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

Thursday 25 May 2017 – 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 ▶

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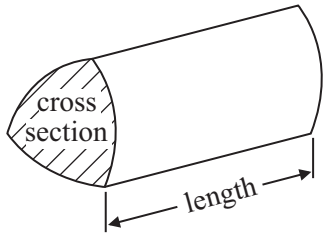
GCSE Mathematics 2AM01

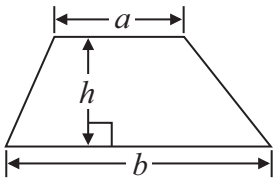
Formulae: Higher Tier

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 × length

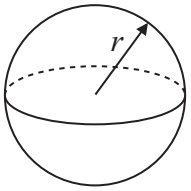


Area of trapezium = $\frac{1}{2}(a + b)h$



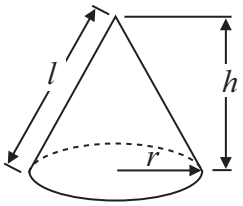
Volume of sphere = $\frac{4}{3}\pi r^3$

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

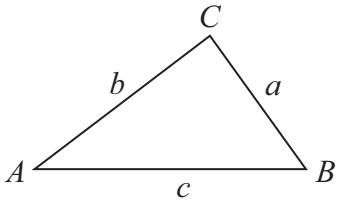


Volume of cone = $\frac{1}{3}\pi r^2 h$

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

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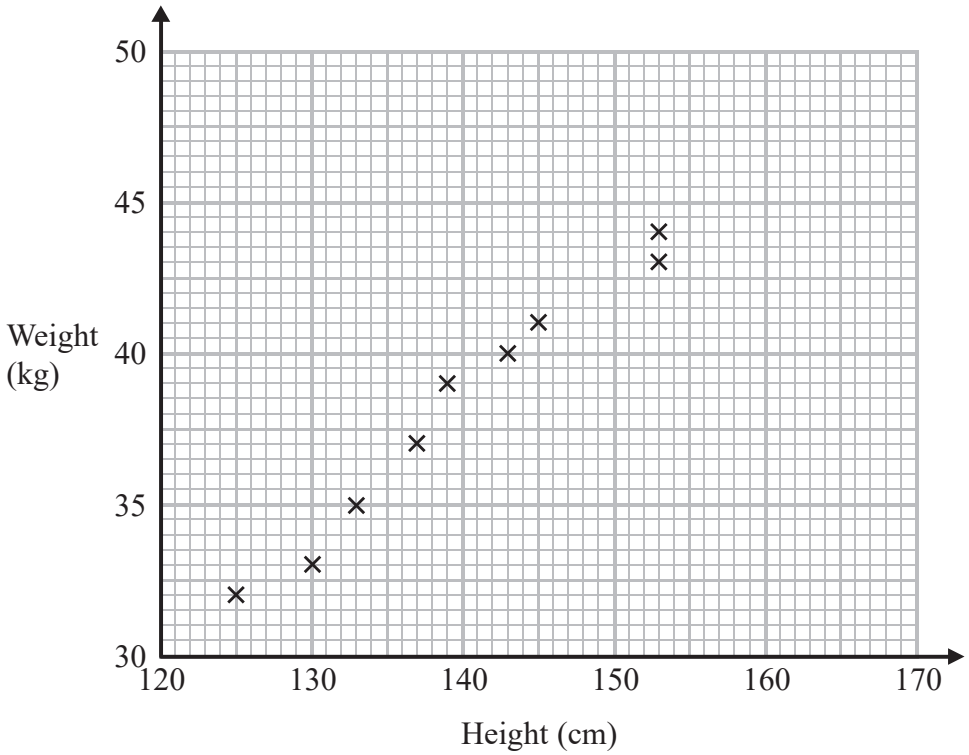
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Anita recorded the height, in cm, and the weight, in kg, of each of nine children.

The scatter graph shows information about her results.



A different child has a height of 130 cm and a weight of 35 kg.

(a) Plot this information on the scatter graph.

(1)

(b) Describe the relationship between the height and the weight of these children.

.....

(1)

A child has a weight of 42.5 kg.

(c) Use the scatter graph to predict the height of this child.

..... cm

(2)

(Total for Question 1 is 4 marks)

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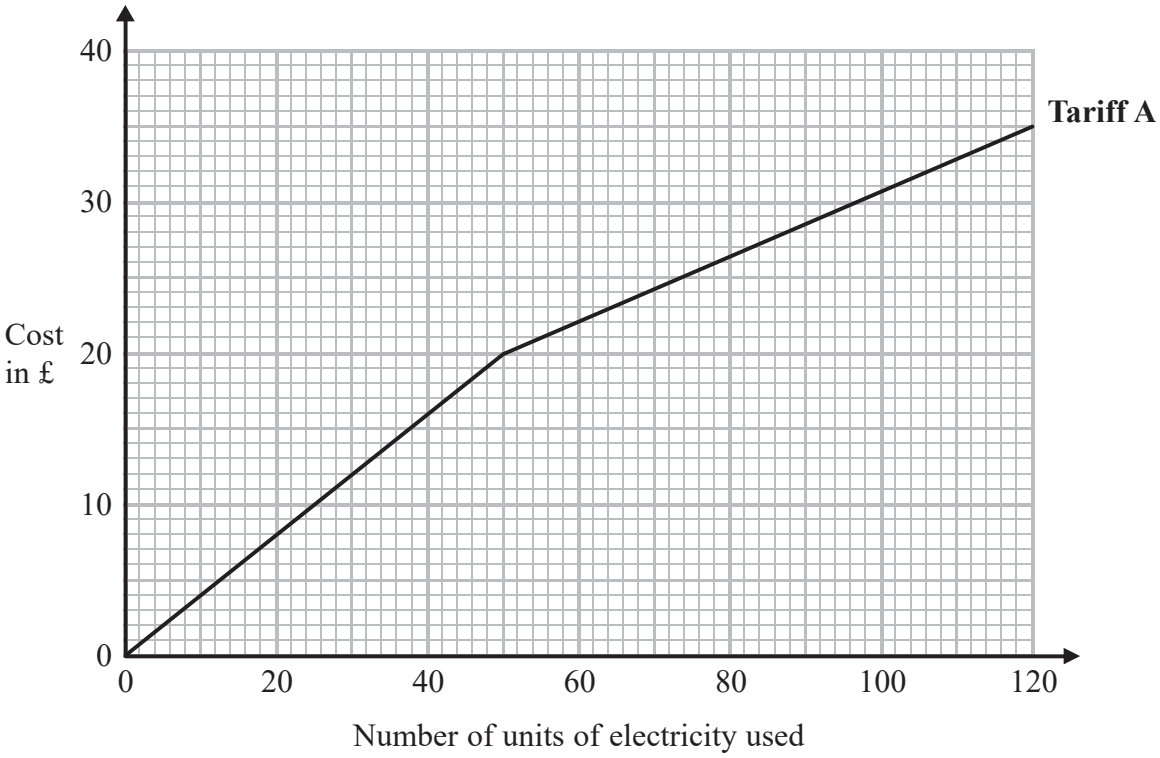
2 Beth pays on Tariff A for the number of units of electricity she uses.

She can use this graph to find out how much she pays each month.



(a) How much does Beth pay for each unit of electricity she uses up to a total of 50 units?

.....

(2)

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Beth could change to Tariff B.
Here is the monthly charge for Tariff B.

30p per unit of electricity used

On average, Beth uses 80 units of electricity each month.
Beth wants to pay the least amount of money for the units of electricity she uses.

*(b) Should Beth change to Tariff B?
You must show all your working.

(3)

(Total for Question 2 is 5 marks)

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3 Buzz buys equipment needed for skateboarding.
He then sells this equipment.

Buzz sets up a spreadsheet.
Here is a part of the spreadsheet.

	A	B	C	D
1	**Equipment**	**Buys (£)**	**Sells (£)**	**Profit or loss (£)**
2	Skateboard	120	165	
3	Balance board	260	235	
4	Bag	40	48	
5	Grind rail	47	54	
6	Ramp			
7	Total			

Buzz buys a ramp for £50
He sells the ramp for £42

(a) Put this information in the spreadsheet.

(2)

(b) Write down the formulas to go into each of the cells D2 and B7

D2.....

B7.....

(3)

(Total for Question 3 is 5 marks)

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4 Aaron, Bonny and Connor are playing a game with cards.

Aaron has some cards.
Bonny has twice as many cards as Aaron.
Connor has 6 cards more than Bonny.

They have a total of 101 cards.

Work out how many cards Aaron has.
You must show all your working.

.....

(Total for Question 4 is 4 marks)

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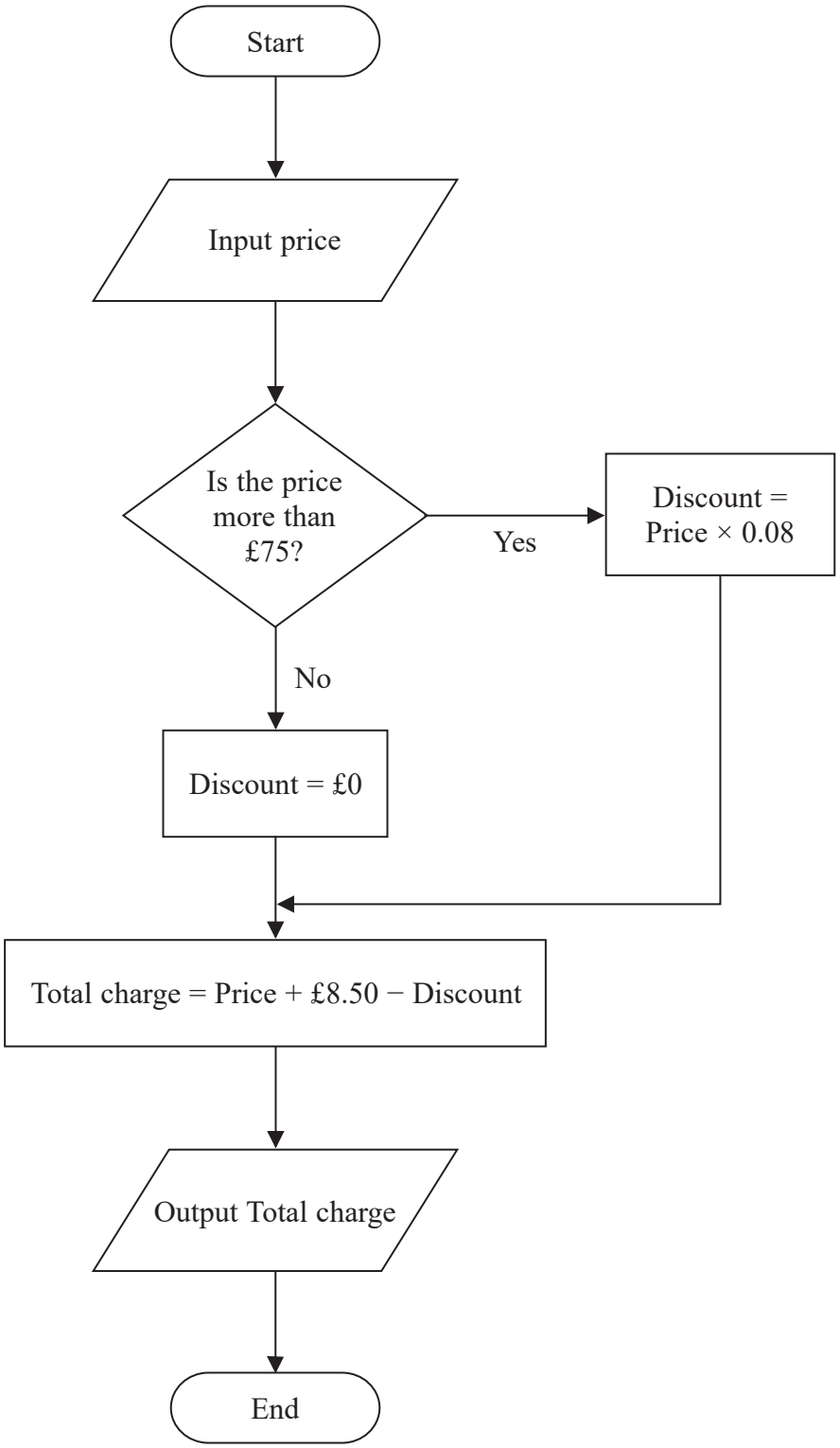
5 Earl sells shoes online.

He gives a discount for shoes with a price of more than £75
He charges £8.50 for postage.

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



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The price of a pair of shoes is £120

(a) Work out how much Earl will charge for the pair of shoes.

£.....

(2)

Nat bought a pair of shoes from Earl.
The total charge was £42.50

(b) What was the price of this pair of shoes?

£.....

(1)

Earl is going to change how he works out the total charge.

He is going to change the amount he charges for postage to £11

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

(2)

(Total for Question 5 is 5 marks)

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***6** Micah wants to change £500 to dollars ($).
He goes to the post office to change his money.

The post office has only $20 notes.

The exchange rate is £1 = $1.43

Micah wants to change as much of his £400 as possible.

How many $20 notes will Micah get?

(Total for Question 6 is 4 marks)

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7 A council is planning to make a new tennis court in a park.

The council uses this question on a questionnaire.

How often would you use a tennis court?

Not a lot ☐ Sometimes ☐ A lot ☐

(a) Write down **two** things wrong with this question.

1 .....

.....

2 .....

.....

(2)

(b) Design a question for the questionnaire to find out how much people would pay to use the tennis court.

(2)

(Total for Question 7 is 4 marks)

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8 Joey asked 70 adults if they like apple juice best or orange juice best or tomato juice best.

40 of the adults are women
12 of the men like orange juice best
8 of the women like tomato juice best
10 of the 15 adults who like apple juice best are women.

Work out the number of men who like tomato juice best.

.....

(Total for Question 8 is 4 marks)

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9 Here is part of a structure for a building.

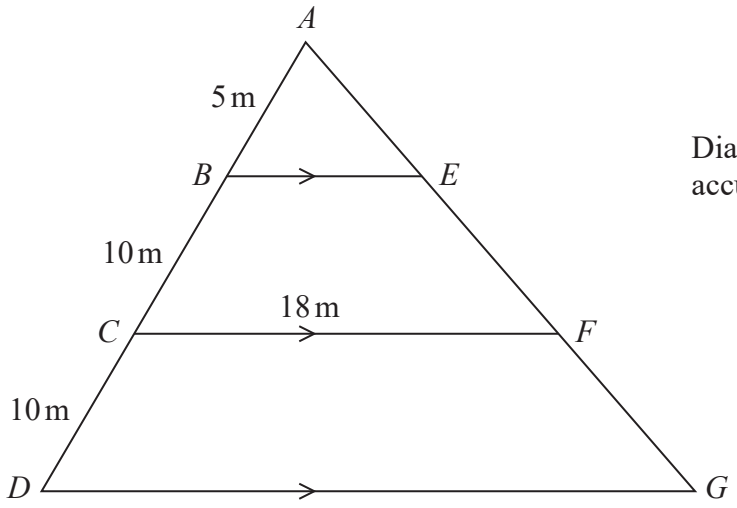

Diagram **NOT** accurately drawn

BE is parallel to *CF*.
CF is parallel to *DG*.

Triangles *ABE*, *ACF* and *ADG* are similar triangles.

AB = 5 m.
BC = *CD* = 10 m.
CF = 18 m.

(a) Find the length of *BE*.

..... m

(2)

(b) Find the length of *DG*.

..... m

(2)

(Total for Question 9 is 4 marks)

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10 Rosie wants to make a patio using paving stones.
She will use square paving stones and triangular paving stones.

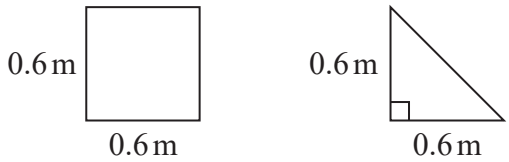

Diagram **NOT** accurately drawn

The patio will be in the shape of a hexagon, as shown below.

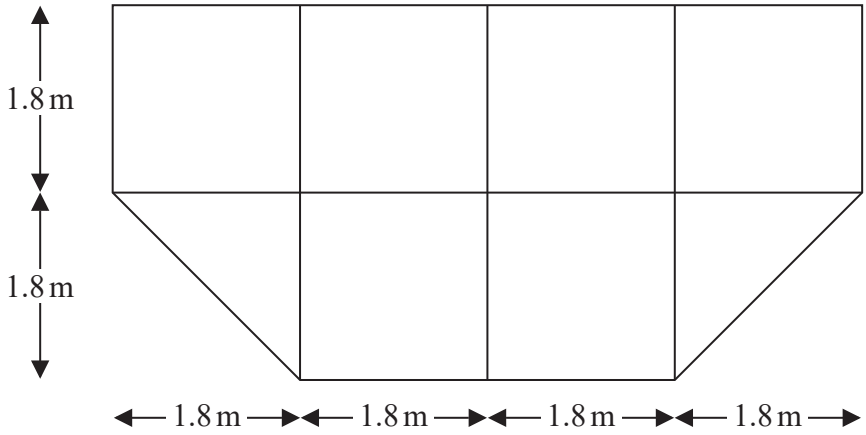

Diagram **NOT** accurately drawn

(a) Work out the number of each type of paving stone Rosie needs.

..... triangular paving stones

and

..... square paving stones

(4)

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Rosie needs to paint her patio with sealant.
She needs one litre of sealant for every 4.2 m^2 of patio.

(b) Work out how many litres of sealant Rosie needs.

..... litres

(4)

(Total for Question 10 is 8 marks)

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***11** Gina wants to buy some cola for a party.
She is also going to buy some burgers and some buns.

Cola, burgers and buns are all sold in packs.

There are

6 cans of cola in a pack
12 burgers in a pack
9 buns in a pack

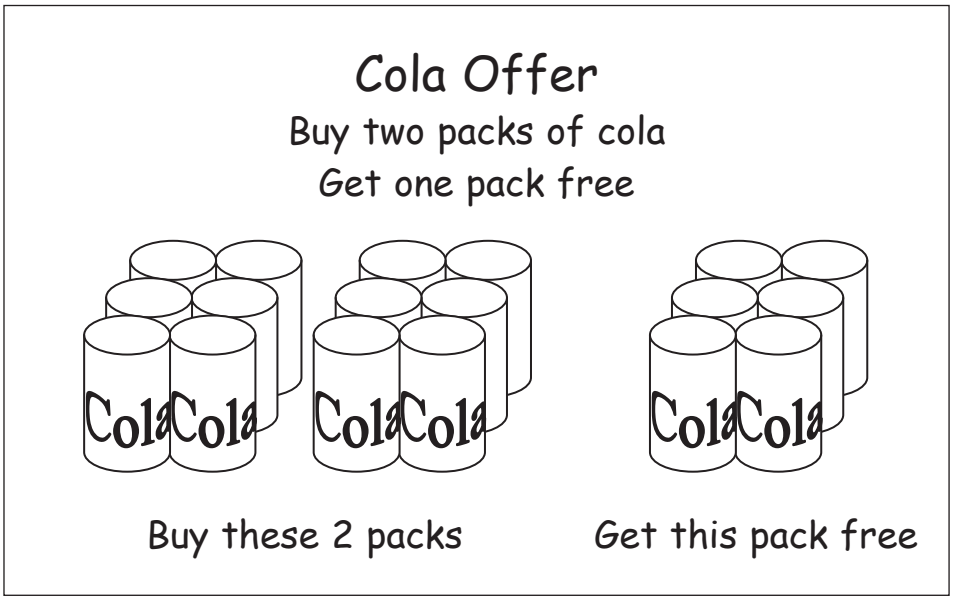
A pack of cola costs £2.95

A pack of burgers costs £4.95

A pack of buns costs £1.80

Gina is going to buy the same number of cans of cola, burgers and buns.

Gina sees this special offer for cola.



Work out the cheapest total price Gina pays for the cola, the burgers and the buns.
You must show all your working.

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(Total for Question 11 is 6 marks)

12 The diameter of the Sun is 1 390 000 km.

(a) Write 1 390 000 in standard form.

.....

(1)

The distance from the Earth to the Moon is 3.7×10^5 km.

(b) Write 3.7×10^5 as an ordinary number.

.....

(1)

The distance from the Earth to the Sun is 1.5×10^8 km.

(c) Work out the value of $\dfrac{\text{Distance from the Earth to the Sun}}{\text{Distance from the Earth to the Moon}}$

Give your answer correct to 3 significant figures.

.....

(1)

(Total for Question 12 is 3 marks)

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13 Jonah invests £2000 for 2 years in a savings account.
He gets 3% per annum compound interest.

(a) How much money is in Jonah's savings account at the end of 2 years?

£.....

(3)

Sarah invests £3000 at 0.2% **per month** compound interest.

(b) Work out the annual equivalent rate (AER).
Give your answer correct to 2 decimal places.
You must show your working.

..... %

(3)

(Total for Question 13 is 6 marks)

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14 The table gives information about the weekly wages earned by a sample of 80 people in Cornwall.

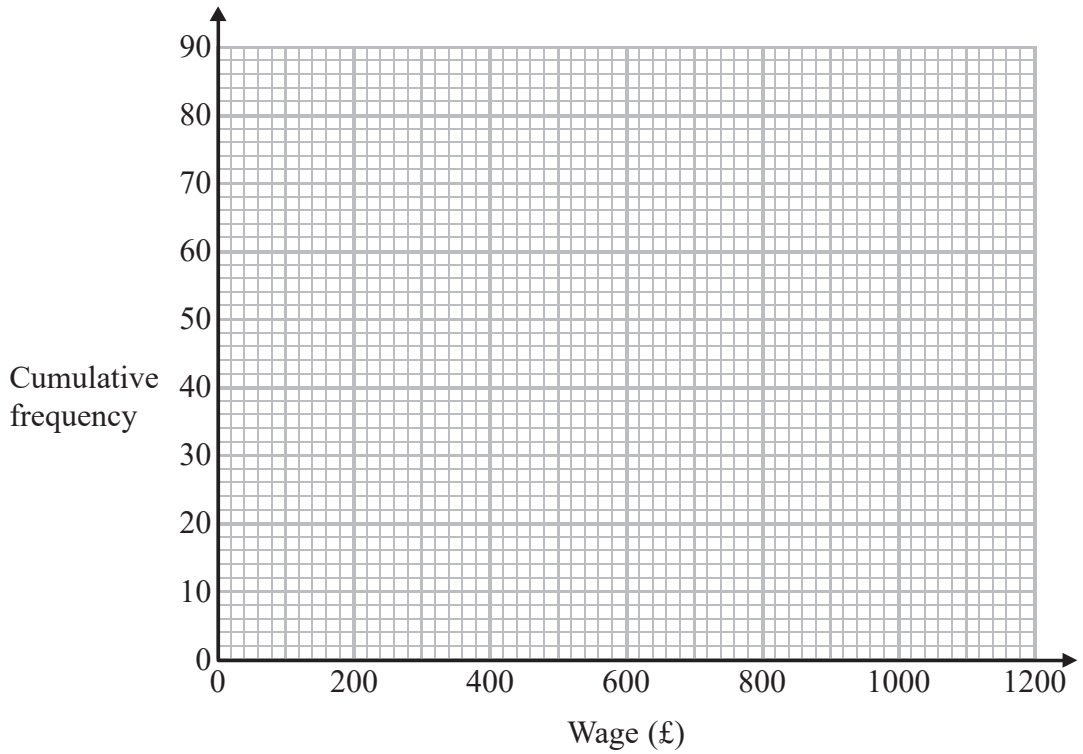
Wage (£W)	Frequency
$0 \leqslant W < 200$	18
$200 \leqslant W < 400$	26
$400 \leqslant W < 600$	14
$600 \leqslant W < 800$	12
$800 \leqslant W < 1000$	6
$1000 \leqslant W < 1200$	4

(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 diagram for your table.



(2)

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A charity said,

"More than 70% of the people in Cornwall earn less than £480 a week."

*(c) Is the charity correct?
You must show all your working.

(4)

(Total for Question 14 is 7 marks)

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15 The diagram gives information about two paintings, **P** and **Q**.
Each painting is in the shape of a rectangle.

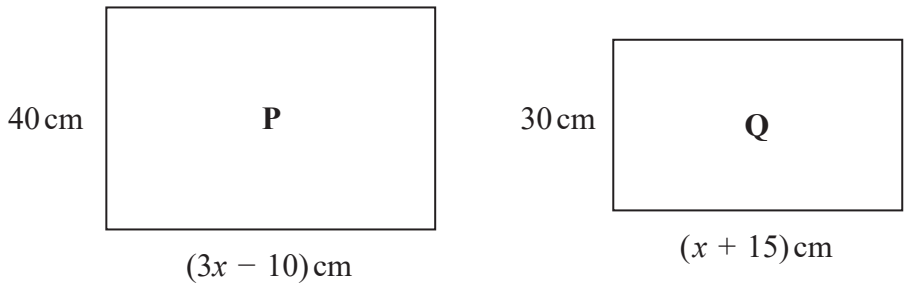

Diagram **NOT** accurately drawn

Painting **P** has an area 1400 cm^2 more than the area of painting **Q**.
Work out the area of painting **P**.

..... cm^2

(Total for Question 15 is 4 marks)

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16 A company sells kites.
It sells Basic kites and Designer kites.

2 Basic kites and 2 Designer kites have a total weight of 400 g.
4 Basic kites and 1 Designer kite have a total weight of 440 g.

Work out the weight of a Basic kite and the weight of a Designer kite.

Basic kite..... g

Designer kite..... g

(Total for Question 16 is 4 marks)

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17 The table shows information about the population of a town.

	Population size
Male children	1819
Male adults	6150
Female children	2003
Female adults	5918

Hussein is going to carry out a survey about the health service in this town.
He wants to find out if people have been to their doctor in the last year.

Hussein decides to take a sample.

(a) Explain why it is appropriate to take a stratified sample.

.....

.....

(1)

Hussein takes a stratified sample of 160 people.

(b) Calculate the number of female adults there should be in the sample.

.....

(2)

Emily takes a random sample of 90 people from the town.
40 of these people have not been to their doctor in the last year.

(c) Work out an estimate for the number of people in the town who have not been to their doctor in the last year.

.....

(2)

(Total for Question 17 is 5 marks)

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18 A flower bed in a garden is formed from the sectors of two circles with centre O.

The area of the sector AOD is $3\,m^2$.

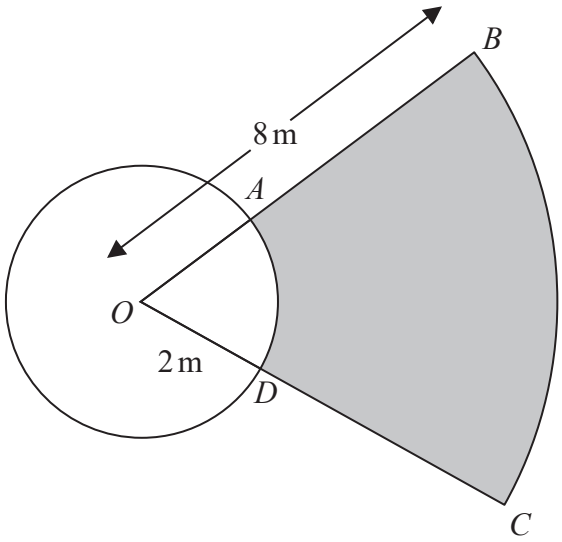

Diagram **NOT** accurately drawn

OAB and ODC are straight lines.
$OB = 8\,m$.
$OD = 2\,m$.

Calculate the area of the shaded region.

..... m^2

(Total for Question 18 is 5 marks)

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19 Zak is going to buy some bookcases and some lamps to sell in his shop.

Each bookcase costs £16
Each lamp costs £12

Zak has a maximum of £360 to spend.

He is going to buy x bookcases.
He is going to buy y lamps.

(a) Show that $4x + 3y \leqslant 90$

(2)

The first constraint is $4x + 3y \leqslant 90$
The other constraints are $y \leqslant 2x$, $x + y \geqslant 15$, $x \geqslant 0$, $y \geqslant 0$

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

(4)

Zak makes a profit of £15 for each bookcase he sells.
He makes a profit of £12 for each lamp he sells.

(c) Write down the objective function.

.....

(1)

(d) Use your objective function to find

(i) the greatest profit Zak can make,
(ii) the number of bookcases he needs to buy to make the greatest profit,
(iii) the number of lamps he needs to buy to make the greatest profit.

greatest profit £.....

number of bookcases.....

number of lamps.....

(3)

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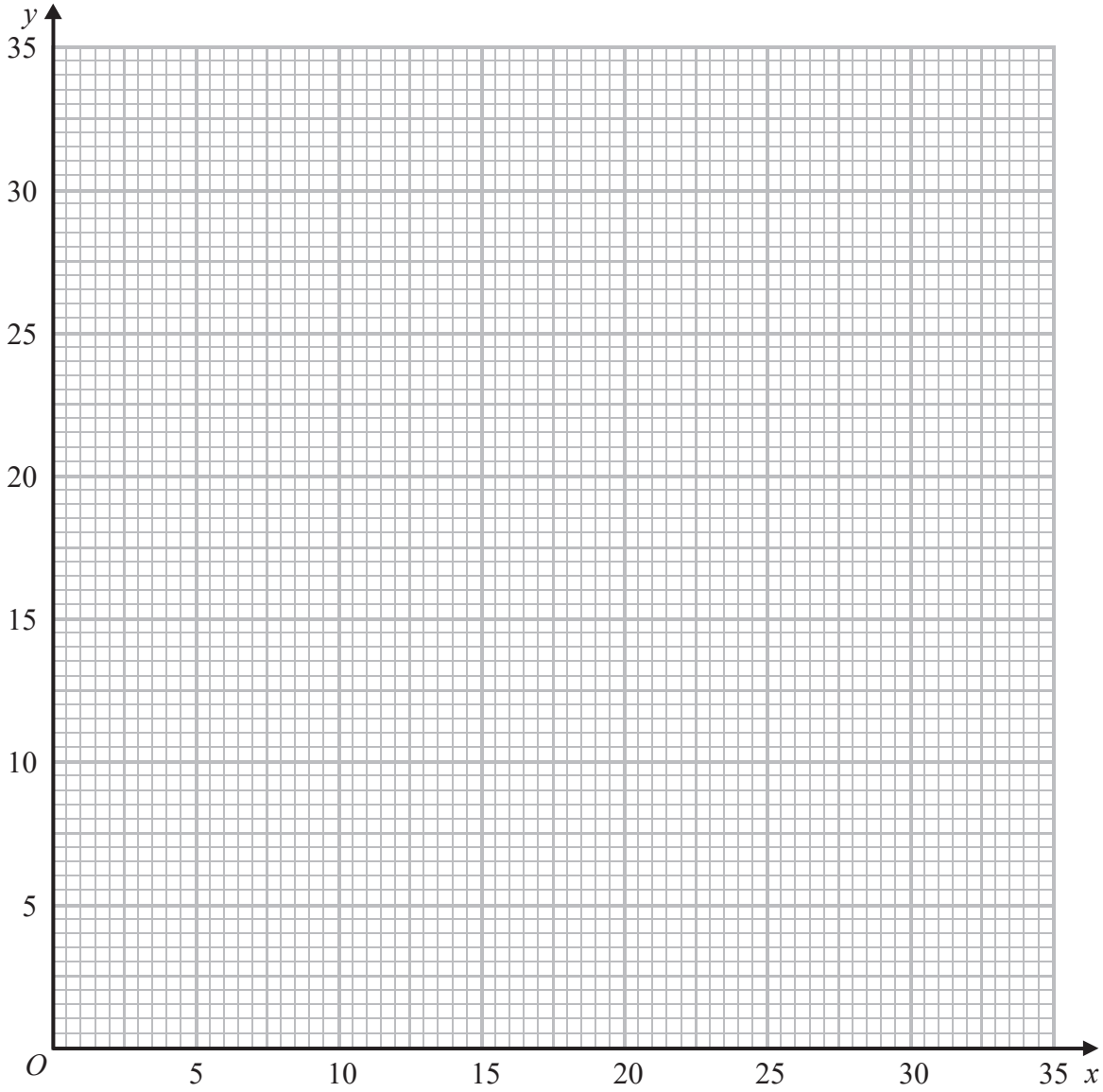

(Total for Question 19 is 10 marks)

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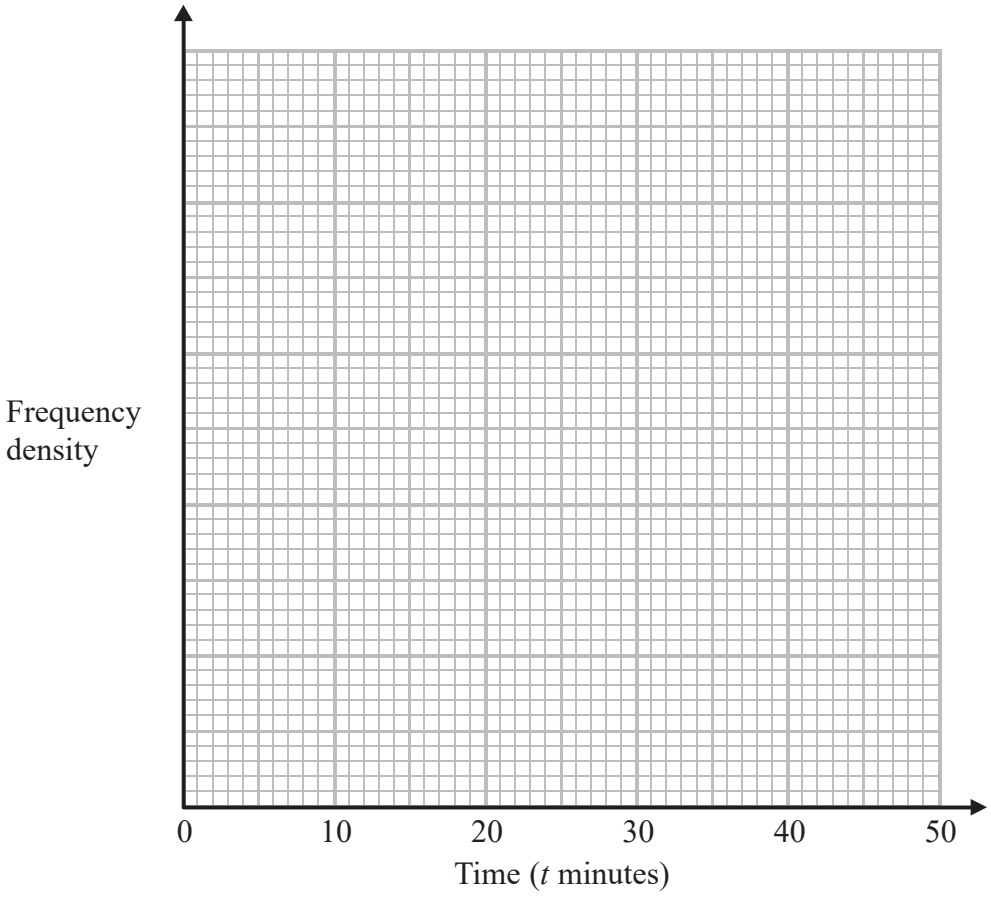
20 The table shows information about how much time people had to wait at a bus stop.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	12
$10 < t \leqslant 20$	20
$20 < t \leqslant 25$	20
$25 < t \leqslant 30$	16
$30 < t \leqslant 50$	8

Draw a histogram for the information in the table.



(Total for Question 20 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

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