# A SPEED (1)

SPEED = DISTANCE ÷ TIME $\quad S = \frac{D}{T}$

e.g. A ball, travelling at a steady speed, goes 100 metres in 5 seconds. What is its speed?

**FIRST** Write out values of DISTANCE and TIME $\quad D = 100, T = 5$

**THEN** Work out speed $\quad S = \frac{100}{5} = 20$

Ball travels at 20 m/s

**Note** Speeds are always written in **distance per time** units, e.g. m/s (metres per second), miles/h (miles per hour), etc.

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## B Uniform speed and average speed

Things which travel at the same speed all the time have a UNIFORM SPEED (or STEADY SPEED).

Most things which move in the real world (trains, people, aeroplanes, tennis balls, spiders, etc.) do NOT travel at uniform speed, but you can still find their AVERAGE SPEED by the same formula.

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

e.g. A train went 380 miles in 5 hours. What was its average speed?

$$D = 380 \quad , \quad T = 5$$

$$S = \frac{380}{5} = 76$$

Average speed of the train was 76 miles/h

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## C Hours and minutes

Always express hours and minutes in HOURS AND FRACTIONS OF AN HOUR (unless the question asks you to work in minutes). Look at page 30 A if you are not sure.

e.g. What is the average speed of a car which travels 132 miles in 2h 45min?

$$D = 132 \, , \quad T = 2\tfrac{3}{4}$$

$$S = 132 \div 2\tfrac{3}{4} = \frac{132}{1} \div \frac{11}{4} = 48 \text{ miles/h}$$



## a

Find the speed (S) from each distance (D) and time (T)

1) D = 35 m, T = 5 s
2) D = 630 miles, T = 7 h
3) D = 48 km, T = 3 h
4) D = 8 m, T = 0.2 s
5) D = 64.5 m, T = 5 min
6) D = 506 miles, T = 22 h
7) D = 65 km, T = 2½ h
8) D = 49 m, T = 3½ s
9) D = 405 miles, T = 13½ h
10) D = 5340 km, T = 12 h

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## b

Find the average speed of

1) a boy who walks 27 miles in 9 hours
2) a boat which travels 84 km in 6 hours
3) a cricket ball which travels 138 metres in 6 seconds
4) a girl who cycles 72 miles in 4½ hours
5) an aeroplane which flies 1008 miles in 5¼ hours
6) a snail which goes 4 metres in 8 minutes
7) a yacht which sails 12 miles in 1⅓ hours
8) a bee which flies 44 metres in 8 seconds
9) a locomotive which travels 208 miles in 2⅔ hours
10) an athlete who runs 400 metres in 64 seconds

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## c

Find the average speed of

1) an airliner which travels 910 miles in 2 hours 30 minutes
2) a car which travels 105 miles in 2 hours 20 minutes
3) a boy who walks 13½ miles in 3 h 45 min
4) a train which travels 490 miles in 5 h 50 min
5) a ship which goes 88 km in 3 h 40 min
6) a man who cycles 31½ miles in 2 h 15 min
7) a train which goes 400 miles in 4 h 10 min
8) a pigeon which flies 137½ km in 2 h 5 min
9) a helicopter which sets off at 13 15 and travels 120 miles, ending its journey at 14 55
10) a bus which departs from Spalding at 18 45 and arrives at Melton Mowbray, 36 miles away, at 2 021

# A SPEED (2)

## Finding DISTANCE

DISTANCE = SPEED × TIME  D = ST

e.g. A car travels for 5 hours at a speed of 38 miles/hour. How far does it travel ?

S = 38

T = 5  D = 38 × 5 = 190 miles

e.g. (2) An aeroplane flies at a speed of 474 km/h for 3 hours 10 minutes. How far does it fly?

S = 474

$T = 3\frac{1}{6}$  $D = 474 \times 3\frac{1}{6} = \frac{474}{1} \times \frac{19}{6}$  = 1501 km

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# B Finding TIME

TIME = DISTANCE ÷ SPEED  $T = \frac{D}{S}$

e.g. A bird flew a distance of 105 miles at an average speed of 15 miles/h. How long did its journey take?

D = 105

S = 15  $T = \frac{105}{15}$ = 7 hours

e.g. (2) A train travelled from Darlington to London, a distance of 232 miles, at an average speed of 80 miles/h. How long, in hours and minutes, did it take?

D = 232

S = 80

$T = \frac{232}{80} = \frac{29}{10} = 2\frac{9}{10}$ hours

$= 2 \text{ hours } (\frac{9}{10} \times \frac{60}{1}) \text{ minutes}$

= 2 hours 54 minutes

**REMEMBER** To change a fraction of an hour into minutes, multiply by 60 (see page 30B).

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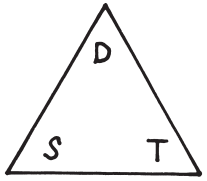
# C




D = ST  (speed × time)

$S = \frac{D}{T}$  (distance ÷ time)

$T = \frac{D}{S}$  (distance ÷ speed)



# a

ALWAYS READ THE QUESTION CAREFULLY AND MAKE SURE WHAT YOU HAVE BEEN ASKED TO FIND. Is it SPEED, or DISTANCE, or TIME?

1) Steven walked for 3 hours at an average speed of 5 km/h. What distance did he walk?

2) A boy ran 200 metres at a speed of 5 m/s. How long did it take him?

3) Barbara cycled at an average speed of 13 miles/h. If her journey took 2½ hours, how far did she go?

4) A golf ball travelled a distance of 27 m at a speed of 36 m/s. How long did it take?

5) An aircraft flew 880 miles at a speed of 330 miles/h. How long, in hours and minutes, did its journey take?

6) A train travels for 4 h 45 min at an average speed of 84 miles/h. Calculate the distance it travels.

7) Bert drove his truck from Exeter to Manchester a distance of 240 miles, in 5 hours 20 minutes. What was his average speed?

8) Kathy and Sara went on a 16½ mile hike. Their average walking speed was 2¾ miles/h. How long did it take them?

9) Light travels at about 186000 mile/s. The sun is about 93 000 000 miles from Earth. About how many seconds does it take sunlight to reach the Earth?

10) A motorist drove from Girvan to Edinburgh in 2 hours 40 minutes at an average speed of 34½ miles/h. Find the distance from Girvan to Edinburgh.

11) Mohammed and his uncle travelled from Liverpool to Nottingham, a distance of 99 miles, in 2 hours 45 minutes. What was their average speed?

12) A snail, travelling at 13½ m/hour, went from the wheelbarrow to the plastic gnome 5⅖ m away. How long, in minutes, did its journey take?

13) A bottle containing a message was launched from St. Kilda island on March 23 and reached Stromness, after floating 242 miles, on May 6. What was the average speed of the bottle in miles/day?

14) Angela set off on her motorbike at 3.46 p.m. and rode at an average speed of 48 miles/h until 4.21 p.m. By first finding how long, in hours, she took, calculate how far she went.

15) A train leaves Glasgow at 08 20 and travels 88 miles to Taynuilt at an average speed of 31⅗ miles/h. At what time does it reach Taynuilt?