

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Applications of Mathematics

Unit 1: Applications 1

Higher Tier

Practice Paper

Time: 1 hour 45 minutes

Paper Reference

5AM1H/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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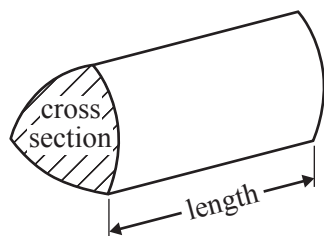
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GCSE Mathematics 2AM01

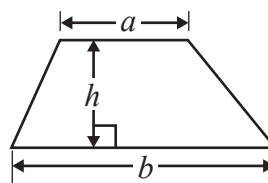
Formulae – Higher Tier

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

Volume of prism = area of cross section \times length

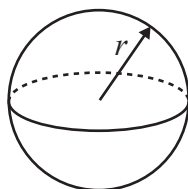


Area of trapezium = $\frac{1}{2}(a + b)h$



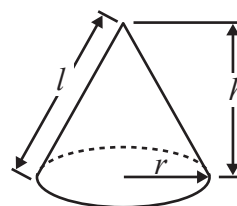
Volume of sphere = $\frac{4}{3}\pi r^3$

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

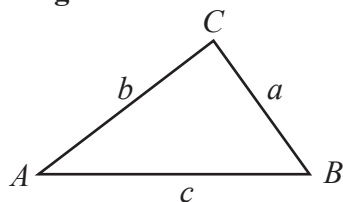


Volume of cone = $\frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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 Tom's cat eats $\frac{1}{4}$ of a tin of cat food every day.

Tom has $2\frac{1}{2}$ tins of cat food.

(a) How many days will this cat food last?

.....
(2)

Tom can get cat food from the market or from the supermarket.

The market

500 gram tins

Cost of a tin is £1.28

The supermarket

300 gram tins

Get 3 for the price of 2

Cost of a tin is £1.08

The quality of the cat food in the market is the same as the quality of cat food in the supermarket.

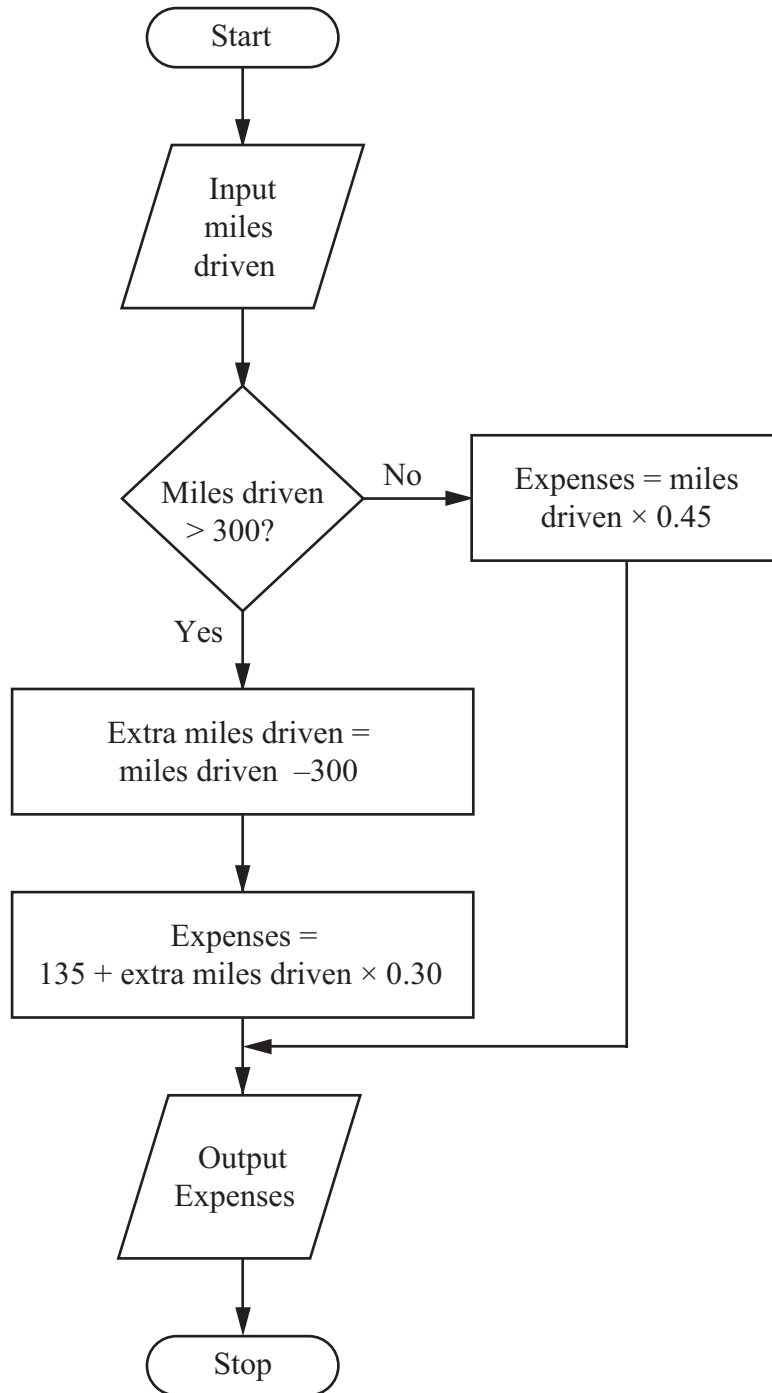
*(b) Which gives the best deal?

.....
(4)

(Total for Question 1 is 6 marks)



- 2 A saleswoman gets weekly travelling expenses for all the miles she drives for her work. The expenses are calculated by using the flowchart.



In the first week of the month, the saleswoman drove 250 miles.

(a) Use the flowchart to work out her expenses for the first week of the month.

£
(2)

In the second week of the month, the saleswoman drove 400 miles.

(b) Use the flowchart to work out her expenses for the second week of the month.

£
(2)

Jim said 'If you drive twice as far then you always get twice the expenses'.

(c) Is Jim correct?

You must explain your answer.

.....
(2)

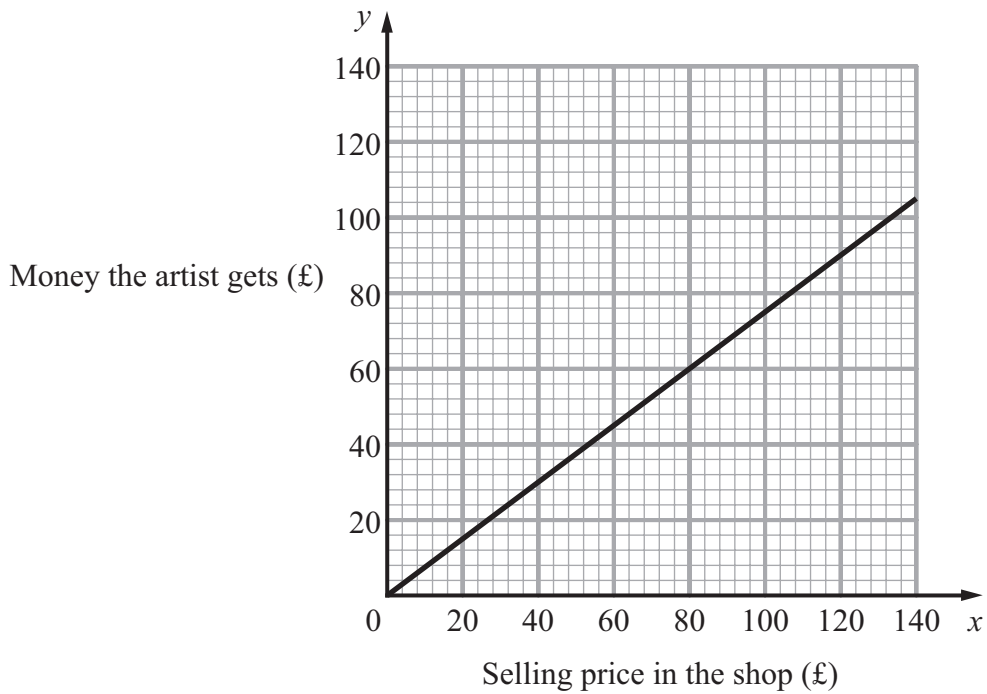
(Total for Question 2 is 6 marks)



3 Artforum is a shop that sells pictures painted by artists.

The shop makes a profit on a picture by paying the artist less than what the shop sold it for.

The graph shows the relationship between the selling price in the shop and the money the artist gets.



(a) Find the gradient of the graph.

.....
(2)

Pablo and Frida are two artists.

The shop sells one of Pablo's pictures for £100

The shop sells one of Frida's pictures for £160

(b) Find an estimate of how much more money Frida should get than Pablo should get.

£
(3)

(Total for Question 3 is 5 marks)



*4

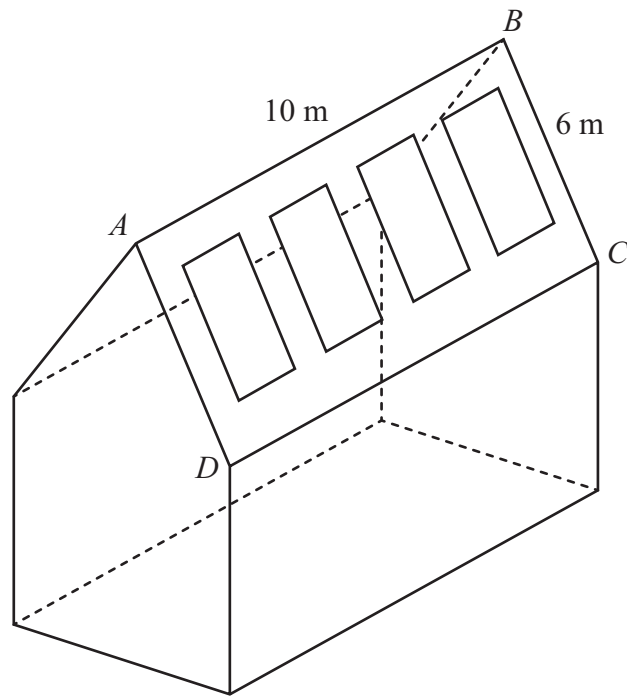


Diagram **NOT**
accurately drawn

$ABCD$ is one side of the roof of the house.
 $ABCD$ is a rectangle.

$AB = 10\text{ m}$.
 $BC = 6\text{ m}$.

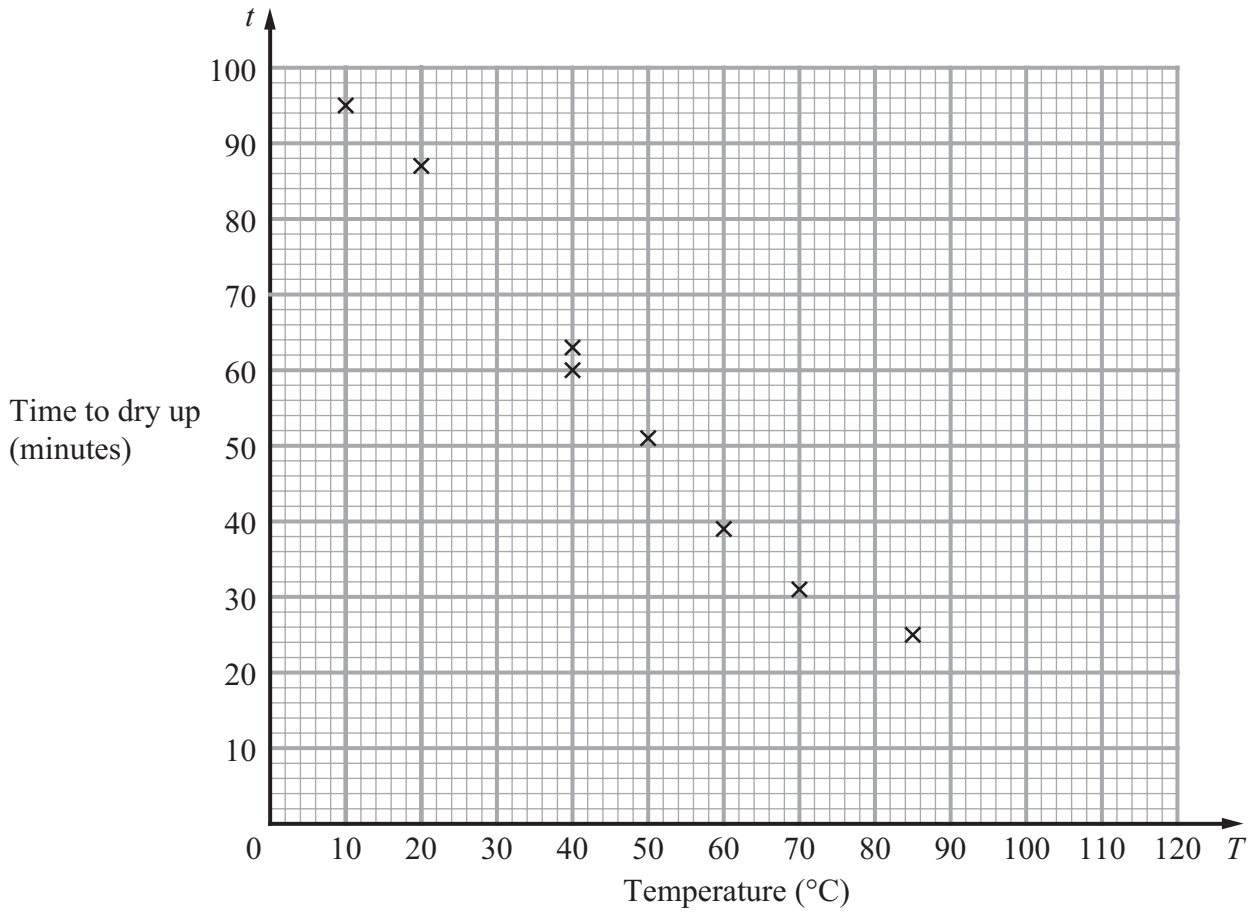
40% of the rectangle is covered with 4 identical solar panels in the shape of rectangles.

Show that 2 m by 3 m rectangles would be suitable.

(Total for Question 4 is 4 marks)



5 Bill carried out an investigation into the times t minutes it took puddles of the same size to dry up at different temperatures $T^\circ\text{C}$. He drew this scatter diagram for eight of his experiments.



In 2 other experiments, Bill got the following results.

Temperature ($T^\circ\text{C}$)	100	80
Time (t minutes)	10	26

(a) Plot these results on the scatter diagram.

(2)

Bill starts one more experiment. He uses a temperature of 30°C .

(b) Estimate the time it will take for the puddle to dry up.

..... minutes
(2)



Bill should not use the graph to estimate times for temperatures above 115°C.

(c) Explain why not.

.....
.....

(1)

(Total for Question 5 is 5 marks)

6 A surgery kept a record of the number of patients attending on Monday.

There were 25 adults.

There were 26 male children.

18 of the adults were men.

The total number of patients was 60

(a) Complete the two-way table.

	Male	Female	Total
Adult			
Child			
Total			

(3)

(b) What percentage of the total number of patients attending the surgery on Monday were girls?

..... %

(2)

(Total for Question 6 is 5 marks)



7 Bill buys a car.

He pays £8950 + VAT at 20%

Bill says ' $\frac{1}{5}$ of what I paid is VAT'.

Is Bill correct?

You must explain your answer.

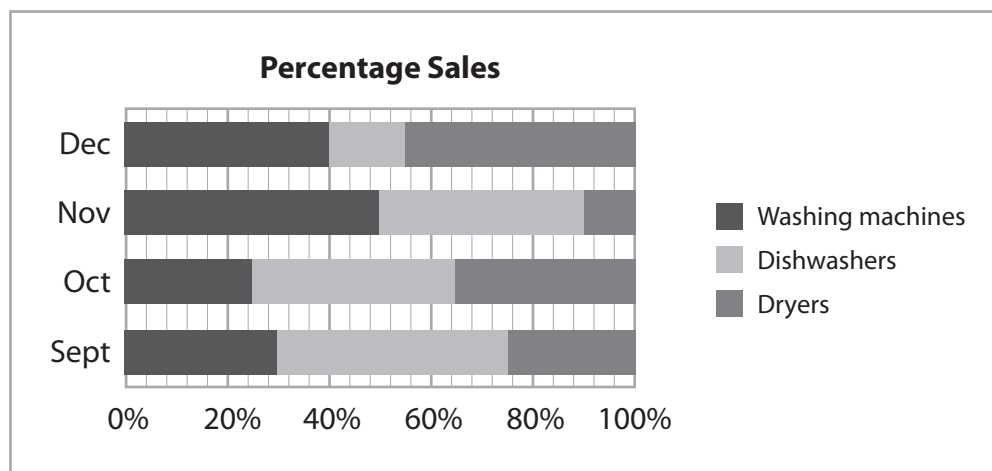
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.....

.....

(Total for Question 7 is 2 marks)

8



The chart gives information about the value of sales from a large shop.

In September, sales of washing machines were 30% of the total value of sales.

The total value of sales in September was £8000.

Find an estimate for the value of sales of dryers in September.

£

(Total for Question 8 is 3 marks)



9

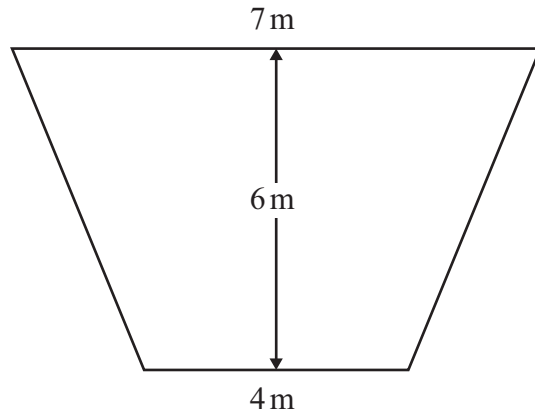


Diagram **NOT** accurately drawn

The diagram shows a floor.
The floor is in the shape of a trapezium.

The floor is to be completely covered in carpet.

1 m² of carpet costs £8.99

Work out the total cost of the carpet needed to completely cover the floor.

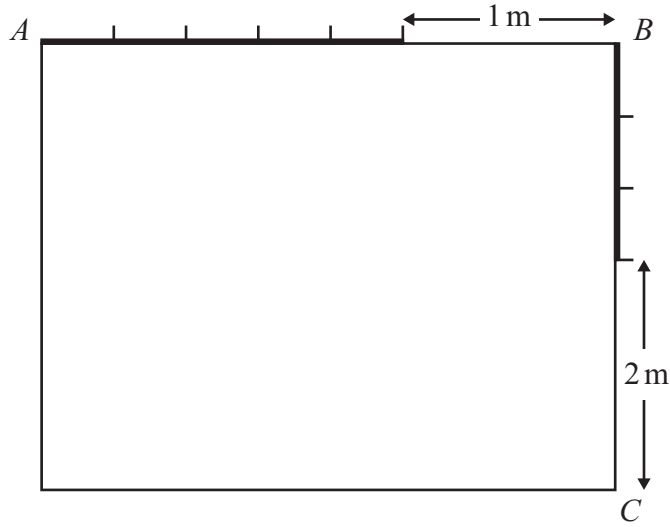
£

(Total for Question 9 is 3 marks)



10

Diagram NOT
accurately drawn



The diagram shows a rectangular room.

Jim has 8 equal rods.

Along the side AB of the room he puts 5 of the equal rods.

Along the side BC of the room he puts 3 of the equal rods.

The length of AB is greater than or equal to the length of BC .

Find the smallest possible length of a rod.

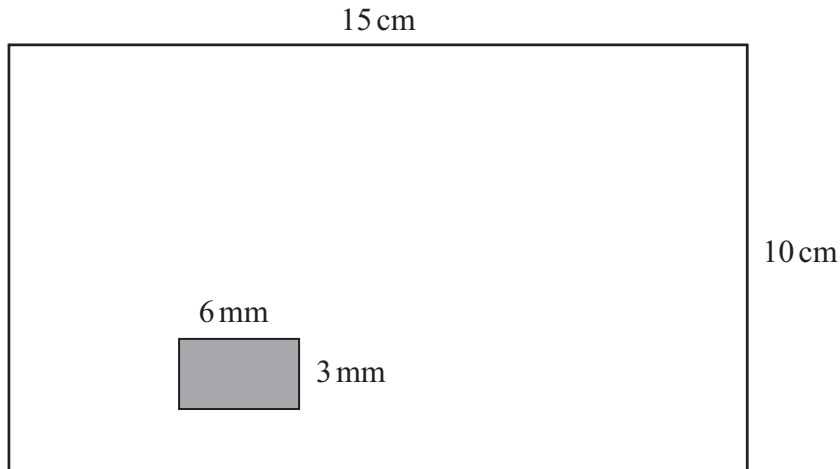
..... m

(Total for Question 10 is 3 marks)



11

Diagram **NOT**
accurately drawn



The diagram shows a small computer chip on a board.

The computer chip is in the shape of a rectangle with sides of length 6 mm and 3 mm.
The board is in the shape of a rectangle with sides of length 15 cm and 10 cm.

(a) Calculate the fraction of the board covered by the computer chip.

.....
(4)

The computer chip carries out 4.2×10^9 operations every second.

(b) Calculate how many operations it will carry out when run continuously for 3 hours.

Give your answer in standard form.

.....
(2)

(Total for Question 11 is 6 marks)



12 (a) Jim invests £2000 **each year** for 3 years at 4% per annum compound interest.

Work out how much the investment is worth at the end of the third year.

£
(4)

Colin invested £10 000 in an account paying $r\%$ per annum compound interest.

At the end of 6 years the investment was worth £12 500

(c) Calculate the value of r .

Give your answer correct to 1 decimal place.

.....
(3)

(Total for Question 12 is 7 marks)



13 The table gives information about the volumes of water in m³ falling on a garden in each of 7 seasons.

Season	Winter 2008	Spring 2008	Summer 2008	Autumn 2008	Winter 2009	Spring 2009	Summer 2009
Volume (m ³)	420	370	240	320	400	360	200

(a) Calculate the first 4-point moving average for this information.

.....
(2)

The second, third and fourth 4-point moving averages from the table are

332.5 m³, 330 m³ and 320 m³.

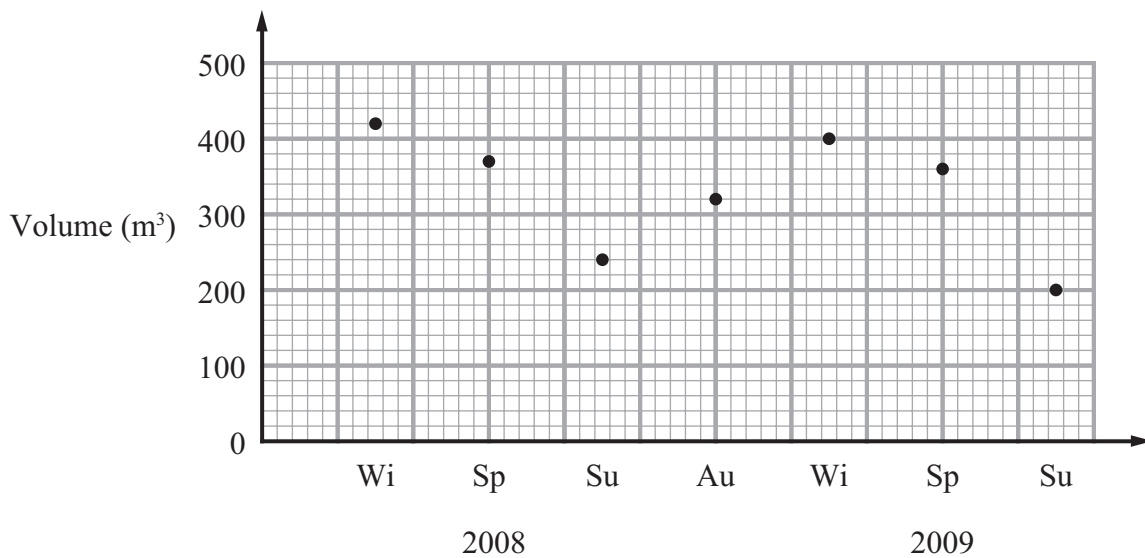
The graph shows the information in the table.

(b) On the graph, plot all four 4-point moving averages.

(2)

(c) Draw a trend line on the graph.

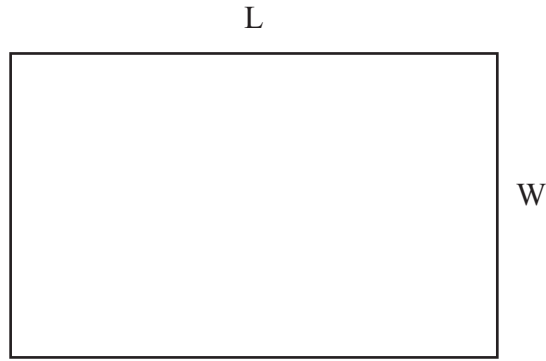
(1)



(Total for Question 13 is 5 marks)



14



To work out the total cost of laying a carpet, a company charges
 £2 for every square metre of the area of the floor
and 50p for every metre of the perimeter of the floor.

The company uses this spreadsheet to work out the total cost.

	A	B	C	D	E	F
1	L	W	Area of floor	Perimeter of floor	Total cost (£)	
2						
3						

Write down each of the formulas that should go in cells C2 to E2.

Cell C2

Cell D2

Cell E2

(Total for Question 14 is 4 marks)



15 The total cost of 3 kg of apples and 2 kg of pears is £4.20

The total cost of 2 kg of apples and 3 kg of pears is £4

Work out the cost of 1 kg of apples and the cost of 1 kg of pears.

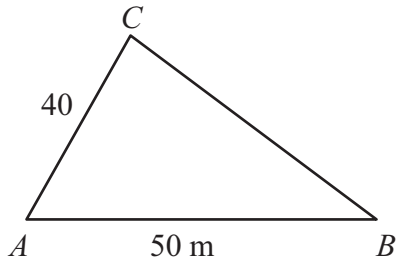
Cost of 1 kg apples p

Cost of 1 kg of pears p

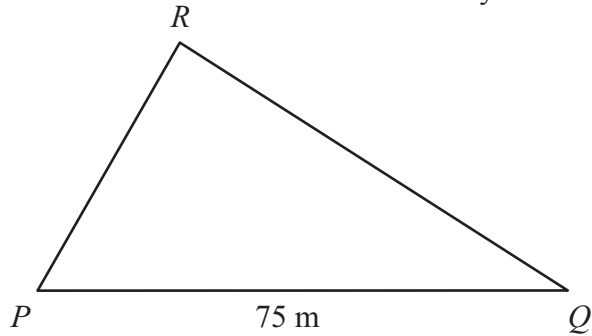
(Total for Question 15 is 4 marks)



16



Diagrams **NOT** accurately drawn



The diagram shows two fields, ABC and PQR .

The fields are mathematically similar, with angle $Q =$ angle B and angle $P =$ angle A .

(a) Work out the length of side PR .

..... m
(2)

It will cost £540 to put fencing along all the sides of triangle PQR .

(b) Work out the cost of putting fencing along all the sides of triangle ABC .

£
(2)

It will cost £64 to cover the area of the field ABC with fertiliser.

(c) Work out the cost to cover the area of the field PQR with fertiliser.

£
(2)

(Total for Question 16 is 6 marks)



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17 The Bluitt engineering company makes two types of pumps – the Boreas and the Sirocco. The greatest total number of pumps that can be made in one day is 105. At least twice as many Boreas as Siroccos are made each day. It takes 2 machine hours to make a Boreas. It takes 4 machine hours to make a Sirocco. There are no more than 240 machine hours available each day.

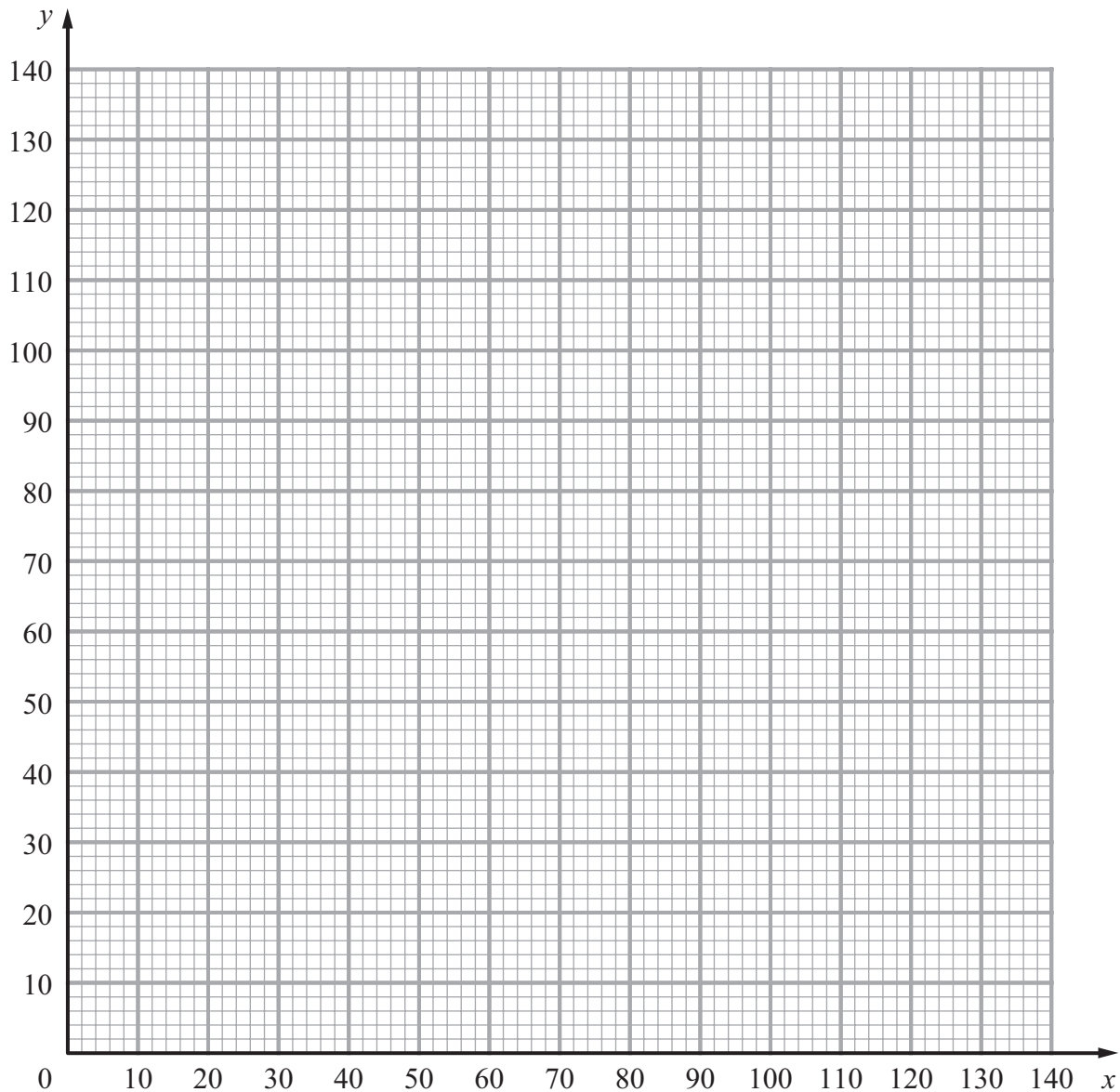
Let x be the number of Boreas made each day.
 Let y be the number of Sirocco made each day.

Two constraints are $x \geq 0, y \geq 0$

(a) Write down the other 3 constraints.

(3)

(b) On the grid, show by shading, the feasible region.



(2)



The profit from a Boreas is £180
The profit from a Sirocco is £230

All the pumps that are made on any day are sold.

(c) Work out the maximum profit that can be made in a day.

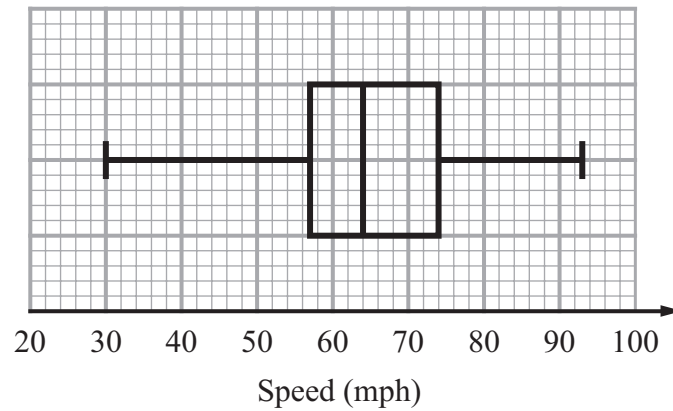
£
(3)

(Total for Question 17 is 8 marks)



18 The box plot gives information about the speeds of vehicles along a road one morning.

Box plot for speeds of vehicles



(a) (i) Write down the median speed.

..... mph

(ii) Write down the speed exceeded by 25% of all the vehicles that morning.

..... mph

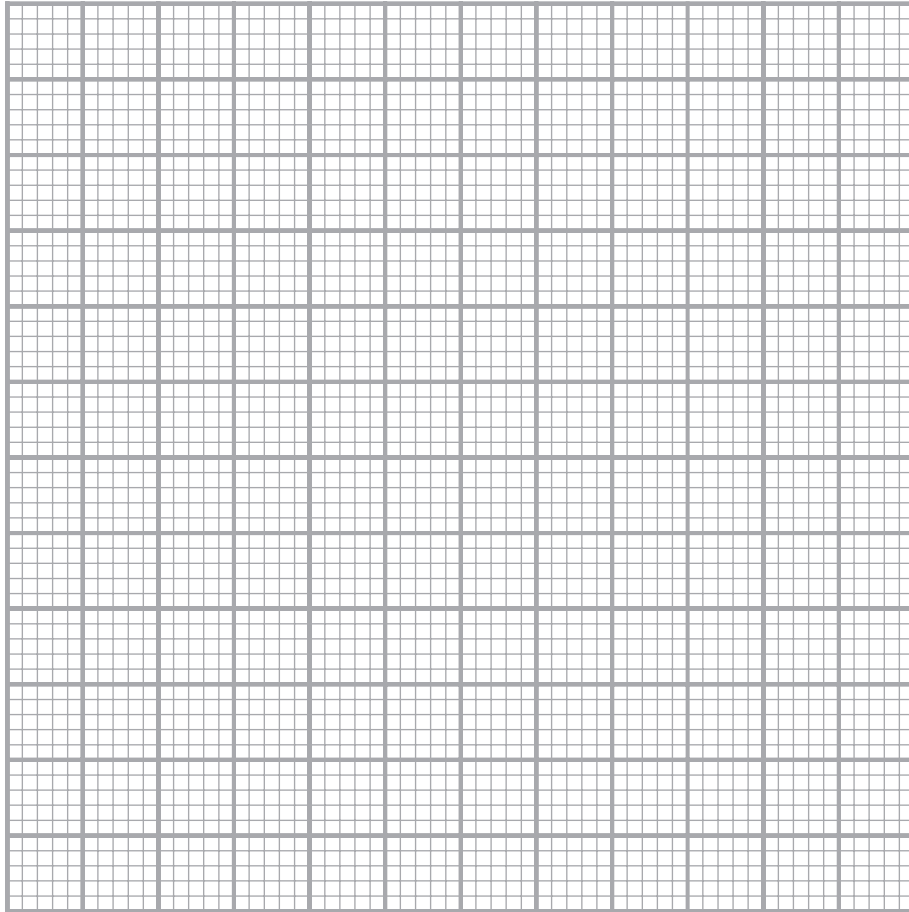
(2)

The table gives information about the speeds of vehicles along the road in the afternoon.

Speed, (S) mph	Number of vehicles
$30 < S \leq 50$	200
$50 < S \leq 55$	160
$55 < S \leq 60$	240
$60 < S \leq 70$	680
$70 < S \leq 100$	320
	1600

* (b) Compare the distributions of the speeds of the vehicles in the morning with the distribution of the speeds of the vehicles in the afternoon.





.....
.....
.....

(5)

Jim wants to take a sample of the vehicles in the afternoon.
He will take a 5% sample stratified by speed.

(c) Work out how many of the sampled vehicles will be in the $55 < S \leq 60$ class interval.

.....

(2)

(Total for Question 18 is 9 marks)



19 The amount of energy, E , units, radiated from a furnace at a temperature, T , units, is given by the rule

$$E = 5.7 \times 10^{-8} T^4$$

(a) Describe the effect on the value of E when the value of T is doubled.

.....
(2)

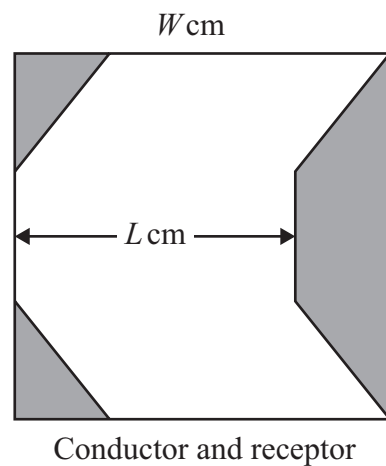
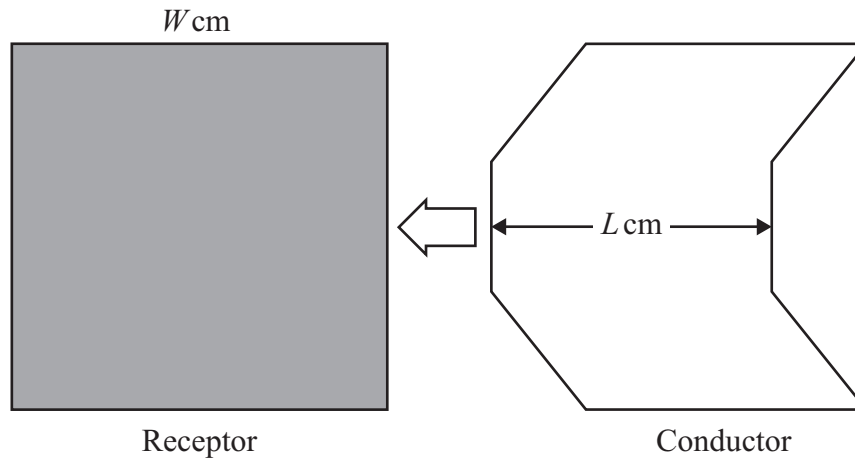
(b) How must T be changed in order to double the value of E ?

.....
(2)

(Total for Question 19 is 4 marks)



*20



Diagrams **NOT** accurately drawn

A part of a machine is made by fitting a conductor inside a receptor.

The conductor consists of one rectangle and two congruent parallelograms.

The receptor consists of a square with side of length W cm.

The conductor fits in the receptor as shown in the diagram.

The length of the rectangle of the conductor is L cm.

The width of the rectangle of the conductor is half the width of the receptor.

The area of the receptor is three times the area of the conductor.

Show that $\frac{W}{L} = 3$

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS





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