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 10 June 2011 – 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
  – *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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P 3 8 9 5 4 A 0 1 2 4

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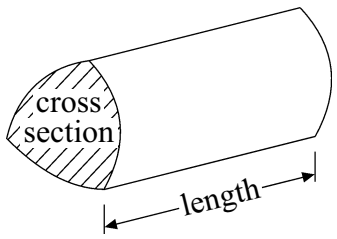
GCSE Mathematics 2AM01

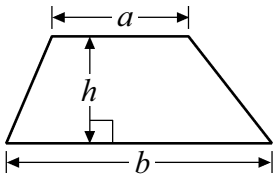
Formulae – Higher Tier

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

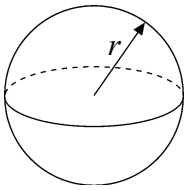


Area of trapezium $= \frac{1}{2}(a+b)h$



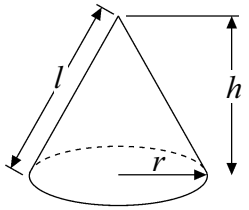
Volume of sphere $= \frac{4}{3}\pi r^3$

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

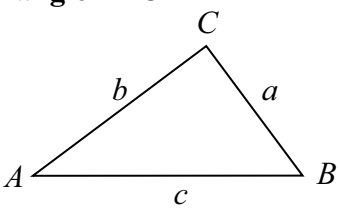


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



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 £2450 is shared between Bill and Maggie in the ratio 5 : 2

Bill gets more money than Maggie.
Work out how much more.

£ .....

(Total for Question 1 is 4 marks)

2 Here is a diagram of Brian's garage.

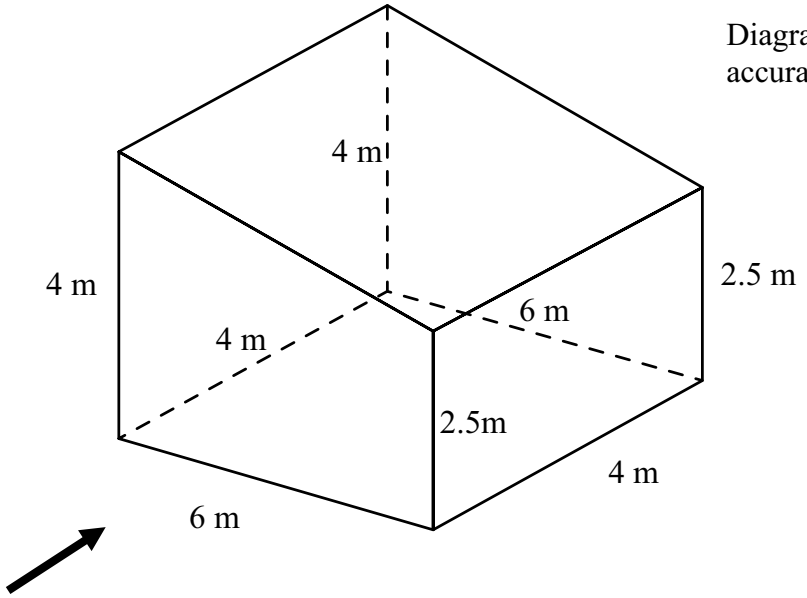


Diagram **NOT** accurately drawn

The floor of the garage is horizontal.
All the walls are vertical.

(a) Draw the front elevation of the garage from the direction of the arrow.
Use a scale of 1 cm to 1 m.

(2)

(b) Work out an estimate for the total surface area of the garage.

..... m^2

(5)

(Total for Question 2 is 7 marks)

3 Gemma plays a game by moving a counter over a board.

Gemma must throw 2 fair dice.
She must get the same number on each dice to start moving the counter.

Gemma throws the 2 fair dice.

(a) Show that the probability she will start moving the counter is $\frac{1}{6}$

You may use this table.

		First dice					
Second dice		**1**	**2**	**3**	**4**	**5**	**6**
	1						
	2						
	3						
	4						
	5						
	6						

(2)

(b) Work out the probability that Gemma will not start moving the counter.

.....

(2)

(Total for Question 3 is 4 marks)

4 Here is the list of materials for making concrete for 20 m^2 of floor.

Concrete for covering 20 m^2 of floor	
Sand	50 kg
Cement	25 kg
Aggregate	100 kg

The floor of a room is a rectangle with length 5 m and width 10 m.

Work out how much of each of these materials is needed to cover this floor with concrete.

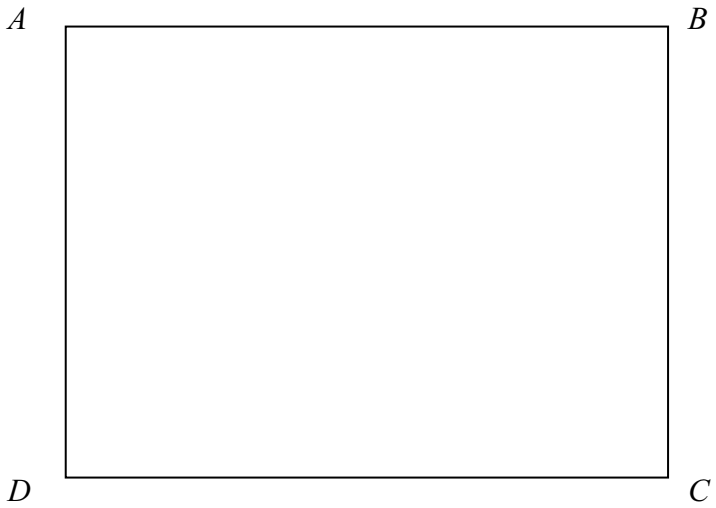
Sand .....

Cement .....

Aggregate .....

(Total for Question 4 is 5 marks)

5 Here is an accurate scale diagram of a car park in the shape of a rectangle.



The scale is 1 cm to 10 m.

Cars must **not** be parked

within 20 m of the centre of the rectangle

or

within 20 m of the side *BC*.

On the diagram, show accurately by shading, the regions where cars must not be parked.

(Total for Question 5 is 4 marks)

6 Keith, Ben and Liz tested a coin to find out if it was biased.
They each threw the coin a number of times.
They counted the number of heads and the number of tails they each got.

The table below gives information about their results.

	Keith	**Ben**	**Liz**
Number of heads	12	34	57
Number of tails	28	66	243

(a) Which person, Keith, Ben or Liz, will have the best estimate for the probability of getting a head on this coin? Explain your answer.

.....

.....

(1)

(b) Using all the results in the table, work out an estimate for the probability that the next throw of the coin will be a head.

.....

(2)

(Total for Question 6 is 3 marks)

7 Here is a sketch of the floor of a room.

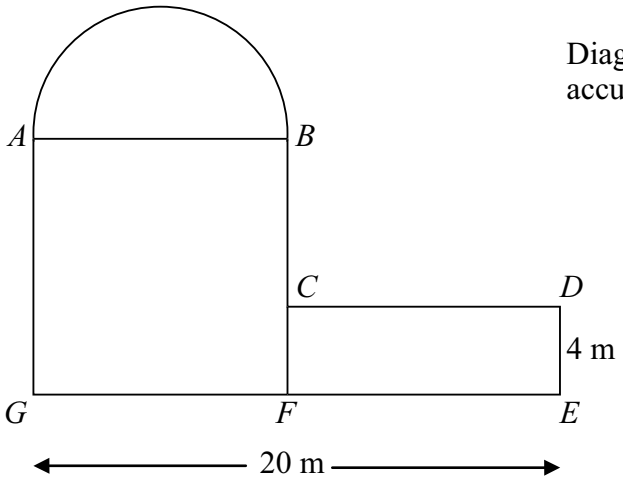


Diagram **NOT** accurately drawn

The room has three parts.
The first part is the square *ABFG*.
The second part is the rectangle *CDEF*.
The third part is the semicircle with *AB* as diameter.

The length of the rectangle is the same as the length of the square.

GE = 20 m
DE = 4 m

(a) Work out the area of the rectangle *CDEF*.

..... m^2

(3)

Jenny is going to cover the floor with varnish.
1 litre of varnish will cover an area of 20 m^2.

(b) Work out the number of litres of varnish that Jenny will need.

.....

(5)

(Total for Question 7 is 8 marks)

8 The police use the following formula to investigate how fast a car was travelling.

$$v^2 = u^2 + 2as$$

$u = 12$

$a = -2$

$s = 11$

(a) Work out a value of v.

$v =$ .....

(2)

$v = 20$

$u = 10$

$s = 25$

(b) Work out the value of a.

$a =$ .....

(2)

When

u = 12.0 correct to 1 decimal place

a = –1.9 correct to 1 decimal place

s = 11 correct to 2 significant figures,

(c) calculate the upper bound of v.

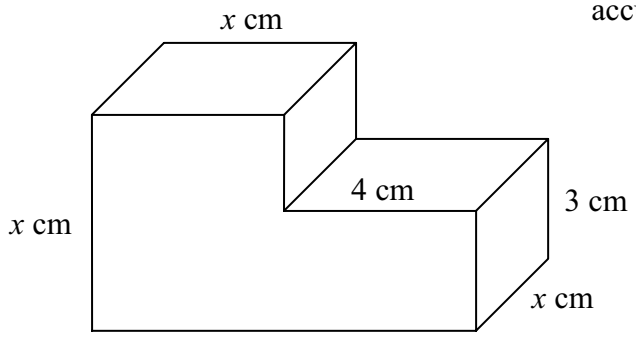
.....

(3)

(Total for Question 8 is 7 marks)

9 Dave has to make a metal shape.

Diagram **NOT** accurately drawn



The diagram represents the metal shape.
The shape is a prism.
The measurements of the prism are shown on the diagram.
The prism must have a volume of 100 cm^3.

(a) Show that $x^3 + 12x = 100$

(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 9 is 7 marks)

10 Peter has x pence.
Anni has three times as much money as Peter.
Eri has 24 pence more than Peter.

The total money they have is more than twice the amount of money that Eri has.

Work out the least amount of money Peter could have.

..... p

(Total for Question 10 is 5 marks)

11 The diagram shows a vertical building *ABCD* on horizontal ground.

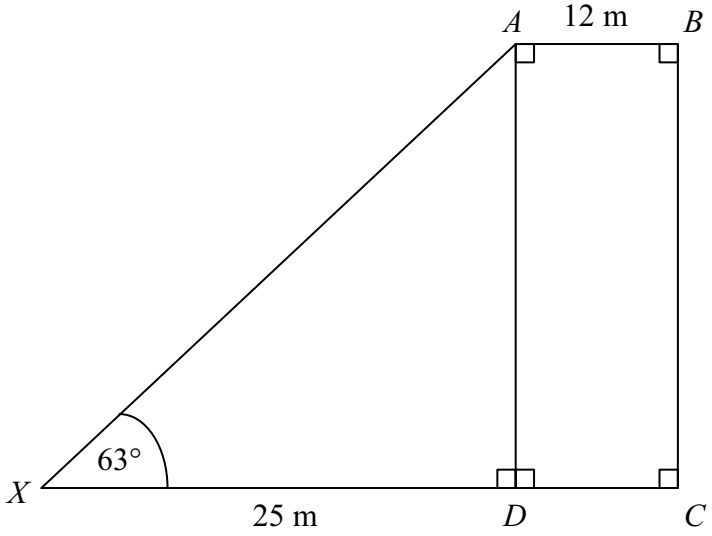


Diagram **NOT** accurately drawn

The angle of elevation of *A* from *X* is 63°.
X is 25 metres from *D*.

Calculate the size of the angle of elevation of *B* from *X*.
Give your answer correct to 3 significant figures.

.....°

(Total for Question 11 is 5 marks)

12 The diagram shows a framework of straight rods in the shape of a cuboid.

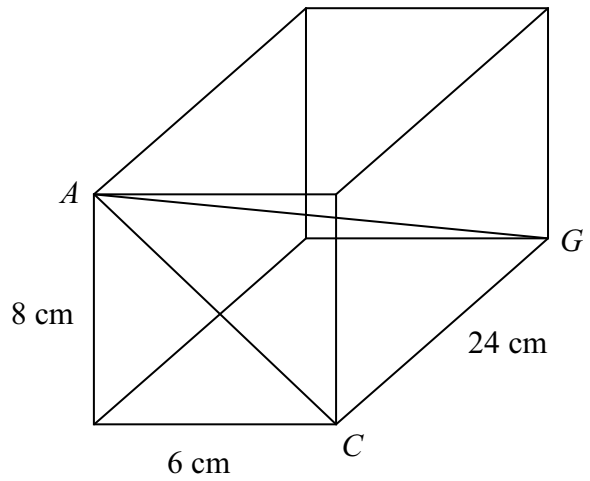


Diagram **NOT** accurately drawn

Two straight rods AC and AG are used to strengthen the framework.

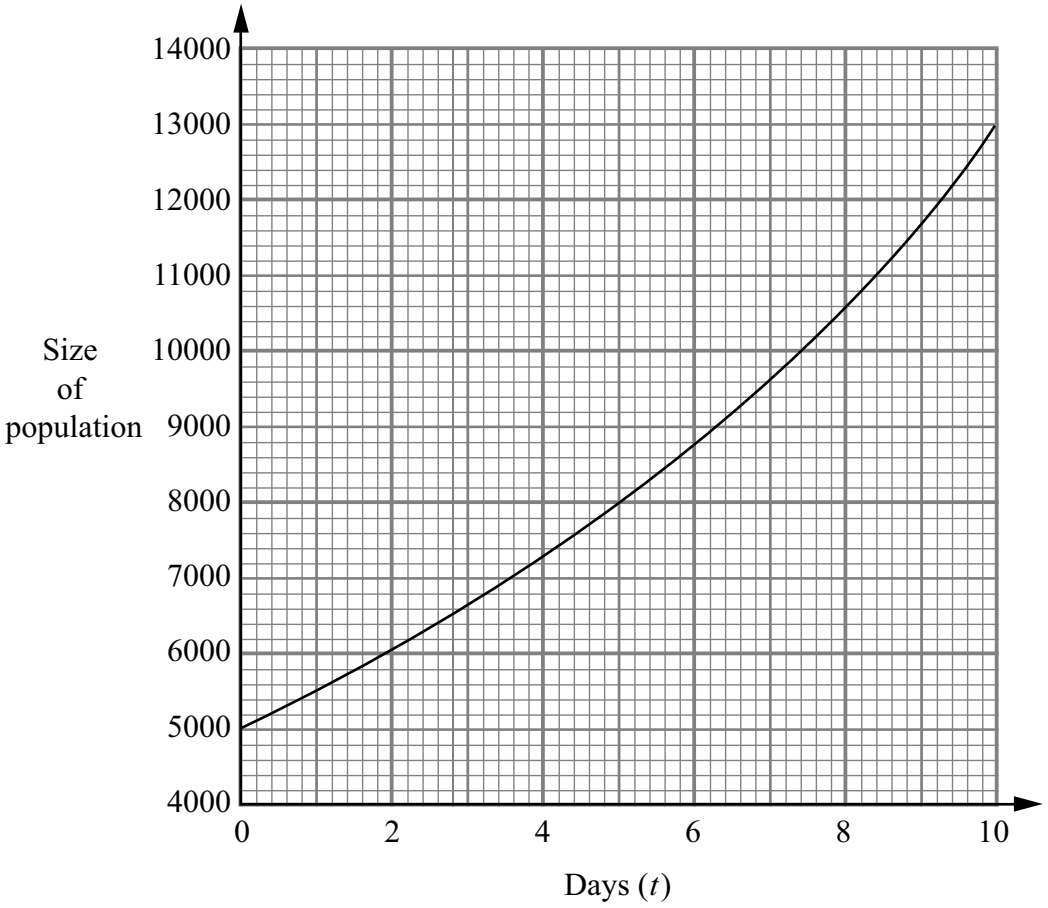
Work out the total length of all the rods in the diagram.

..... cm

(Total for Question 12 is 5 marks)

13 A scientist is studying a population of fruit flies in an experiment.

The graph gives information about the size of the population t days after the start of the experiment.



(a) By how much did the population grow during the 4th day?

.....

(2)

(b) Estimate the value of the multiplier.

.....

(2)

An initial population of size P, grows exponentially at a rate of r% per day.
The size of the population, A, after n days is given by

$$A = P\left(\frac{100+r}{100}\right)^n$$

$P = 20\,000$

$r = 3$

$n = 10$

(c) Find the value of A.
Give your answer correct to 3 significant figures.

.....

(2)

The size of a different population of fruit flies is growing at a rate of x% per day.
The size of this population doubles after 8 days.

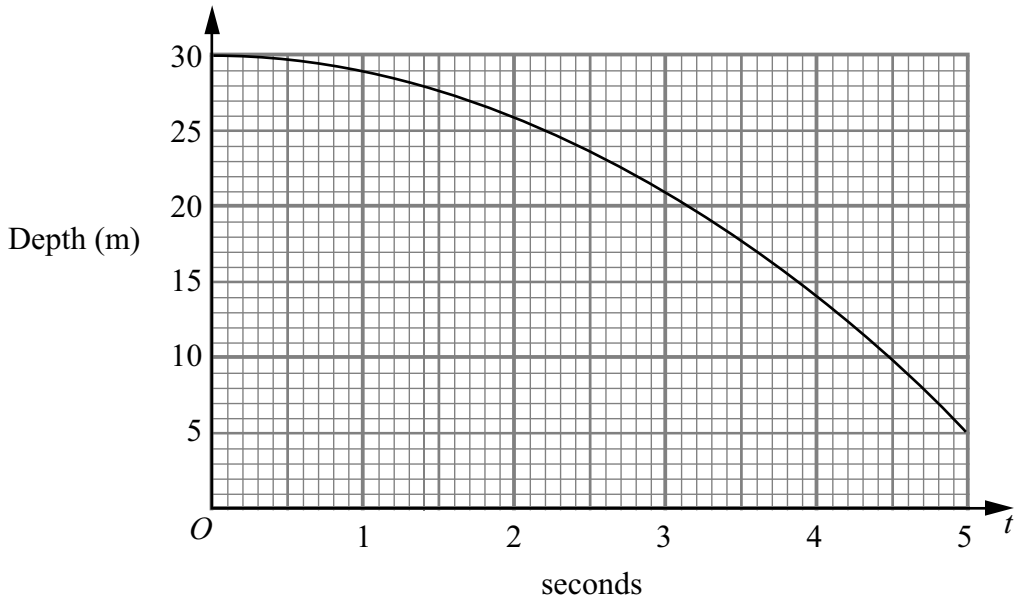
(d) Work out the value of x.

.....

(3)

(Total for Question 13 is 9 marks)

14 The graph below shows the depth of water, in metres, in a tank after t seconds.



(a) Work out the average rate of the change in depth from $t = 0$ to $t = 3$

..... m/s

(2)

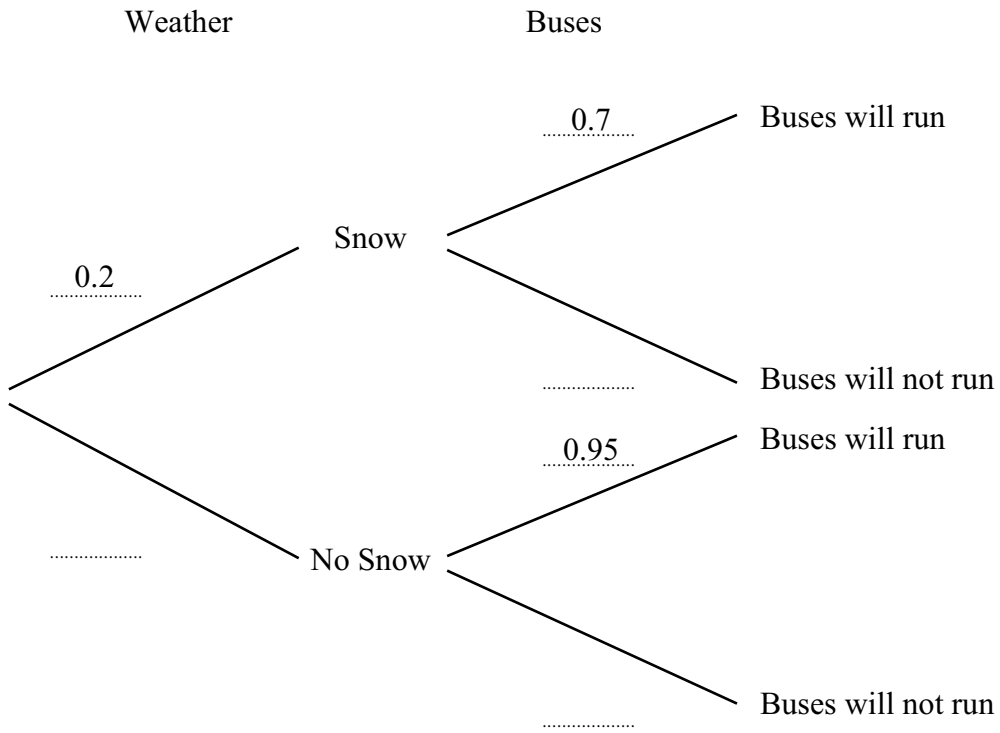
(b) Work out an estimate for the rate of change of depth at $t = 3$

..... m/s

(3)

(Total for Question 14 is 5 marks)

15 The decision tree diagram gives information about the probability of snow for the first 50 days in winter and the probability of whether buses will run or not run.



(a) Complete the decision tree diagram.

(2)

*(b) Show that an estimate for the number of days the buses will not run in the first 50 days is 5

(4)

(Total for Question 15 is 6 marks)

16 When a car accelerates from rest, its speed, v m/s, is proportional to the square of the time, t seconds, for which it travels.

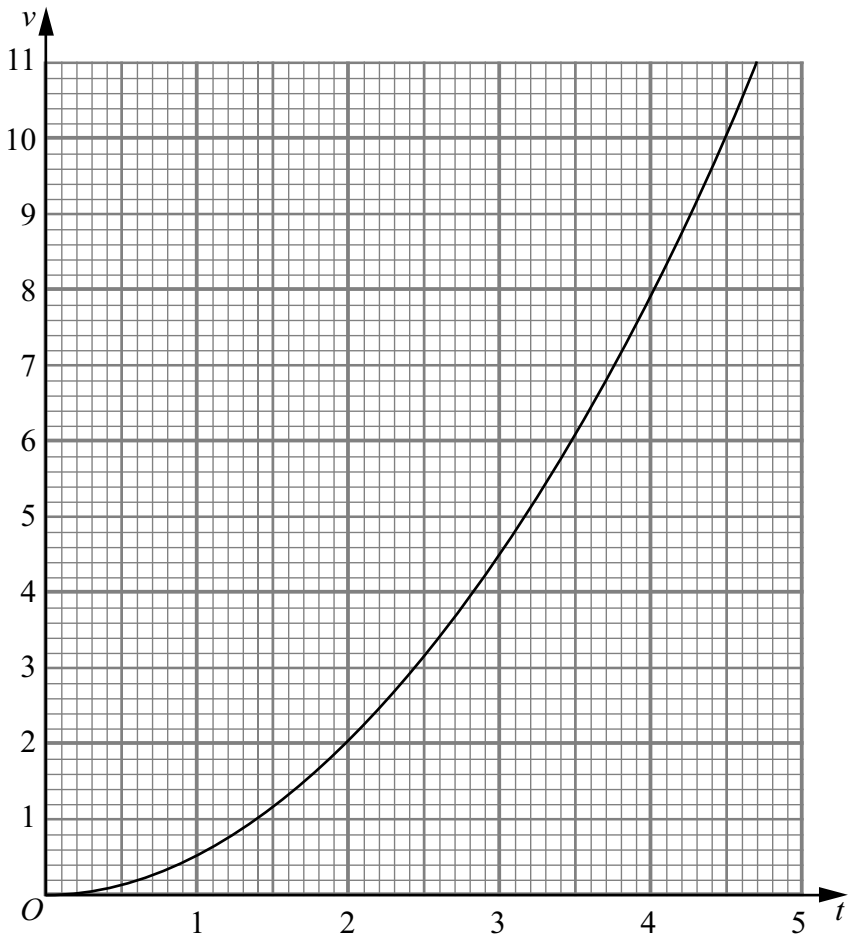
When $t = 4$, $v = 8$

(a) Work out the value of v when $t = 10$

.....

(4)

Here is the graph of v against t for the car.



(b) Work out an estimate for the distance the car travels during the first 4 seconds.

..... m

(3)

The speed of a van is given by $v = 1 + 2t$

(c) Find the value of t for which the speed of the van is the same as the speed of the car.
Give your answer correct to 1 decimal place.

$t =$ ....

(4)

(Total for Question 16 is 11 marks)

***17** In a box there are

a 1p coin
a 2p coin
two 5p coins
and a 10p coin.

Alan, Beth and Celia are each going to take at random a coin from the box and keep their coin.

Alan wants the best chance to take the 10p coin.

Alan can decide to go first or second or third.

What should he do?
You must explain your answer.

(Total for Question 17 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS