Speed

Starter

1. **(Review of last lesson)** A model car is made on a scale of $1 : 20$. The length of the model is 24 cm. The area of the windscreen of the model is 32 cm^2. The volume of the boot of the model is 90 cm^3. Calculate the actual:
   (a) length of the car,
   (b) area of the windscreen,
   (c) volume of the boot.
   Give your answers in m, m^2 and m^3 respectively.

2. How fast, in km/h, would you need to travel in order to cover 100 km in 2 hours?

Notes

The formula connecting speed, distance and time is $\text{Average speed} = \dfrac{\text{Distance travelled}}{\text{Time taken}}$ This is usually shortened to:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

N.B. Converting minutes to hours: divide by 60

Units

Be careful when mixed time units are used i.e. 5h 45m. In such cases, convert such times so that just one unit is used.

E.g. $5\text{h } 45\text{m} \equiv 5\frac{45}{60}$ hours $= 5\frac{3}{4}$hours

E.g. 1 Calculate the average speed, giving appropriate units, for the following journeys:
(a) The distance travelled is 80 miles in 4 hours.
(b) It took 2h 30m to travel 60 km.
(c) 260 miles was covered in 4h 20m

Working: (a)

(b) ***Convert the time into hours:*** $2\text{h } 30\text{m} \equiv 2.5$ hours

$$\text{Average speed} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{60}{2.5} = 24 \text{ km/h}$$

(c)

E.g. 2 A runner sets out at midday to run to the next village, 12 miles away. She wants to arrive at $13:30$. At what average speed should she run?

E.g. 3 Ali ran 800 m in 2 min 38 sec. What was his average speed in m/s?

Other units

Using the same principles we can solve problems using other units.

E.g. 4 15 litres of water flows from a hose in 20 seconds. Give this rate of flow in litres/second.

Working: In 20 seconds, 15 litres of water flow

In 1 second, $\frac{15}{20}$ litres of water flow

So the rate of flow is $\frac{15}{20} = \frac{3}{4} = 0.75$ litres/second

E.g. 5 Mr White swam 102 lengths of a 25 m swimming pool in 50 minutes 27 seconds.
Calculate his average time
(a) per length (b) per 10 lengths.
Choose suitable units for your answer.

Video: Speed, distance and time

Solutions to Starter and E.g.s

Exercise

p111 Ex 18.1 Qu 1-10

Summary

The formula connecting speed, distance and time is $\text{Average speed} = \frac{\text{Distance travelled}}{\text{Time taken}}$ This is usually shortened to:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

N.B. Converting minutes to hours: divide by 60