Chhetri Academy

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GCSE MATHS

Ratio, proportion and rates of change

Edexcel 1MA1 | Subtopic collection Topic 35

Speed, density, pressure and best buys

Higher tier

Past paper question booklet

148	2003-2025	Higher
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

10. A spaceship travelled for 6×10^2 hours at a speed of 8×10^4 km/h.

Leave blank

(a) Calculate the distance travelled by the spaceship.
Give your answer in standard form.

.....km
(3)

One month an aircraft travelled 2×10^5 km.
The next month the aircraft travelled 3×10^4 km.

(b) Calculate the total distance travelled by the aircraft in the two months.
Give your answer as an ordinary number.

..... km
(2)

17. The force, F, between two magnets is inversely proportional to the square of the distance, x, between them.

Leave blank

When $x = 3$, $F = 4$.

(a) Find an expression for F in terms of x.

$F =$ .....

(3)

(b) Calculate F when $x = 2$.

.....

(1)

(c) Calculate x when $F = 64$.

.....

(2)

3. The density of concrete is 2.3 grams per cm^3.

(a) Work out the mass of a piece of concrete with a volume of 20 cm^3.

..... grams
(2)

480 grams of a cheese has a volume of 400 cm^3.

(b) Work out the density of the cheese.

..... grams per cm^3
(2)

(Total 4 marks)

Q3

Blank

2. The cost of hiring a car can be worked out using this rule.

Cost = £90 + 50p per mile

The cost of hiring a car and driving m miles is C pounds.

(a) Complete the formula for C in terms of m.

C = ...

(2)

Zara hired a car.

The cost is £240

(b) How many miles did Zara drive?

..... miles

(3)

(Total 5 marks)

Q2

Blank

10. There are 40 litres of water in a barrel.

The water flows out of the barrel at a rate of 125 millilitres per second.

1 litre = 1000 millilitres.

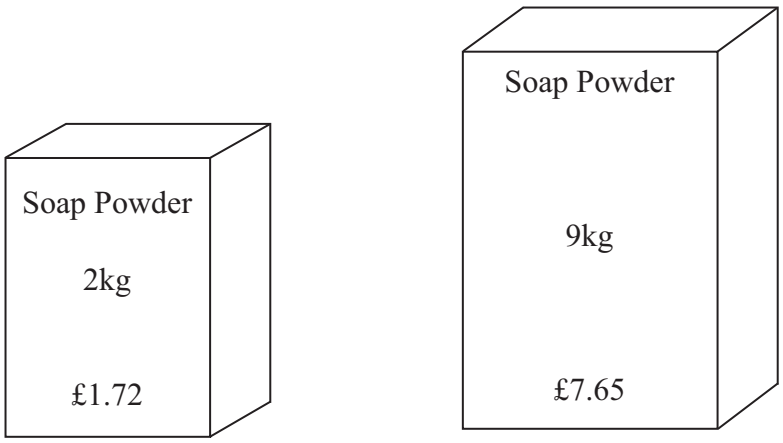
Work out the time it takes for the barrel to empty completely.

..... seconds

Q10

(Total 3 marks)

8. Soap powder is sold in two sizes of box.



Small box Large box

A small box contains 2 kg of soap powder and costs £1.72
A large box contains 9 kg of soap powder and costs £7.65

Which size of box gives the better value for money?

.....

Explain your answer.
You must show all your working.

Q8

(Total 3 marks)

13. A family went on holiday to Miami.
They travelled from London by plane.

The distance from London to Miami is 7120 km.
The plane journey took 8 hours.

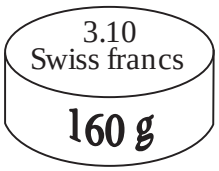
Calculate the average speed of the plane.

.....km/h

(Total 2 marks)

Q13

***5** Margaret is in Switzerland.
The local supermarket sells boxes of Reblochon cheese.



Each box of Reblochon cheese costs 3.10 Swiss francs.
It weighs 160 g.

In England, a box of Reblochon cheese costs £13.55 per kg.

The exchange rate is £1 = 1.65 Swiss francs.

Work out whether Reblochon cheese is better value for money in Switzerland or in England.

(Total for Question 5 is 4 marks)

***8** Jon and Alice are planning a holiday.
They are going to stay at a hotel.

The table shows information about prices at the hotel.

	Price per person per night (£)		Dinner (£)
	Double room	**Single room**	**per person per day**
01 Nov – 29 April	59.75	118.00	31.75
30 April – 08 July	74.25	147.00	31.00
09 July – 29 Aug	81.75	161.75	31.00
30 Aug – 31 Oct	74.25	147.00	31.00

Saver Prices
5 nights for the price of 4 nights from 1st May to 4th July.
3 nights for the price of 2 nights in November.

Jon and Alice will stay in a double room.
They will eat dinner at the hotel every day.

They can stay at the hotel for 3 nights in June or 4 nights in November.

Which of these holidays is cheaper?

(Total for Question 8 is 5 marks)

8 The table shows the costs, per person, of a holiday at two different hotels.
It shows the cost for 5 nights and the cost for each extra night.
It also shows the discount for each child.

	Park Palace		**Dubai Grand**	
Date holiday starts	5 nights	extra night	5 nights	extra night
01 Jan – 31 Mar	£1169	£150	£849	£86
01 Apr – 09 Apr	£1229	£150	£1219	£95
10 Apr – 15 Jul	£810	£80	£853	£53
16 Jul – 20 Aug	£810	£80	£854	£53
21 Aug – 10 Dec	£810	£80	£869	£94
Discount for each child	$\frac{1}{5}$ off		15% off	

There are two adults and two children in the Smith family.
The family want a holiday for 7 nights, starting on 1st August.

One hotel will be cheaper for them than the other hotel.

Work out the cost of the cheaper holiday.
You must show all your working.

£ .....

(Total for Question 8 is 6 marks)

9 A plane takes 30 seconds to fly a distance of 8 kilometres.

Work out the average speed of the plane, in miles per hour.

..... miles per hour

(Total for Question 9 is 3 marks)

10.

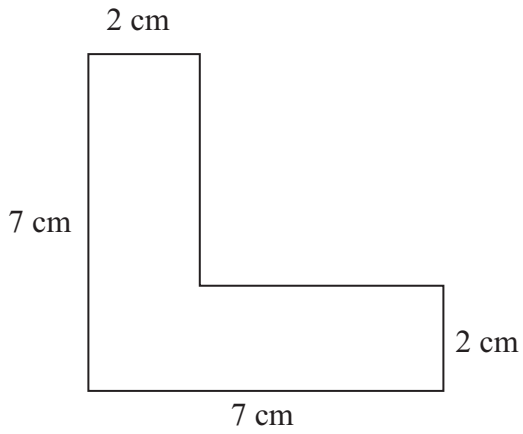


Diagram **NOT** accurately drawn

The diagram shows the cross-section of a solid prism.
The length of the prism is 2 m.

The prism is made from metal.
The density of the metal is 8 grams per cm^3.

Work out the mass of the prism.

.....

(Total 5 marks)

Q10

Question 13

***9** Mr Smith drives 24 miles to work.

On Monday his journey to work takes 30 minutes.
On Tuesday the average speed of his journey to work is 56 km/h.

Did Mr Smith drive more quickly to work on Monday or on Tuesday?
You must show all your working.

(Total for Question 9 is 4 marks)

6.

Reading				
22	**Slough**			
28	40	**Guildford**		
30	22	47	**Oxford**	
45	28	66	25	**Buckingham**

The table gives distances in miles by road between some towns.

Izzy lives in Oxford.
She has to drive to a meeting in Buckingham and then from Buckingham to Reading to pick up a friend.
After she picks up her friend she will drive back to Oxford.
She plans to drive at a speed of 50 miles per hour.
The meeting will last 3 hours, including lunch.
She leaves Oxford at 9 am.

Work out the time at which she should get back to Oxford.

.....

Q6

(Total 4 marks)

16.

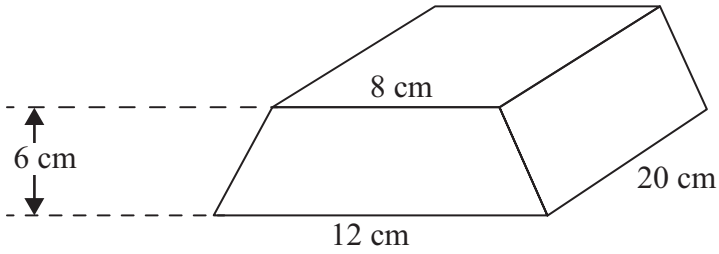


Diagram **NOT** accurately drawn

The diagram shows a solid prism made from metal.
The cross-section of the prism is a trapezium.

The parallel sides of the trapezium are 8 cm and 12 cm.
The height of the trapezium is 6 cm.
The length of the prism is 20 cm.

The density of the metal is 5 g/cm^3.

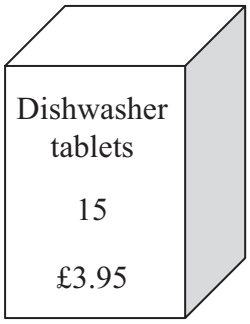
Calculate the mass of the prism.
Give your answer in kilograms.

..... kg

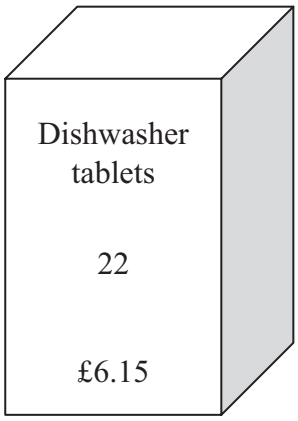
(Total 5 marks)

Q16

6 Dishwasher tablets are sold in two sizes of box.



Small box



Large box

A small box contains 15 tablets and costs £3.95
A large box contains 22 tablets and costs £6.15

*(a) Which size of box gives the better value for money?
You must show all your working.

(4)

The weight of the large box is 357 grams, to the nearest gram.

(b) (i) What is the minimum possible weight of the box?

..... grams

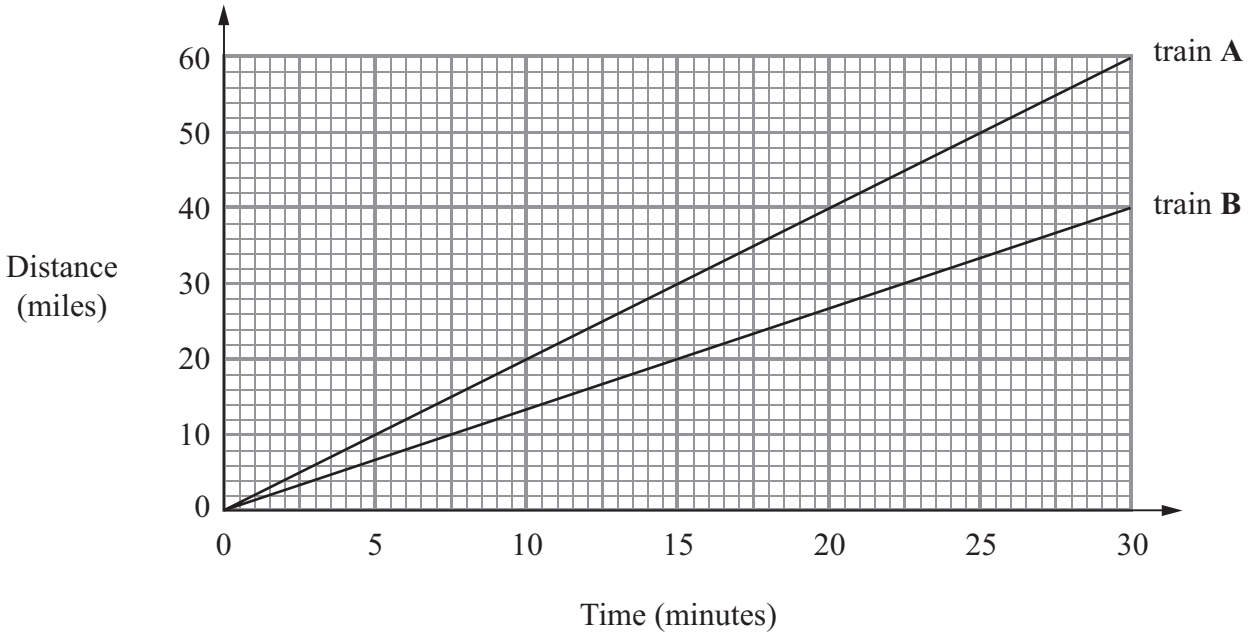
(ii) What is the maximum possible weight of the box?

..... grams

(2)

(Total for Question 6 is 6 marks)

7 The graph shows the distance travelled by two trains.



(a) Work out the gradient of the line for train **A**.

.....

(2)

(b) Which train is travelling at the greater speed?
You must explain your answer.

.....

.....

.....

(1)

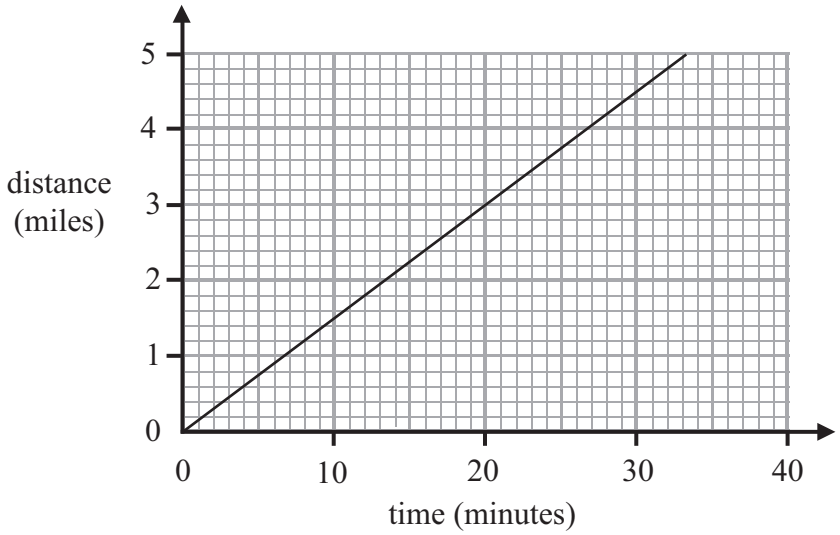
(c) After how many minutes has train **A** gone 10 miles further than train **B**?

..... minutes

(1)

(Total for Question 7 is 4 marks)

***9** Lisa cycles to work.
The travel graph shows information about her journey to work on Tuesday.



Martin also cycles to work.
On Tuesday his average speed was 16 km per hour.

Who has the greater average speed, Lisa or Martin?
You must show all your working.

(Total for Question 9 is 4 marks)

***10** Railtickets and Cheaptrains are two websites selling train tickets.

Each of the websites adds a credit card charge and a booking fee to the ticket price.

Railtickets	**Cheaptrains**
Credit card charge: 2.25% of ticket price	Credit card charge: 1.5% of ticket price
Booking fee: 80 pence	Booking fee: £1.90

Nadia wants to buy a train ticket.
The ticket price is £60 on each website.
Nadia will pay by credit card.

Will it be cheaper for Nadia to buy the train ticket from Railtickets or from Cheaptrains?

(Total for Question 10 is 4 marks)

***6** Potatoes cost £9 for a 12.5 kg bag at a farm shop.
The same type of potatoes cost £1.83 for a 2.5 kg bag at a supermarket.

Where are the potatoes the better value, at the farm shop or at the supermarket?
You must show your working.

(Total for Question 6 is 4 marks)

***4** Pete and Sue are going to take their children to France.
They will travel together on the same ferry.
They will travel with one of two ferry companies, Easy Ferry or Seawagon.

The tables give information about the costs for each adult and each child to travel with these ferry companies.

Easy Ferry	**July**			**August**		
Date	**1 – 10**	**11 – 21**	**22 – 31**	**1 – 10**	**11 – 21**	**22 – 31**
Adult	£32.00	£36.50	£39.50	£42.25	£42.25	£37.75
Child	£18.00	£20.25	£23.75	£25.85	£25.85	£21.00

Seawagon	**July**			**August**		
Date	**1 – 10**	**11 – 21**	**22 – 31**	**1 – 10**	**11 – 21**	**22 – 31**
Adult	£33.50	£37.50	£40.25	£43.85	£44.95	£38.50
Child	£17.25	£19.75	£21.85	£24.65	£23.95	£19.95

The table below gives information about the discount they will get from each ferry company if they book early.

Early booking discount	
Easy Ferry	$\frac{1}{3}$ off
Seawagon	25% off

Pete and Sue have three children.
They will travel on 25 July.
They will book early.

Pete and Sue will travel with the cheaper ferry company.

Which ferry company?
You must show all your working.

(Total for Question 4 is 5 marks)

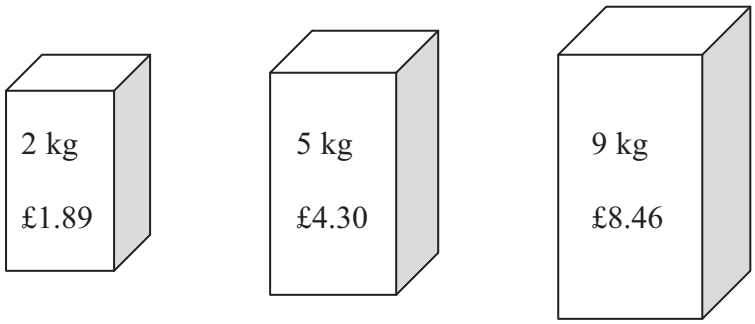
16 Judy drives at an average speed of 80 km per hour for 2 hours 45 minutes.

Work out the number of **miles** Judy drives.

..... miles

(Total for Question 16 is 3 marks)

***5** Soap powder is sold in three sizes of box.



A 2 kg box of soap powder costs £1.89
A 5 kg box of soap powder costs £4.30
A 9 kg box of soap powder costs £8.46

Which size of box is the best value for money?
Explain your answer.
You must show all your working.

(Total for Question 5 is 4 marks)

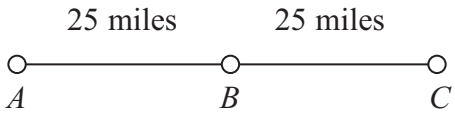
12 An object is travelling at a speed of 2650 metres per second.

How many seconds will the object take to travel a distance of 3.45×10^{10} metres?
Give your answer in standard form, correct to 2 significant figures.

..... seconds

(Total for Question 12 is 3 marks)

5



A, *B* and *C* are 3 service stations on a motorway.

AB = 25 miles
BC = 25 miles

Aysha drives along the motorway from *A* to *C*.

Aysha drives at an average speed of 50 mph from *A* to *B*.
She drives at an average speed of 60 mph from *B* to *C*.

Work out the difference in the time Aysha takes to drive from *A* to *B* and the time Aysha takes to drive from *B* to *C*.
Give your answer in minutes.

..... minutes

(Total for Question 5 is 3 marks)

***10** In the UK, petrol cost £1.24 per litre.
In the USA, petrol cost 3.15 dollars per US gallon.

1 US gallon = 3.79 litres
£1 = 1.47 dollars

Was petrol cheaper in the UK or in the USA?

(Total for Question 10 is 4 marks)

13 The diagram shows a solid triangular prism.

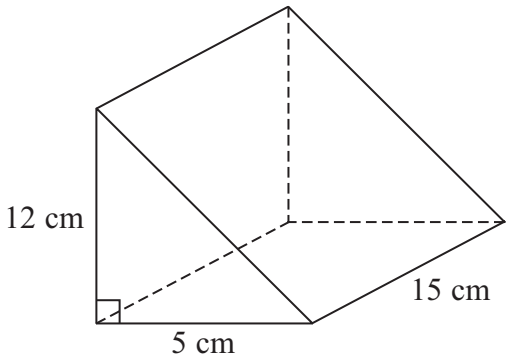


Diagram **NOT** accurately drawn

The prism is made from metal.
The density of the metal is 6.6 grams per cm^3.

Calculate the mass of the prism.

..... grams

(Total for Question 13 is 3 marks)

***8** Joan is planning a skiing holiday in Hinterglemm for herself and her two children.
They are going skiing for 6 days.

The table shows the costs of ski hire, of boot hire and of buying lift passes in two shops in Hinterglemm.
All prices are in Euros.

Shop A

		Ski hire	Boot hire	Lift pass
Adult	**6 days**	111	53	236
	13 days	168	90	314
Child	**6 days**	78	52	165
	13 days	122	87	210

Shop B

		Ski hire	Boot hire	Lift pass
Adult	**6 days**	108	54	242
	13 days	170	89	324
Child	**6 days**	68	48	160
	13 days	118	85	205

Joan will use her own skis and her own boots.

For 6 days she will need

to hire skis for each of her two children
to hire boots for each of her two children
and to buy lift passes for herself and each of her two children.

Shop A gives 5% off the total cost.
Shop B gives 3% off the total cost.

Joan wants to hire the skis and boots and buy the lift passes from the same shop.
She wants to get everything from the cheaper shop.

Which shop is cheaper for Joan?
You must show all your working.

(Total for Question 8 is 5 marks)

1 Richard's car uses 1 litre of petrol every 8 miles.
Petrol costs £1.30 per litre.

Richard drives 240 miles.

Work out the total cost of the petrol the car uses.

£ .....

(Total for Question 1 is 3 marks)

***4** Gordon owns a shop.

Here are the prices of three items in Gordon's shop and in a Supermarket.

Gordon's Shop	
400 g loaf of bread	£1.22
1 litre of milk	£0.96
40 tea bags	£2.42

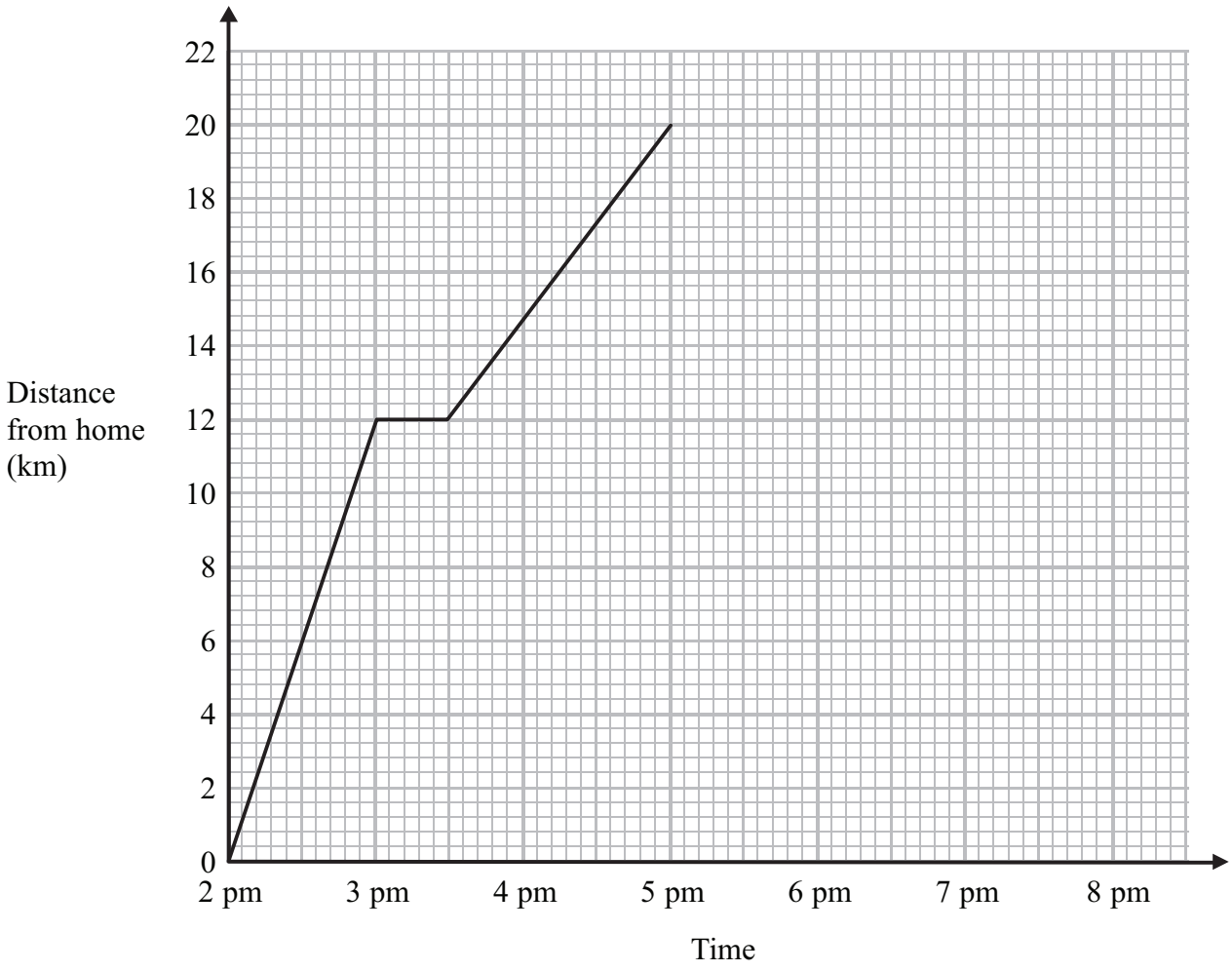
Supermarket	
400 g loaf of bread	£1.15
1 litre of milk	£0.86
40 tea bags	£2.28

Gordon reduces his prices by 5%.
Will the total cost of these three items be cheaper in Gordon's shop than in the Supermarket?

(Total for Question 4 is 3 marks)

3 Simon went for a cycle ride.
He left home at 2 pm.

The travel graph represents part of Simon's cycle ride.



At 3 pm Simon stopped for a rest.

(a) How many minutes did he rest?

..... minutes
(1)

(b) How far was Simon from home at 5 pm?

..... km
(1)

At 5 pm Simon stopped for 30 minutes.
Then he cycled home at a steady speed.
It took him 1 hour 30 minutes to get home.

(c) Complete the travel graph.

(2)

(Total for Question 3 is 4 marks)

6 Mr Watkins needs to buy some oil for his central heating.

Mr Watkins can put up to 1500 litres of oil in his oil tank.
There are already 850 litres of oil in the tank.
Mr Watkins is going to fill the tank with oil.

The price of oil is 67.2p per litre.
Mr Watkins gets 5% off the price of the oil.

How much does Mr Watkins pay for the oil he needs to buy?

£.....

(Total for Question 6 is 5 marks)

7 Peter goes for a walk.
He walks 15 miles in 6 hours.

(a) Work out Peter's average speed.
Give your answer in miles per hour.

..... mph
(2)

5 miles = 8 km.
Sunita says that Peter walked more than 20 km.

*(b) Is Sunita right?
You must show all your working.

(2)

(Total for Question 7 is 4 marks)

***1** Soap powder is sold in two sizes of box.

Small	**Large**
1.75 kg for £4.20	3.5 kg for £8.68

Which size of box gives the better value for money?
Explain your answer.

(Total for Question 1 is 3 marks)

21 A solid sphere has

a mass of 1180 g measured to the nearest gram
and a radius of 6.2 cm measured to the nearest millimetre.

Given that

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

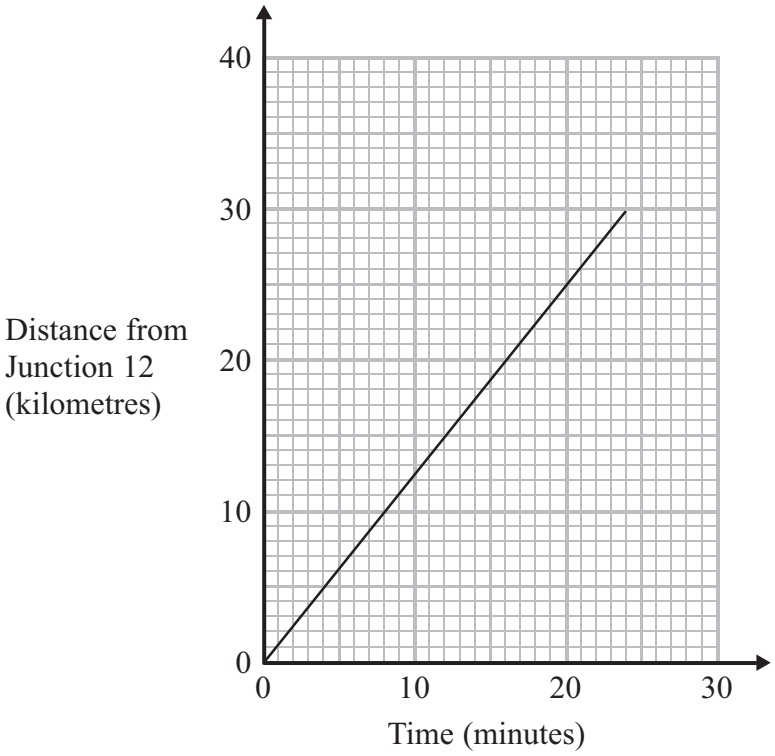
find the upper bound for the density of the sphere.
Give your answer to 3 significant figures.

..... g/cm^3

(Total for Question 21 is 4 marks)

***11** Debbie drove from Junction 12 to Junction 13 on a motorway.

The travel graph shows Debbie's journey.



Ian also drove from Junction 12 to Junction 13 on the same motorway.
He drove at an average speed of 66 km/hour.

Who had the faster average speed, Debbie or Ian?
You must explain your answer.

(Total for Question 11 is 4 marks)

***9** Mr and Mrs Singh are planning a holiday in France.

They want to stay in a hotel or stay in a villa.

If they stay in a hotel, the meals are included in the price.
If they stay in a villa, they will cook their own meals.
The food for their meals will cost £200 each week.

The table gives information about the costs.

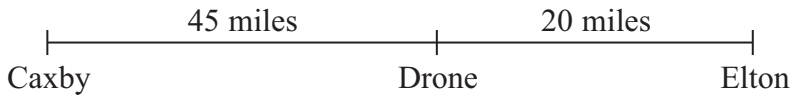
Start of holiday	**Hotel (Cost per adult per night)**	**Villa (Cost per week for up to 4 people)**
01 Jan – 28 Feb	£120	£1000
01 Mar – 30 Apr	£125	£1200
01 May – 30 June	£150	£1500
01 July – 31 Aug	£180	£2600
01 Sep – 31 Oct	£150	£1500
Cost for children	40% of adult cost	Included in cost of villa

Mr and Mrs Singh want to go on holiday with their one child on the 3rd of August for one week (7 nights).

Is it cheaper for Mr and Mrs Singh to stay in the hotel or stay in the villa?
You must show all your working.

(Total for Question 9 is 6 marks)

11 The distance from Caxby to Drone is 45 miles.
The distance from Drone to Elton is 20 miles.



Colin drives from Caxby to Drone.
Then he drives from Drone to Elton.

Colin drives from Caxby to Drone at an average speed of 30 mph.
He drives from Drone to Elton at an average speed of 40 mph.

Work out Colin's average speed for the whole journey from Caxby to Elton.

..... mph

(Total for Question 11 is 3 marks)

***9** Ketchup is sold in three different sizes of bottle.



Small bottle Medium bottle Large bottle

A small bottle contains 342 g of ketchup and costs 88p
A medium bottle contains 570 g of ketchup and costs £1.95
A large bottle contains 1500 g of ketchup and costs £3.99

Which bottle is the best value for money?
You must show your working.

(Total for Question 9 is 4 marks)

5 Ben goes on holiday to Hong Kong.

In Hong Kong, Ben sees a camera costing HK$3179.55
In London, an identical camera costs £285

The exchange rate is £1 = HK$12.30

Ben buys the camera in Hong Kong.

How much cheaper is the camera in Hong Kong than in London?

.....

(Total for Question 5 is 3 marks)

*7 Plants are sold in three different sizes of tray.

A small tray of 30 plants costs £6.50
A medium tray of 40 plants costs £8.95
A large tray of 50 plants costs £10.99

Kaz wants to buy the tray of plants that is the best value for money.

Which size tray of plants should she buy?
You must show all your working.

(Total for Question 7 is 4 marks)

***13** Axel and Lethna are driving along a motorway.

They see a road sign.
The road sign shows the distance to Junction 8
It also shows the average time drivers will take to get to Junction 8

To Junction 8
30 miles 26 minutes

The speed limit on the motorway is 70 mph.

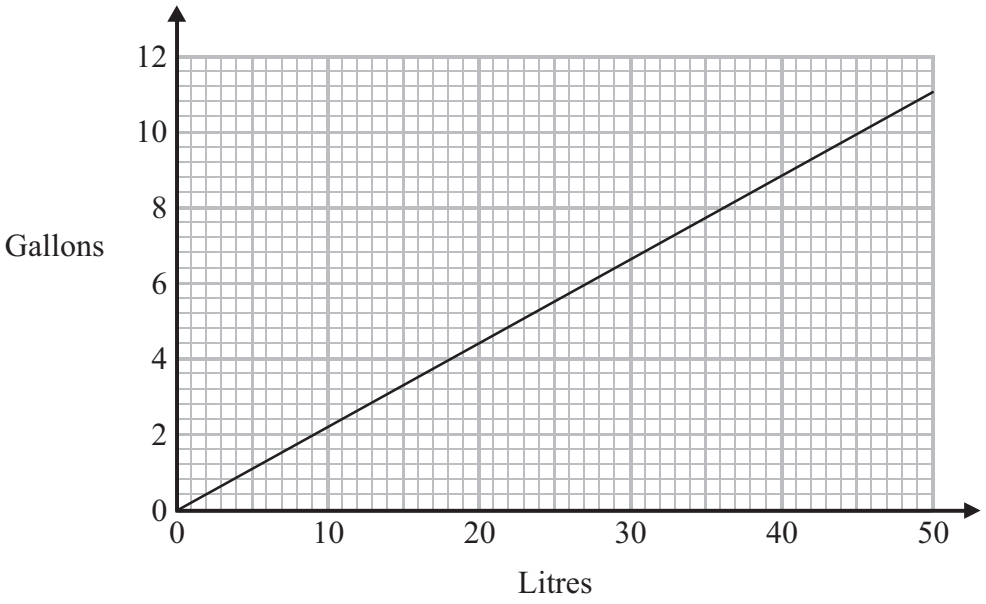
Lethna says,

'We will have to drive faster than the speed limit to go 30 miles in 26 minutes.'

Is Lethna right?
You must show how you got your answer.

(Total for Question 13 is 3 marks)

***4** You can use this graph to convert between litres and gallons.



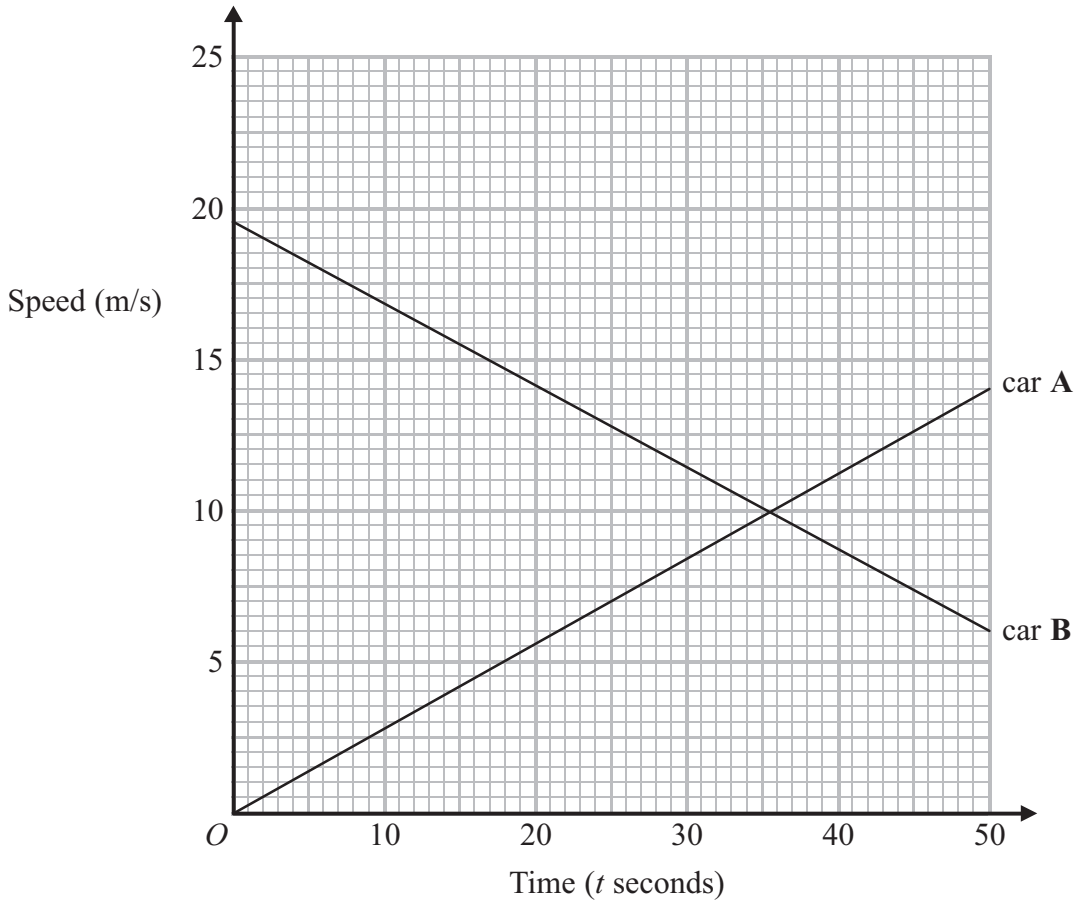
Jack buys 8 gallons of diesel.
He pays £52

Francoise buys 40 litres of diesel.
She pays £58

Who got the better value for their money, Jack or Francoise?
You must show your working.

(Total for Question 4 is 3 marks)

12 The graph shows information about the speeds of two cars.



(a) Work out the gradient of the line for car A.

.....

(2)

(b) After how many seconds is the speed of car A equal to the speed of car B?

..... seconds

(1)

(Total for Question 12 is 3 marks)

6 Mrs Evans is planning a trip to the zoo.

She finds out this information.

July

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Off peak Peak

Ticket Prices

	Peak	Off peak
Adult	£20.50	£19.50
Child	£15.50	£15.00
Senior citizen	£19	£18

Family Offer

10% Discount	2 adults and 2 children or 1 adult and 3 children

Mrs Evans will go to the zoo on Friday 17th July.
She will need to buy tickets for 1 adult and 3 children.

Mrs Evans wants to buy the tickets as cheaply as possible.

Work out the total cost of the tickets.

£ .....

(Total for Question 6 is 4 marks)

***8** A shop sells toothpaste in 3 different sizes of tube.

A 70 m*l* tube of toothpaste costs £1.79
A 100 m*l* tube of toothpaste costs £2.75
A 150 m*l* tube of toothpaste costs £3.99

Which size of tube is the best value for money?
You must show all your working.

(Total for Question 8 is 4 marks)

6 Mrs Evans is planning a trip to the zoo.

She finds out this information.

July

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Off peak Peak

Ticket Prices

	Peak	Off peak
Adult	£20.50	£19.50
Child	£15.50	£15.00
Senior citizen	£19	£18

Family Offer

10% Discount	2 adults and 2 children or 1 adult and 3 children

Mrs Evans will go to the zoo on Friday 17th July.
She will need to buy tickets for 1 adult and 3 children.

Mrs Evans wants to buy the tickets as cheaply as possible.

Work out the total cost of the tickets.

£ .....

(Total for Question 6 is 4 marks)

***8** A shop sells toothpaste in 3 different sizes of tube.

A 70 m*l* tube of toothpaste costs £1.79
A 100 m*l* tube of toothpaste costs £2.75
A 150 m*l* tube of toothpaste costs £3.99

Which size of tube is the best value for money?
You must show all your working.

(Total for Question 8 is 4 marks)

***10** Milk is sold in two sizes of bottle.

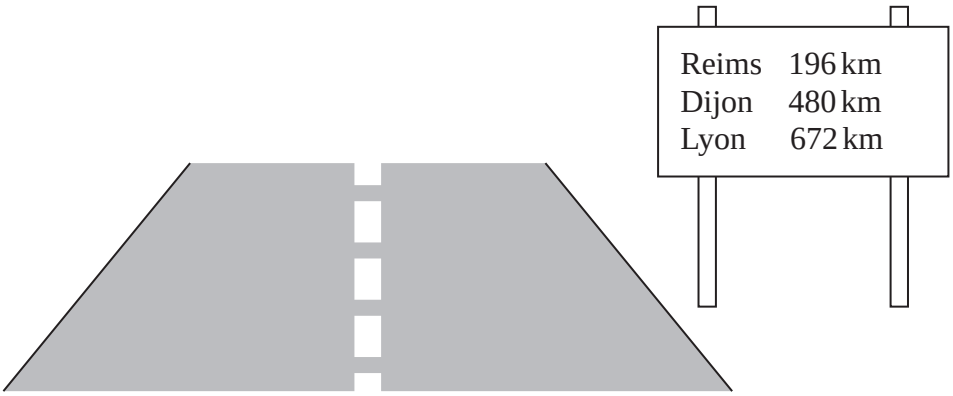


A 4 pint bottle of milk costs £1.18
A 6 pint bottle of milk costs £1.74

Which bottle of milk is the best value for money?
You must show all your working.

(Total for Question 10 is 3 marks)

14 Emily is driving in France.
She sees this sign.



Emily is going to drive to Dijon.
She plans to drive at an average speed of 50 miles per hour.

Work out how long it should take Emily to drive to Dijon.

.....

(Total for Question 14 is 4 marks)

6 Sue is driving home from her friend's house.

Sue drives

10 miles from her friend's house to the motorway
240 miles on the motorway
5 miles from the motorway to her home

Sue

takes 20 minutes to drive from her friend's house to the motorway
drives at an average speed of 60 mph on the motorway
takes 25 minutes to drive from the motorway to her home

Sue stops for a 30 minute rest on her drive home.

Sue leaves her friend's house at 9.00 am.

What time does Sue get home?
You must show all your working.

.....

(Total for Question 6 is 3 marks)

13 Harry travels from Appleton to Brockley at an average speed of 50 mph.
He then travels from Brockley to Cantham at an average speed of 70 mph.

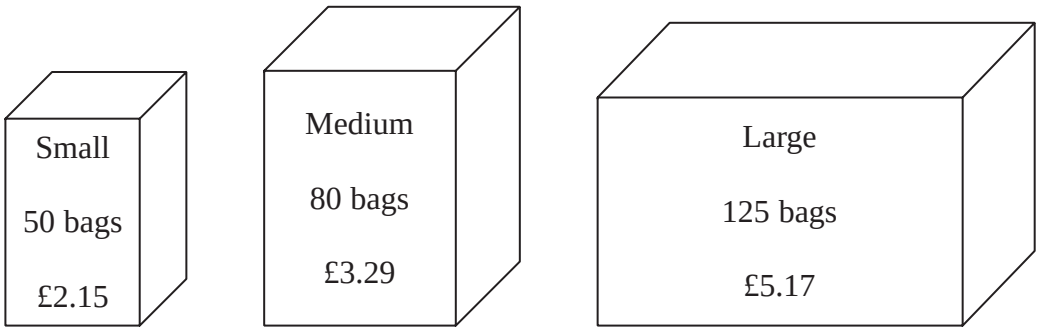
Harry takes a total time of 5 hours to travel from Appleton to Cantham.
The distance from Brockley to Cantham is 210 miles.

Calculate Harry's average speed for the total distance travelled from Appleton to Cantham.

..... mph

(Total for Question 13 is 4 marks)

***4** Tea bags are sold in three sizes of box.



A small box of 50 tea bags costs £2.15
A medium box of 80 tea bags costs £3.29
A large box of 125 tea bags costs £5.17

Which size of box is the best value for money?

(Total for Question 4 is 4 marks)

***18** The diagram shows a solid wooden sphere.

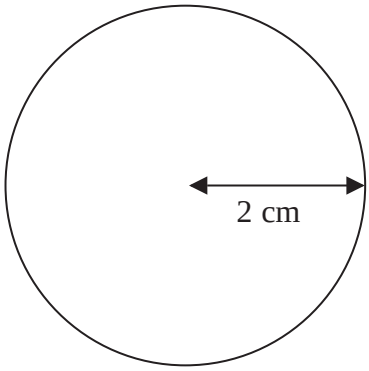


Diagram **NOT** accurately drawn

The radius of the sphere is 2 cm.
The mass of the sphere is 45 grams.

Wood will float on the Dead Sea only when the density of the wood is less than 1.24 g/cm^3.

Will this wooden sphere float on the Dead Sea?

(Total for Question 18 is 4 marks)

13 The diagram shows a swimming pool in the shape of a prism.

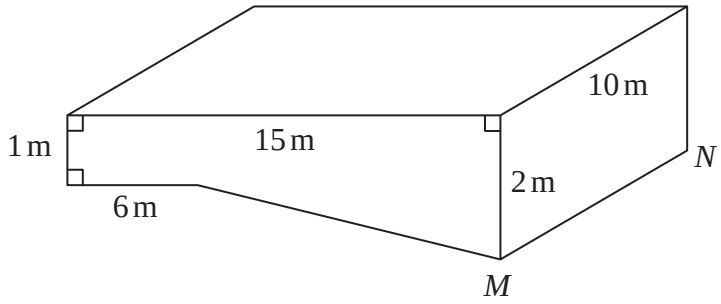


Diagram **NOT** accurately drawn

The swimming pool is empty.

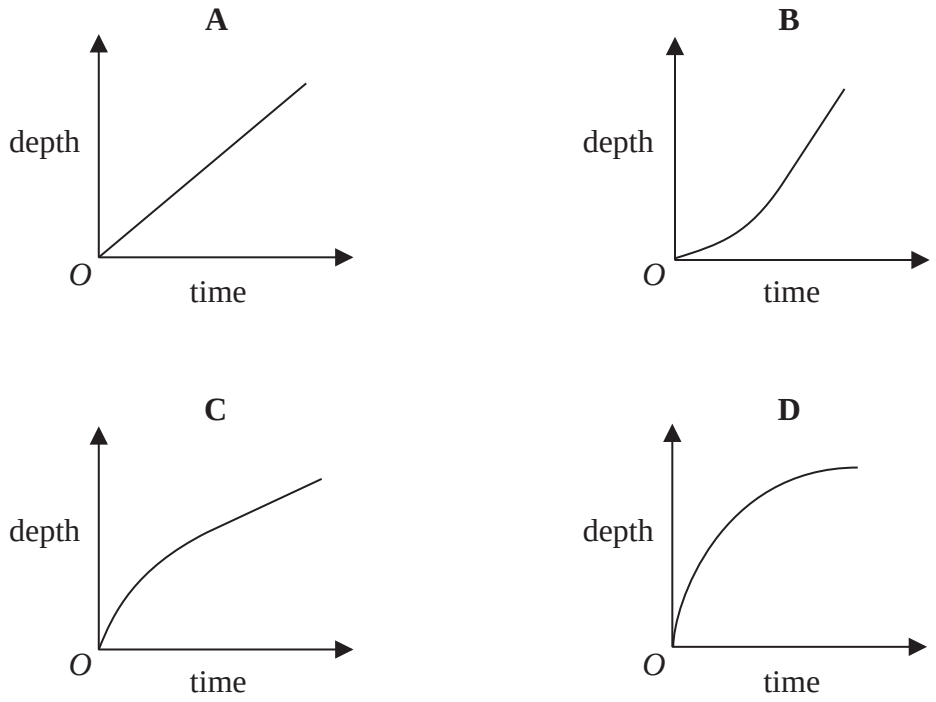
The swimming pool is filled with water at a constant rate of 50 litres per minute.

(a) Work out how long it will take for the swimming pool to be completely full of water.
Give your answer in hours.
($1\,m^3 = 1000$ litres)

..... hours

(5)

Here are four graphs.



(b) Write down the letter of the graph that best shows how the depth of the water in the pool above the line *MN* changes with time as the pool is filled.

.....

(1)

(Total for Question 13 is 6 marks)

***23** A road is 4530 m long, correct to the nearest 10 metres.
Kirsty drove along the road in 205 seconds, correct to the nearest 5 seconds.

The average speed limit for the road is 80 km/h.

Could Kirsty's average speed have been greater than 80 km/h?
You must show your working.

(Total for Question 23 is 5 marks)

6 Nick has 2 cars.
Car A uses petrol.
Car B uses diesel.

Petrol costs £1.39 per litre.
Diesel costs £1.47 per litre.

The table below shows the average distance that Nick can drive each car using 1 litre of fuel.

Car A	10.3 miles per litre of petrol
Car B	14.6 miles per litre of diesel

Nick is going on a journey in one of his cars.
The distance Nick is going to drive is 450 miles.

Work out the difference of the total costs of the fuel for the 2 cars for this journey.

£.....

(Total for Question 6 is 4 marks)

***7** The world speed record for a train is 360 mph.
It takes Malcolm 6 seconds to drive a train 1 kilometre.

Has the train broken the world speed record?
Use 5 miles = 8 km.

(Total for Question 7 is 5 marks)

***2** Matches are sold in three sizes of box.

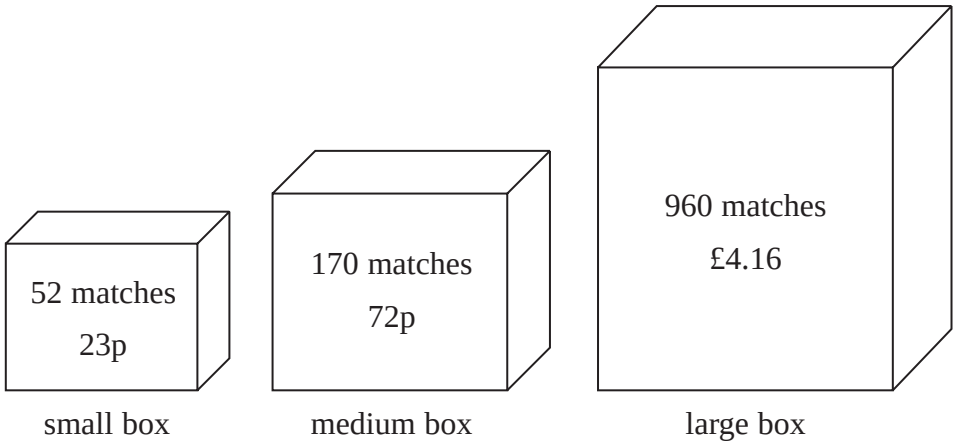


Diagram **NOT** accurately drawn

A small box contains 52 matches and costs 23p.
A medium box contains 170 matches and costs 72p.
A large box contains 960 matches and costs £4.16

Which size of box is the best value for money?
Show how you got your answer.

(Total for Question 2 is 4 marks)

***8**

Nail Company	Hammer Company
50 nails	25 nails
£4.15 plus VAT at 20%	£2.95
	Special offer Buy 100 get 25 free

Barak is going to buy 550 nails from one of these companies.

He wants to buy the nails at the cheaper cost.

Where should he buy the nails, from the Nail Company or from the Hammer Company?

(Total for Question 8 is 5 marks)

14 The distance from Fulbeck to Ganby is 10 miles.
The distance from Ganby to Horton is 18 miles.



Raksha is going to drive from Fulbeck to Ganby.
Then she will drive from Ganby to Horton.

Raksha leaves Fulbeck at 10 00
She drives from Fulbeck to Ganby at an average speed of 40 mph.

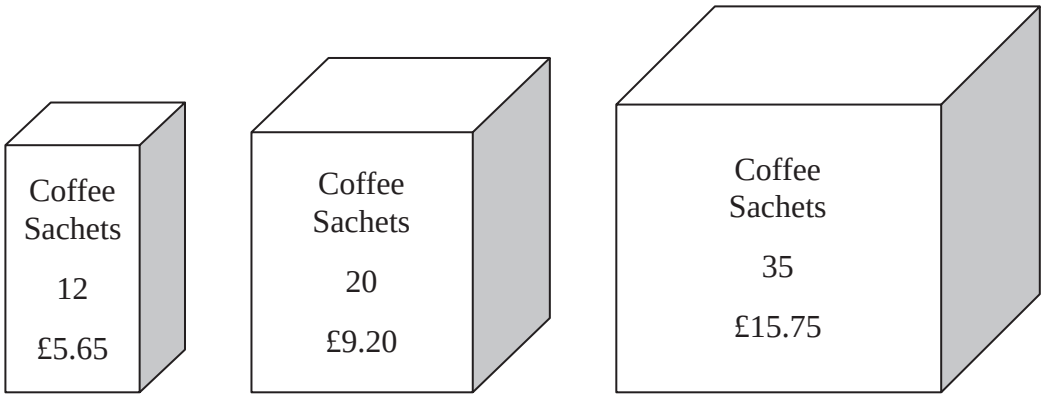
Raksha wants to get to Horton at 10 35

Work out the average speed Raksha must drive at from Ganby to Horton.

..... mph

(Total for Question 14 is 3 marks)

***6** Coffee sachets are sold in three different sizes of box.



small medium large

A small box has 12 coffee sachets and costs £5.65
A medium box has 20 coffee sachets and costs £9.20
A large box has 35 coffee sachets and costs £15.75

Work out which size of box gives the best value for money.
You must show all your working.

(Total for Question 6 is 4 marks)

16 Liquid A has a density of 0.7 g/cm^3.
Liquid B has a density of 1.6 g/cm^3.

140 g of liquid A and 128 g of liquid B are mixed to make liquid C.

Work out the density of liquid C.

..... g/cm^3

(Total for Question 16 is 4 marks)

24 Steve travelled from Ashton to Barnfield.

He travelled 235 miles, correct to the nearest 5 miles.
The journey took him 200 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the average speed of the journey.
Give your answer in **miles per hour**, correct to 3 significant figures.
You must show all your working.

..... mph

(Total for Question 24 is 4 marks)

Question 65

***9** In England the speed limit is 70 miles per hour.
In Italy the speed limit is 130 kilometres per hour.

Which country has the greater speed limit, England or Italy?
You must show your working.

(Total for Question 9 is 3 marks)

***4** A shop sells coffee in 3 different sizes of jar.



£4.39 £6.39 £7.95

A 150 g jar of coffee costs £4.39
A 200 g jar of coffee costs £6.39
A 275 g jar of coffee costs £7.95

Which size of jar is the best value for money?
You must show all your working.

(Total for Question 4 is 4 marks)

11 Manchester airport is on a bearing of 330° from a London airport.

(a) Find the bearing of the London airport from Manchester airport.

.....°

(2)

The London airport is 200 miles from Manchester airport.

A plane leaves Manchester airport at 10 am to fly to the London airport.
The plane flies at an average speed of 120 mph.

(b) What time does the plane arrive at the London airport?

.....

(4)

(Total for Question 11 is 6 marks)

4 There are 18500 gallons of fuel in a fuel tank.

The fuel is pumped from the fuel tank into a plane at a rate of 1700 litres per minute.

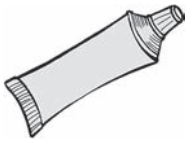
1 gallon = 4.5 litres.

How many minutes will it take to empty the fuel tank completely?
Give your answer to the nearest minute.

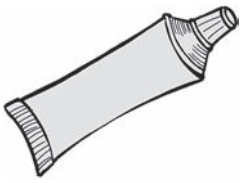
..... minutes

(Total for Question 4 is 3 marks)

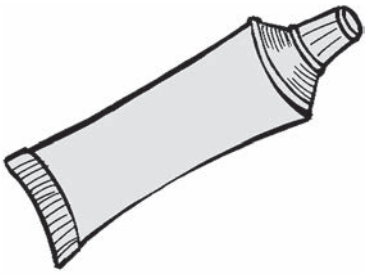
***8** Toothpaste is sold in three different sizes of tube.



50 m*l*



75 m*l*



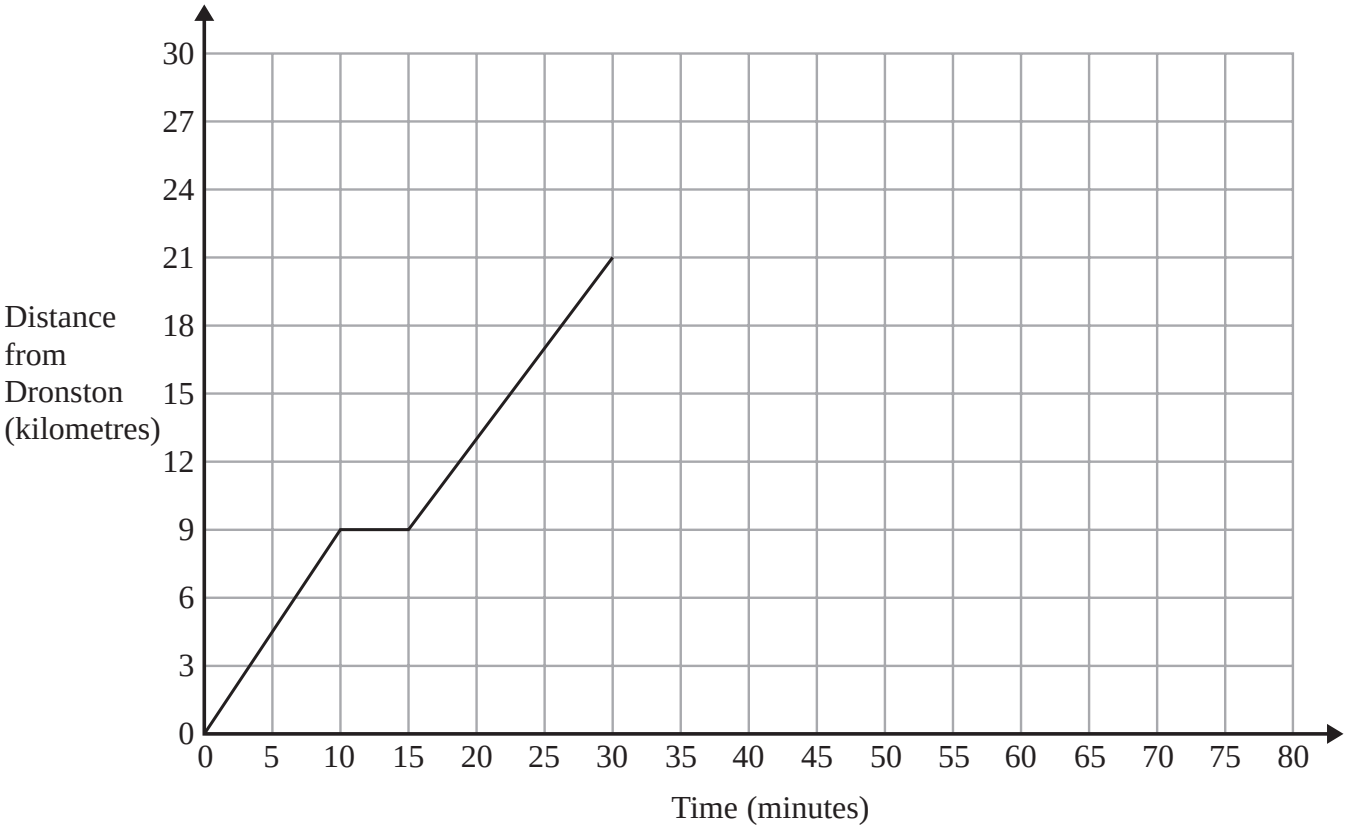
125 m*l*

A 50 m*l* tube costs £1.09
A 75 m*l* tube costs £1.68
A 125 m*l* tube costs £2.69

Which tube of toothpaste is the best value for money?
You must show all your working.

(Total for Question 8 is 4 marks)

10 A coach travels from Dronston to Luscoe.
The travel graph for this journey is shown below.



(a) Work out the average speed of the coach, in kilometres per hour, for the first 10 minutes of the journey.

..... km/h
(2)

The coach stops in Luscoe for 15 minutes.
The coach then returns to Dronston at a constant speed of 42 km/h.

(b) Show this information on the travel graph.

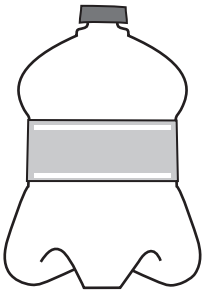
(3)

(Total for Question 10 is 5 marks)

***3** A supermarket has two special offers on lemonade.

Bottles of lemonade

Special offer



15% off the normal price of each bottle

Cans of lemonade

Special offer



Buy 3 cans get 25p off the total cost

The normal price of a 2.5 litre bottle of lemonade is £1.60
The normal price of a 0.33 litre can of lemonade is 28p.

Jerry is going to buy 4 bottles of the lemonade on special offer or 30 cans of the lemonade on special offer.

Which special offer is the better value for money?

(Total for Question 3 is 5 marks)

12 Jade makes an orange drink by mixing orange concentrate with water.

She mixes 15 cm^3 of orange concentrate with 250 cm^3 of water.

The density of orange concentrate is 1.20 g/cm^3.
The density of water is 1.00 g/cm^3.

Work out the density of Jade's orange drink.
Give your answer correct to 2 decimal places.

.....g/cm^3

(Total for Question 12 is 3 marks)

***4** A shop sells bags of crisps in different size packs.

There are

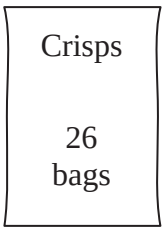
18 bags of crisps in a small pack
20 bags of crisps in a medium pack
26 bags of crisps in a large pack



£4 each pack



£4.99 each pack



£6.00 each pack

Which size pack is the best value for money?
You must show all your working.

(Total for Question 4 is 4 marks)

14 The diagram shows a metal bar in the shape of a prism.

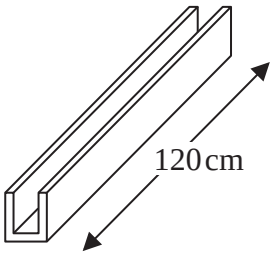


Diagram **NOT** accurately drawn

The length of the metal bar is 120 cm.
The cross section of the metal bar is shown below.

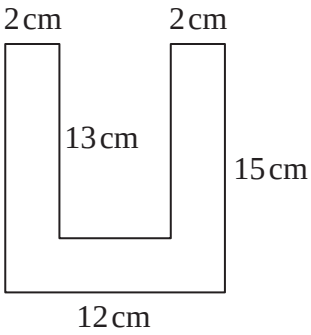


Diagram **NOT** accurately drawn

All corners are right angles.

The metal bar is made from steel with density 8 g/cm^3.

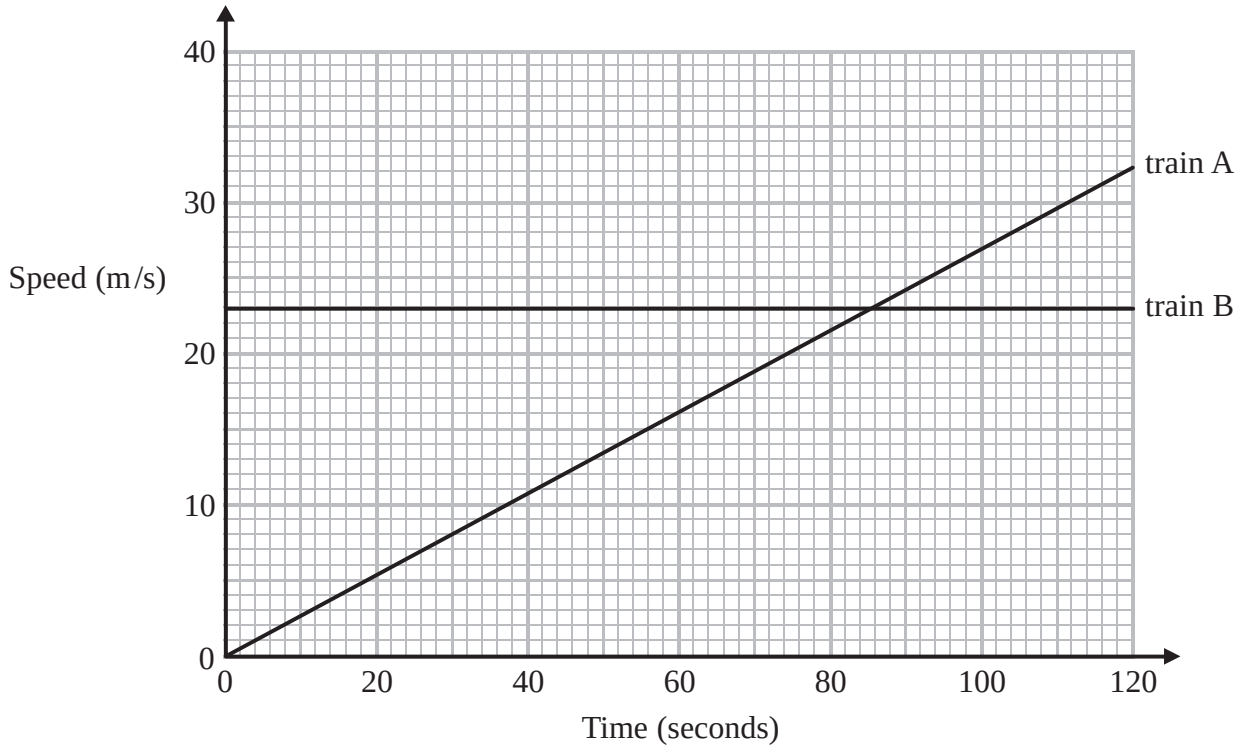
Sean has a trolley.
The trolley can carry a maximum mass of 250 kg.

How many metal bars can the trolley carry at the same time?
You must show your working.

.....

(Total for Question 14 is 5 marks)

12 The graph shows information about the speeds of two trains.



(a) Work out the gradient of the line for train A.

.....

(2)

*(b) Describe how the speed of train A and the speed of train B are changing in relation to time.

.....

.....

.....

(1)

(Total for Question 12 is 3 marks)

2

Train tickets
day return £6.45
monthly saver £98.50

Sue goes to work by train.

Sue worked for 18 days last month.
She bought a day return ticket each day she worked.

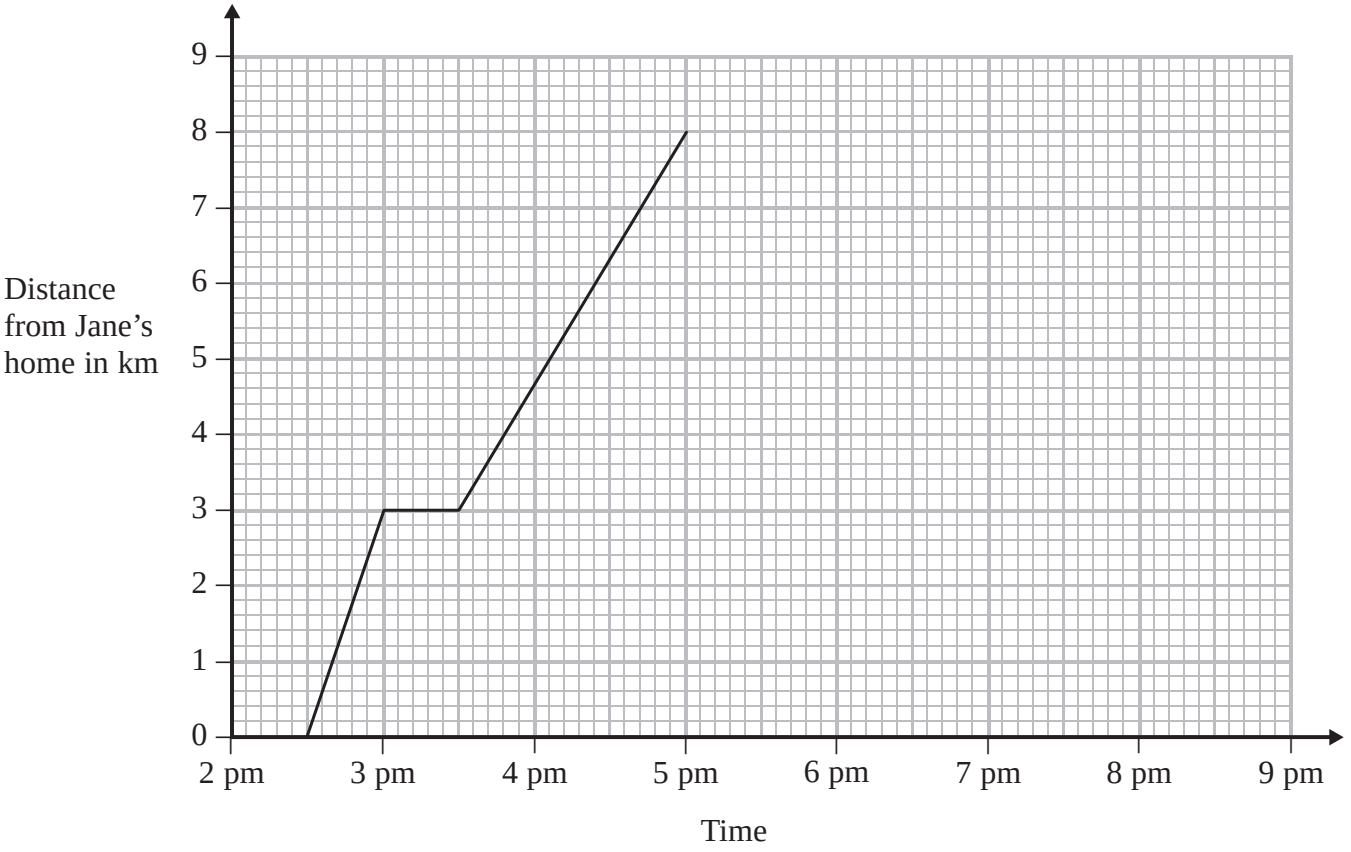
A monthly saver ticket is cheaper than 18 day return tickets.
How much cheaper?

£ .....

(Total for Question 2 is 4 marks)

4 Jane walked from her home to the ice rink.

The travel graph for Jane's journey to the ice rink is shown below.



On the way to the ice rink Jane stopped at her friend's house.

(a) How far is it from her friend's house to the ice rink?

..... km

(1)

Jane was at the ice rink for 1 hour 30 minutes.
She then walked home at a steady speed.
Jane took 2 hours to walk home.

(b) Complete the travel graph for this information.

(2)

(Total for Question 4 is 3 marks)

9 The diagram shows a rectangular framework.

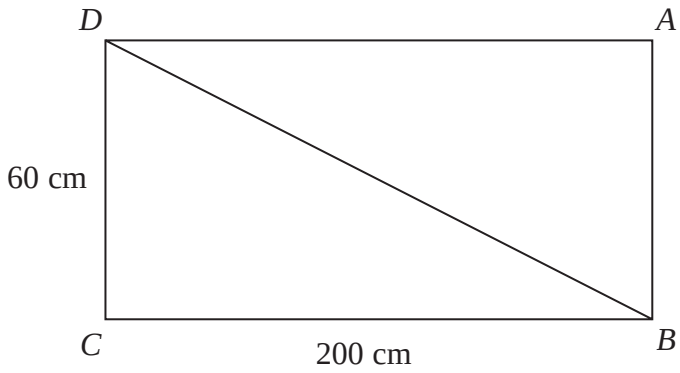


Diagram **NOT** accurately drawn

The framework is made from 5 metal rods.
The metal rods have a weight of 0.9 kg per metre.

Work out the total weight of the framework.
Give your answer, in kg, correct to 3 significant figures.

..... kg

(Total for Question 9 is 4 marks)

***10** Blueberries are sold in small cartons and in large cartons.



small carton

large carton

There are 125 g of blueberries in a small carton.
Each small carton costs £1.60

There are 225 g of blueberries in a large carton.
Each large carton costs £2.80

Which size of carton is the better value for money?
You must show your working.

(Total for Question 10 is 3 marks)

6 Regan cycles 78 miles in 6 hours.
His average speed for the first 30 miles is 15 miles per hour.

Work out Regan's average speed for the last 48 miles.

.....miles per hour

(Total for Question 6 is 3 marks)

***9** The normal price of a watch is £80 in two shops, Tymes and Sekonds.

Both shops have a sale.

In Tymes the normal price of the watch is reduced by £18
In Sekonds the normal price of the watch is reduced by 20%

Which shop is selling the watch for the cheaper price in the sale?
You must show your working.

(Total for Question 9 is 3 marks)

18 A spacecraft travels from Earth to Mars at an average speed of 13 km/s.

The spacecraft travels a distance of 1.4×10^8 miles.

Calculate the number of days the spacecraft takes to travel from Earth to Mars.

You may use

1 mile = 1.6 km
1 km/s = 2250 miles per hour

..... days

(Total for Question 18 is 3 marks)

3 Identical pairs of boots are sold in London, in Geneva and in Paris.

These boots have a price of

£115 in London
189 Swiss francs in Geneva
174 euros in Paris

The exchange rates are

£1 = 1.39 Swiss francs
£1 = 1.27 euros

Are the boots the best value for money in London or in Geneva or in Paris?
You must show how you get your answer.

.....

(Total for Question 3 is 3 marks)

18 Ibrar mixes 74 g of lead and 126 g of tin to make 200 g of an alloy.

Lead has a density of 11.34 g/cm^3.
Tin has a density of 7.31 g/cm^3.

Work out the density of the alloy.
Give your answer correct to 1 decimal place.

..... g/cm^3

(Total for Question 18 is 3 marks)

4 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 4 is 5 marks)

Question 86

6 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 6 is 4 marks)

17 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 17 is 5 marks)

Question 88

November 2017 | 1MA1/1H | Original Q9

9 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.

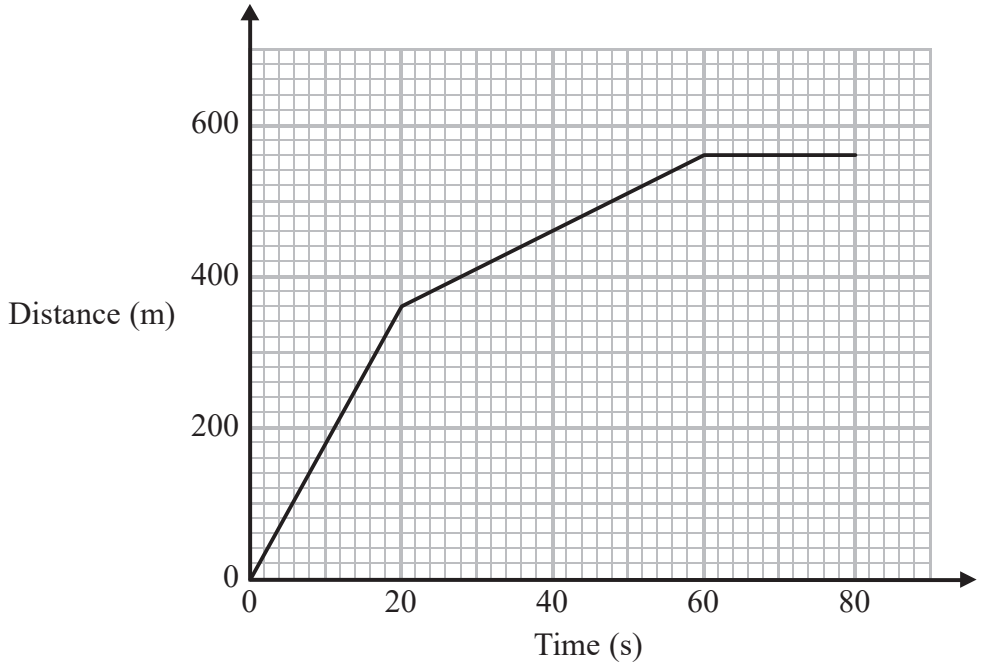
James and Peter both cycled at constant speeds.

Work out Peter's speed.

..... km/h

(Total for Question 9 is 5 marks)

10 Here is part of a distance-time graph for a car's journey.



(a) Between which two times does the car travel at its greatest speed?
Give a reason for your answer.

.....

.....

(2)

(b) Work out this greatest speed.

..... m/s

(1)

(Total for Question 10 is 3 marks)

2 In London, 1 litre of petrol costs 108.9p
In New York, 1 US gallon of petrol costs $2.83

1 US gallon = 3.785 litres
£1 = $1.46

In which city is petrol better value for money, London or New York?
You must show your working.

(Total for Question 2 is 3 marks)

Question 91

3 A gold bar has a mass of 12.5 kg.

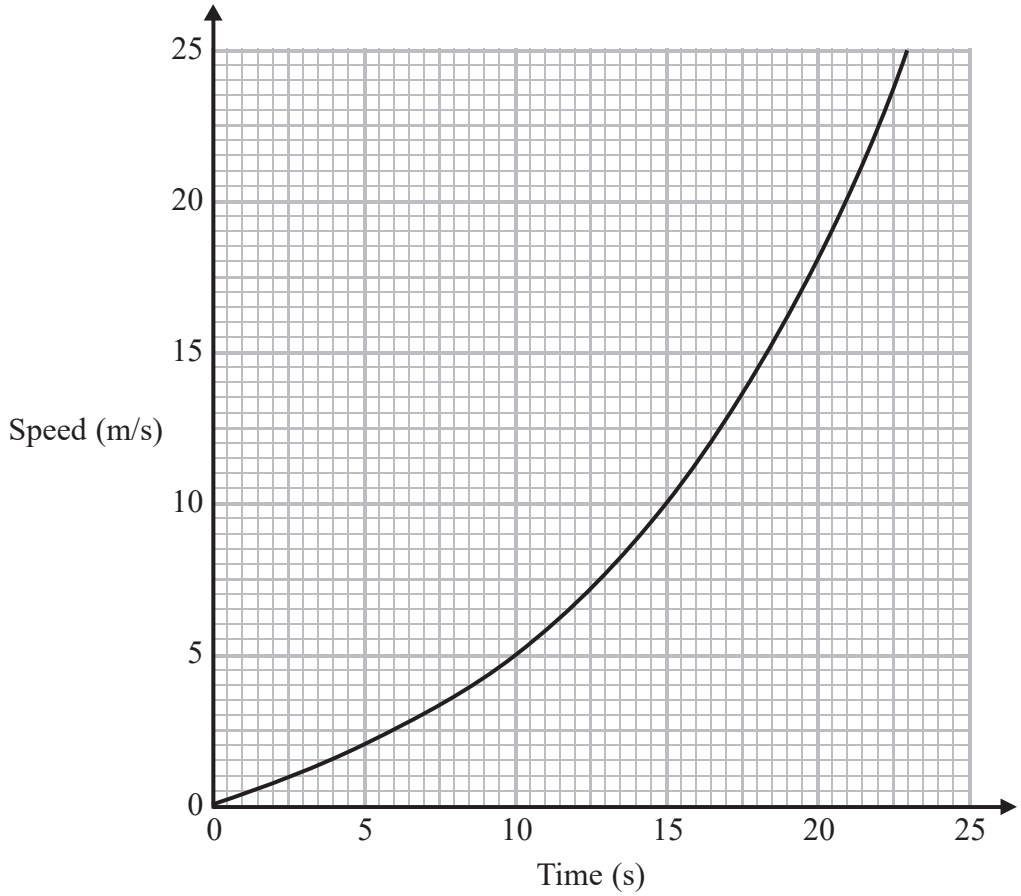
The density of gold is 19.3 g/cm^3

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

..... cm^3

(Total for Question 3 is 3 marks)

18 Here is a speed-time graph for a train.



(a) Work out an estimate for the distance the train travelled in the first 20 seconds.
Use 4 strips of equal width.

..... m

(3)

(b) Is your answer to (a) an underestimate or an overestimate of the actual distance the train travelled?
Give a reason for your answer.

.....

.....

(1)

(Total for Question 18 is 4 marks)

4 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

.....

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

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

.....

.....

(1)

(Total for Question 4 is 4 marks)

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

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

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

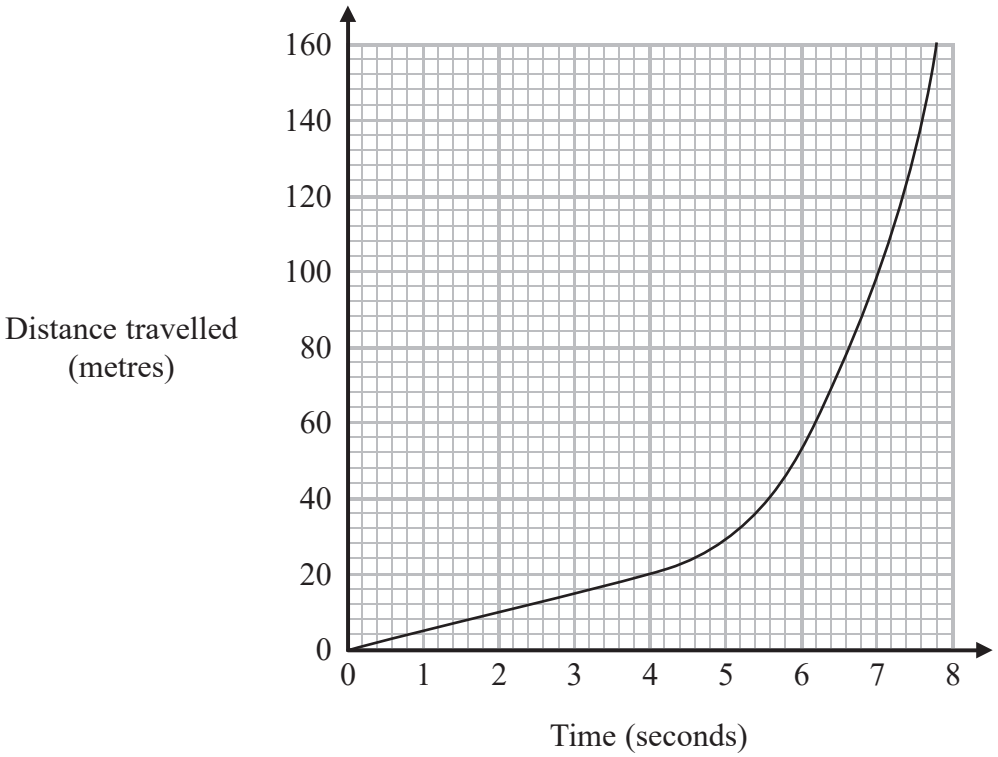
Helen says,

"The pressure decreases by less than 20%"

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

(Total for Question 6 is 3 marks)

14 The distance-time graph shows information about part of a car journey.



Use the graph to estimate the speed of the car at time 5 seconds.

..... m/s

(Total for Question 14 is 3 marks)

Question 96

21 Jackson is trying to find the density, in g/cm^3, of a block of wood.
The block of wood is in the shape of a cuboid.

He measures
the length as 13.2 cm, correct to the nearest mm
the width as 16.0 cm, correct to the nearest mm
the height as 21.7 cm, correct to the nearest mm

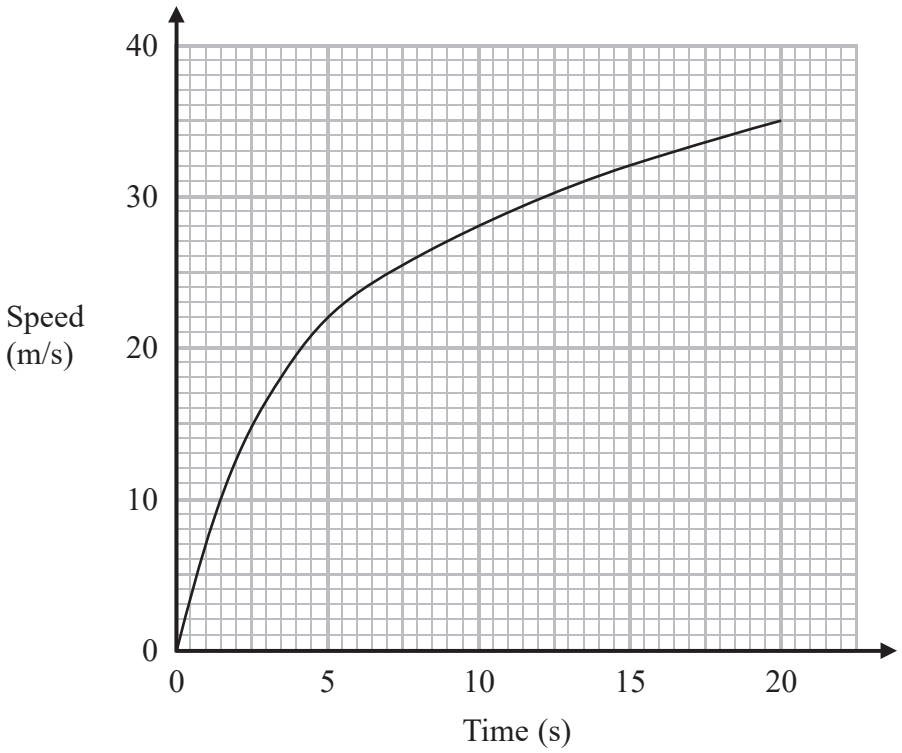
He measures the mass as 1970 g, correct to the nearest 5 g.

By considering bounds, work out the density of the wood.
Give your answer to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for Question 21 is 5 marks)

15 The graph shows the speed of a car, in metres per second, during the first 20 seconds of a journey.



(a) Work out an estimate for the distance the car travelled in the first 20 seconds.
Use 4 strips of equal width.

..... metres

(3)

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 20 seconds?
Give a reason for your answer.

.....

.....

(1)

(Total for Question 15 is 4 marks)

5 A plane travels at a speed of 213 miles per hour.

(a) Work out an estimate for the number of seconds the plane takes to travel 1 mile.

..... seconds

(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

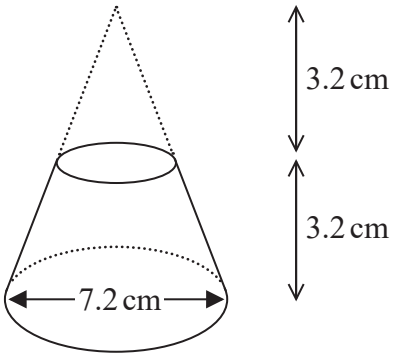
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.....

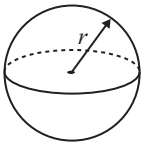
(1)

(Total for Question 5 is 4 marks)

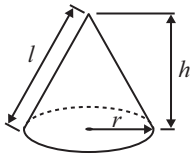
20 Here is a frustum of a cone.



Volume of sphere $= \frac{4}{3}\pi r^3$



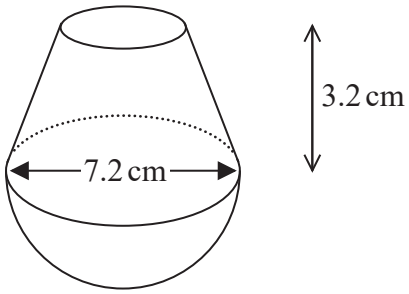
Volume of cone $= \frac{1}{3}\pi r^2 h$



The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid **S** shown below.

Solid **S**



The density of the frustum is 2.4 g/cm^3
The density of the hemisphere is 4.8 g/cm^3

Calculate the average density of solid **S**.

.....g/cm^3

(Total for Question 20 is 5 marks)

5 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 5 is 4 marks)

18 A high speed train travels a distance of 487 km in 3 hours.

The distance is measured correct to the nearest kilometre.
The time is measured correct to the nearest minute.

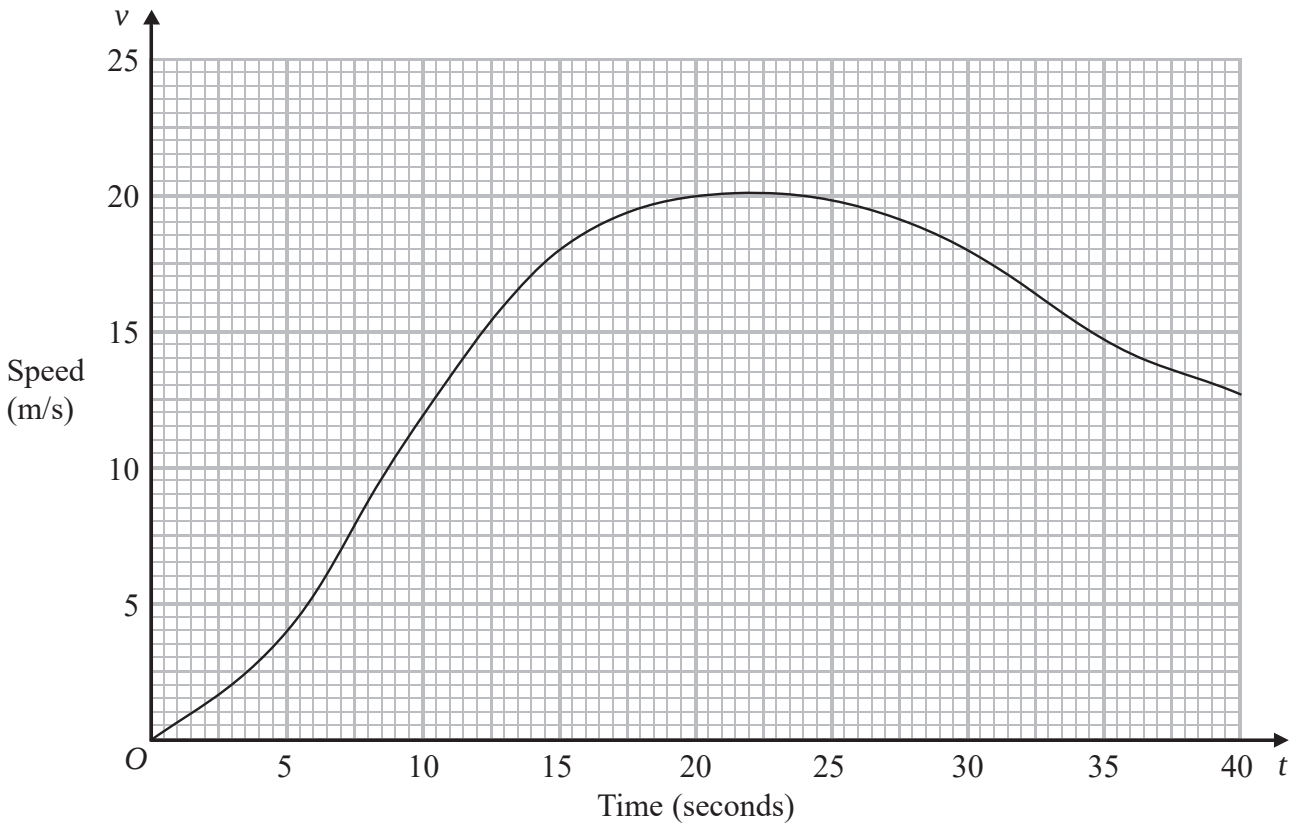
By considering bounds, work out the average speed, in km/minute, of the train to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

.....km/minute

(Total for Question 18 is 5 marks)

14 A car moves from rest.

The graph gives information about the speed, v metres per second, of the car t seconds after it starts to move.



(a) (i) Calculate an estimate of the gradient of the graph at $t = 15$

.....

(3)

(ii) Describe what your answer to part (i) represents.

.....

(1)

(b) Work out an estimate for the distance the car travels in the first 20 seconds of its journey.
Use 4 strips of equal width.

.....m

(3)

(Total for Question 14 is 7 marks)

11 In May 2019, the distance between Earth and Mars was 3.9×10^7 km.

In May 2019, a signal was sent from Earth to Mars.
Assuming that the signal sent from Earth to Mars travelled at a speed of 3×10^5 km per second,

(a) how long did the signal take to get to Mars?

..... seconds
(2)

The speed of the signal sent from Earth to Mars in May 2019 was actually less than 3×10^5 km per second.

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

.....

.....

.....

(1)

(Total for Question 11 is 3 marks)

Question 104

13 The density of ethanol is 1.09 g/cm^3
The density of propylene is 0.97 g/cm^3

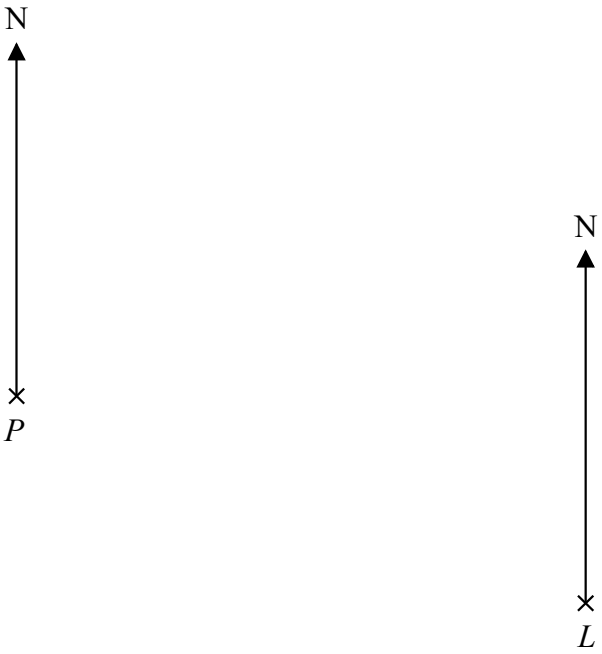
60 litres of ethanol are mixed with 128 litres of propylene to make 188 litres of antifreeze.

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

..... g/cm^3

(Total for Question 13 is 4 marks)

8 The accurate scale drawing shows the positions of port P and a lighthouse L.



Scale: 1 cm represents 4 km.

Aleena sails her boat from port P on a bearing of 070°

She sails for $1\frac{1}{2}$ hours at an average speed of 12 km/h to a port Q.

Find

(i) the distance, in km, of port Q from lighthouse L,

(ii) the bearing of port Q from lighthouse L.

distance QL = ... km

bearing of Q from L = ... °

(Total for Question 8 is 5 marks)

9 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,

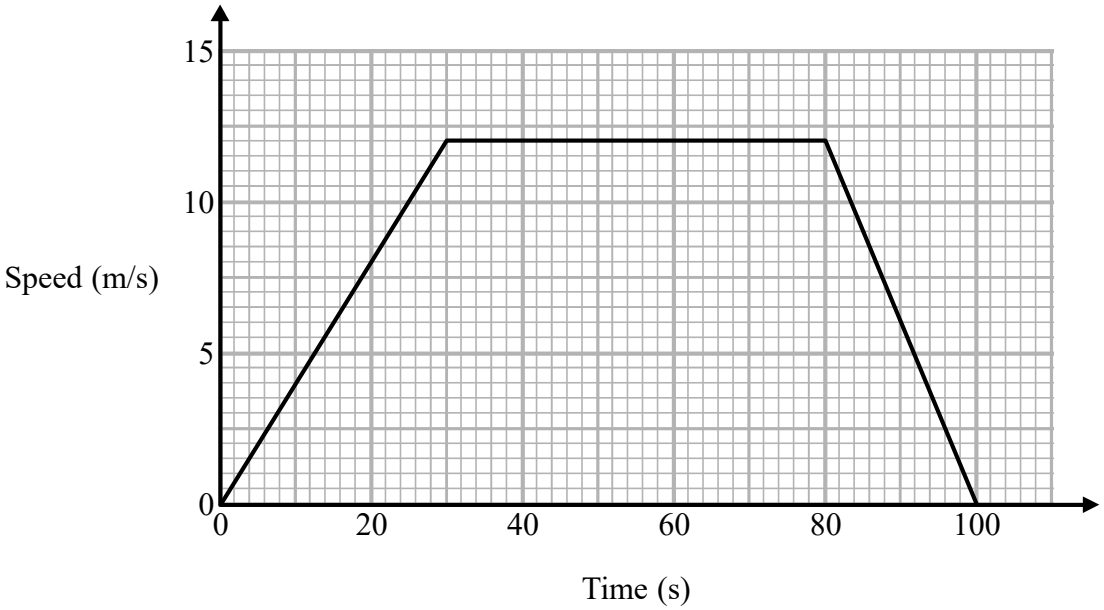
"72 kilometres per hour is faster than 20 metres per second."

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

(2)

(Total for Question 9 is 4 marks)

21 Here is a speed-time graph for a train journey between two stations.
The journey took 100 seconds.



(a) Calculate the time taken by the train to travel half the distance between the two stations.
You must show all your working.

..... seconds
(4)

(b) Compare the acceleration of the train during the first part of its journey with the acceleration of the train during the last part of its journey.

.....

.....

.....

(1)

(Total for Question 21 is 5 marks)

6 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 6 is 4 marks)

13 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 g/cm^3
Liquid B has density 1.02 g/cm^3

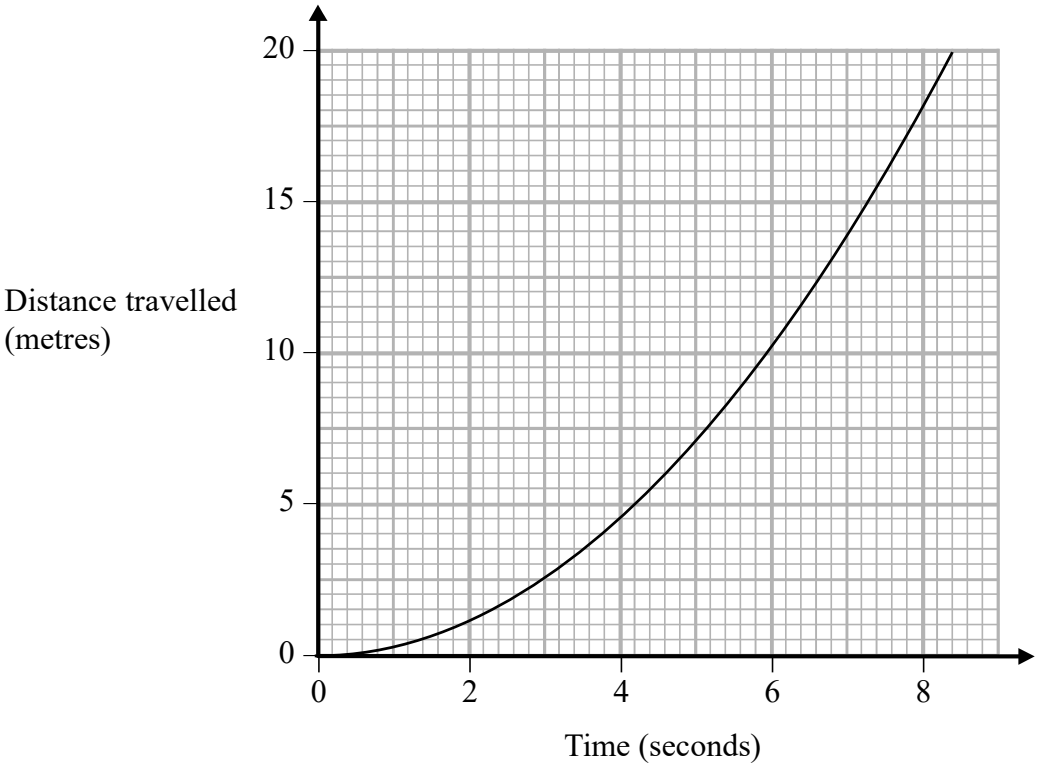
A cylindrical container is filled completely with liquid C.
The cylinder has radius 3 cm and height 25 cm.

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 13 is 4 marks)

19 The graph shows information about part of a cyclist's journey.

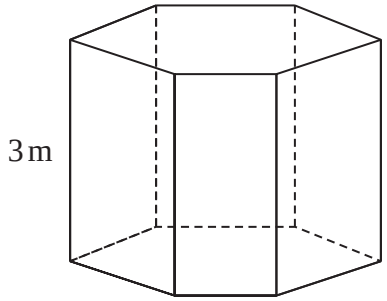


Work out an estimate of the speed, in m/s, of the cyclist at time 6 seconds.

..... m/s

(Total for Question 19 is 3 marks)

8 The diagram shows a prism placed on a horizontal floor.



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

The prism has height 3 m
The volume of the prism is 18 m^3

The pressure on the floor due to the prism is 75 newtons/m^2

Work out the force exerted by the prism on the floor.

..... newtons

(Total for Question 8 is 3 marks)

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

Liquid **A** has a density of 70 kg/m^3
Liquid **A** has a mass of 1400 kg

Liquid **B** has a density of 280 kg/m^3
Liquid **B** has a volume of 30 m^3

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

..... kg/m^3

(Total for Question 13 is 3 marks)

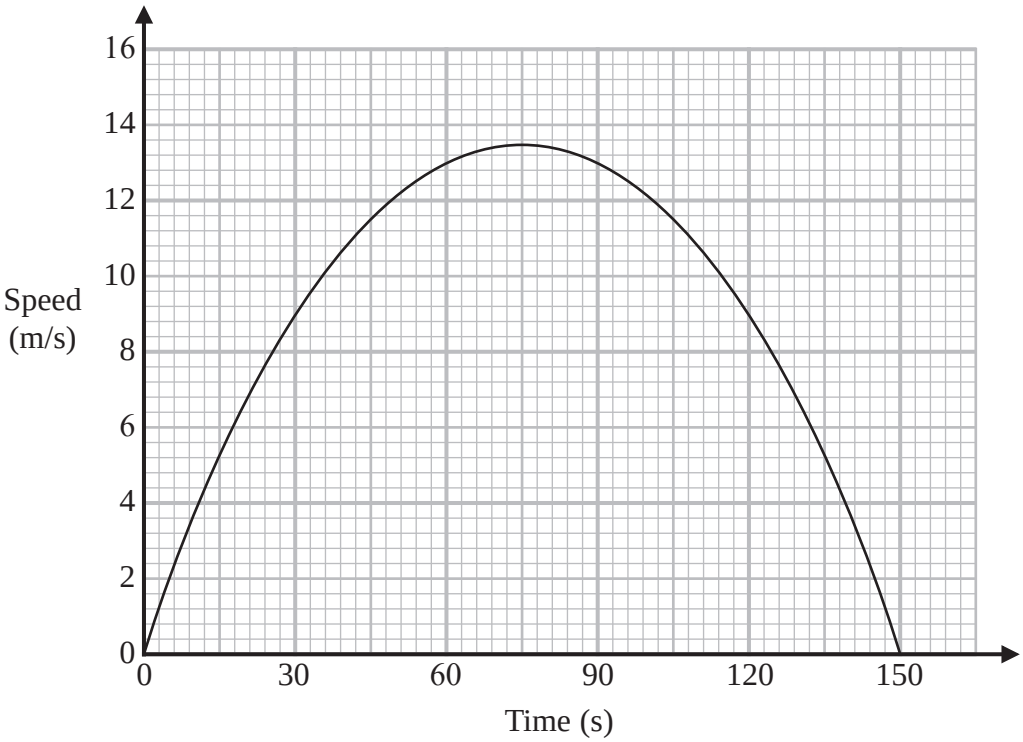
2 Andy cycles a distance of 30 km at an average speed of 24 km/h.
He then runs a distance of 12 km at an average speed of 8 km/h.

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

..... hours ..... minutes

(Total for Question 2 is 3 marks)

16 Here is a speed-time graph for a car.



(a) Work out an estimate for the distance the car travelled in the first 30 seconds.

..... m

(2)

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 30 seconds?
Give a reason for your answer.

.....

.....

.....

(1)

Julian used the graph to answer this question.

Work out an estimate for the acceleration of the car at time 60 seconds.

Here is Julian's working.

$$\text{acceleration} = \text{speed} \div \text{time}$$

$$= 13 \div 60$$

$$= 0.21\dot{6} \text{ m/s}^2$$

Julian's method does not give a good estimate of the acceleration at time 60 seconds.

(c) Explain why.

.....

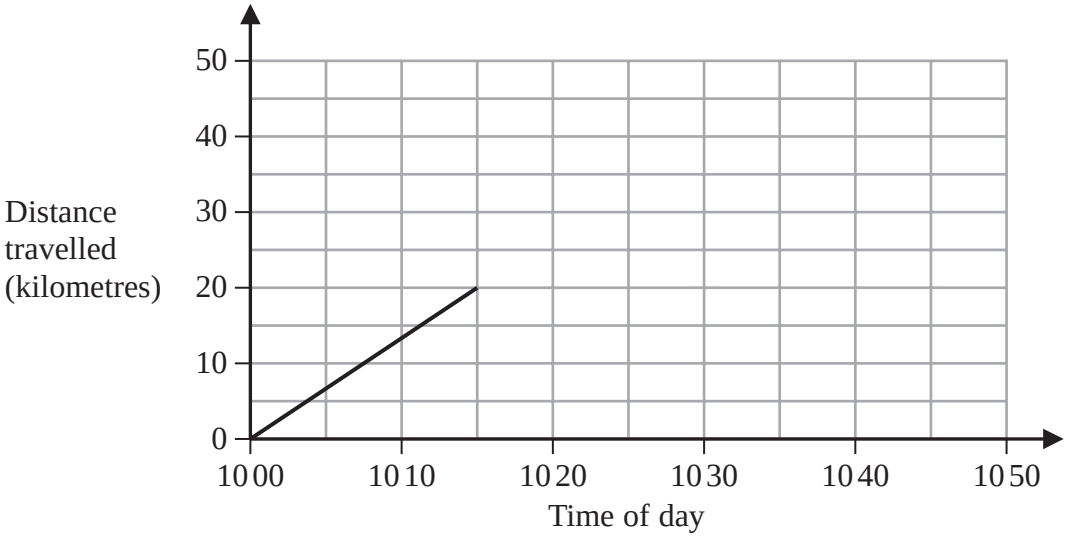
.....

.....

(1)

(Total for Question 16 is 4 marks)

3 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

..... km/h
(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(b) On the grid, complete the travel graph for Sam's journey.

(3)

(Total for Question 3 is 5 marks)

Question 116

7 Liquid **A** has a density of $1.8\,g/cm^3$
Liquid **B** has a density of $1.2\,g/cm^3$

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

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

..... g/cm^3

(Total for Question 7 is 3 marks)

4 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

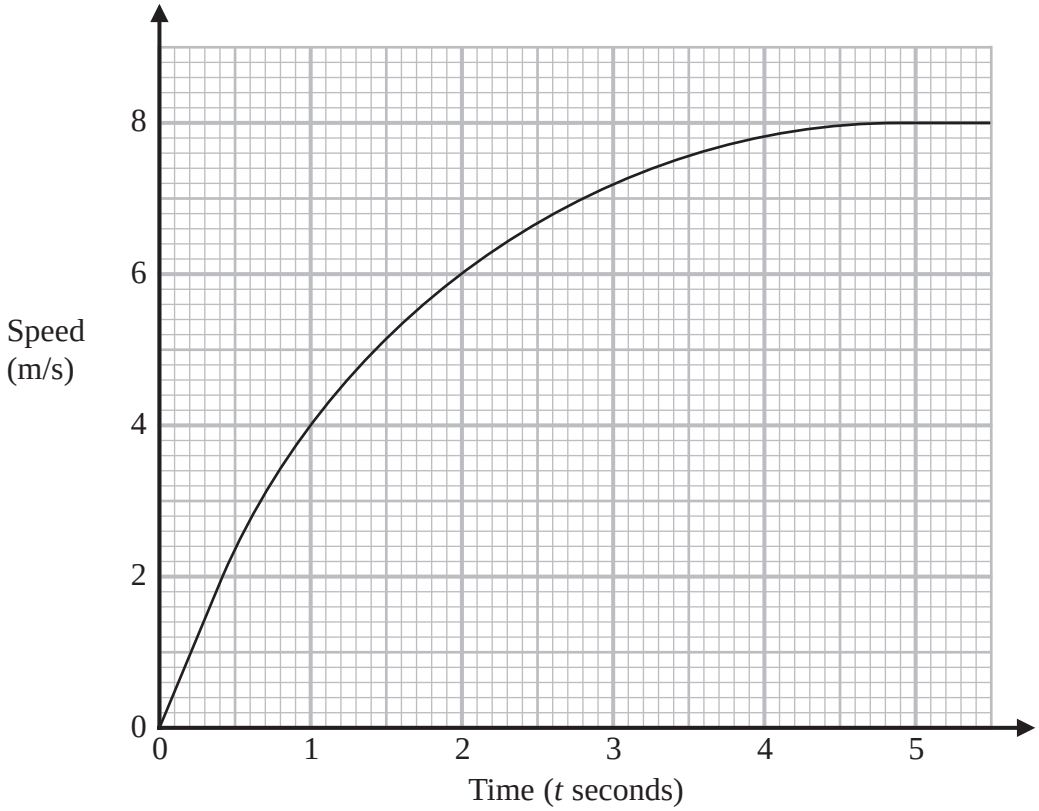
Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

..... minutes

(Total for Question 4 is 4 marks)

21 Here is a speed-time graph showing the speed, in metres per second, of an object t seconds after it started to move from rest.



(a) Using 3 trapeziums of equal width, work out an estimate for the area under the graph between $t = 1$ and $t = 4$

.....

(3)

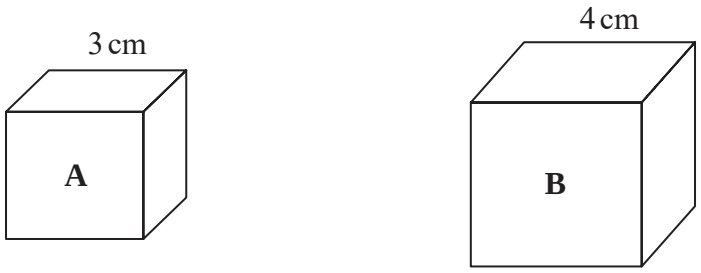
(b) What does this area represent?

.....

(1)

(Total for Question 21 is 4 marks)

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



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

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

Work out

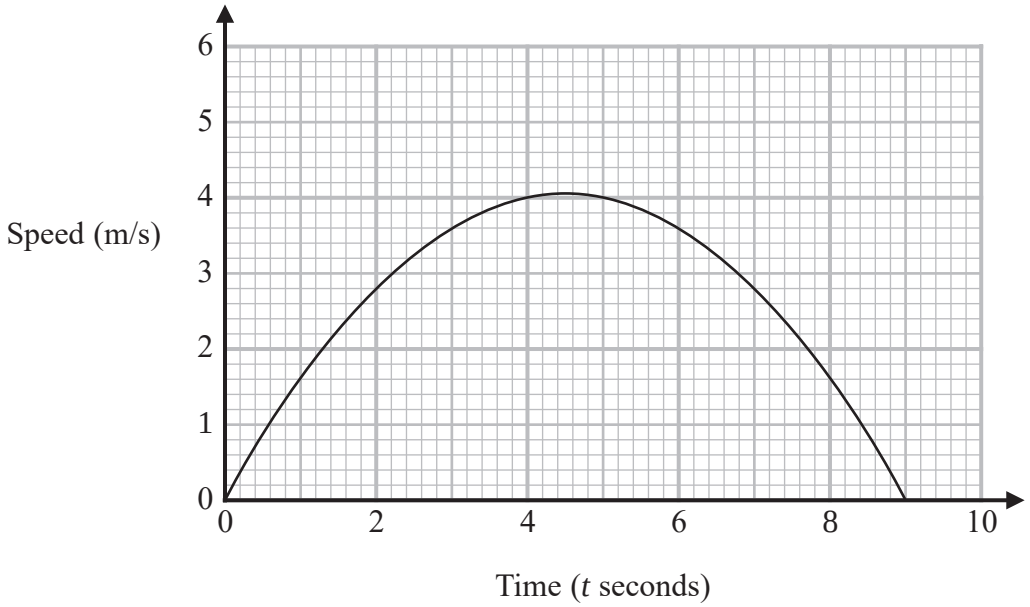
the density of cube **A** : the density of cube **B**

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

.....

(Total for Question 7 is 3 marks)

14 Here is a speed-time graph.



(a) Work out an estimate of the gradient of the graph at $t = 2$

.....

(3)

(b) What does the area under the graph represent?

.....

.....

(1)

(Total for Question 14 is 4 marks)

6 A new phone cost £679
The value of the phone decreases at a rate of 4% per year.

Work out the value of the phone at the end of 3 years.

£.....

(Total for Question 6 is 3 marks)

Question 122

7 In Spain, Sam pays 27 euros for 18 litres of petrol.
In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

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

(Total for Question 7 is 4 marks)

Question 123

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

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

The box exerts a force of 180 newtons on the floor.
The box exerts a pressure of 187.5 newtons/m^2 on the floor.

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 9 is 3 marks)

6 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.

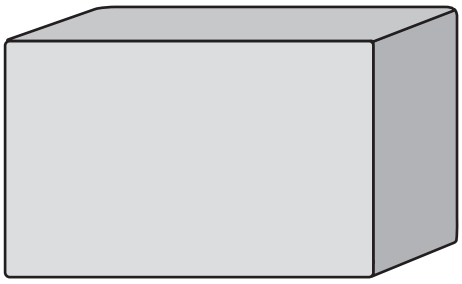
It takes Amy 45 minutes to run the same total distance that Jessica runs.

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

..... miles per hour

(Total for Question 6 is 4 marks)

7



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

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 / m^2

(Total for Question 7 is 2 marks)

23 A race is measured to have a distance of 10.6 km, correct to the nearest 0.1 km.
Sam runs the race in a time of 31 minutes 48 seconds, correct to the nearest second.

Sam's average speed in this race is V km/hour.

By considering bounds, calculate the value of V to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

(Total for Question 23 is 5 marks)

7 (a) Change 8000 cm^3 to m^3

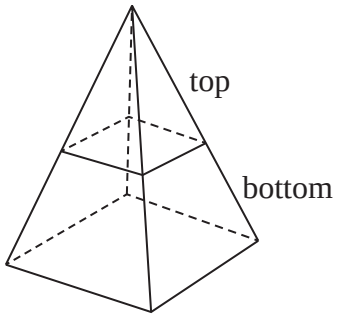
..... m^3
(1)

(b) Change a speed of 180 km per hour to metres per second.

..... metres per second
(3)

(Total for Question 7 is 4 marks)

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



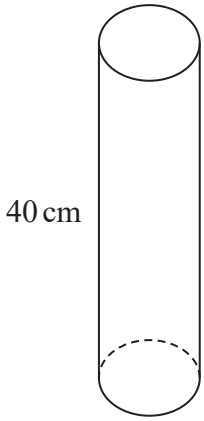
The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm^3
The bottom part of **P** has a mass of 972.8 g
The average density of **P** is 4.7 g/cm^3

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 25 is 5 marks)

8 The diagram shows a solid cylinder on a horizontal floor.



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

The cylinder has a

volume of $1200\,\text{cm}^3$
height of 40 cm.

The cylinder exerts a force of 90 newtons on the floor.

Work out the pressure on the floor due to the cylinder.

..... newtons/cm^2

(Total for Question 8 is 3 marks)

6 Lava flows from a volcano at a constant rate of $11.9\,m^3/s$

How many days does it take for $67\,205\,600\,m^3$ of lava to flow from the volcano?
Give your answer correct to the nearest day.

..... days

(Total for Question 6 is 3 marks)

8 A solid cuboid is made of metal.

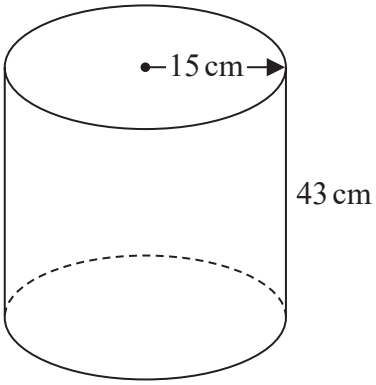
The metal has a density of $9\,g/cm^3$
The volume of the cuboid is $72\,cm^3$

Work out the mass of the cuboid.

..... g

(Total for Question 8 is 2 marks)

7 The diagram shows an empty tank in the shape of a cylinder.



The cylinder has radius 15 cm and height 43 cm.

Water flows into the tank at a rate of 0.47 litres per minute.

Calculate the number of minutes it will take to completely fill the tank.
Give your answer correct to the nearest minute.

..... minutes

(Total for Question 7 is 4 marks)

Question 133

7 Riley travelled by car and by aeroplane.

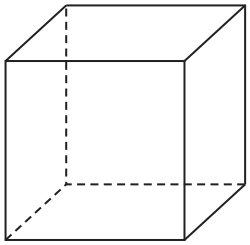
He travelled 143 miles by car at an average speed of 55 miles per hour.
Riley then travelled for 5 hours and 20 minutes by aeroplane.

Work out, in hours and minutes, Riley's total travelling time.

..... hours ..... minutes

(Total for Question 7 is 3 marks)

8 The diagram shows a solid cube placed on a horizontal table.



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

The pressure on the table due to the cube is 3.5 newtons/cm^2
The force exerted by the cube on the table is 504 newtons.

Show that the total surface area of the cube is less than 900 cm^2

(Total for Question 8 is 3 marks)

22 Ebony makes some bracelets to sell.

The materials to make all the bracelets cost £190, correct to the nearest £5
Ebony sells all the bracelets for a total of £875, correct to the nearest £5

The total time taken to make and sell all these bracelets was 72 hours, correct to the nearest hour.

Ebony uses this method to calculate her hourly rate of pay

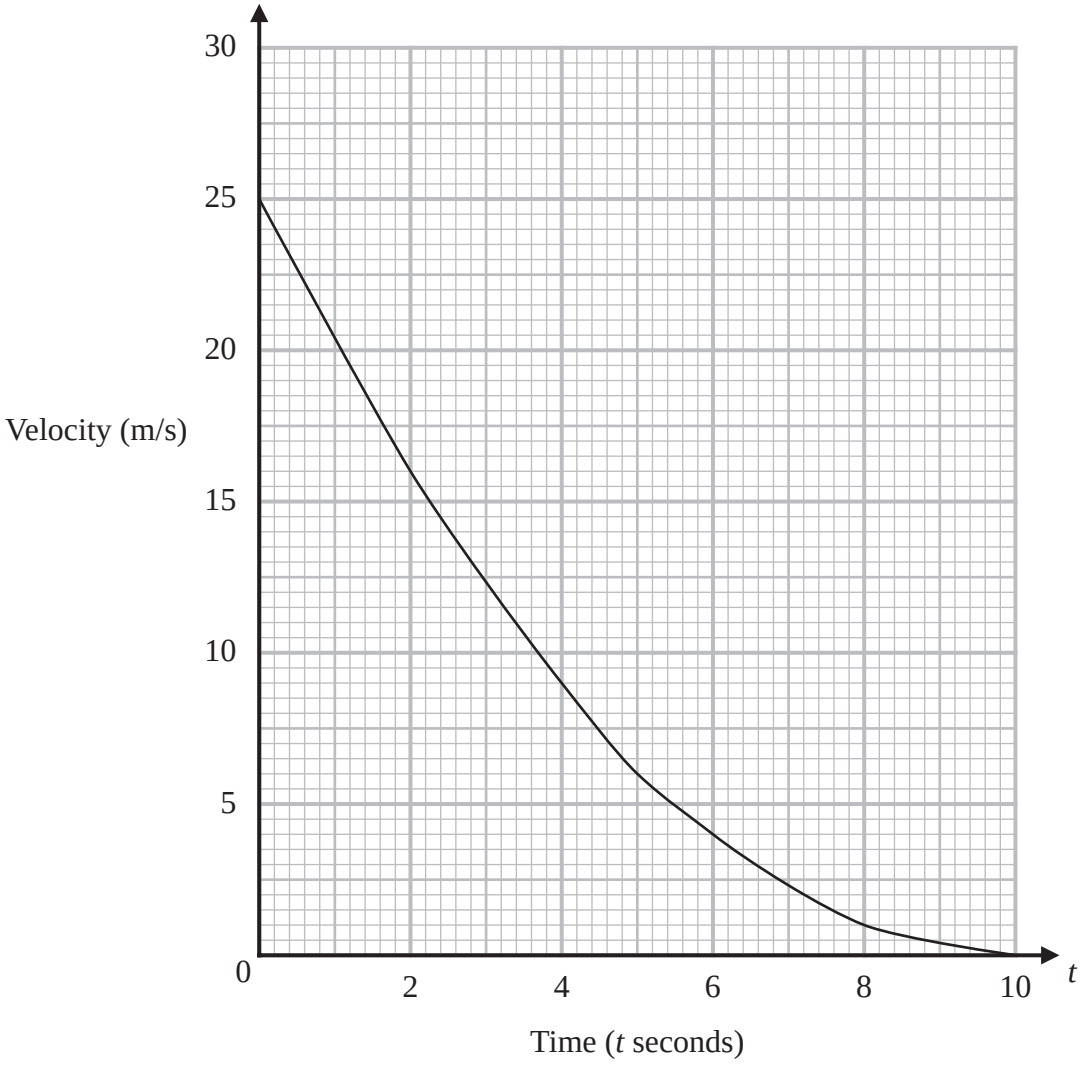
$$\text{Hourly rate of pay} = \frac{\text{total selling price} - \text{total cost of materials}}{\text{total time taken}}$$

The minimum hourly rate of pay for someone of Ebony's age is £8.20

By considering bounds, determine if Ebony's hourly rate of pay was definitely more than £8.20
You must show all your working.

(Total for Question 22 is 4 marks)

14 The graph shows the velocity of a car, in metres per second, t seconds after it starts to slow down.



(a) Calculate an estimate for the acceleration of the car when $t = 5$
You must show all your working.

..... m/s^2
(3)

(b) Work out an estimate for the distance the car travels in the first 6 seconds after it starts to slow down.
Use 3 strips of equal width.

..... m
(3)

(Total for Question 14 is 6 marks)

4 A company has 25 000 workers.
The number of workers increases at a rate of 6% per year for 3 years.

Calculate the total number of workers at the end of the 3 years.

.....

(Total for Question 4 is 4 marks)

5 Habib has two identical tins.

He puts 600 grams of flour into one of the tins.
The flour fills the tin completely.
The density of the flour is $0.6\,g/cm^3$

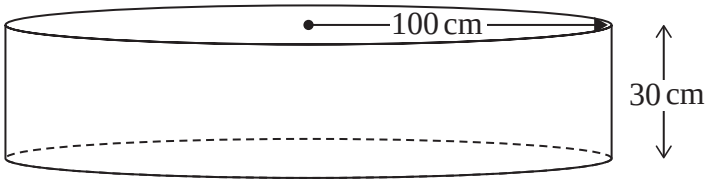
Habib puts 600 grams of salt into the other tin.
The salt does **not** fill the tin completely.
The volume of the space in the tin that is **not** filled with salt is $700\,cm^3$

Work out the density of the salt.
You must show all your working.

..... g/cm^3

(Total for Question 5 is 4 marks)

7 A paddling pool is in the shape of a cylinder.



The pool has radius 100 cm.
The pool has depth 30 cm.

The pool is empty.
It is then filled with water at a rate of 250 cm^3 per second.

Work out the number of minutes it takes to fill the pool completely.
Give your answer correct to the nearest minute.
You must show all your working.

..... minutes

(Total for Question 7 is 4 marks)

5 A car travelled 4.96 miles at an average speed of 30.4 miles per hour.

(a) Work out an estimate for the time taken by the car.
Give your answer in minutes.

..... minutes
(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....

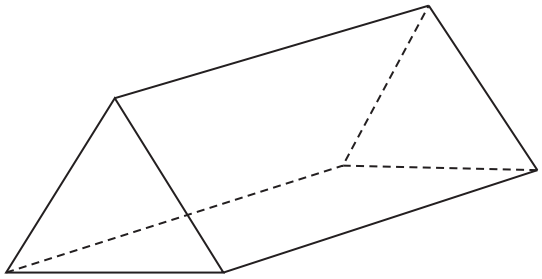
.....

.....

(1)

(Total for Question 5 is 4 marks)

8 The diagram shows a solid triangular prism on a horizontal floor.



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

The face in contact with the floor is a rectangle of width 2 m.

The pressure on the floor due to the prism is 80 newtons/m^2
The force exerted by the prism on the floor is 720 newtons.

Work out the length of the prism.

..... m

(Total for Question 8 is 3 marks)

3

Choci bar	Choci bar
200 g	360 g
£3.50	7.20 Swiss francs
London	**Zurich**

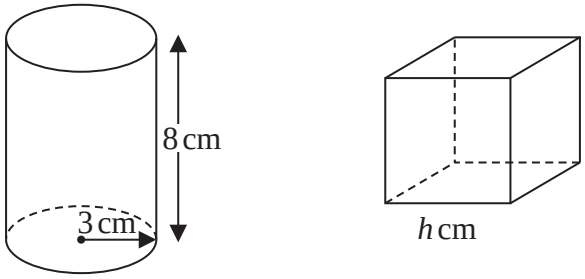
In London, a 200 g Choci bar costs £3.50
In Zurich, a 360 g Choci bar costs 7.20 Swiss francs.

The exchange rate is £1 = 1.25 Swiss francs.

In which city is the Choci bar the better value for money, in London or in Zurich?
You must show how you get your answer.

(Total for Question 3 is 3 marks)

12 The diagram shows a solid cylinder with base radius 3 cm and height 8 cm.
It also shows a solid cube with side length h cm.



The cylinder is made from steel with a density of 7.86 g/cm^3
The cube is made from brass with a density of 8.5 g/cm^3

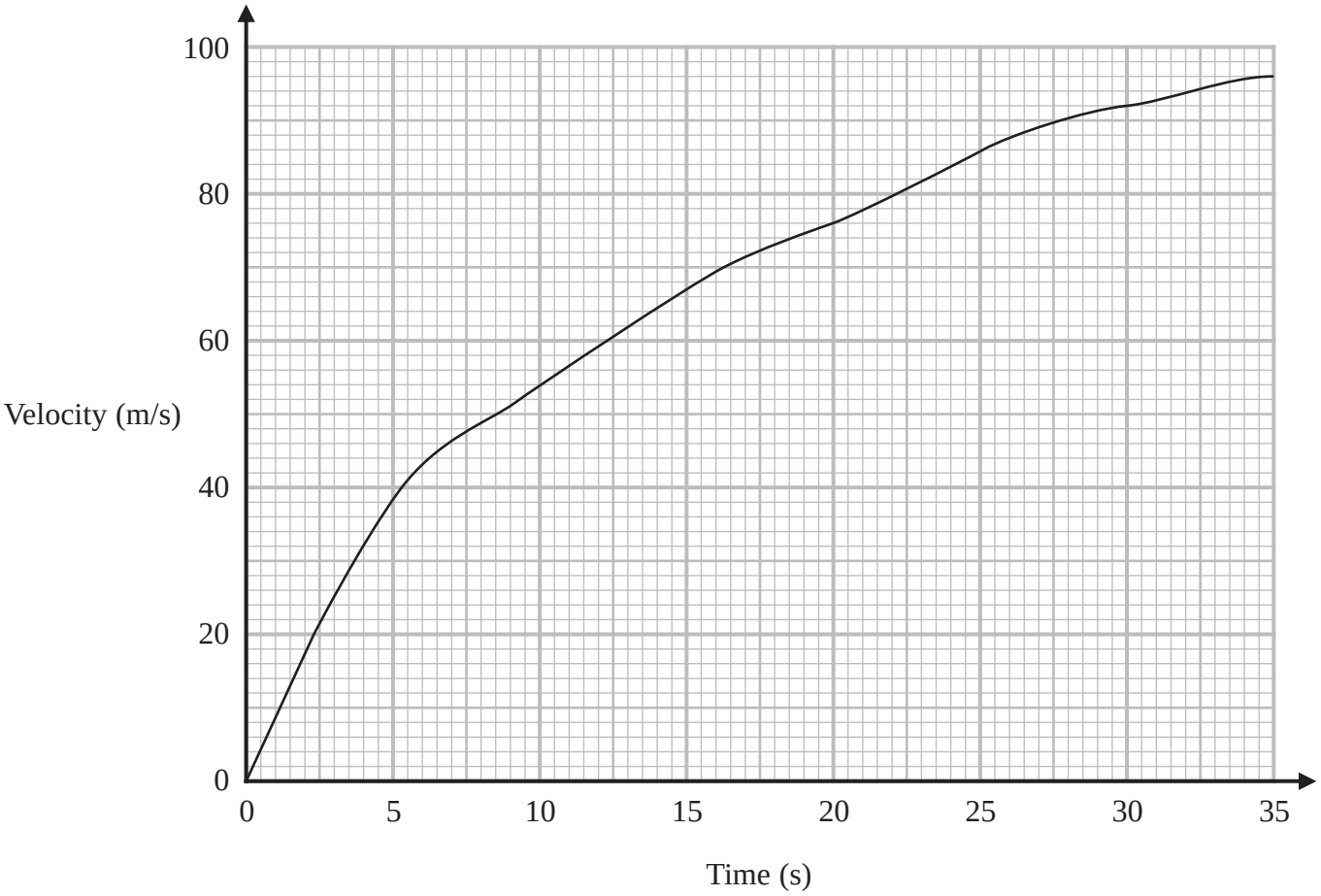
The mass of the cylinder is equal to the mass of the cube.

Work out the value of h.
Give your answer correct to 1 decimal place.

h = ...

(Total for Question 12 is 5 marks)

22 Here is a velocity-time graph for an aeroplane.

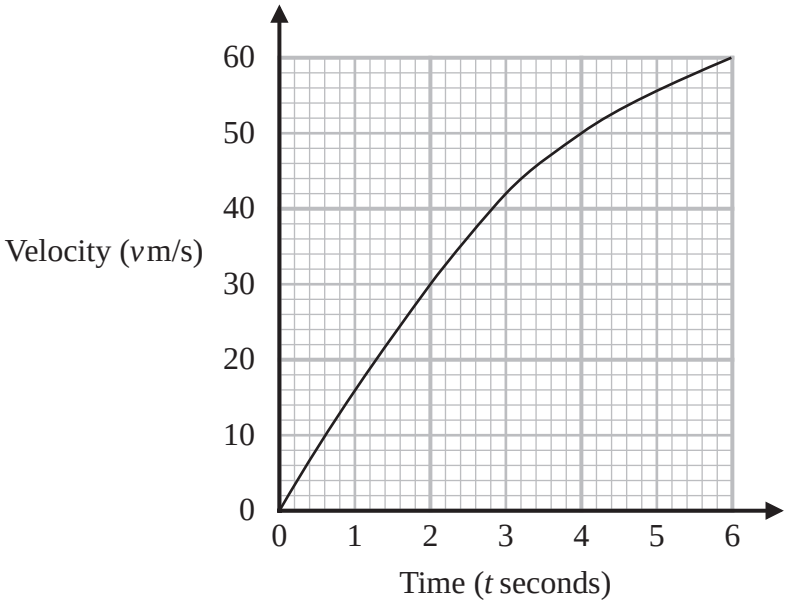


Work out an estimate for the distance the aeroplane travelled in the first 30 seconds.
Use 3 strips of equal width.

..... m

(Total for Question 22 is 3 marks)

12 The graph shows the velocity, v m/s, of a particle t seconds after it starts to move.



(a) (i) Work out an estimate of the gradient of the graph at $t = 3$
You must show how you get your answer.

.....

(3)

(ii) What does this gradient represent?

.....

.....

(1)

(b) Work out an estimate for the distance the particle travelled in the first 6 seconds.
Use 3 strips of equal width.

..... m

(3)

(Total for Question 12 is 7 marks)

8 Metal rods are made from steel with density $8\,g/cm^3$
Each metal rod has a volume of $1500\,cm^3$

The maximum mass of metal rods that can be put on a trolley is 300 kg.

Work out the greatest number of metal rods that can be put on the trolley.

.....

(Total for Question 8 is 3 marks)

4 In London, 2 kg of carrots cost £3.75
In New York, 5 lbs of carrots cost 4.90 US dollars.

£1 = 1.20 US dollars
1 kg = 2.2 lbs

In which city are carrots better value for money, London or New York?
You must show how you get your answer.

(Total for Question 4 is 4 marks)

6 A plane takes 2 hours 24 minutes to fly from Luton to Alicante.
The plane flies a distance of 1512 kilometres.

Work out the average speed of the plane.
Give your answer in kilometres per hour.

..... kilometres per hour

(Total for Question 6 is 3 marks)