Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 2: Applications 2

For Approved Pilot Centres ONLY

Higher Tier

Friday 14 June 2013 – Morning
Time: 1 hour 45 minutes

Paper Reference
5AM2H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 2 0 6 3 A 0 1 2 8

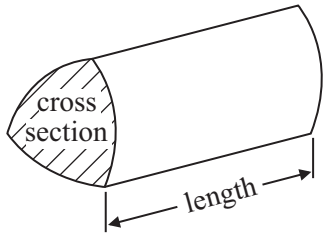
PEARSON

GCSE Mathematics 2AM01

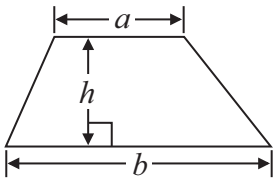
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

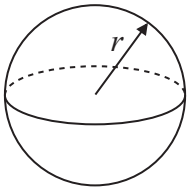


Area of trapezium = $\frac{1}{2}(a + b)h$



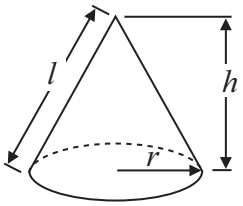
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

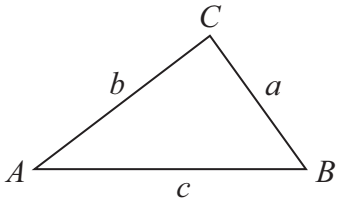


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$

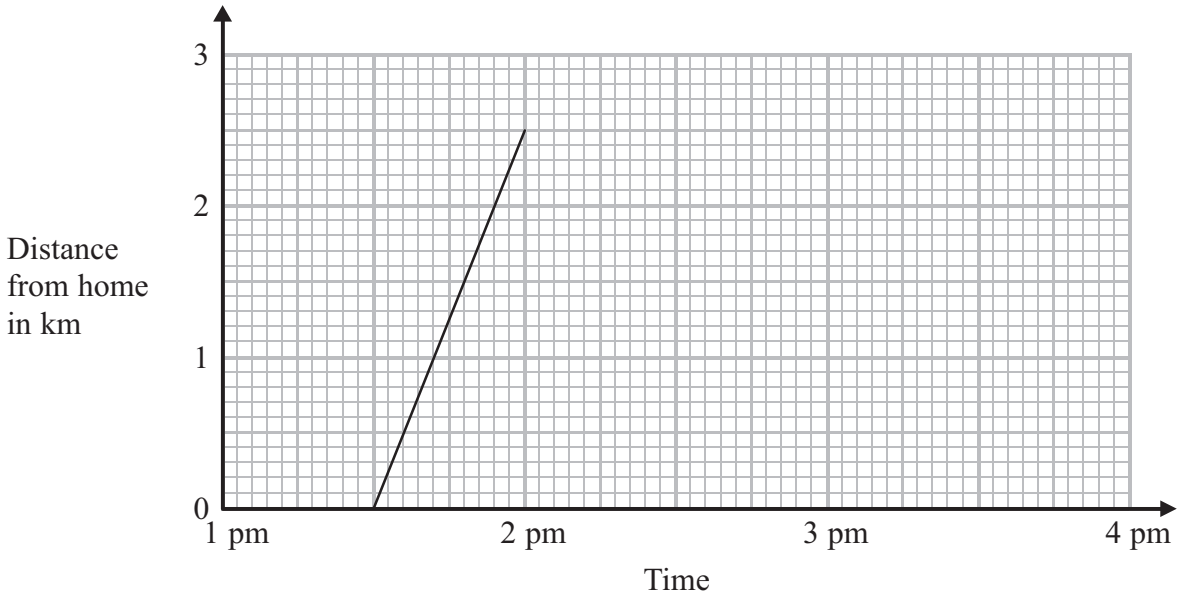
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Sophie walked from her home to her friend's house.

The travel graph shows Sophie's journey to her friend's house.



(a) What time did Sophie get to her friend's house?

.....

(1)

Sophie spent 1 hour at her friend's house.
She then walked home at a steady speed.
It took her 45 minutes to walk home.

(b) Complete the travel graph for this information.

(2)

(c) What was the total distance Sophie walked?

..... km

(1)

(Total for Question 1 is 4 marks)

*2 Here are the ingredients needed to make 20 cookies.

Cookies

Ingredients to make **20** cookies

225 g of butter
120 g of castor sugar
275 g of flour

Liz is going to make some cookies for a party.

There will be 4 adults and 14 children at the party.

Liz wants to make 2 cookies for each adult and 3 cookies for each child.

Liz has

500 g of butter
300 g of castor sugar
1 kg of flour

Does Liz have enough butter, enough castor sugar and enough flour to make all the cookies for the party?
You must show all your working.

(Total for Question 2 is 5 marks)

3 Greta, Hakim and Chloe wanted to know how often the letter 'e' is used in English words.

They each chose a different section from the same book written in English.
They each counted the total number of letters in their section
and the number of times the letter 'e' occurred.

The table gives information about their results.

	Greta	Hakim	Chloe
Total number of letters counted	20	1000	30 000
Frequency of letter 'e'	5	170	4100

Which of these results should give the best estimate for the probability that a letter picked at random from the book will be the letter 'e'?
Give a reason for your answer.

.....

.....

.....

.....

(Total for Question 3 is 2 marks)

4 Here is a diagram of Jim's shed.

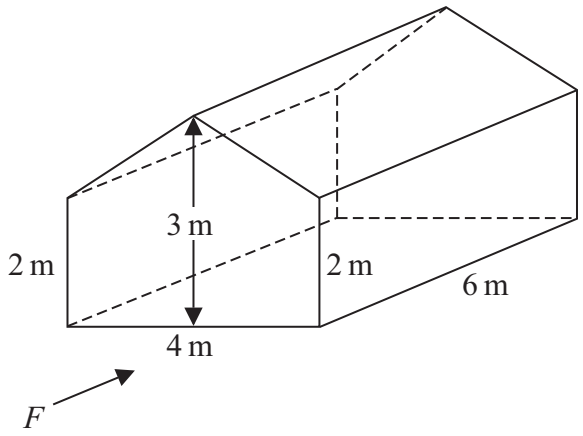


Diagram **NOT** accurately drawn

The shed is in the shape of a prism.
The shed is on horizontal ground.
The two ends and the two sides of the shed are vertical.

(a) On the centimetre grid, draw the front elevation of the shed from direction *F*.
Use a scale of 1 cm to 1 m.

(2)

Jim is going to paint the two ends and the two sides of the shed.

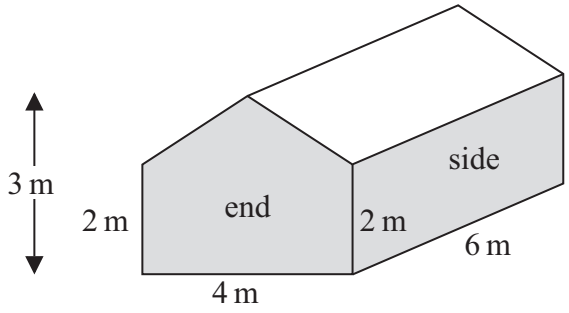


Diagram **NOT** accurately drawn

1 litre of paint will cover an area of 8 m^2.

Paint is sold in 1 litre tins, in 2.5 litre tins and in 5 litre tins.

Jim wants the total cost of the paint to be as little as possible.

(b) Work out the total cost of the paint.
You must show all your working.

£ .....

(6)

(Total for Question 4 is 8 marks)

5 Colin has a piece of wood 200 cm long.
He cuts the wood into pieces with lengths in the ratio 2 : 3 : 5

Work out the length of each piece of wood.

..... cm

..... cm

..... cm

(Total for Question 5 is 3 marks)

***6** The diagram shows a sandpit in the shape of a cuboid.

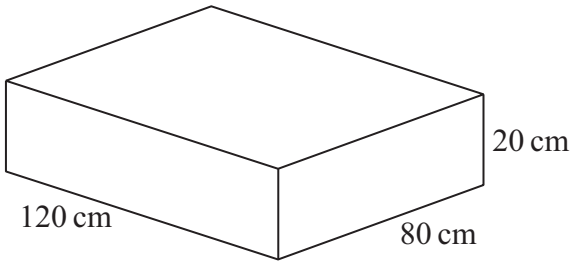


Diagram **NOT** accurately drawn

The sandpit is 120 cm by 80 cm by 20 cm.

The sandpit is empty.
Jade is going to put sand into the sandpit.

A bag of sand costs £2.99
There are 10 000 cm^3 of sand in a bag.

Jade has only £50 to spend on sand.

Show that Jade cannot buy enough sand to fill the sandpit completely.
You must show all your working.

(Total for Question 6 is 5 marks)

7 Here is a formula used to work out the speed, v mph, of a car making an emergency stop.

$$v = \sqrt{21d}$$

d feet is the length of the mark the car's tyres make on the road when making an emergency stop.

A car makes an emergency stop.
The car's tyres make a mark 90 feet long.

(a) Work out the speed of the car.
Give your answer correct to the nearest whole number.

..... mph

(2)

A car made an emergency stop.
The car's speed was 50 mph.

(b) Work out the length of the mark on the road.
Give your answer correct to the nearest whole number.

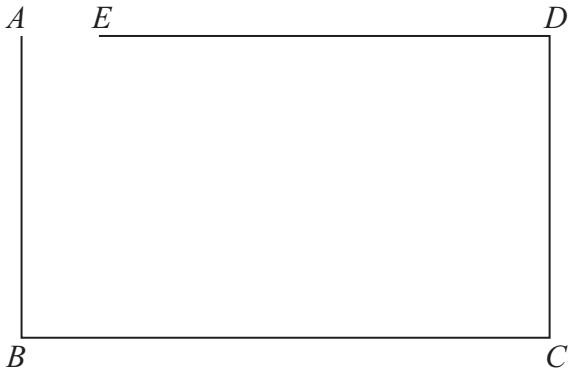
..... feet

(3)

(Total for Question 7 is 5 marks)

8 The diagram represents a harbour *ABCDE*.

The scale of the diagram is 1 cm represents 10 m.



Scale: 1 cm represents 10 m

People can leave boats in the harbour.

People **cannot** leave boats

less than 30 metres from point *A*
or less than 10 metres from the line *ED*.

On the diagram, shade the region where people **cannot** leave boats.

(Total for Question 8 is 4 marks)

9 The diagram represents a frame for a window.

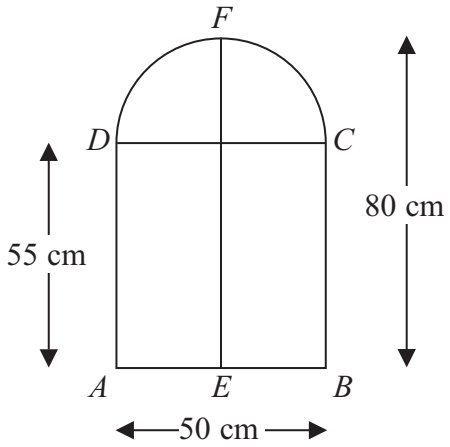


Diagram **NOT** accurately drawn

The frame is made from metal bars.

AD, *BC* and *EF* are vertical bars.
AB and *DC* are horizontal bars.

DFC is a bar in the shape of a semicircle.
E is the midpoint of *AB*.

AB = 50 cm
AD = 55 cm
EF = 80 cm

(a) Work out the total length of the metal bars in the frame.

..... cm

(4)

(b) Work out the total area of the window.

..... cm^2

(3)

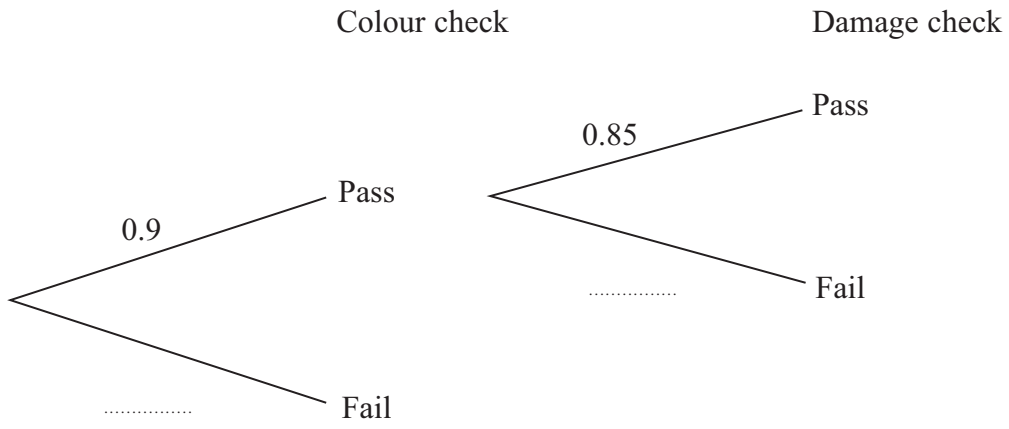
(Total for Question 9 is 7 marks)

10 Joe has a job packing tomatoes in boxes.

First he has to check the colour of each tomato.
He also has to check the tomato for damage.

The decision tree diagram gives information about the probability of a tomato passing the colour check and the probability of a tomato passing the damage check.

(a) Complete the decision tree diagram.



(2)

Joe packs the tomatoes that pass both the colour check and the damage check.

On Thursday Joe has to check 9600 tomatoes.

(b) Work out an estimate for the number of these tomatoes he will pack.

.....

(4)

(Total for Question 10 is 6 marks)

11 The diagram represents a door wedge.
The door wedge is in the shape of a triangular prism.

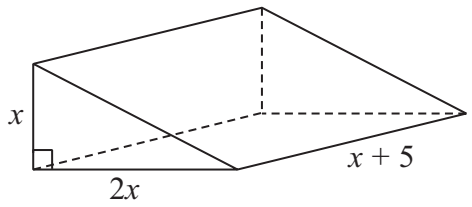


Diagram **NOT** accurately drawn

All the measurements shown on the diagram are in centimetres.

The triangular prism has a volume of 100 cm^3.

(a) Show that $x^3 + 5x^2 = 100$

(2)

(b) Use trial and improvement to find the value of x.
You must show all your working.
Give your answer correct to 1 decimal place.

$x =$ .....

(5)

(Total for Question 11 is 7 marks)

12 *ABCDE* is a car jack on horizontal ground as shown in the diagram.

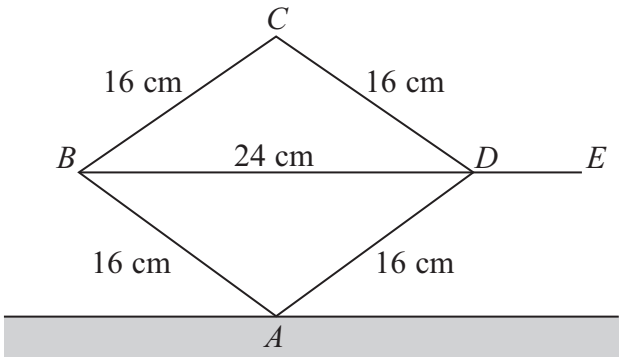


Diagram **NOT** accurately drawn

$AB = BC = CD = DA = 16$ cm
$BD = 24$ cm
BDE is horizontal.

Calculate the height of C above A.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 4 marks)

13 *AT* is a vertical tower on horizontal ground as shown in the diagram.

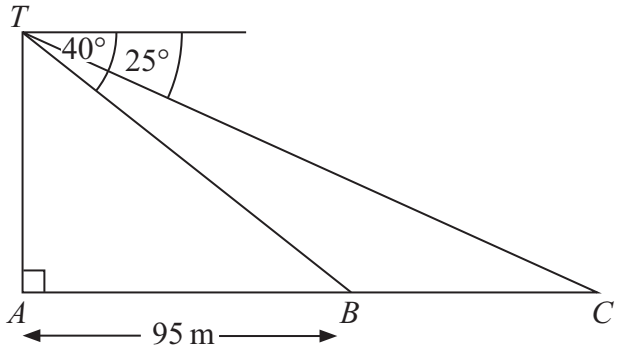


Diagram **NOT** accurately drawn

ABC is a straight line.
AB = 95 m.

The angle of depression of *B* from *T* is 40°
The angle of depression of *C* from *T* is 25°

Calculate the distance of *B* from *C*.
Give your answer correct to 3 significant figures.

..... m

(Total for Question 13 is 5 marks)

14 A town has three car parks.

South car park has x spaces.
North car park has 48 more spaces than South car park.
Central car park has four times as many spaces as South car park.

The total number of spaces in South car park and Central car park is more than twice the number of spaces in North car park.

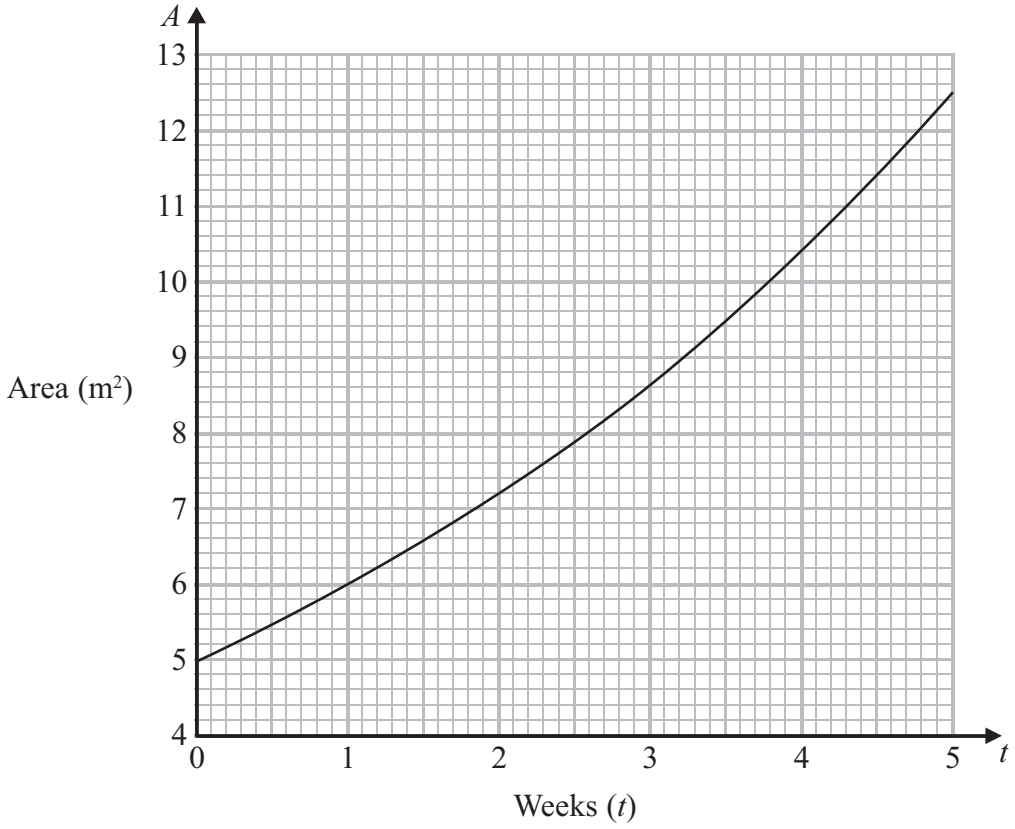
Work out the least possible number of spaces in South car park.

.....

(Total for Question 14 is 5 marks)

15 Waterweed is growing in a pond.
Each week a student records the area of the pond covered by the waterweed.

The graph gives information about the area, A m^2, covered by the waterweed after t weeks.



The area covered by the waterweed increased during the first 4 weeks.

(a) How much did the area increase during the first 4 weeks?

..... m^2

(2)

(b) The area, A m^2, covered by the waterweed after t weeks is given by the formula $A = ka^t$

(i) Write down the value of k.

.....

(ii) Work out an estimate for the value of a.

.....

(3)

Waterweed is also growing in a different pond.
The student puts weed killer on this waterweed.

The area covered by the waterweed decreases by x% each week.

The area covered by the waterweed halves in 10 weeks.

(c) Work out the value of x.
Give your answer correct to 1 decimal place.

.....

(3)

(Total for Question 15 is 8 marks)

16 Amir is standing on a cliff by the sea.
He is looking at the horizon.

The distance, d km, to the horizon is proportional to the square root of the height, h m, Amir is above sea level.

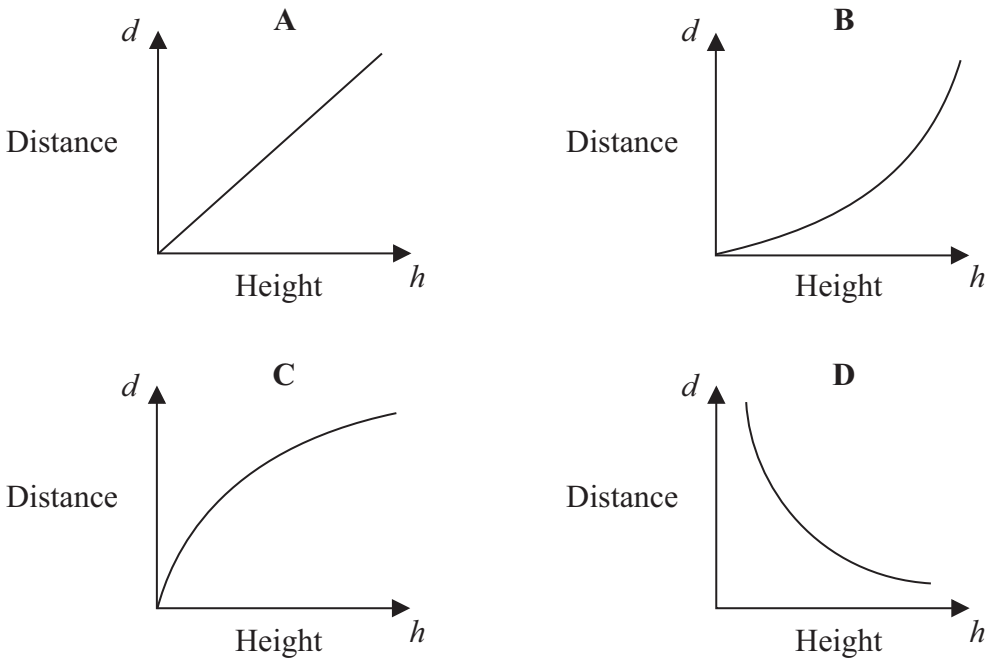
When Amir is 38 m above sea level, the distance to the horizon is 22 km.

(a) Work out the distance to the horizon when Amir is 25 m above sea level.

..... km

(3)

Here are four graphs.



(b) Write down the letter of the graph that best shows the relationship between the distance to the horizon and the height Amir is above sea level.

.....

(1)

(Total for Question 16 is 4 marks)

***17** A car is driven through a tunnel in 89 seconds, correct to the nearest second.
The tunnel is 2460 m long, correct to the nearest 10 metres.

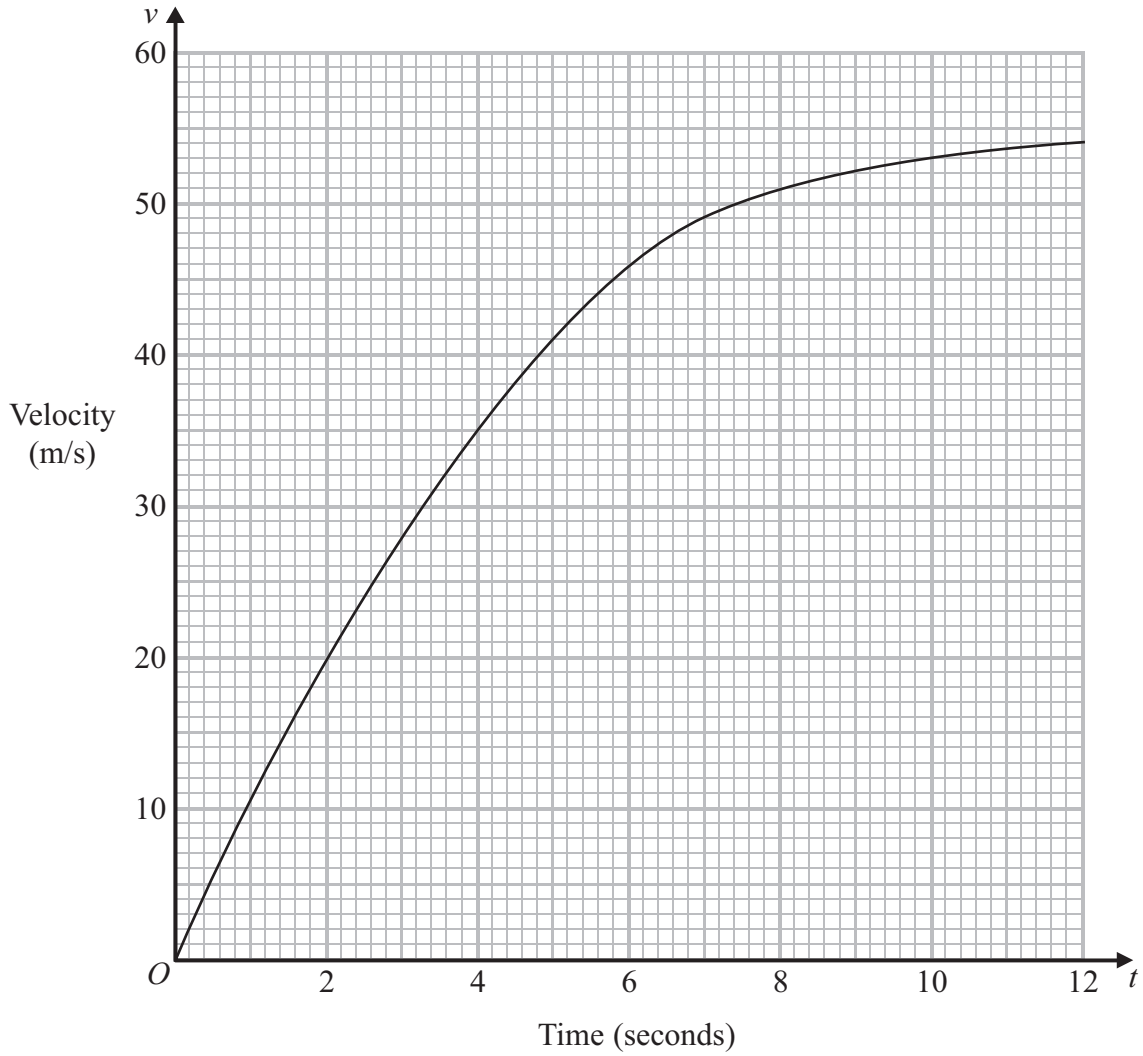
The average speed limit in the tunnel is 100 km/h.

Could the average speed of this car have been greater than 100 km/h?
You must show your working.

(Total for Question 17 is 4 marks)

18 A parachutist jumps out of a plane.

This graph shows information about the velocity, v m/s, of the parachutist t seconds after he jumped.



(a) Work out an estimate for the acceleration of the parachutist when $t = 8$

..... m/s^2

(3)

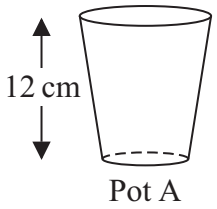
(b) Work out an estimate for the distance the parachutist falls in the first 6 seconds.

..... m

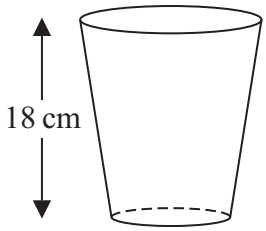
(3)

(Total for Question 18 is 6 marks)

19 Here are two plant pots.



Pot A



Pot B

Diagrams **NOT** accurately drawn

Pot A and pot B are mathematically similar.

Pot A has a height of 12 cm.
Pot B has a height of 18 cm.

Pot A has a volume of 1000 cm^3.

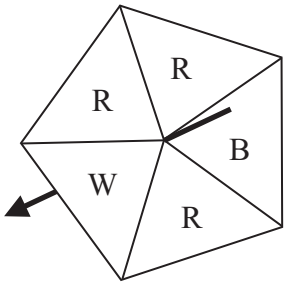
Work out the volume of pot B.

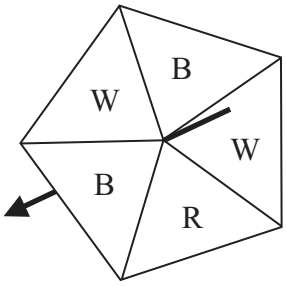
..... cm^3

(Total for Question 19 is 3 marks)

***20** Simon wants to raise money for charity.
He designs a game for people to play.

Simon uses two fair 5-sided spinners for the game.





People spin each spinner once.
A person wins the game when both spinners land on the same letter.

People pay 40p for each game they play.
The prize for a win is £1

Work out if Simon is likely to raise any money for charity with his game.

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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