Calculating Speed

Speed tells us how quickly something is moving.

A cyclist has a constant (steady) speed of 6 m/s (six metres per second). Every second they travel six metres.
In ten seconds, the cyclist will travel $10 \times 6 = 60$ m. In 25 s, they will travel $25 \times 6 = 150$ m.

You can also measure speeds in kilometres per hour (km/h) or miles per hour (mph).
A truck on a motorway moving 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.

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1 Match each of these moving objects to their typical speed: **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

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2 A long distance runner runs at 3 m/s.

(a) Complete the sentence: They run ☐ metres every second.

(b) Work out how far they will run in ten seconds using an equation.

distance (m) = speed (m/s) × time (s)

☐ = 3 × 10

(c) Work out how far they will run in 40 s using an equation.

distance (m) = speed (m/s) × time (s)

☐ = 3 × 40

(d) Work out how far they would travel in 120 s.

(e) Work out how far they would travel in fifteen minutes.

3 A car on a motorway travels at 30 m/s.

(a) How far does it travel every second?

(b) Work out how much time it will take to travel 150 m using an equation.

distance (m)	=	speed (m/s)	×	time (s)
150	=	30	×	

(c) Work out how much time it will take to travel 600 m using an equation.

distance (m)	=	speed (m/s)	×	time (s)
600	=	30	×	

(d) Work out how much time it would take to travel 900 m.

(e) Work out how much time it would take to travel 90 km. 1 km $= 1000$ m

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4 A flying duck travels 1000 m in 50 s.

(a) Distance flown in one second $=$ ☐ $\div$ ☐ $=$ ☐ metres

(b) Complete the sentence: The duck's speed (in m/s) is ☐.

(c) A seagull flies 90 m in 6 s. Work out its speed using an equation.

distance (m)	=	speed (m/s)	×	time (s)
90	=		×	6

(d) Work out the speed of a pigeon which flies 440 m in 22 s.

(e) Work out the speed (in m/s) of a cyclist who travels 5000 m in thirty minutes.

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

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6 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?

7 Complete the word equations using **speed**, **distance** and **time**.

(a) distance $=$ (b) time $=$ (c) speed $=$

8 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) $v =$

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9 Use your understanding of speed, or the equations, to calculate

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

(b) the distance travelled 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

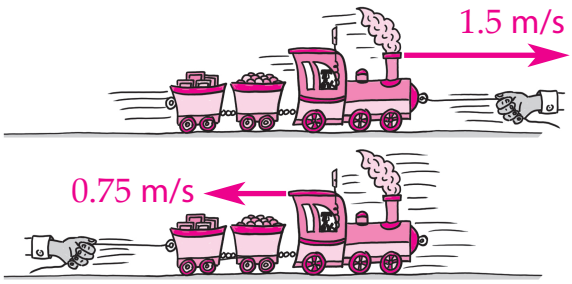
(d) the time taken for a train to travel 150 km at 100 km/h

(e) the speed of a marble rolling 1.5 m in 0.5 s

(f) the speed of an athlete running 200 m in 22 s.

You need to know speed and direction 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.

10 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 $= \dfrac{\text{total distance}}{\text{total time}}$

11 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 this car exceed the speed limit?