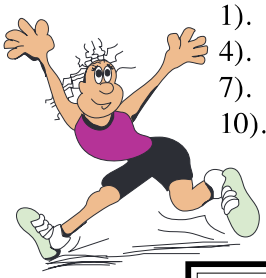
Speed 1.



A. Write each of the following as i). a fraction,
ii). a decimal fraction of 1 hour.

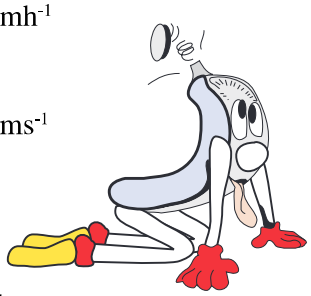
1). 15 minutes, 2). 1 hour 30 minutes, 3). 1 hour 6 minutes,
4). 45 minutes, 5). 18 minutes, 6). 2 hours 54 minutes,
7). 5 hours 36 minutes, 8). 3 hours 12 minutes, 9). 2 hours 48 minutes,
10). 42 minutes, 11). 1 hour 24 minutes, 12). 20 minutes.

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

Units: $\frac{\text{miles}}{\text{hour}}$ miles/hour mph

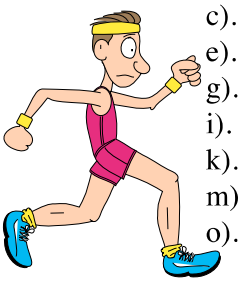
$\frac{\text{kilometres}}{\text{hour}}$ km/h kmh^{-1}

$\frac{\text{metres}}{\text{second}}$ m/s ms^{-1}



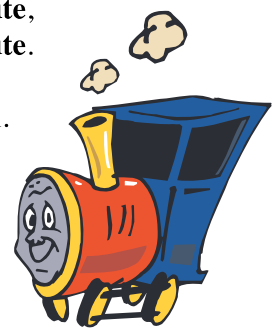
B. Find the average speed for each journey, state the units of your answer.

1). a). 60 kilometres in 2 hours, b). 75 kilometres in 5 hours,
c). 52 kilometres in 4 hours, d). 3 hours to travel 129 kilometres,
e). 6 hours to travel 174 kilometres, f). 3 hours to travel 210 kilometres,
g). 72 kilometres in 6 hours, h). 201 kilometres in 5 hours,
i). 8 hours to travel 36.8 kilometres, j). 30 **minutes** to travel 10 kilometres,
k). 3 kilometres in 30 **minutes**, l). 8 kilometres in 15 **minutes**,
m). 45 **minutes** to travel 18 kilometres, n). 63 kilometres in 1 hour 30 minutes,
o). 48 kilometres in 1 hour 30 minutes, p). 35 kilometres in 1 hour 45 minutes.



2). a). 24 miles in 6 hours, b). 7 hours to travel 315 miles,
c). 11 hours to travel 176 miles, d). 192 miles in 6 hours,
e). 57 miles in 3 hours, f). 328 miles in 8 hours,
g). 60 miles in 8 hours, h). 5 hours to travel 21 miles,
i). 6 hours to travel 207 miles, j). 30 **minutes** to travel 8 miles,
k). 12 miles in 15 **minutes**, l). 33 miles in 45 **minutes**,
m). 35 miles in 1 hour 15 minutes, n). 1 hour 45 minutes to travel 84 miles,
o). 73.5 miles in 1 hour 45 minutes, p). 140 miles in 2 hours 30 minutes.

3). a). 126 metres in 7 seconds, b). 12 seconds to travel 60 metres,
c). 4 seconds to travel 8 metres, d). 15 metres in 5 seconds,
e). 28 metres in 7 seconds, f). 6 seconds to travel 42 metres,
g). 12 seconds to travel 28.8 metres, h). 37.2 metres in 12 seconds,
i). 21 seconds to travel 113.4 metres, j). 240 metres in 1 **minute**,
k). 1 **minute** to travel 390 metres, l). 210 metres in 1 **minute**.



4). A train travels 148 km in 4 hours. Find the average speed of the train.
5). A car travels up the motorway. It goes 193.5 miles in 3 hours.
Find the average speed of the car.
6). A cyclist goes 24 kilometres in 1 hour 30 minutes.
Find the average speed for this journey.
7). A snake crawls 18 metres in 15 seconds. Find the average speed.

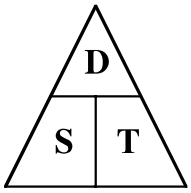
8). A scooter travels 80 miles in 2 hours 30 minutes.
Find the average speed of the scooter.

9). A aeroplane covers 412.5 miles in 1 hour 15 minutes. What is the average speed of the aeroplane for this journey ?

10). A sprinter runs the 100 metres in 12.5 seconds. What is the average speed of the sprinter ?

11). A car travels 221 kilometres in 4 hours 15 minutes.
Find the average speed for this journey.

12). A rocket is sent 2598.75 miles in 2 hour 45 minutes.
Find the average speed of the rocket.

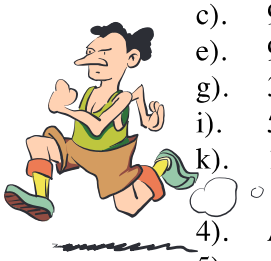


C. Find the distance travelled for each journey, state the units of your answer.

1). a). 37 km/h for 2 hours, b). 59 km/h for 6 hours,
c). 12 km/h for 5 hours, d). 3 hours travelling at 24 km/h,
e). 3 hours travelling at 18 km/h, f). 9 hours travelling at 16 km/h,
g). 12.5 km/h for 5 hours, h). 4.6 km/h for 8 hours,
i). 4 hours travelling at 42.3 km/h, j). 30 **minutes** travelling at 40 km/h,
k). 52 km/h for 15 **minutes**, l). 35 km/h for 45 **minutes**,
m). 1 hour 30 minutes travelling at 20 km/h, n). 64 km/h for 2 hours 15 minutes,
o). 85 km/h for 3 hour 45 minutes, p). 105 km/h for 5 hours 15 minutes.

2). a). 17 mph for 4 hours, b). 8 hours travelling at 16 mph,
c). 3 hours travelling at 48 mph, d). 5 mph for 2 hours,
e). 19 mph for 5 hours, f). 72 mph in 4 hours,
g). 42.4 mph for 2 hours, h). 7 hours travelling at 57.5 mph,
i). 8 hours travelling at 23.7 mph, j). 15 **minutes** travelling at 35 mph,
k). 70 mph for 45 **minutes**, l). 62 mph for 2 hours 30 minutes,
m). 18 mph for 1 hour 45 minutes, n). 2 hours 15 minutes travelling at 4 mph,
o). 28 mph for 3 hours 45 minutes, p). 56 mph for 4 hours 30 minutes.

3). a). 7 m/s for 8 seconds, b). 3 seconds travelling at 12 m/s,
c). 9 seconds travelling at 3 m/s, d). 6.2 m/s for 4 seconds,
e). 9.8 m/s for 5 seconds, f). 12 seconds travelling at 4.3 m/s,
g). 32 seconds travelling at 3.1 m/s, h). 7.9 m/s for 40 seconds,
i). 51 seconds travelling at 14.6 m/s, j). 5 m/s for 1 **minute** 5 seconds,
k). 1 minute 20 seconds at 6.2 m/s, l). 9.4 m/s for 2 minutes 24 seconds.



4). A cyclist travels at 18 km/h for 2 hours. How far has the cyclist travelled ?

5). A train travels at 84 mph for 3 hours. How far has the train travelled ?

6). A spider crawls at 0.9 m/s for 15 seconds. How far has the spider crawled ?

7). It takes 45 minutes to travel to school at 35 km/h. How far is it to school ?

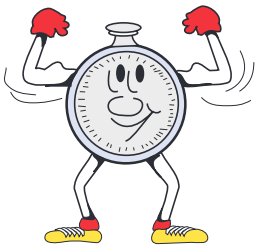
8). A train takes 2 hours 45 minutes to travel between two stations. The average speed of the train is 104 km/h. What is the distance between the 2 stations?

9). A hiker walks for 1 hour 15 minutes. His average speed during this time is 4 mph. How far has he walked during this journey ?

10). A journey lasts 3 hours 30 minutes, during which time the average speed is 66 mph. How far is the journey ?

11). A cat runs at 6 m/s for 1 minute. How far has the cat run ?

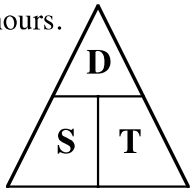
12). A journey in a helicopter lasts for 3 hours 15 minutes, during which time the average speed is 95 km/h. How far has the helicopter travelled in this time ?



Speed 2.

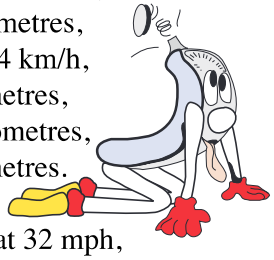
A. How many **hours and minutes** is

1).	0.6 hours,	2).	$^1/_4$ hour,	3).	2.1 hours,	4).	3.4 hours,
5).	$2\ ^3/_4$ hours,	6).	1.25 hours,	7).	$^1/_3$ hour,	8).	$4\ ^1/_4$ hours,
9).	2.75 hours,	10).	3.9 hours,	11).	4.7 hours,	12).	$5\ ^2/_3$ hours.



B. Find the time taken for each journey, state the units of your answer.

1).	a).	45 km/h for 405 kilometres,	b).	55 km/h for 220 kilometres,
	c).	43 km/h for 258 kilometres,	d).	236 km travelling at 59 km/h,
	e).	224 km travelling at 32 km/h,	f).	162 km travelling at 27 km/h,
	g).	67 km/h for 469 kilometres,	h).	39 km/h for 312 kilometres,
	i).	193 km travelling at 19.3 km/h,	j).	17 km travelling at 34 km/h,
	k).	16 km/h for 12 kilometres,	l).	24 km/h for 36 kilometres,
	m).	77.5 kilometres travelling at 62 km/h,	n).	22 km/h for 38.5 kilometres,
	o).	40 km/h for 150 kilometres,	p).	12 km/h for 45 kilometres.

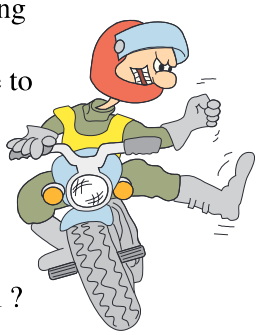


2).	a).	17 mph for 153 miles,	b).	224 miles travelling at 32 mph,
	c).	405 miles travelling at 81 mph,	d).	55.5 mph for 222 miles,
	e).	45 mph for 225 miles,	f).	17.5 mph in 140 miles,
	g).	5.6 mph for 67.2 miles,	h).	140.4 miles travelling at 15.6 mph,
	i).	47 miles travelling at 94 mph,	j).	6 miles travelling at 24 mph,
	k).	8 mph for 12 miles,	l).	8 mph for 6 miles,
	m).	18 mph for 22.5 miles,	n).	49 miles travelling at 28 mph,
	o).	32 mph for 88 miles,	p).	32 mph for 120 miles.

3).	a).	7 m/s for 21 metres,	b).	35 metres travelling at 5 m/s,
	c).	171 metres travelling at 9 m/s,	d).	3.2 m/s for 80 metres,
	e).	4.5 m/s for 153 metres,	f).	116 metres travelling at 7.25 m/s,
	g).	94 metres travelling at 20 m/s,	h).	14 m/s for 91 metres,
	i).	81 metres travelling at 15 m/s,	j).	3 m/s for 192 metres,
	k).	504 metres at 7 m/s,	l).	6 m/s for 738 metres.

4). A car travels 140 km. During the journey it averages 35 km/h. How long will it take to travel this distance ?

5). A boat can travel at an average speed of 12 mph. How long will it take to complete a journey of 60 miles ?



6). A helicopter flies 210 miles at an average speed of 84 mph. How long will it take to complete this journey ?

7). A motorbike travels 87 miles at an average speed of 58 mph. How long will it take to complete this journey ?

8). How long will it take a lorry travelling at 48 km/h to complete 180 km ?

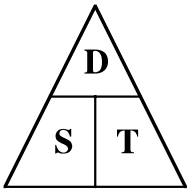
9). A dog runs at 14 m/s over 175 metres. How long did it take ?

10). A helicopter flies at 88 mph. How long will it take it to fly 374 km at this speed ?

11). A lorry travels 153 miles along the motorway. It averages 36 mph. How long does the journey take ?

12). A rocket is shot at a target 185 miles away. It has an average speed of 740 mph. How long will it take to reach the target ?

Mixed Questions.



1). A car averages 20 mph for a journey. The journey lasts 1 hour 30 minutes.
How far was the journey ?

2). A man walks at 3 mph. He covers 13.5 miles. How long does the walk take ?

3). A cyclist travels at a steady speed of 8 m/s. How far will she travel in
a). 50 seconds, b). 4 minutes,
c). 10 minutes, d). 1 hour ?

4). A boy runs the 400 metres race. His time is 50 seconds. What is his average speed ?

5). A bus travels between two towns 16 kilometres apart. It takes 30 minutes.
Calculate the average speed of the bus.

6). A cyclist travels at a steady speed of 14 km/h. How far will he travel in 1 hour 30 minutes ?

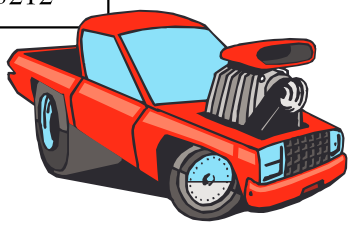
7). How long will it take a car to travel 137.5 miles at an average speed of 50 mph ?

8). An aircraft travels at a constant speed of 200 mph. How far would it go in
a). 4 hours, b). 15 minutes,
c). 45 minutes, d). 5 hours 30 minutes ?

9). Graham leaves home at 0745 and arrives at the office at 0830. The journey is 21 miles.
a). How long does his journey last ?
b). What is his average speed for the journey ?

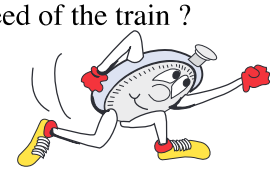
10). Penny records the time and the reading on the odometer throughout a journey.

Time	14.00	16.00	16.30
Odometer reading (km)	23106	23196	23212



a). How far does she travel between 14.00 and 16.00 ?
b). What is her average speed between 14.00 and 16.00 ?
c). How far does she travel between 16.00 and 16.30 ?
d). What is her average speed between 16.00 and 16.30 ?
e). What is her average speed for the whole journey ?

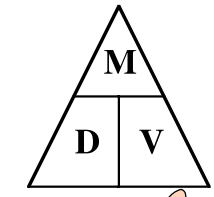
11). Amy goes to the seaside for the day. She goes by bus and returns by train. The distances are exactly the same.
a). The bus travels at an average speed of 45 mph and takes 2 hours.
How far is it to the seaside ?
b). The train sets off back home at 19.55 and arrives back at 21.10.
i). What time did this take ? ii). What was the average speed of the train ?



12). An athlete trains on a 400 metre track. He jogs at 4 m/s for 10 **minutes**.
How many laps of the track will he complete in this time ?

13). The marathon is 42730 metres long. A top woman athlete would average a speed of 5 m/s.
Find the time it would take her to complete the race in
a). seconds, b). minutes and seconds, c). hours, minutes and seconds.

Density.



Density = $\frac{\text{mass}}{\text{volume}}$

Units : $\frac{\text{grams}}{\text{cubic centimetres}}$ g/cm^3

$\frac{\text{kilograms}}{\text{cubic metres}}$ kg/m^3

A. In each of the following questions find the density. State the units of your answer.

1). a). Mass 45 g, volume 5 cm^3, b). Volume 7 cm^3, mass 56 g,
c). Volume 12 cm^3, mass 84 g, d). Mass 18.9 g, volume 9 cm^3,
e). Mass 40.5 g, volume 9 cm^3, f). Volume 6 cm^3, mass 20.7 g,
g). Mass 2 g, volume 5 cm^3, h). Volume 20 cm^3, mass 32 g,
i). Volume 16 cm^3, mass 148 g, j). Mass 61.2 g, volume 150 cm^3.

2). a). Mass 4340 kg, volume 7 m^3, b). Volume 4 m^3, mass 800 kg,
c). Mass 1610 kg, volume 0.7 m^3, d). Mass 945 kg, volume 2.1 m^3,
e). Volume 0.4 m^3, mass 688 kg, f). Volume 0.3 m^3, mass 1884 kg,
g). Mass 1440 kg, volume 2.4 m^3, h). Volume 3.7 m^3, mass 4588 kg,
i). Volume 2.6 m^3, mass 5538 kg, j). Mass 8601.6 kg, volume 12.8 m^3.

B. In each of the following questions find the mass. State the units of your answer.

1). a). Density 5 g/cm^3, volume 4 cm^3, b). Volume 19 cm^3, density 8 g/cm^3,
c). Volume 3 cm^3, density 1.4 g/cm^3, d). Density 2.7 g/cm^3, volume 5 cm^3,
e). Density 0.9 g/cm^3, volume 18 cm^3, f). Volume 24 cm^3, density 7.5 g/cm^3,
g). Density 4.2 g/cm^3, volume 35 cm^3, h). Volume 42 cm^3, density 0.82 g/cm^3,
i). Volume 95 cm^3, density 9.3 g/cm^3, j). Density 5.75 g/cm^3, volume 140 cm^3.

2). a). Density 190 kg/m^3, volume 3 m^3, b). Volume 7 m^3, density 2450 kg/m^3,
c). Volume 4 m^3, density 5450 kg/m^3, d). Density 842 kg/m^3, volume 2.6 m^3,
e). Density 260 kg/m^3, volume 7.1 m^3, f). Volume 0.6 m^3, density 4792 kg/m^3,
g). Density 8040 kg/m^3, volume 2.5 m^3, h). Volume 4.6 m^3, density 416 kg/m^3,
i). Volume 0.25 m^3, density 960 kg/m^3, j). Density 7247 kg/m^3, volume 12.69 m^3.

C. In each of the following questions find the volume. State the units of your answer.

1). a). Density 1.4 g/cm^3, mass 5.6 g, b). Mass 43.5 g, density 2.9 g/cm^3,
c). Mass 4.2 g, density 0.7 g/cm^3, d). Density 0.9 g/cm^3, mass 4.5 g,
e). Density 3.7 g/cm^3, mass 59.2 g, f). Mass 1932 g, density 8.4 g/cm^3,
g). Density 2.5 g/cm^3, mass 175 g, h). Mass 1615 g, density 1.7 g/cm^3,
i). Mass 16.32 g, density 2.4 g/cm^3, j). Density 6.3 g/cm^3, mass 124.74 g.

2). a). Density 800 kg/m^3, mass 4800 kg, b). Mass 19642 kg, density 1403 kg/m^3,
c). Mass 16900 kg, density 8450 kg/m^3, d). Density 732 kg/m^3, mass 13176 kg,
e). Density 140 kg/m^3, mass 420 kg, f). Mass 1615.5 kg, density 1795 kg/m^3,
g). Density 4790 kg/m^3, mass 30177 kg, h). Mass 71471.4 kg, density 7293 kg/m^3,
i). Mass 10413 kg, density 4628 kg/m^3, j). Density 6904 kg/m^3, mass 28306.4 kg.

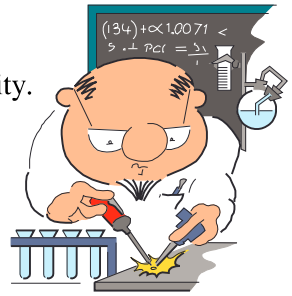
Worded Questions.

1). A block of ice weighs 2208 g and has a volume of 2400 cm^3. Find the density of the ice.
2). A piece of Stilton cheese has a density of 2 g/cm^3. It has a volume of 420 cm^3.
What is the mass of the cheese ?
3). A stone weighs 440 kg. The density of the stone is 2200 kg/m^3.
What is the volume of the stone ?
4). Magnesium has a density of 174 kg/m^3. A bar of magnesium has a volume of 1.2 m^3.
What is the mass of the bar of magnesium ?
5). A gold chunk has a volume of 2.5 cm^3 and a mass of 48.5 g. What is the density of gold ?
6). Steel has a density of 7700 kg/m^3. A girder made out of steel weighs 26180 kg.
What is the volume of the steel girder ?
7). Lead has a density of 11.5 g/cm^3. A rectangular block of lead measures 7 cm x 5 cm x 2 cm.
a). Find the volume of the block of lead.
b). Find the mass of the block of lead.
8). A plywood plank measures 1 cm x 8 cm x 90 cm and weighs 396 g.
a). Find the volume of the plywood plank.
b). Find the density of plywood.
9). The petrol in a petrol can weighs 2000 g. The density of petrol is 0.8 g/cm^3.
What is the volume of petrol in the petrol can
a). in cm^3, b). in litres ?
10). A **cube** of balsa wood has edges of length 12 cm. It weighs 345.6 g.
a). Find the volume of the balsa wood cube.
b). Find the density of balsa wood.
11). A marble slab is 1 **metre** long and has a rectangular cross section of area 15 cm^2.
a). What is the volume of the marble slab ?
b). The density of marble is 2.7 g/cm^3, what is the mass of the marble slab ?
12). Copper is cast in a rectangular block of dimensions 10 cm x 8 cm x 5 cm.
The density of copper is 8.9 g/cm^3.
a). Find the volume of the copper.
b). Find the mass of the copper.

Experiments.

1). Water has a density of 1 g/cm^3 or 1000 kg/m^3.
To see if objects are less dense or more dense than water observe if they float or sink.
If they float they are less dense, if they sink they have a density greater than 1 g/cm^3.

2). Find the density of 10 different solid objects.
First select the 10 objects you are to use.
Find their mass by weighing them on scales.
To find their volumes you will need a displacement can.
The displacement can is filled with water up to the spout and the object is fully immersed.
The amount of water displaced is the volume of the object.
The overflow is measured in a measuring cylinder.
The values found can now be substituted into the formula to find the density.
Put your objects in order of density.



3). Explain how you could find the density of different liquids.