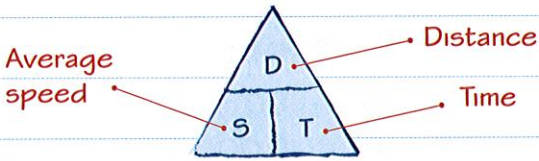




Speed

This is the formula triangle for speed.



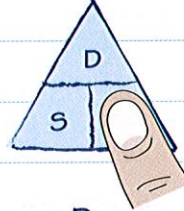
$$\text{Average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$$

$$\text{Time} = \frac{\text{distance}}{\text{average speed}}$$

$$\text{Distance} = \text{average speed} \times \text{time}$$

Using a formula triangle

Cover up the quantity you want to find with your finger.



The position of the other two quantities tells you the formula.

$$T = \frac{D}{S} \quad S = \frac{D}{T} \quad D = S \times T$$

Units

The most common units of speed are

- metres per second: m/s
- kilometres per hour: km/h
- miles per hour: mph

The units in your answer will depend on the units you use in the formula.

When distance is measured in **km** and time is measured in **hours**, speed will be measured in **km/h**.

When you are calculating a distance or time, you **MUST** make sure that the units of the other quantities match.

Minutes and hours

For questions on speed, you need to be able to convert between minutes and hours.

Remember there are 60 minutes in 1 hour.

To convert from minutes to hours you divide by 60.

$$24 \text{ minutes} = 0.4 \text{ hours} \quad \frac{24}{60} = \frac{2}{5} = 0.4$$

To convert from hours to minutes you multiply by 60.

$$3.2 \text{ hours} = 192 \text{ minutes} \quad 3.2 \times 60 = 192 \\ = 3 \text{ hours } 12 \text{ minutes}$$

Worked example

A plane travels at a constant speed of 600 km/h for 45 minutes. How far has it travelled?

$$45 \text{ minutes} = \frac{45}{60} \text{ hours} = \frac{3}{4} \text{ hour}$$

$$D = S \times T$$

$$= 600 \times \frac{3}{4} = \frac{600 \times 3}{4} = \frac{1800}{4} = 450$$

The plane has travelled 450 km.

grade C



Speed checklist

Draw formula triangle.

Make sure units match.

Give units with answer.

The journey time in part (b) needs to be changed into hours.

Any minutes calculated must be changed to a fraction of an hour in its simplest form before calculating the speed.

Now try this

- (a) Daniel leaves his house at 07:00. He drives 100 miles to a meeting. He drives at an average speed of 40 miles per hour. At what time does Daniel arrive at the meeting? (2 marks)

- (b) Daniel leaves the meeting at 17:20. He drives 100 miles back home. He arrives home at 20:00. What was Daniel's average speed? (2 marks)

edexcel

grade C