1 James and Peter cycled along the same 50 km route.

James took $2\frac{1}{2}$ hours to cycle the 50 km.

Peter started to cycle 5 minutes after James started to cycle.
Peter caught up with James when they had both cycled 15 km.

James and Peter both cycled at constant speeds.

Work out Peter's speed.

.... km/h

(Total for Question 1 is 5 marks)

2   A gold bar has a mass of 12.5 kg.

The density of gold is 19.3 g/cm^3

Work out the volume of the gold bar.
Give your answer correct to 3 significant figures.

....cm^3

(Total for Question 2 is 3 marks)

3 Olly drove 56 km from Liverpool to Manchester.
He then drove 61 km from Manchester to Sheffield.

Olly's average speed from Liverpool to Manchester was 70 km/h.
Olly took 75 minutes to drive from Manchester to Sheffield.

(a) Work out Olly's average speed for his total drive from Liverpool to Sheffield.

.... km/h

(4)

Janie drove from Barnsley to York.

Janie's average speed from Barnsley to Leeds was 80 km/h.
Her average speed from Leeds to York was 60 km/h.

Janie says that the average speed from Barnsley to York can be found by working out the mean of 80 km/h and 60 km/h.

(b) If Janie is correct, what does this tell you about the two parts of Janie's journey?

....

....

(1)

(Total for Question 3 is 5 marks)

4   The density of apple juice is 1.05 grams per cm ^{3}.

The density of fruit syrup is 1.4 grams per cm^3.

The density of carbonated water is 0.99 grams per cm^3.

25 cm^3 of apple juice are mixed with 15 cm^3 of fruit syrup and
280 cm^3 of carbonated water to make a drink with a volume of 320 cm^3.

Work out the density of the drink.
Give your answer correct to 2 decimal places.

....g/cm^3

(Total for Question 4 is 4 marks)

5 A train travelled along a track in 110 minutes, correct to the nearest 5 minutes.

Jake finds out that the track is 270 km long.
He assumes that the track has been measured correct to the nearest 10 km.

(a) Could the average speed of the train have been greater than 160 km/h?
You must show how you get your answer.

(4)

Jake's assumption was wrong.
The track was measured correct to the nearest 5 km.

(b) Explain how this could affect your decision in part (a).

....

....

....

(1)

(Total for Question 5 is 5 marks)

6 A force of 70 newtons acts on an area of $20\,\text{cm}^2$

The force is increased by 10 newtons.
The area is increased by $10\,\text{cm}^2$

Helen says,

"The pressure decreases by less than 20%"

Is Helen correct?
You must show how you get your answer.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

(Total for Question 6 is 3 marks)

7   The density of ethanol is $1.09\,\text{g/cm}^3$
The density of propylene is $0.97\,\text{g/cm}^3$

60 litres of ethanol are mixed with 128 litres of propylene to make 188 litres of antifreeze.

Work out the density of the antifreeze.
Give your answer correct to 2 decimal places.

.... g/cm^3

(Total for Question 7 is 4 marks)

8 Liquid **A** and liquid **B** are mixed to make liquid **C**.

Liquid **A** has a density of $70 \, \text{kg/m}^3$
Liquid **A** has a mass of $1400 \, \text{kg}$

Liquid **B** has a density of $280 \, \text{kg/m}^3$
Liquid **B** has a volume of $30 \, \text{m}^3$

Work out the density of liquid **C**.

.... kg/m^3

(Total for Question 8 is 3 marks)

9 Andy cycles a distance of 30 km at an average speed of 24 km/h.
He then runs a distance of 12 km at an average speed of 8 km/h.

Work out the total time Andy takes.
Give your answer in hours and minutes.

.... hours .... minutes

(Total for Question 9 is 3 marks)

10   Liquid **A** has a density of $1.8\,\text{g/cm}^3$
Liquid **B** has a density of $1.2\,\text{g/cm}^3$

$80\,\text{cm}^3$ of liquid **A** is mixed with $40\,\text{cm}^3$ of liquid **B** to make $120\,\text{cm}^3$ of liquid **C**.

Work out the density of liquid **C**.

.... g/cm^3

(Total for Question 10 is 3 marks)

11 Lara is a skier.

She completed a ski race in 1 minute 54 seconds.
The race was 475 m in length.

Lara assumes that her average speed is the same for each race.

(a) Using this assumption, work out how long Lara should take to complete a 700 m race.
Give your answer in minutes and seconds.

.... minutes .... seconds

(3)

Lara's average speed actually increases the further she goes.

(b) How does this affect your answer to part (a)?

....

....

(1)

(Total for Question 11 is 4 marks)

12 A car travels for 18 minutes at an average speed of 72 km/h.

(a) How far will the car travel in these 18 minutes?

.... km

(2)

David says,

"72 kilometres per hour is faster than 20 metres per second."

(b) Is David correct?
You must show how you get your answer.

(2)

(Total for Question 12 is 4 marks)

13 Nimer was driving to a hotel.
He looked at his Sat Nav at 13 30

Time	13 30
Distance to destination	65 miles

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48
You must show all your working.

.... mph

(Total for Question 13 is 4 marks)

14 Liquid A and liquid B are mixed together in the ratio $2:13$ by volume to make liquid C.

Liquid A has density $1.21 \, \text{g/cm}^3$
Liquid B has density $1.02 \, \text{g/cm}^3$

A cylindrical container is filled completely with liquid C.
The cylinder has radius $3 \, \text{cm}$ and height $25 \, \text{cm}$.

Work out the mass of the liquid in the container.
Give your answer correct to 3 significant figures.
You must show all your working.

.... g

(Total for Question 14 is 4 marks)

15

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

A storage tank exerts a force of 10 000 newtons on the ground.

The base of the tank in contact with the ground is a 4 m by 2 m rectangle.
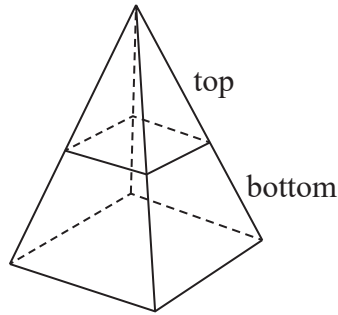
Work out the pressure on the ground due to the tank.

.... newtons / m²

(Total for Question 15 is 2 marks)

16 The pyramid **P** is formed from two parts made of different materials.

The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm³
The bottom part of **P** has a mass of 972.8 g
The average density of **P** is 4.7 g/cm³

Calculate the volume of the top part of **P** as a percentage of the total volume of **P**.
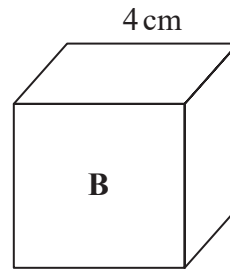Give your answer correct to 1 decimal place.
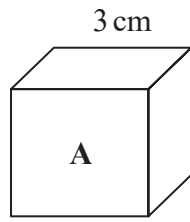You must show all your working.

....%

(Total for Question 16 is 5 marks)

17 Here are two cubes, **A** and **B**.

3 cm

A

4 cm

B

Cube **A** has a mass of 81 g.

Cube **B** has a mass of 128 g.

Work out

   the density of cube **A** : the density of cube **B**

Give your answer in the form $a : b$, where a and b are integers.

....

(Total for Question 17 is 3 marks)

18 A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.
The box exerts a pressure of 187.5 newtons/m² on the floor.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.

Work out the value of x.

$x =$ ....

(Total for Question 18 is 3 marks)

19 Jessica runs for 15 minutes at an average speed of 6 miles per hour.
She then runs for 40 minutes at an average speed of 9 miles per hour.

It takes Amy 45 minutes to run the same total distance that Jessica runs.

Work out Amy's average speed.
Give your answer in miles per hour.

.... miles per hour

(Total for Question 19 is 4 marks)