Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 2: Applications 2

Higher Tier

Practice paper **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
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

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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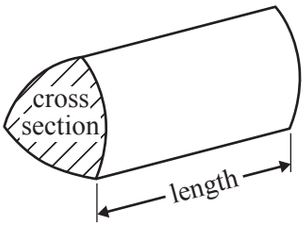
GCSE Mathematics 2AM01

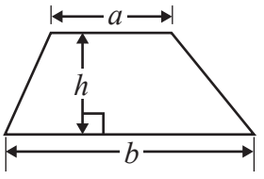
Formulae – Higher Tier

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

Volume of a prism = area of cross section × length

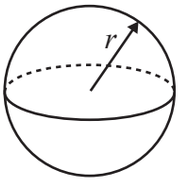


Area of trapezium $= \frac{1}{2}(a + b)h$



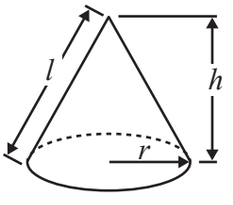
Volume of sphere $= \frac{4}{3}\pi r^3$

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

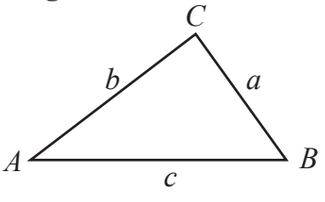


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle *ABC*



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 $= \frac{1}{2}ab\sin C$

The Quadratic Equation

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

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

W 4 1 0 6 0 A 0 2 2 4

Answer ALL questions.

Write all your answers in the spaces provided.

You must write down all the stages in your working.

1 This is a list of ingredients for making an apple crumble for 4 people.

Ingredients for **4** people.
90 g plain flour
50 g oats
30 g sugar
60 g butter
4 apples

Work out the amount of each ingredient needed to make an apple crumble for **10** people.

..... g plain flour

..... g oats

..... g sugar

..... g butter

..... apples

(Total for Question 1 is 3 marks)

2 Emily uses this formula to work out the weight, W pounds, of her horse.

$$W = \frac{g^2 b}{330}$$

where g is the girth in inches and b is the body length of the horse in inches.

For Emily's horse

$g = 73$
$b = 62$

Work out the weight of Emily's horse.
Give your answer correct to 3 significant figures.

..... pounds

(Total for Question 2 is 2 marks)

***3** The diagram shows part of a climbing frame.

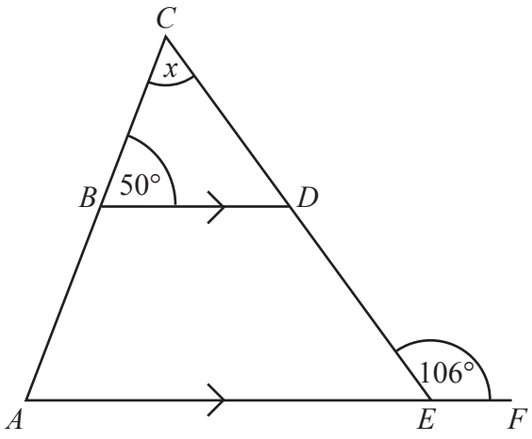


Diagram **NOT** accurately drawn

BD is parallel to *AEF*.

Work out the size of angle *x*.
You must give reasons for your working.

(Total for Question 3 is 4 marks)

4 Charlie buys 2 kg of potatoes.
The total cost is £1.28

Jill buys 3 kg of potatoes and 2 kg of carrots.
The total cost is £3.40

Work out the cost of 1 kg of carrots.

.....

(Total for Question 4 is 3 marks)

5 Each day patients in a hospital can have one of four meals for lunch.
The four meals are curry, chicken, pasta and salad.

The table shows the probability that a patient chosen at random from the patients who have meals will have curry or chicken or salad.

Snack	curry	chicken	pasta	salad
Probability	0.17	0.26		0.2

One patient is chosen at random from the patients who have meals.

(a) Work out the probability that the patient

(i) did **not** have salad,

.....

(ii) had pasta.

.....

(3)

200 patients had meals on Tuesday.
(b) Work out an estimate for the number of patients who had curry.

.....

(2)

(Total for Question 5 is 5 marks)

6 A pond is in the shape of a circle.
The pond has a diameter of 170 cm.

Fencing is to be put all the way round the circumference of the pond.
Fencing can only be bought in whole numbers of metres.
Fencing costs £3.45 per metre.

Work out the total cost of the fencing.

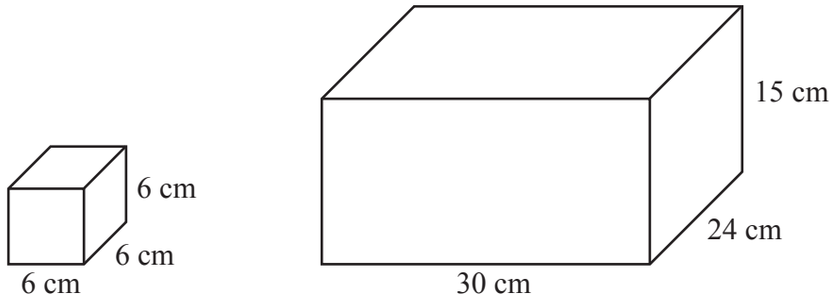
£ .....

(Total for Question 6 is 4 marks)

***7** A company makes building bricks for children.
The bricks are all 6 cm cubes.

The bricks are going to be packed in boxes.

Diagram **NOT** accurately drawn



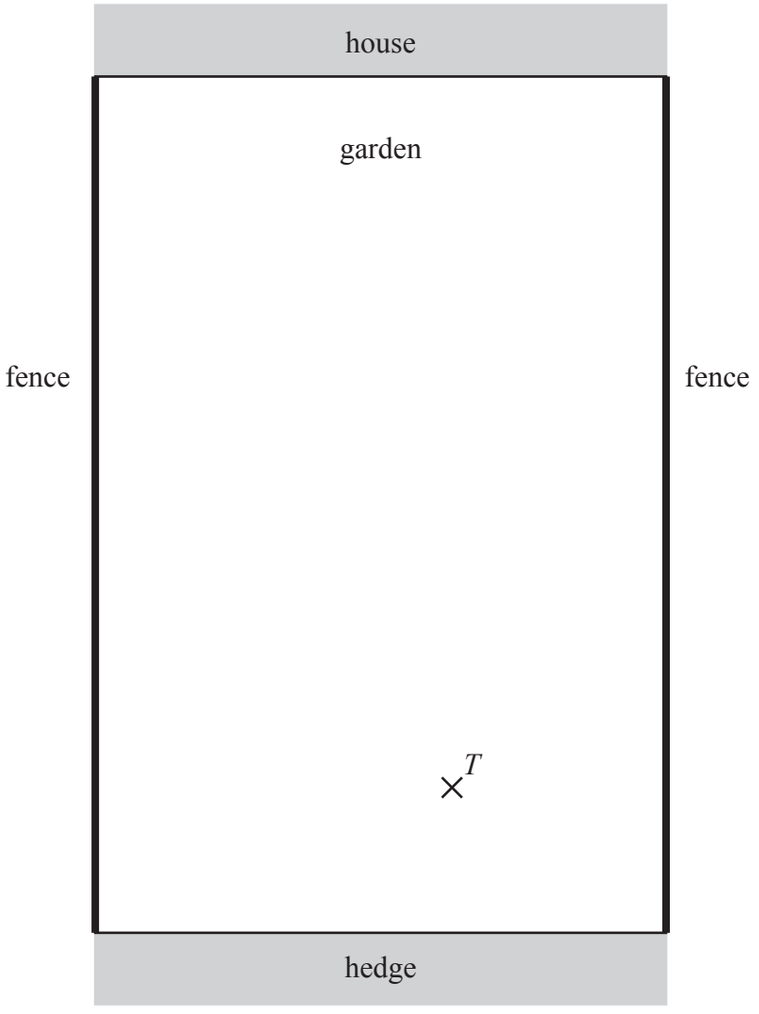
Michael designs a box for the bricks.
The box is a cuboid.

The size of the box is 30 cm by 24 cm by 15 cm.

Will the box be big enough for 50 bricks?
You must give reasons for your answer.

(Total for Question 7 is 4 marks)

8 The scale drawing shows the rectangular garden of Mrs Brigg's house.



Scale : 1 cm represents 1 m

Mrs Briggs wants to put a bench in her garden.

There is an apple tree, *T*, in her garden.

The bench has to be
at least 2 m from the two fences
at least 5 m from the apple tree

On the scale drawing, show accurately by shading the region where Mrs Briggs could put her bench.

(Total for Question 8 is 4 marks)

9 William and Paul book a holiday for their families.
The total cost of the holiday would be £2400

William and Paul book their holiday early so they get $\frac{1}{5}$ off the price of the total cost of the holiday.

William and Paul share the total cost of the holiday in the ratio 3 : 5

Work out how much William pays and how much Paul pays.

William £ .....

Paul £ .....

(Total for Question 9 is 4 marks)

10 Colin plays a game with blue cards and red cards.

Blue cards are worth 4 points each.
Red cards are worth 5 points each.

Colin has b blue cards and r red cards.

His total number of points is P.
Write down, in terms of b and r, a formula for P.

.....

(Total for Question 10 is 3 marks)

11 A car park is in the shape of a rectangle.
The length of the car park must 30 m more than the width of the car park.

The perimeter of the car park must be less than 165 m.

The width of the car park must be a whole number of metres.

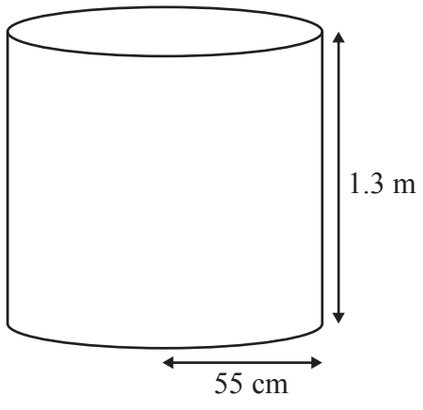
Work out the greatest possible width of the car park.

.....

(Total for Question 11 is 4 marks)

12 Malik has a water tank in the shape of a cylinder.

Diagram **NOT** accurately drawn



The water tank has a base but not a top.
The tank has a radius of 55 cm and a height of 1.3 m.

Malik needs to know the total surface area of the water tank.
Work out the total surface area of the water tank.
Give your answer correct to 3 significant figures.

.....

(Total for Question 12 is 5 marks)

13 You can use this formula to change a temperature C, in °C, to a temperature F, in °F.

$F = 1.8C + 32$

(a) Use the formula to change 10°C into °F.

.....°F

(2)

(b) On the grid opposite, draw a conversion graph that can be used to change between temperatures in °C and temperatures in °F.

(3)

(c) Sally says

'A temperature of 40°C is hotter than a temperature of 40°F'

Is Sally correct? .....

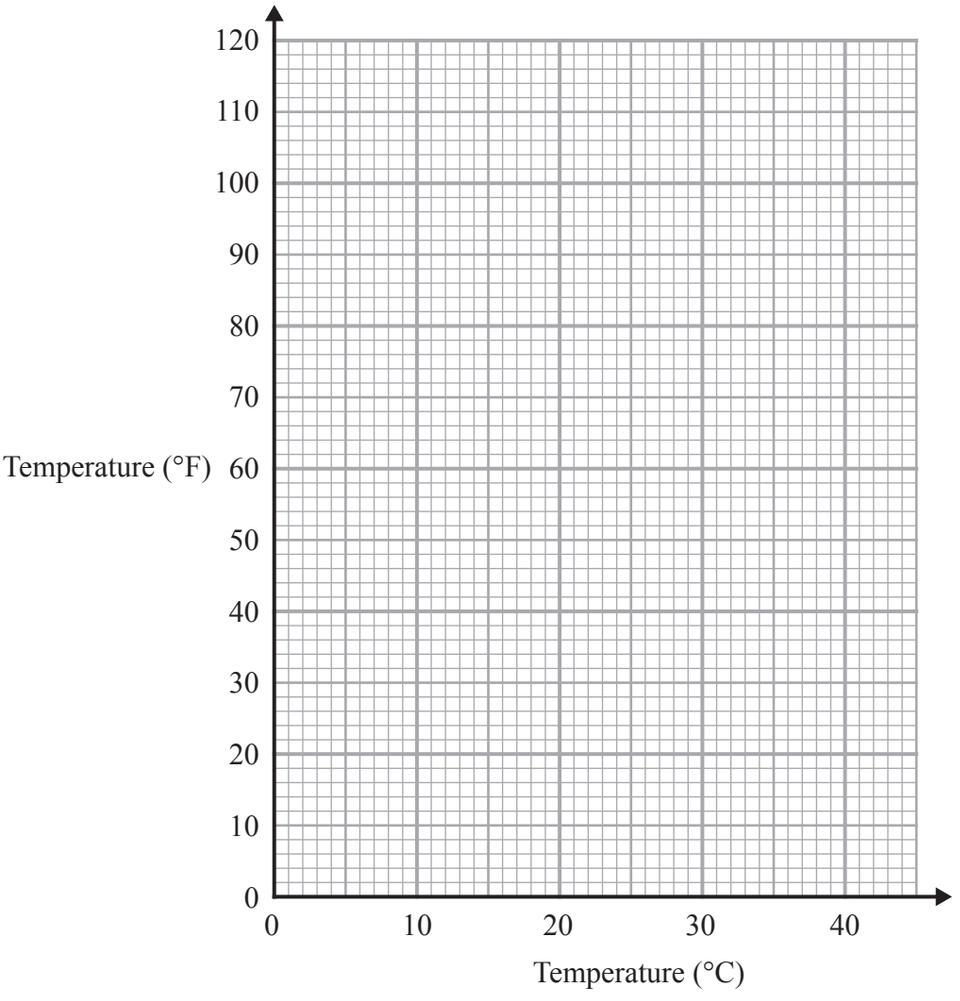
You must explain your answer.

.....

.....

.....

(2)



(Total for Question 13 is 7 marks)

14 Alan is making a cuboid out of plastic.

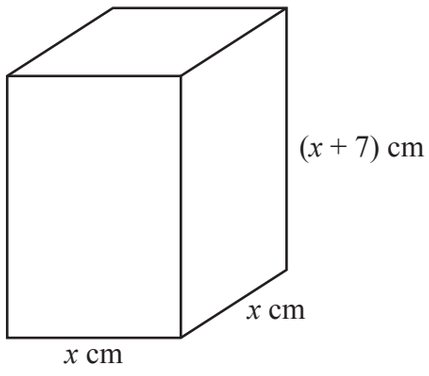


Diagram **NOT** accurately drawn

The base of the cuboid is a square of side x cm.
The height of the cuboid is $(x + 7)$ cm.

The volume of the cuboid needs to be 320 cm^3.

(a) Show that $x^3 + 7x^2 = 320$

(2)

(b) Alan knows that each side of the square base is between 5 cm and 6 cm.
Use a trial and improvement method to find the value of x.
You must show all your working.
Give your answer correct to 1 decimal place.

$x =$ .....

(4)

(Total for Question 14 is 6 marks)

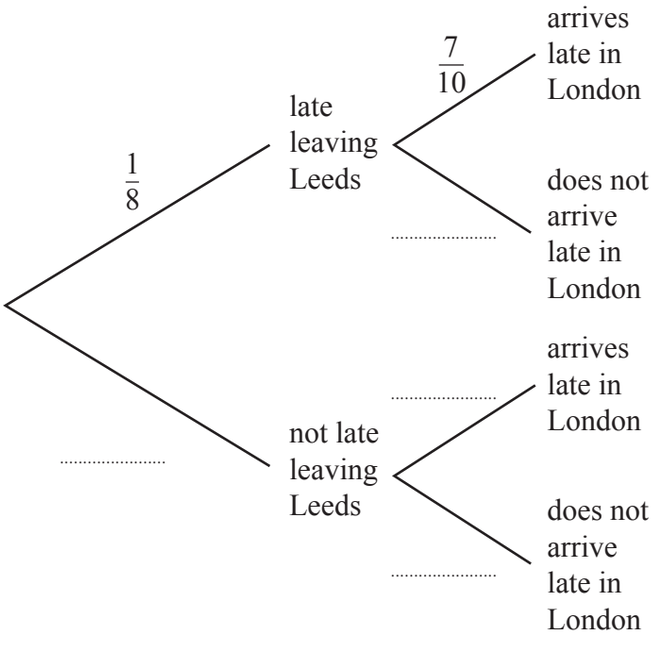
15 Trains run from Leeds to London.

The probability that a train to London will be late leaving Leeds is $\frac{1}{8}$

When the train is late leaving Leeds, the probability that the train will arrive late in London is $\frac{7}{10}$

When the train is **not** late leaving Leeds, the probability that the train will arrive late in London is $\frac{1}{20}$

(a) Complete the decision tree diagram.



(2)

The train company is fined whenever a train is late leaving Leeds **and** late arriving in London.

(b) For a London to Leeds train, work out the probability that the train company will be fined.

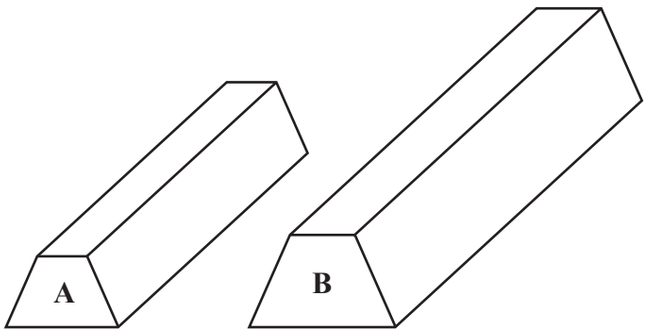
.....

(2)

(Total for Question 15 is 4 marks)

16 The diagram shows two chocolate boxes.

Diagram **NOT** accurately drawn



The boxes are mathematically similar.

The total surface area of box **A** is 296 cm^2
The total surface area of box **B** is 666 cm^2.

Box **A** has a volume of 280 cm^3.
Calculate the volume of box **B**.

..... cm^3

(Total for Question 16 is 3 marks)

17 A ball is thrown vertically into the air from a point A.
The height, s metres, of the ball above A at time t seconds is given by $s = 12t - 5t^2$ for $0 \leqslant t \leqslant 2.25$

(a) Complete the table of values for $s = 12t - 5t^2$

t	0	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25
s	0	2.6875		6.1875			6.75	5.6875	4	1.6875

(2)

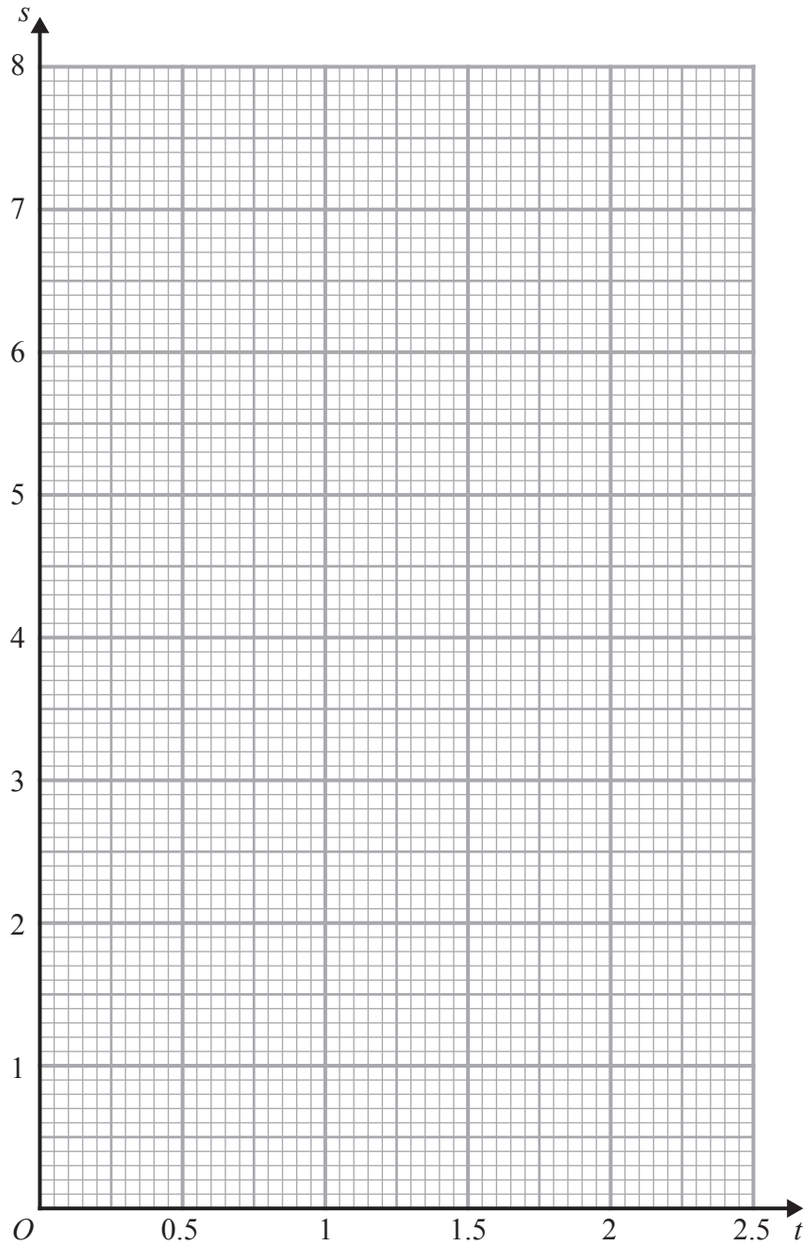
(b) On the grid opposite, draw the graph of $s = 12t - 5t^2$ for $0 \leqslant t \leqslant 2.25$

(2)

(c) Use your graph to find after how many seconds the ball was at a height of 4.5 metres above A.

.....

(2)



(Total for Question 17 is 6 marks)

18 The diagram shows a vertical flagpole, AB.

The flagpole stands on horizontal ground supported by two ropes BC and BD, fixed to the ground at the points C and D.

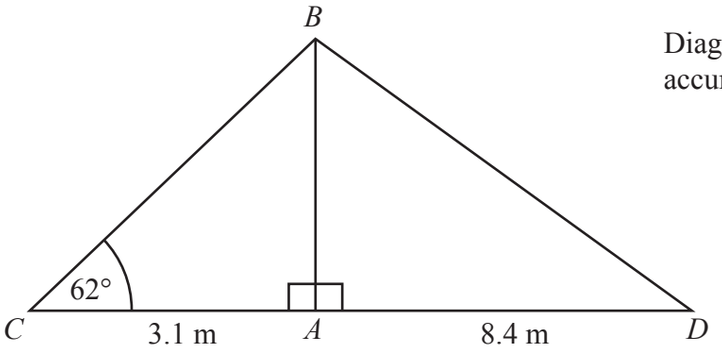


Diagram **NOT** accurately drawn

CAD is a straight line.
$CA = 3.1$ m.
$AD = 8.4$ m.
Angle $ACB = 62°$.

Calculate the total length of the two ropes.
Give your answer correct to 3 significant figures.

..... m

(Total for Question 18 is 6 marks)

19 The shutter speed, S, of a camera varies inversely as the square of the aperture setting, f.

When $f = 4$, $S = 500$

(a) Find a formula for S in terms of f.

.....

(3)

(b) Hence, or otherwise, calculate the value of f when $S = 125$

$f =$ .....

(2)

(Total for Question 19 is 5 marks)

20 A scientist is studying a population of flies.
The number of flies, P, is the population t days after the study started is given by

$P = 80 \times 1.3^t$

(a) Write down the number of flies in the population at the start of the study.

.....

(1)

(b) Work out the number of flies in the population after 20 days.

.....

(2)

(c) By what percentage does the size of the population increase each day?

..... %

(2)

(Total for Question 20 is 5 marks)

21 The diagram shows a child's toy.

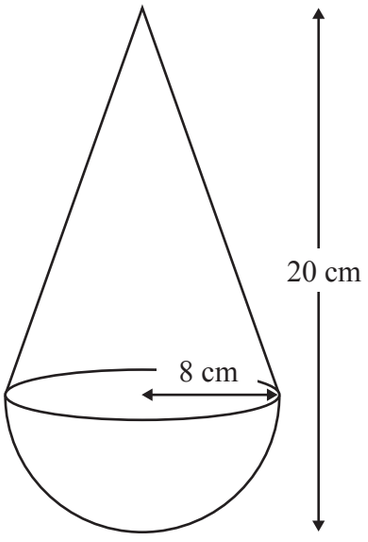


Diagram **NOT** accurately drawn

The toy is made from a solid cone on top of a solid hemisphere.

The cone and the hemisphere both have a radius of 8 cm.
The total height of the toy is 20 cm.

The toy is made from wood.
The wood has a density of 0.8 g/cm^3.

Work out the mass of the toy.
Give your answer correct to 3 significant figures.

..... g

(Total for Question 21 is 4 marks)

22 Lucy drove for 253 miles, correct to the nearest mile.
She used 28.4 litres of petrol, correct to the nearest tenth of a litre.

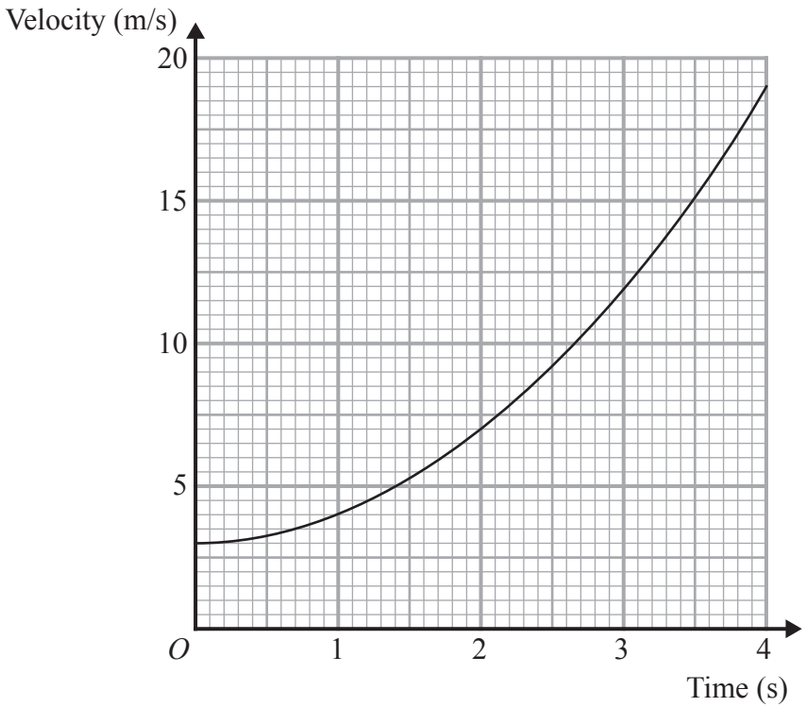
$$\text{Petrol consumption} = \frac{\text{Number of miles travelled}}{\text{Number of litres of petrol used}}$$

Work out the upper bound for the petrol consumption for Lucy's journey.
Give your answer correct to 2 decimal places.

.....

(Total for Question 22 is 3 marks)

23 The graph gives information about the velocity of a particle during the first 4 seconds of its motion.



(a) Work out an estimate for the acceleration after 1.5 seconds

..... m/s^2

(3)

(b) Work out an estimate for the distance travelled by the particle during the first 4 seconds of its motion.

..... m

(3)

(Total for Question 23 is 6 marks)

24 40% of the houses built along a river are on a flood plain.

Houses on the flood plain have a 9% risk of being flooded by the river in any year.
Houses not on the flood plain have a 1% risk of being flooded by the river in any year.

When a house has been flooded the average clean up cost is £35 000

9000 houses have been built by this river.

Work out an estimate of the average total clean up cost per year due to these houses being flooded by the river.

£ .....

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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