Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Monday 9 June 2014 – Morning
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.

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 ▶

P43389A

5/6/1/c2/

P 4 3 3 8 9 A 0 1 3 2

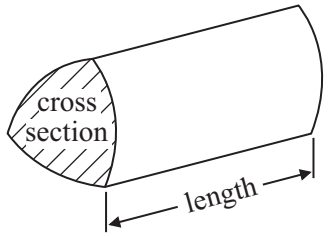
PEARSON

GCSE Mathematics 2AM01

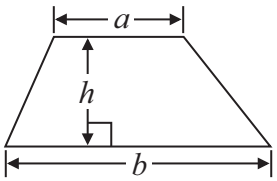
Formulae: Higher Tier

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

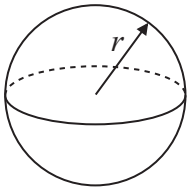


Area of trapezium = $\frac{1}{2}(a + b)h$



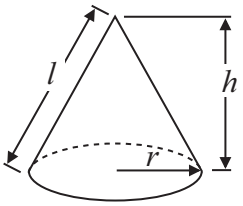
Volume of sphere = $\frac{4}{3}\pi r^3$

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

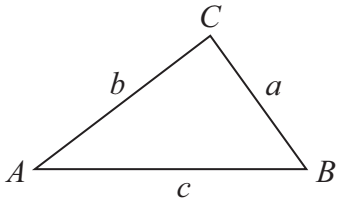


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 Scotland has an area of 30 000 square miles.

$\frac{1}{6}$ of the area is woodland.

$\frac{3}{4}$ of the area of woodland is covered with pine trees.

Work out the area of woodland covered with pine trees.

.....square miles

(Total for Question 1 is 3 marks)

2 The cost of living index has increased by 30% from the year 2004 to the year 2014

In 2004, Shola's wage was £340 a week.
In 2014, his wage was £450 a week.

Show that Shola's wage has increased by more than the increase in the cost of living index.

(Total for Question 2 is 3 marks)

3 Tyler has £x

Kayla has twice as much money as Tyler.

Lauren has £4 more than Kayla.

(a) Write an expression, in terms of x, for the total amount of money they have in pounds. Give your answer in its simplest form.

.....

(2)

Kayla has £12

(b) Work out the total amount of money they have.

£.....

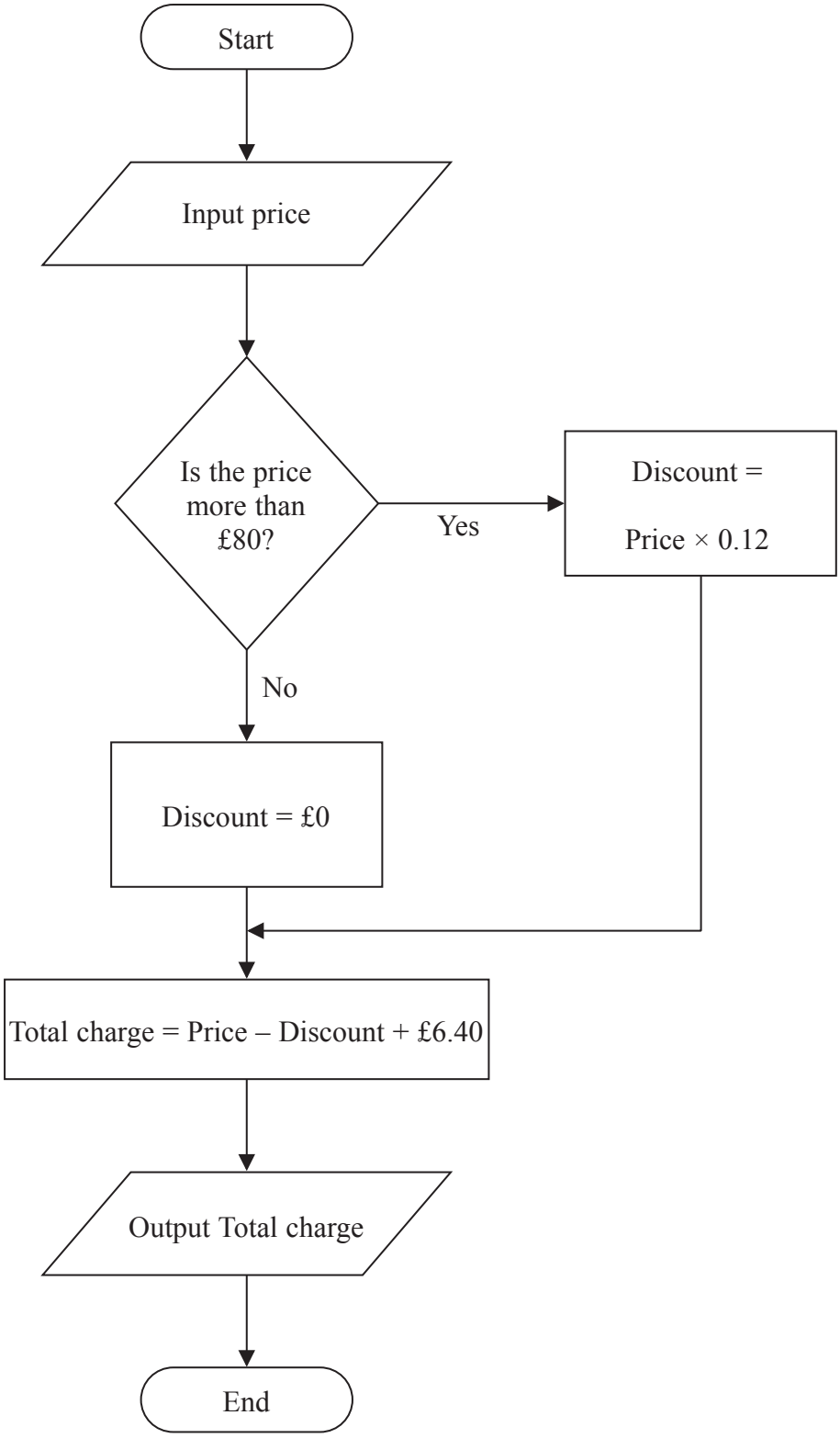
(3)

(Total for Question 3 is 5 marks)

4 Salma sells dresses online.

She gives a discount for dresses with a price of more than £80
She charges £6.40 for postage.

Salma uses this flow chart to work out the total charge to customers.



The price of a dress is £100

(a) Work out how much Salma will charge for the dress.

£.....

(2)

Soo Min paid £45.60

(b) What was the price of the dress?

£.....

(1)

Salma is going to change how she works out the total charge.

She is going to give a discount when the price of a dress is more than £70

(c) In the space below, show the part of the flow chart she needs to change **and** show the change she needs to make.

(2)

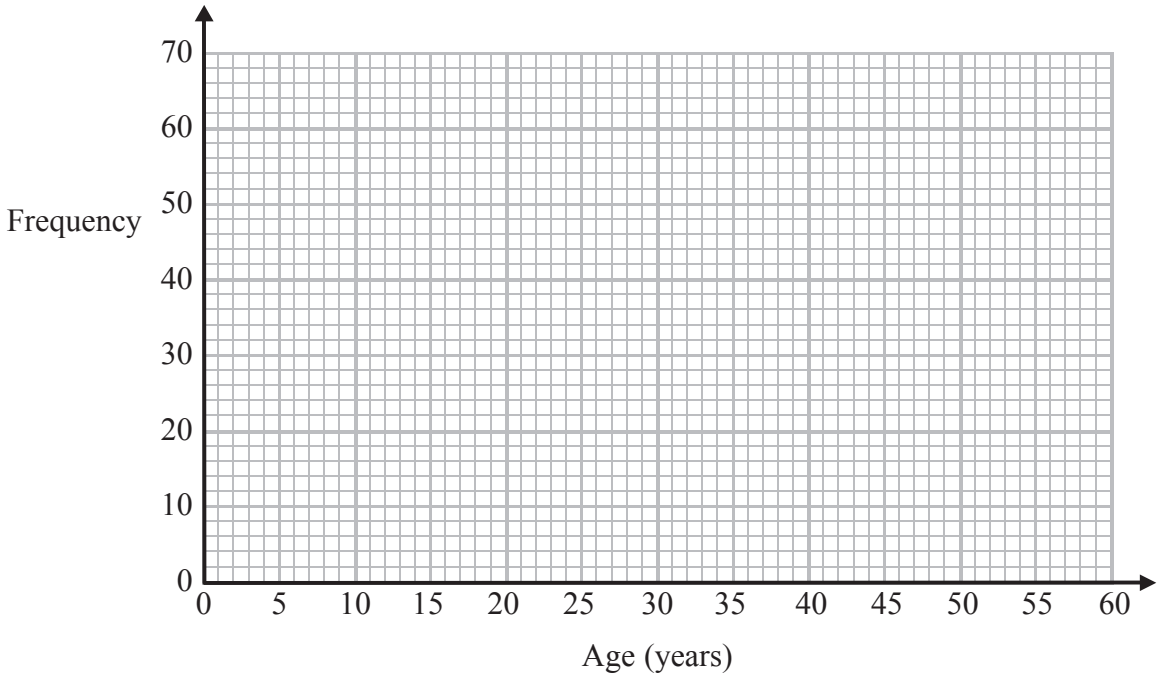
(Total for Question 4 is 5 marks)

5 The table gives information about 177 men in a town.

It shows their ages when they first got married.

Age (years)	Frequency
Under 20	0
20 – 24	19
25 – 29	60
30 – 34	52
35 – 39	27
40 – 44	12
45 – 49	5
50 – 54	2
Over 54	0

(a) Draw a frequency polygon to show this information.



(2)

(b) Find the class interval that contains the median.

.....

(1)

The table gives information about the ages of people in the town when they first got married.

	Years		**Years**
Age of youngest woman	18	Age of youngest man	20
Age of oldest woman	54	Age of oldest man	52

The median of the ages of the women when they first got married was 28.5 years.

*(c) Compare the distribution of the ages of the women when they first got married and the distribution of the ages of the men when they first got married.

.....

.....

.....

.....

(2)

(Total for Question 5 is 5 marks)

***6** The diagram represents the floor of a village hall.

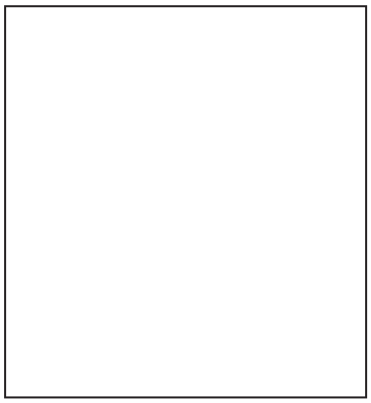


Diagram **NOT** accurately drawn

The floor is in the shape of a rectangle.
The width is 10 m.
The length is 15 m.

The floor is going to be waxed.

1 litre of wax will cover 20 m^2 of floor.
The wax is sold in pots of 2 litres.
The cost of a pot of wax is £32.40

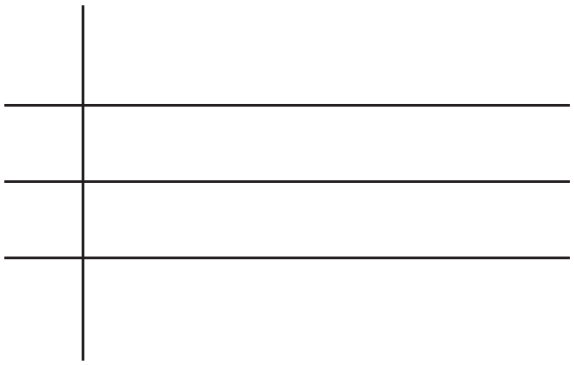
All the wax has to be bought.
Work out the total cost of the pots of wax that have to be bought.
You must show how you got your answer.

(Total for Question 6 is 5 marks)

7 Here are the points that Marlon scored in his last 15 basketball games.

16	28	0	13	12
20	9	15	28	16
12	24	12	31	8

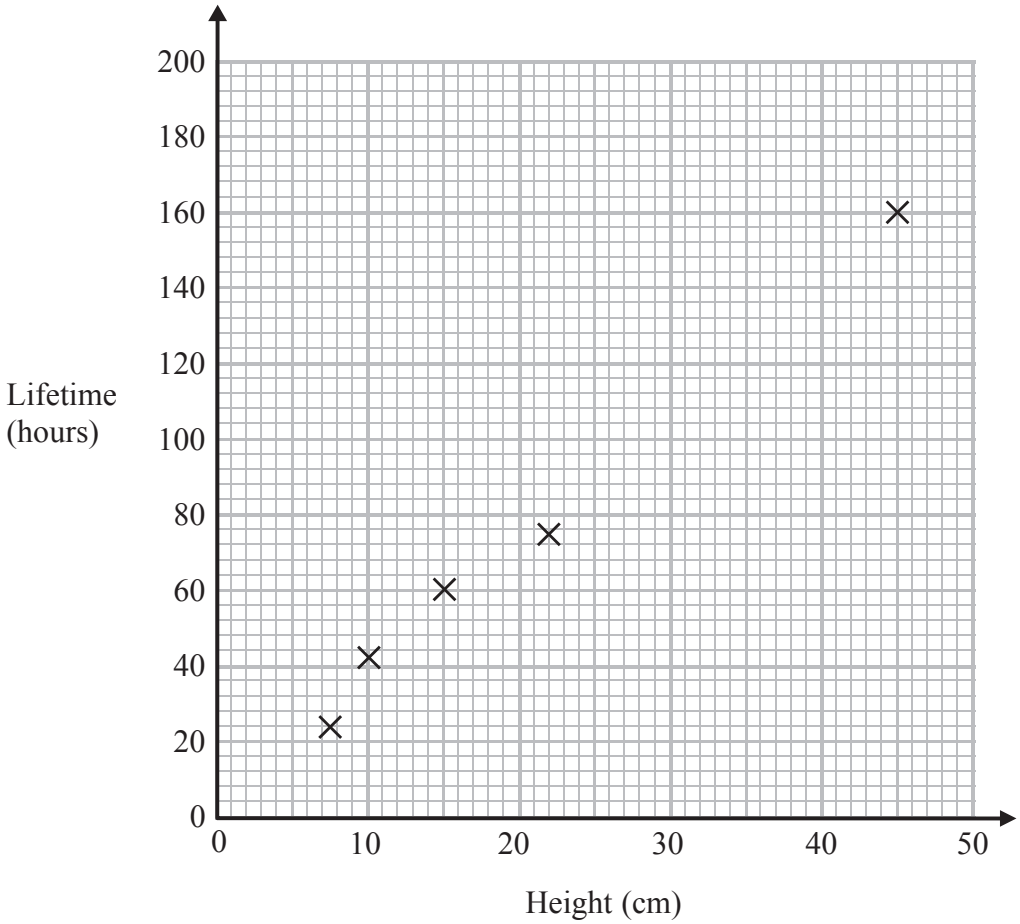
Show this information in an ordered stem and leaf diagram.
Include a key.



(Total for Question 7 is 3 marks)

8 A company sells two types of candles, standard candles and super candles.

The scatter graph gives information about the lifetime (hours) of some standard candles of different heights (cm).



Sam burns a standard candle with a height of 30 cm.
It has a lifetime of 115 hours.

(a) Show this information on the scatter diagram.

(1)

(b) Draw a line of best fit on the diagram.

(1)

A standard candle has a height of 35 cm.

(c) Find an estimate for the lifetime of this candle.

..... hours

(1)

The lifetime of a super candle is 4 times the lifetime of a standard candle of the same height.

The lifetime of one of these super candles is 200 hours.

(d) Find an estimate for the height of this super candle.

..... cm

(2)

(Total for Question 8 is 5 marks)

9 Here is a design for a flag.

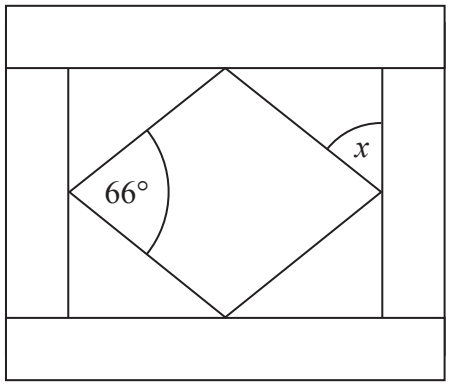


Diagram **NOT** accurately drawn

The design is made from a rhombus and four rectangles.

One angle in the rhombus is 66°

The design has two lines of symmetry.

(a) Work out the size of the angle marked x.

.....°

(3)

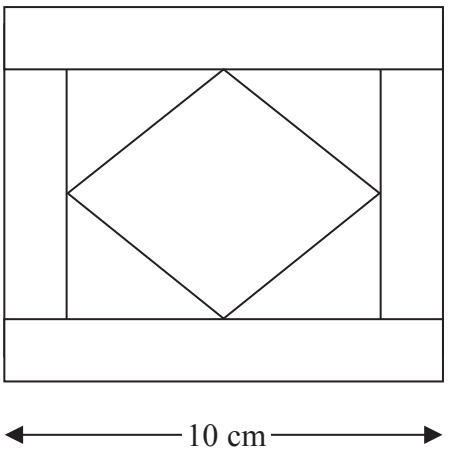
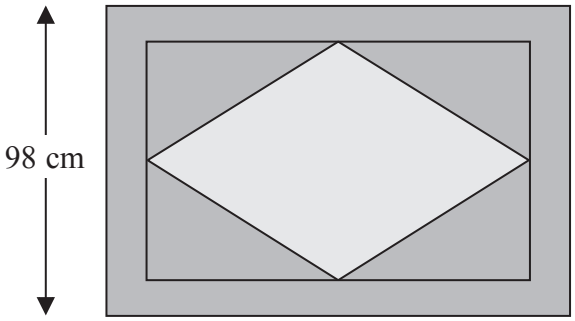


Diagram **NOT** accurately drawn



The design has a width of 10 cm.
The design has a height of 7 cm.

The flag and the design are mathematically similar.
The flag has a height of 98 cm.

(b) Work out the width of the flag.

..... cm

(2)

The area of the rhombus on the design is 20 cm^2.

(c) Work out the area of the rhombus on the flag.

..... cm^2

(2)

(Total for Question 9 is 7 marks)

10 Pat sells computers.

He uses a spreadsheet to work out the amount a customer has to pay for a computer.
The total cost is price + VAT + delivery charge.

	A	B	C	D	E
1	**Model number**	**Price (£)**	**VAT (£)**	**Delivery charge (£)**	**Total cost (£)**
2					
3					

Pat types in the model number and the price.

In cell C2, he types a formula to calculate the VAT, which is 20% of the price.
In cell D2, he types the delivery charge, which is always £7.50
In cell E2, he types the formula to calculate the total cost.

On the answer lines, write what Pat should type in each of the cells.

C2 .....

D2 .....

E2 .....

(Total for Question 10 is 4 marks)

11 The total cost of 3 apples and 4 pears is £1.84

The total cost of 5 apples and 2 pears is £1.76

Work out the cost of one apple and the cost of one pear.

Cost of one apple .....p

Cost of one pear .....p

(Total for Question 11 is 4 marks)

12 A virus has a width of 25 nanometres.

1 nanometre = 10^{-9} metres.

(a) Find the width of the virus in metres.
Give your answer in standard form.

..... m
(2)

The distance of the Andromeda Galaxy from the Earth is 2.365×10^{22} metres.

1 light year = 9.46×10^{15} metres.

(b) Find the distance of the Andromeda Galaxy from the Earth in light years.

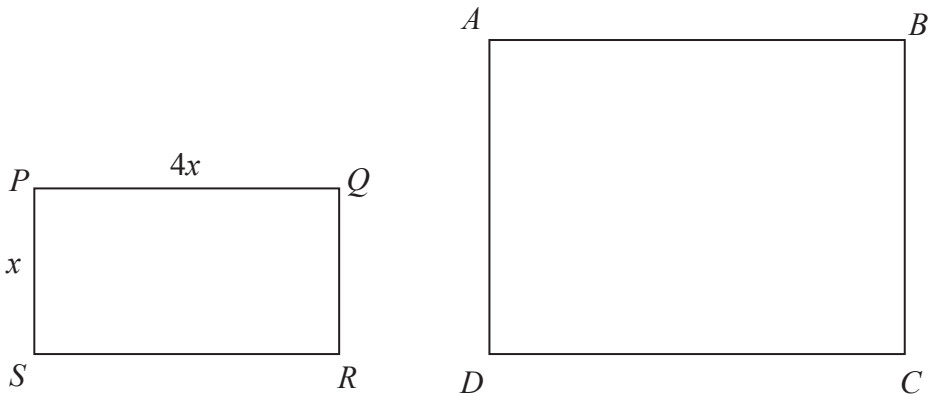
Give your answer as an ordinary number.

..... light years
(2)

(Total for Question 12 is 4 marks)

13 Here are two metal plates in the shape of rectangles.

Diagrams **NOT** accurately drawn



In the diagram, all the measurements are in cm.

The length of AD is twice the length of PS.
The length of AB is 5 cm more than the length of PS.

Find the range of values of x for which the perimeter of the rectangle $ABCD$ is greater than the perimeter of the rectangle $PQRS$.

.....

(Total for Question 13 is 5 marks)

14 The table gives information about the wages earned by a sample of 90 people in the North East of England.

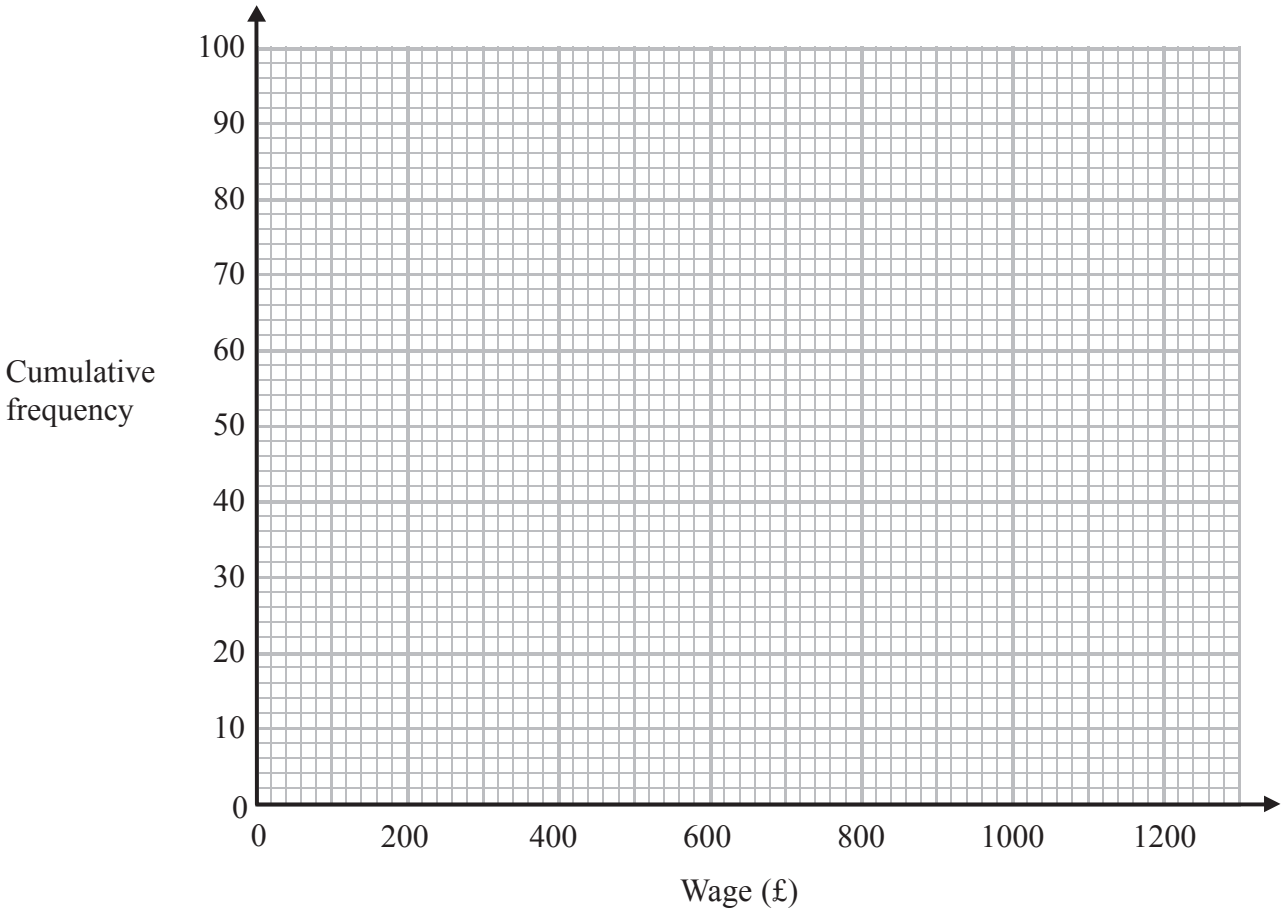
Wage (£W)	Frequency
$0 \leqslant W < 200$	14
$200 \leqslant W < 400$	32
$400 \leqslant W < 600$	19
$600 \leqslant W < 800$	13
$800 \leqslant W < 1000$	7
$1000 \leqslant W < 1200$	5

(a) Complete the cumulative frequency table.

Wage (£W)	Cumulative frequency
$0 \leqslant W < 200$	
$0 \leqslant W < 400$	
$0 \leqslant W < 600$	
$0 \leqslant W < 800$	
$0 \leqslant W < 1000$	
$0 \leqslant W < 1200$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

A charity claimed,

"More than 80% of the people in the North East of England earn less than £685 a week."

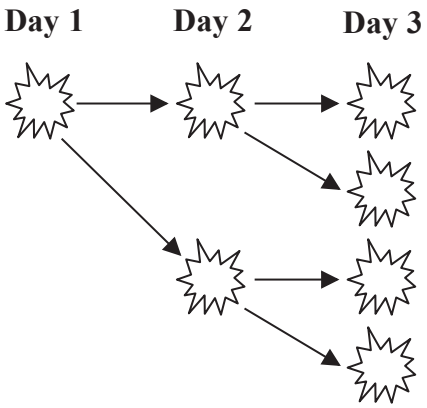
*(c) Is this claim correct?
You must show all your working.

(4)

(Total for Question 14 is 7 marks)

15 A cell reproduces by splitting into two every day.

On day 1, there is one cell.
On day 2, there are two cells.
On day 3, there are four cells.



On day $(n + 1)$ there are twice as many cells as on day n.

(a) Write down the number of cells on day 10
Give your answer as a power of 2

.....

(1)

(b) Write down the number of cells on day 1
Give your answer as a power of 2

.....

(1)

At the end of day 10, $\frac{7}{8}$ of the cells were removed.

(c) Write down the number of cells left.
Give your answer as a power of 2

.....

(2)

(Total for Question 15 is 4 marks)

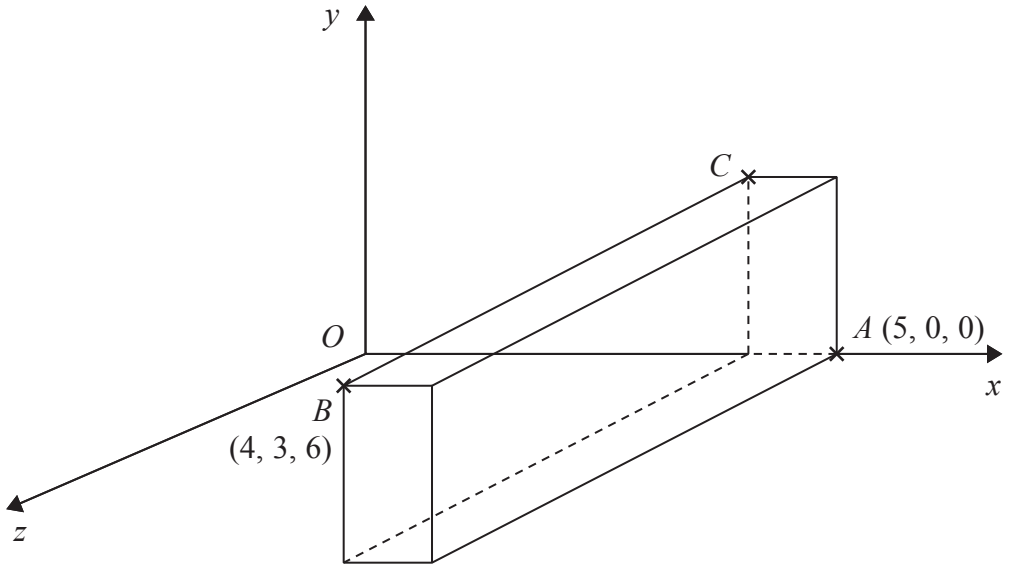
16 Amina invests £6000 in an account paying compound interest at an AER of 3.5% for 4 years.

Calculate the interest earned by the investment at the end of 4 years.

£.....

(Total for Question 16 is 4 marks)

17 The 3-D grid shows information about an archaeological site.



There is a wall on the site.
The wall is in the shape of a cuboid.

The corner A of the wall is at (5, 0, 0).
The corner B of the wall is at (4, 3, 6).

C is another corner of the wall.

(a) Write down the coordinates of C.

.....

(1)

M is the midpoint of the line AB.
A gold coin is found at M.

(b) Find the coordinates of M.

.....

(2)

(Total for Question 17 is 3 marks)

18 Brooke is doing a survey on water use in homes.
Information about the people that Brooke can ask is shown in the table.

		Gender		
		Male	**Female**	**Total**
Age (years)	**18–34**	10	44	54
	35–51	35	69	104
	52–68	60	91	151
	Total	105	204	309

Brooke thinks it would be better to take a stratified sample than a simple random sample.

(a) Explain why Brooke is correct.

.....

.....

(1)

Brooke wants to take a sample of size 60 stratified by gender and age.

(b) How many females aged 35–51 should he have in the sample?

.....

(2)

(Total for Question 18 is 3 marks)

19 A factory makes two types of T-shirts.

A basic T-shirt is made from 90 g of cotton and 90 g of silk.
A luxury T-shirt is made from 60 g of cotton and 120 g of silk.

Here are the constraints on the number of T-shirts to be made.

The number of basic T-shirts made per day must be at least 100
The number of luxury T-shirts made per day must be at least 200
The total weight of cotton available per day is 45 000 g.
The total weight of silk available per day is 63 000 g.

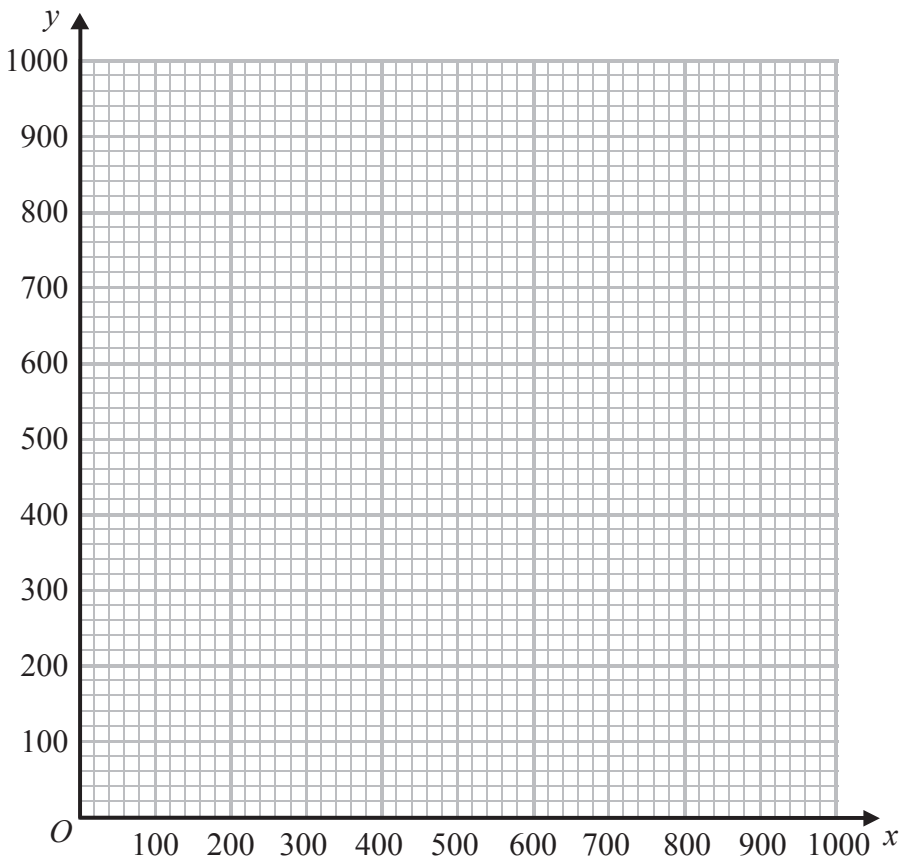
Let x be the number of basic T-shirts made per day.
Let y be the number of luxury T-shirts made per day.

(a) Complete the table to show the algebraic inequality for each constraint. Give each inequality in its simplest form.

Constraint	**Algebraic inequality in its simplest form**
Number of basic T-shirts	$x \geqslant 100$
Number of luxury T-shirts	
Total weight of cotton	$3x + 2y \leqslant 1500$
Total weight of silk	

(3)

(b) On the grid, represent these constraints and show the feasible region.



(3)

The profit made from a basic T-shirt is £8
The profit made from a luxury T-shirt is £4

(c) Work out the maximum total profit possible from the T-shirts made in one day.
You must show your working.

£.....

(2)

(Total for Question 19 is 8 marks)

20 The diagram shows the cross section *ABCDE* of the roof space of a building.

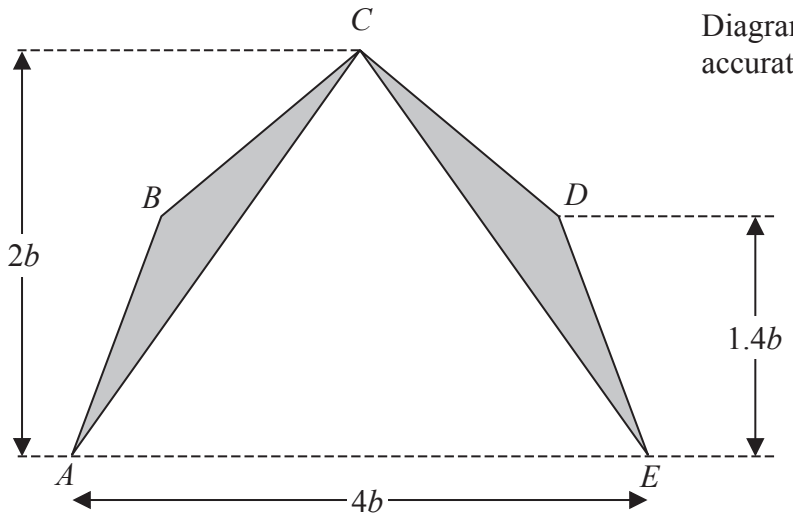


Diagram **NOT** accurately drawn

In the diagram, all the measurements are in metres.

ABCDE has a single line of symmetry.

$$BD = \frac{3}{4}AE$$

Triangle *ABC* and triangle *CDE* are wooden supports.

Find an expression, in terms of b, for the total area, in m^2, of these wooden supports.
Give your answer in its simplest form.

..... m^2

(Total for Question 20 is 5 marks)

***21** In the USA, Sam pays 20.88 US Dollars for 6 US gallons of petrol.
In Russia, Leon pays 800 Roubles for 25.58 litres of petrol.

Use the information in the table to compare the prices of petrol in the two countries.

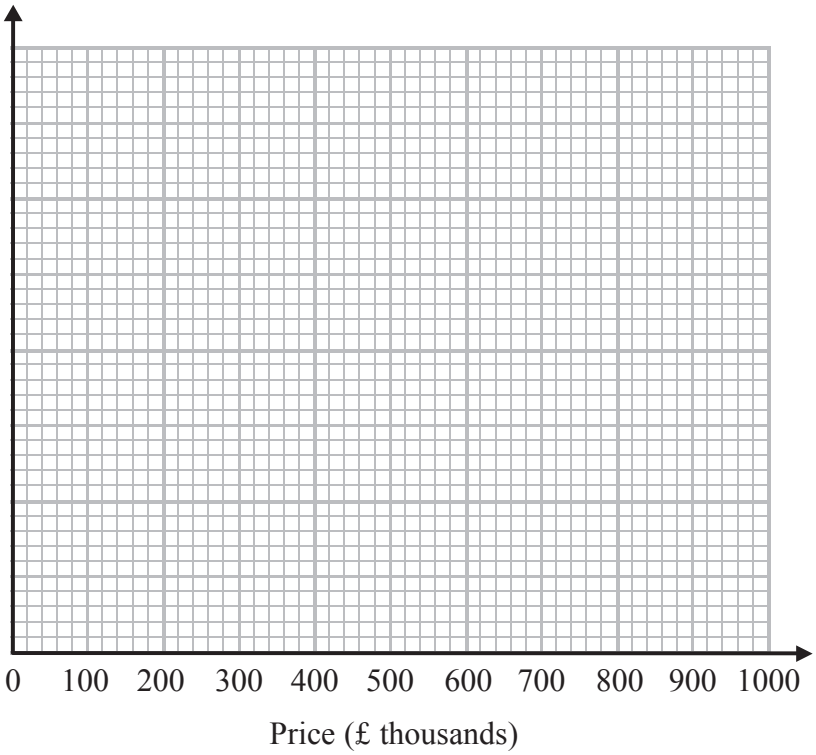
1 US gallon = 3.79 litres
1 Euro = 40.63 Roubles
1 US Dollar = 0.77 Euros

(Total for Question 21 is 5 marks)

22 The table gives information about house prices in 2010

Price (£P thousands)	Frequency
$0 < P \leqslant 100$	13
$100 < P \leqslant 150$	30
$150 < P \leqslant 200$	38
$200 < P \leqslant 300$	44
$300 < P \leqslant 400$	19
$400 < P \leqslant 1000$	18

Draw a histogram to show this information.



(Total for Question 22 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

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