

Calculating Speed

Speed tells us how **quickly** something is **moving**.

A cyclist has a constant (**steady**) speed of 6 m/s.

Every **second** they travel **six metres**.

In ten seconds, the cyclist will travel

$10 \times 6 = 60 \text{ m}$. In 25 s, they will travel

$25 \times 6 = 150 \text{ m}$.



You can also measure speeds in kilometres per hour (**km/h**) or miles per hour (**mph**).

A truck on a motorway at 60 km/h travels **60 km** each hour.

In two hours, the truck will travel **120 km**. In half an hour, the truck will travel **30 km**.

- 1 Fill in the table which shows typical speeds in m/s and km/h. The moving objects are **Snail, Airliner, Bus in town** and **Person walking** (but not in that order).

Object	Speed (m/s)	Speed (km/h)
	0.01	0.04
	1.5	6
	12	40
	220	800

- 2 A long distance runner runs at 3 m/s. How far will they run in

(a) ten seconds

(c) 120 s

(b) 45 s

(d) ten minutes?

- 3 A car on a motorway travels at 30 m/s. How much time does it take to travel

(a) 90 m

(c) 1800 m

(b) 900 m

(d) 90 km = 90 000 m?

- 4 A radio controlled buggy takes 8 s to travel 32 m at a steady speed. What is the buggy's speed in m/s?

- 5 A train travels 30 km at a steady speed. The journey takes 12 min = 0.2 h. What is the train's speed in km/h?

6 Complete the word equations using **Speed, Distance** and **Time**.

(a) Distance =

(b) Time =

(c) Speed =

7 Rewrite your word equations using symbols.

s is the distance, t is the time taken and v is the speed.

(a) $s =$

(b) $t =$

(c) $v =$

8 Use your understanding of speed, or the formulae, to calculate

(a) the distance when a toy car rolls at 2 m/s for 5 s

(b) the distance when a 3 m/s jogger jogs for 4 s

(c) the time taken for a child to run 30 m at 5 m/s

(d) the time taken for a train to travel 150 km at 100 km/h

(e) the speed if a marble rolls 1.5 m in 0.5 s

(f) the speed if an athlete runs 200 m in 22 s.

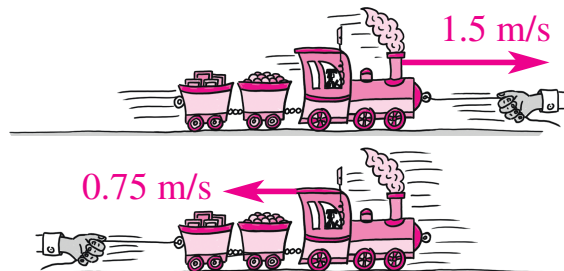
Velocity is the **speed** and **direction** of motion.

You need both pieces of information to work out where something will end up.

Suppose you move a trolley 12 m forwards and then 3 m backwards.

You have moved it **15 m** in total, but it is only **9 m** from where it started.

9 A child moves a model train forward at 1.5 m/s for 6 s then backwards at 0.75 m/s for 4 s. How far is the train from where it started?



Most journeys are not done at a steady speed. We calculate **Average speed** = $\frac{\text{Total distance}}{\text{Total time}}$

10 The speed limit on a road is 30 m/s. Two **average speed cameras** are 3600 m apart.

(a) A car takes 90 s to travel this distance. Calculate its average speed.

(b) A different car takes 150 s to travel the distance. Did it exceed the speed limit?