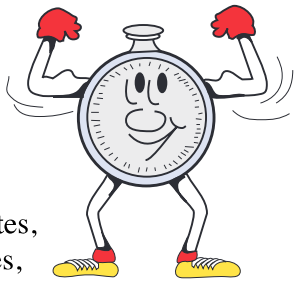
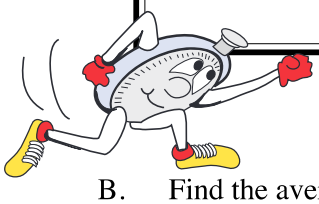
Compound Measures 1 (Speed).

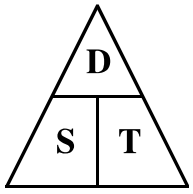


A. Write each of the following as i). a fraction,
ii). a decimal fraction of 1 hour.

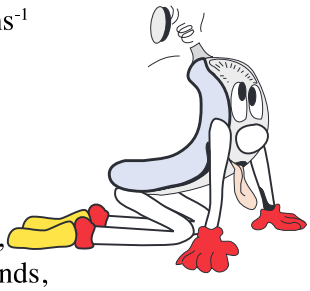
1). 30 minutes,	2). 45 minutes,	3). 12 minutes,
4). 48 minutes,	5). 18 minutes,	6). 6 minutes,
7). 36 minutes,	8). 21 minutes,	9). 57 minutes,
10). 10 minutes,	11). 40 minutes,	12). 20 minutes,
13). 1 hour 24 minutes,	14). 1 hour 54 minutes,	15). 3 hours 33 minutes,
16). 2 hours 5 minutes,	17). 5 hours 25 minutes,	18). 4 hours 51 minutes.

Speed = Distance / 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). 24 kilometres in 6 hours, b). 94 miles in 2 hours,
c). 18 metres in 3 seconds, d). 270 miles in 5 hours,
e). 186 kilometres in 4 hours, f). 12 metres in 24 seconds,
g). 54 miles in 12 hours, h). 124 metres in 25 seconds,
i). 2030 miles in 28 hours, j). 24700 kilometres in 250 hours.

2). a). 99 kilometres in $1\frac{1}{2}$ hours, b). 75 miles in $1\frac{1}{4}$ hours,
c). 56 miles in $2\frac{1}{2}$ hours, d). 110 kilometres in $2\frac{3}{4}$ hours,
e). 189 miles in $2\frac{1}{4}$ hours, f). 112 kilometres in $1\frac{3}{4}$ hours,
g). 42.25 kilometres in $3\frac{1}{4}$ hours, h). 118.23 miles in $2\frac{1}{10}$ hours,
i). 84 kilometres in $1\frac{1}{6}$ hours, j). 246.5 miles in $4\frac{5}{6}$ hours.

3). a). 8 kilometres in 1 hour 15 minutes, b). 9 miles in 1.5 hours,
c). 16 miles in 3 hours 20 minutes, d). 200 kilometres in 2 hours 40 minutes,
e). 400 metres in 1 minute 20 seconds, f). 26 miles in 3 hours 12 minutes,
g). 98.4 km in 8 hours 12 minutes h). 800 metres in 3 minutes 12 seconds,
i). 44 miles in 2.65 hours. j). 134 km in 6 hours 54 minutes.
k). 4 miles in 30 minutes. l). 7.2 km in 42 minutes.

4). A train travels 210 km in 1 hour 45 minutes. Find the average speed of the train.
5). A car travels up the motorway. It goes 52.5 miles in 45 minutes.
Find the average speed of the car.
6). A cyclist goes 42 kilometres in 3 hours 30 minutes.
Find the average speed of this journey.
7). A hedgehog crawls 12 metres in 30 seconds. Find the average speed.
8). Jane walks 16.5 miles in 3 hours 40 minutes. Find her average speed for the walk.

9). A bus travels 3 kilometres through a city centre. It takes 10 minutes. Find the average speed of the bus.

10). A dog runs 805 metres in 1 minute 10 seconds. Find the average speed of the dog.

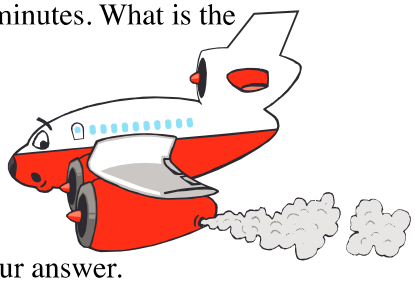
11). A scooter travels 63 kilometres in 2 hours 20 minutes.
Find the average speed of the scooter.

12). A aeroplane covers 144 miles in 40 minutes. What is the average speed of the aeroplane for this journey ?

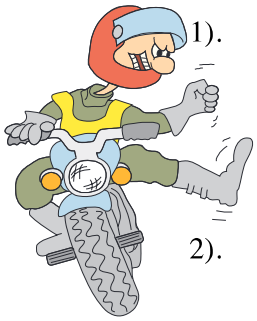
13). An Olympic cyclist travels 68.4 kilometres in 3 hours 10 minutes. What is the average speed of the cyclist over this journey ?

14). A car travels 308.7 kilometres in 4 hours 5 minutes.
Find the average speed of this journey.

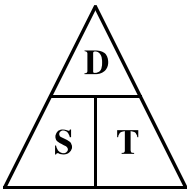
15). A rocket is sent 1596 miles in 1 hour 54 minutes.
Find the average speed of the rocket.



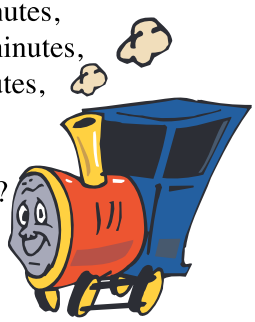
C. Find the distance travelled for each journey, state the units of your answer.



1). a). 25 km/h for 5 hours, b). 30 mph for 4 hours,
c). 12 m/s for 10 seconds, d). 16 km/h for 6 hours,
e). 17 mph for 7 hours, f). 54 mph for 3 hours,
g). 3.2 m/s for 5 seconds, h). 87 km/h for 4 hours,
i). 4.5 km/h for 6 hours, j). 9.4 m/s for 16 seconds.



2). a). 16 km/h for 2 hours 30 minutes, b). 20 mph for 4 hours 15 minutes,
c). 48 km/h for 1 hour 45 minutes, d). 72 mph for 3 hours 15 minutes,
e). 120 mph for 2 hours 10 minutes, f). 70 mph for 5 hours 6 minutes,
g). 40 km/h for 3 hours 18 minutes, h). 80 km/h for 4 hours 48 minutes,
i). 72 km/h for 2 hours 20 minutes, j). 36 mph for 6 hours 40 minutes,
k). 60 mph for 2 hours 57 minutes, l). 100 km/h for 5 hours 21 minutes,
m). 54 mph for 40 minutes, n). 60 mph for 7 hours 2 minutes,
o). 90 mph for 3 hours 59 minutes, p). 50 km/h for 21 minutes.



3). A cyclist travels at 20 km/h for 4 hours. How far has the cyclist travelled ?

4). A train travels at 95 mph for 2 hours. How far has the train travelled ?

5). A car travels 48 km/h for 20 minutes. How far has the car travelled ?

6). A fly flies at 2.4 m/s for 50 seconds. How far has the fly flown ?

7). A woman on roller blades travels at 7.5 m/s for 2 minutes. How far has she travelled?

8). It takes 15 minutes to travel to school at 64 km/h. How far is it to school ?

9). A train takes 1 hour 45 minutes to travel between two stations. The average speed of the train is 180 km/h. What is the distance between the 2 stations?

10). A car travels at 66 mph for 70 minutes. What is the distance the car has covered during this journey ?

11). A hiker walks for 170 minutes. His average speed during this time is 6 mph.
How far has he walked during this journey ?

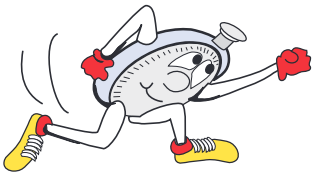
12). A car travels at 35 km/h for 3 hours 12 minutes. How far has the car travelled ?

13). A journey lasts 4 hours 54 minutes, during which time the average speed is 60 mph. How far is the journey ?

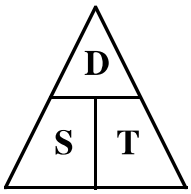
14). A cat runs at 12 m/s for 2 minutes 5 seconds. How far has the cat run ?

15). A journey in a helicopter lasts for 152 minutes, during which time the average speed is 90 km/h. How far has the helicopter travelled in this time ?

Compound Measures 2 (Speed).

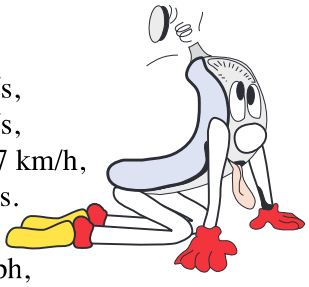


A. Change the following from hours to **hours and minutes**.

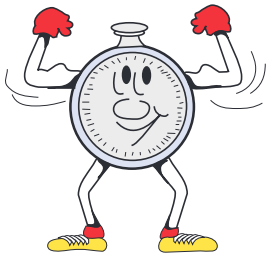


1). 0.5 hours,	2). 2.1 hours,	3). $2^{3}/_{4}$ hours,	4). $3^{1}/_{4}$ hours,
5). $^{1}/_{10}$ hours,	6). $5^{1}/_{5}$ hours,	7). 5.75 hours,	8). 4.8 hours,
9). $1^{7}/_{30}$ hours,	10). $^{11}/_{20}$ hours,	11). 6.3 hours,	12). $4^{5}/_{6}$ hours,
13). $2^{17}/_{20}$ hours,	14). $^{9}/_{10}$ hours,	15). $7^{17}/_{30}$ hours,	16). $2^{31}/_{60}$ hours,
17). 0.05 hours,	18). $2^{2}/_{15}$ hours,	19). 6.9 hours,	20). $^{11}/_{15}$ hours.

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



1). a). 200 kilometres at 40 km/h, b). 32 metres at 8 m/s,
c). 175 miles at 25 mph, d). 180 metres at 36 m/s,
e). 270 kilometres at 30 km/h, f). 126 metres at 42 m/s,
g). 448 miles at 56 mph, h). 486 kilometres at 27 km/h,
i). 882 kilometres at 63 km/h, j). 112 metres at 56 m/s.



2). a). 30 kilometres at 20 km/h, b). 420 miles at 336 mph,
c). 105 miles at 28 mph, d). 132 kilometres at 120 km/h,
e). 204 kilometres at 60 km/h, f). 221 miles at 51 mph,
g). 12.6 kilometres at 42 km/h h). 128 km at 40 km/h,
i). 497 miles at 70 mph, j). 208 miles at 39 mph,
k). 297 kilometres at 45 km/h, l). 351 miles at 90 mph,
m). 184 miles at 48 mph, n). 2626 kilometres at 520 km/h
o). 1067 kilometres at 330 km/h, p). 716 miles at 240 mph.

3). A motorcyclist averages a speed of 35 km/h over a 140 km journey.
How long will the journey last ?

4). A car travels 252 km. During the journey it averages 42 km/h. How long will it take to travel this distance ?

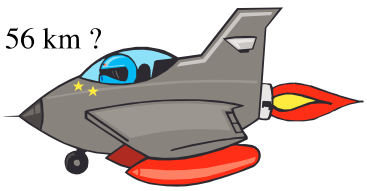
5). A boat travels at an average speed of 18 mph. How long will it take to complete a journey of 180 miles ?

6). A helicopter flies 175 miles at an average speed of 70 mph.
How long will it take to complete this journey ?

7). How long will it take a car travelling at 50 km/h to complete 225 km ?

8). A motorbike travels 60 miles at an average speed of 48 mph.
How long will it take to complete this journey ?

9). How long will it take a lorry travelling at 42 km/h to complete 56 km ?



10). An aeroplane averages 500 km/h over a 125 km journey.
How long will the flight last ?

11). A car travels 70 km along the motorway. It averages 42 km/h.
How long does the journey take ?

12). A helicopter flies at 240 mph. How long will it take it to fly 160 km at this speed ?

13). A lorry travels 56 miles along the motorway. It averages 48 mph.
How long does the journey take ?

14). An aeroplane averages 240 mph over a 620 mile journey.
How long will the flight last ?

15). A rocket is shot at a target 168 miles away. It has an average speed of 1260 mph.
How long will it take to reach the target ?

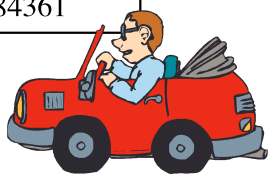
Mixed Questions.

1). For each of the following athletes find their average jogging speed.
Then put them in order of fastest to slowest.

a). Keith jogs 19.5 km in 3 hours.
b). Jean jogs 8 km in 1 hour 15 minutes.
c). Ian jogs 10.5 km in 1 hour 30 minutes.
d). Lynne jogs 13 km in 2 hours 10 minutes.

2). Pete records the time and the reading on the speedometer throughout a journey.

Time	14.00	15.00	15.30	15.45
Speedometer reading (km)	84263	84328	84344	84361



a). What is his average speed between 14.00 and 15.00 ?
b). What is his average speed between 15.00 and 15.30 ?
c). What is his average speed between 15.30 and 15.45 ?
d). What is his average speed for the complete journey ?

3). An albatross can cruise at an average speed of 84 km/h.
What distance can the albatross cruise in
a). 3 hours, b). 45 minutes, c). 20 minutes ?

4). A train averages 76 mph between two stations. The train leaves the first station at 09.40 and arrives at the other at 10.55. What is the distance between the 2 stations ?

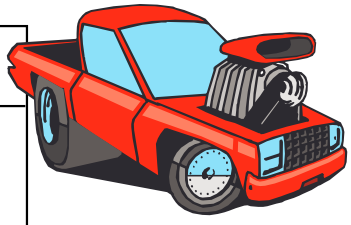
5). Below are some of the fastest land animals on earth. The table shows their top speed and the distance for which they can maintain that speed.

Animal	Top speed (m/s)	Distance (metres)
Racehorse	18	300
Cheetah	28	500
Antelope	15.5	6000
Deer	12.5	32000

Calculate the time each animal can maintain its maximum speed to the nearest second.

6). A jogger sets out at 6 p.m. to run to the next town 10.5 km away. She wants to arrive at 7.30 p.m.. Find her average speed if she gets there exactly on time.

7). A car manufacturer wants to test the milometer in a car. Here are the results for four test runs.

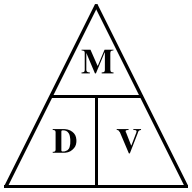


Average speed mph	Time Taken	Distance km
64	2 h 30 min	
87	3 h 40 min	
48	1 h 10 min	
90	4 h 58 min	

Copy and complete the table for the missing distances.

8). Three athletes argue over who spent the longest time training.
Jim ran 6 km at an average speed of 4 km/h.
Penny ran 11 km at an average speed of 6 km/h.
Sue ran 5.55 km at an average speed of 4.5 km/h.
Work out the time each athlete spent training.

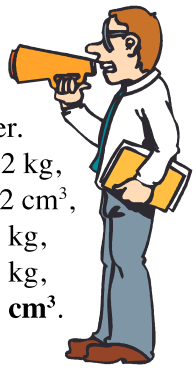
Compound Measures 3 (Density).



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

Units : grams / cubic centimetres g/cm³

kilograms / cubic metres kg/m³



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

a). Mass 86.8 g, volume 6.2 cm³,
b). Volume 0.43 m³, mass 1032 kg,
c). Volume 25 cm³, mass 170 g,
d). Mass 1531.2 g, volume 132 cm³,
e). Mass 23.04 g, volume 9.6 cm³,
f). Volume 9.6 m³, mass 5808 kg,
g). Mass 48 kg, volume 0.02 m³,
h). Volume 1.3 m³, mass 5473 kg,
i). Volume 96 **cm³**, mass 1.8528 **kg**,
j). Mass 8.82 **kg**, volume 420 **cm³**.

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

a). Density 4 g/cm³, volume 2 cm³,
b). Volume 10 cm³, density 12 g/cm³,
c). Volume 9 cm³, density 2.4 g/cm³,
d). Density 420 kg/m³, volume 0.6 m³,
e). Density 1240 kg/m³, volume 2.4 m³,
f). Volume 16 cm³, density 9.8 g/cm³,
g). Density 7400 kg/m³, volume 8.6 m³,
h). Volume 8.3 m³, density 630 kg/m³,
i). Vol 470000 **cm³**, density 1400 **kg/m³**,
j). Density 16.3 **g/cm³**, volume 2.4 **m³**.

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

a). Density 3.4 g/cm³, mass 23.8 g,
b). Mass 43.5 g, density 2.9 g/cm³,
c). Mass 5980 kg, density 4600 kg/m³,
d). Density 450 kg/m³, mass 180 kg,
e). Density 3.7 g/cm³, mass 59.2 g,
f). Mass 2323 kg, density 1010 kg/m³,
g). Density 6420 kg/m³, mass 192.6 kg,
h). Mass 432.6 g, density 4.2 g/cm³,
i). Mass 2.232 **kg**, density 9.3 **g/cm³**,
j). Density 810 **kg/m³**, mass **16200 g**.

Worded Questions.

1). A piece of cheddar cheese has a volume of 230 cm³ and a mass of 460 g.
What is the density of the cheese ?

2). The density of a stone is 2200 kg/m³ and has a volume of 0.3 m³. What is the mass of the stone ?

3). A bar of magnesium has a volume of 3.4 m³ and a mass of 591.6 kg.
What is the density of magnesium ?

4). A block of ice weighs 322 g and has a density of 0.92 g/cm³. What is the volume of the block ?

5). Steel has a density of 7700 kg/m³. A steel bar weighs 33110 kg.
What is the volume of the steel bar ?

6). A gold ingot has a density of 19.4 g/cm³ and a mass of 1.261 **kg**.
What is the volume of the gold ingot ?

7). A rectangular block of lead measures 8 cm x 6 cm x 4 cm and has a mass of 2208 g.
a). Find the volume of the block of lead.
b). Find the density of lead.

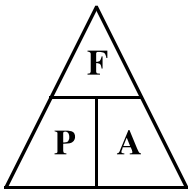
8). A plywood plank measures 2 cm x 10 cm x 2.4 **m** and has a density of 0.55 g/cm³.
a). Find the volume of the plywood plank.
b). Find the mass of plywood.

9). A **cube** of balsa wood has edges of length 80 cm. The density is 200 kg/m³.
a). Find the volume of the balsa wood cube in i). cm³ ii). m³.
b). Find the mass of balsa wood.

10). Some petrol in a barrel weighs 6 kg. The density of petrol is 0.8 g/cm³.
What is the volume of petrol in the barrel
a). in cm³, b). in litres ?

Pressure.

Pressure = Force / Area Units : newtons / square metres N/m^2



1). In each of the following questions find the pressure.

a). Force 90 N, area 5 m^2,
b). Area 6 m^2, force 132 N,
c). Area 3.7 m^2, force 103.6 N,
d). Force 220.5 N, area 0.9 m^2,
e). Force 4324 N, area 4.6 m^2,
f). Area 15000 **cm^2**, force 690 N,
g). Force 7140 N, area 34000 **cm^2**,
h). Area 5000 **cm^2**, force 1150 N,
i). Area 47000 **cm^2**, force 4183 N,
j). Force 60.3 N, area 900 **cm^2**.

2). In each of the following questions find the force.

a). Pressure 43 N/m^2, area 2 m^2,
b). Area 4.7 m^2, pressure 1400 N/m^2,
c). Area 1.5 m^2, pressure 94 N/m^2,
d). Pressure 210 N/m^2, area 0.06 m^2,
e). Pressure 1800 N/m^2, area 0.01 m^2,
f). Area 14000 **cm^2**, pressure 74 N/m^2,
g). Pressure 320 N/m^2, area 56000 **cm^2**,
h). Area 3000 **cm^2**, pressure 900 N/m^2,
i). Area 500 **cm^2**, pressure 84 N/m^2,
j). Pressure 732 N/m^2, area 10000 **cm^2**.

3). In each of the following questions find the area.

a). Pressure 270 N/m^2, force 3240 N,
b). Force 3850 N, pressure 1100 N/m^2,
c). Force 1840 N, pressure 2300 N/m^2,
d). Pressure 130 N/m^2, force 5850 N,
e). Pressure 5 N/m^2, force 32 N,
f). Force 2.48 N, pressure 62 N/m^2,
g). Pressure 940 N/m^2, force 5.64 N,
h). Force 324.8 N, pressure 56 N/m^2,
i). Force 0.728 N, pressure 910 N/m^2,
j). Pressure 230 N/m^2, force 24.84 N.

Worded Questions.

1). A block on concrete stands on one rectangular end which measures 60 **cm** by 80 **cm**. The block weighs 2000 N. What is the pressure the concrete block exerts on the floor ?

2). A boy weighs 600 N. Each of his feet has an area of 240 **cm^2**.
Calculate the pressure exerted on the floor when the boys stands
a). with the weight spread equally between both feet,
b). on one foot.

3). The imperial unit of pressure is pounds per square inch (lb/in^2).
A woman who weighs 8 stones wears stilettos. The heal of each stiletto is $^1/_4$ by $^1/_4$ inch.
If the woman puts **all** her weight on one heal how much pressure is applied ?

4). An elephant weighs 11520 pounds. Each foot has an area of 30 square inches.
If the elephant stands on one foot, what pressure is applied ?

5). Which would cause more damage to a floor, the elephant or the woman in stilettos ?

Population Density.

Population Density = **Population / Area** Units : population / square kilometres pop/km^2

1). A town has a population of 78000 spread over 15.6 km^2.
What is the population density of the town ?

2). A city has a population density of 8650 pop/km^2. It has a population of 4.6 million.
What area is the city ?

3). A large town is 98 km^2 and has a population density of 2300 pop/km^2.
What is the population of the town ?