Application Worksheet 1

$$\textbf{average speed} = \frac{\textbf{distance}}{\textbf{time}}$$

also written as

$$\bar{v} = \frac{\mathbf{d}}{\mathbf{t}}$$

Where $\bar{v}$= average speed in metres per second (m/s)

d= distance in metres (m)

t= time in seconds (s).

Variations of this formula are;

$$\mathbf{d} = \bar{v} \times \mathbf{t} \qquad \mathbf{t} = \frac{\mathbf{d}}{\bar{v}}$$

	Average speed (m/s)	*Distance* (m)	*Time* (s)
(*a*)		120	40
(*b*)		20	5
(c)	20		0·5
(*d*)	19		55

1. Find the missing values in the table above. Showing full working in your jotter.

2. A car travels a distance of 1800 metres in a time of 90 seconds. Calculate the average speed of the car in metres per second.

3 Jane jogs to work every day at an average speed of 4 m/s. Most days it takes her 800 seconds to reach work. Calculate how far she jogs.

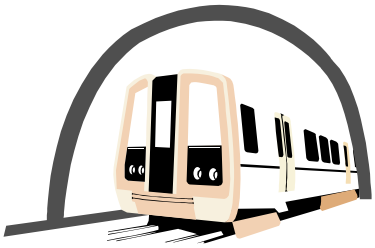
4. A model train travels round 20 m of track at an average speed of 2·5 m/s. How long does this take?

5. Christopher takes 15 seconds to swim one length of a swimming pool. If the pool is 90 metres long calculate his average speed.

6. How far will a cyclist travel in 60 seconds if he is travelling at an average speed of 13 m/s?

7. Calculate a hurdler's time if she completes the 400 m hurdle race at an average speed of 7 m/s.

8. How far will a jet aircraft travel in 5 minutes if it flies at 400 metres per second?

9. 

The Channel Tunnel is approximately 50 km long. How long will it take a train travelling at 90 m/s to travel from one end of the tunnel to the other?

10. A hill walker walks at an average speed of 1·6 m/s. How long will it take her to cover a distance of 33 km?

11. A lorry takes 4 hours to travel 150 km. Calculate the average speed of the lorry in m/s.

12. Richard Noble captured the world land speed record in 1983 in his vehicle Thrust 2. The car travelled one 2km in 3·5 seconds. Calculate the average speed of the car.

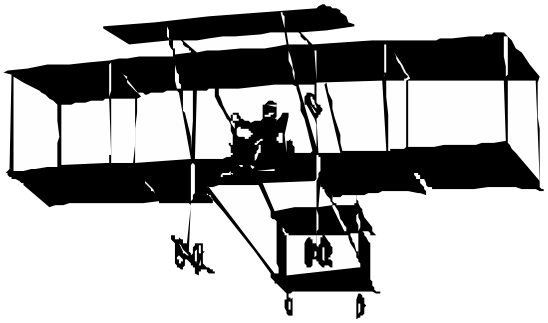
13. The table below shows part of a timetable for the Glasgow to Aberdeen train

Station	*Departure time*	*Distance* (km)
Glasgow	1025	0
Perth	1125	100
Dundee	1148	142
Aberdeen	1324	250

(*a*) Calculate the average speed of the train in m/s over the whole journey.

(*b*) Between which stations is the train's average speed greatest?

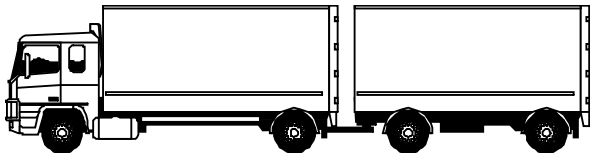
14. The Wright brothers were the first people to fly an aeroplane. Their first flight in 1903 lasted only 12 seconds and covered just 36 metres.



(a) Calculate the average speed of the plane during that first journey.

(b) Today a Tornado fighter jet can fly at Mach 2 (twice the speed of sound). How long would it take the jet to travel 36 metres?
(Speed of sound in air = 340 m/s)

15. A long distance lorry driver has 3 hours to travel 210 km to catch the Northlink ferry.



b) Calculate the average speed at which the lorry must travel in order to reach the ferry on time. Give your answer in km/h.

c) Due to heavy traffic the lorry has an average speed of 60 km/h for the first 100 km. Calculate how long this leg of the journey takes.

d) At what speed must the lorry travel for the rest of the journey if the driver is to catch the ferry? Give your answer in km/h.

16. The cheetah is the fastest mammal on earth. It can run at an average speed of 40 m/s but can only maintain this speed for short periods of time. Cheetahs prey on antelopes. The average speed of an antelope is 35 m/s. The antelope can maintain this speed for several minutes.

a) Calculate how far a cheetah could run in 12 seconds if it maintained an average speed of 40 m/s.

b) How long would it take an antelope to run 480 m?

c) A cheetah is 80 m away from an antelope when it begins to chase it. The antelope sees the cheetah and starts to run at the same instant than the cheetah begins its chase. Both animals run at their average speeds and the cheetah is able to run for 15 s. Show by calculation whether or not the cheetah catches the antelope.

17. Before a major motor race the competitors complete practice circuits in their cars. These practice runs are timed and used to determine the position of each car at the starting grid for the race. The race circuit is 3·6 km long.

In a particular race each driver completed four practice laps. The practice lap times for the top three drivers are shown in the table.

Driver Name	Lap Times (s)			
	1	2	3	4
Mickey	45·8	43·4	46·4	48·2
Donald	44·7	46·2	44·6	49·5
Goofy	46·3	44·8	45·1	43·8

a) Which driver had the greatest average speed during lap 1?

b) Calculate the greatest average speed during lap 2.

c) For each driver calculate their average speed in metres per second for the complete practice run.

d) Which driver is most likely to win the race?