts.

Starter activity

Aisha is shopping. A pair of trainers costs £45 and has a sign "20% off". She also has 3 items that cost £2.45 each. How much will she pay altogether? To answer this you need to calculate with decimals and percentages. In this chapter you will learn how to read and round decimals, multiply and divide them, and write fractions, decimals and percentages in different ways.

Place value with decimals

Definition: decimal place value

The digits after the decimal point are tenths, hundredths and thousandths. In 5.372, the 3 is worth 0.3, the 7 is worth 0.07 and the 2 is worth 0.002.

Definition: decimal

A **decimal** is a number with a decimal point that separates the whole part from the parts smaller than one.

Example 1

What is the value of the 4 in 8.742?

The 4 is in the hundredths column, so it is worth 0.04.

Rounding decimals

Rule: rounding

Look at the next digit. If it is 5 or more, round up. If it is 4 or less, round down.

Example 2

Round 7.846 to 1 decimal place and to the nearest whole number.

1 decimal place: the hundredths digit is 4, so 7.8. Nearest whole number: the tenths digit is 8, so 8.

Multiplying and dividing by 10, 100 and 1 000

Key fact: moving digits

When multiplying by 10, 100 or 1 000, digits move 1, 2 or 3 places to the left. When dividing, digits move to the right. So 3.45 × 100 = 345 and 62 ÷ 1 000 = 0.062.

Multiplying and dividing decimals by whole numbers

Method: multiplying a decimal by a whole number

1. Ignore the decimal point and multiply the digits.
2. Count the decimal places in the original number.
3. Put the decimal point back so the answer has the same number of decimal places.

Example 3

Work out 2.4 × 6.

24 × 6 = 144. 2.4 has 1 decimal place, so the answer is 14.4.

Example 4

Work out 7.5 ÷ 5.

75 ÷ 5 = 15. Two digits after the point become one decimal place: 1.5.

Watch out

Do not forget the decimal point. Estimate first: 2.4 × 6 is a bit more than 12, so 14.4 makes sense, but 1.44 does not.

Fractions, decimals and percentages

Key fact: equivalents

$\frac{1}{2}$ = 0.5 = 50%. $\frac{1}{4}$ = 0.25 = 25%. $\frac{3}{4}$ = 0.75 = 75%. $\frac{1}{10}$ = 0.1 = 10%. $\frac{1}{5}$ = 0.2 = 20%.

Example 5

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

$\frac{7}{20} = \frac{35}{100}$, which is 0.35 or 35%.

Percentages of amounts

Method: finding a percentage of an amount

1. Find 10% by dividing by 10, and 1% by dividing by 100.
2. Build up the percentage you need.
3. Add or subtract as needed.

Example 6

Find 15% of £80.

10% = £8 and 5% = £4. So 15% = £12.

Example 7

A coat costing £60 has 35% off. Find the sale price.

10% = £6, so 30% = £18 and 5% = £3. 35% = £21. The sale price is £60 − £21 = £39.

More about decimals and percentages

Method: converting a fraction to a decimal

1. Divide the numerator by the denominator.
2. Or make an equivalent fraction with a denominator of 10, 100 or 1 000.
3. Write the numerator as a decimal with the right number of places.
4. Multiply by 100 to find the percentage.

Example 8

Write $\frac{5}{8}$ as a decimal and as a percentage.

Divide 5 by 8: 5 ÷ 8 = 0.625. To find the percentage, multiply by 100, so 0.625 × 100 = 62.5%.

Example 9

Work out 4.6 × 12.

First estimate: 5 × 10 = 50. Now calculate 46 × 12 = 46 × 10 + 46 × 2 = 460 + 92 = 552. The number 4.6 has one decimal place, so the answer has one decimal place: **55.2**. This is close to the estimate.

Example 10

A pupil scores 21 out of 25 in a test. What is the score as a percentage?

Make an equivalent fraction out of 100. 25 × 4 = 100, so multiply the top by 4 as well: 21 × 4 = 84. The score is $\frac{84}{100}$, which is **84%**.

Example 11

A bike costs £84. In a sale it is reduced by 25%. What is the sale price?

25% is the same as $\frac{1}{4}$, and £84 ÷ 4 = £21. The reduction is £21. The sale price is £84 − £21 = **£63**. You could also find 75% directly: 75% of £84 = 3 × £21 = £63.

Watch out: common mistakes

A longer decimal is not always bigger: 0.45 is smaller than 0.5 because 4 tenths is less than 5 tenths. Be careful with zeros as place holders, so that "five thousandths" is 0.005 and not 0.05. Also, 7% is 0.07 and not 0.7.

Percentages you can find in your head

50% is half, 25% is a quarter, 10% is one tenth and 1% is one hundredth. To find 5%, halve 10%. To find 15%, add 10% and 5%. To find 75%, find 25% and multiply by 3. These facts make most percentage questions quick.

Did you know?

The word "percent" comes from the Latin "per centum", which means "by the hundred". The percent sign % developed from a way of writing "per cento" in Italian merchants\' notebooks about 600 years ago. Today it is used in shops, banks and weather forecasts all over the world.

Otto's tip

Percentages are just fractions out of 100. Find 10% first, and build every other percentage from it!