EDEXCEL GCSE APPLICATIONS OF MATHEMATICS

MATHS



EXAM QUESTION PACK

UNIT 1 HIGHER TIER 5AM1H PAPERS

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Centre Number | | | | | |

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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

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- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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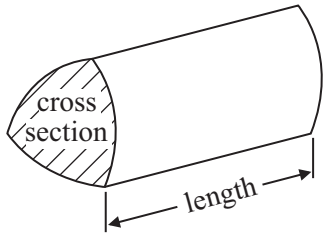
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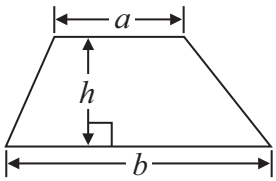
Formulae: Higher Tier

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

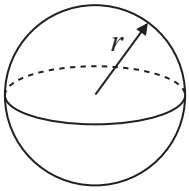


Area of trapezium = $\frac{1}{2}(a + b)h$



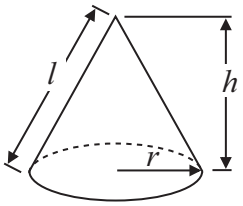
Volume of sphere = $\frac{4}{3}\pi r^3$

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

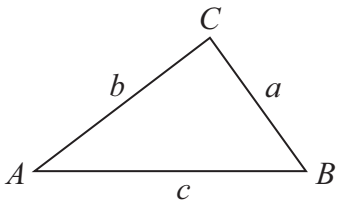


Volume of cone = $\frac{1}{3}\pi r^2 h$

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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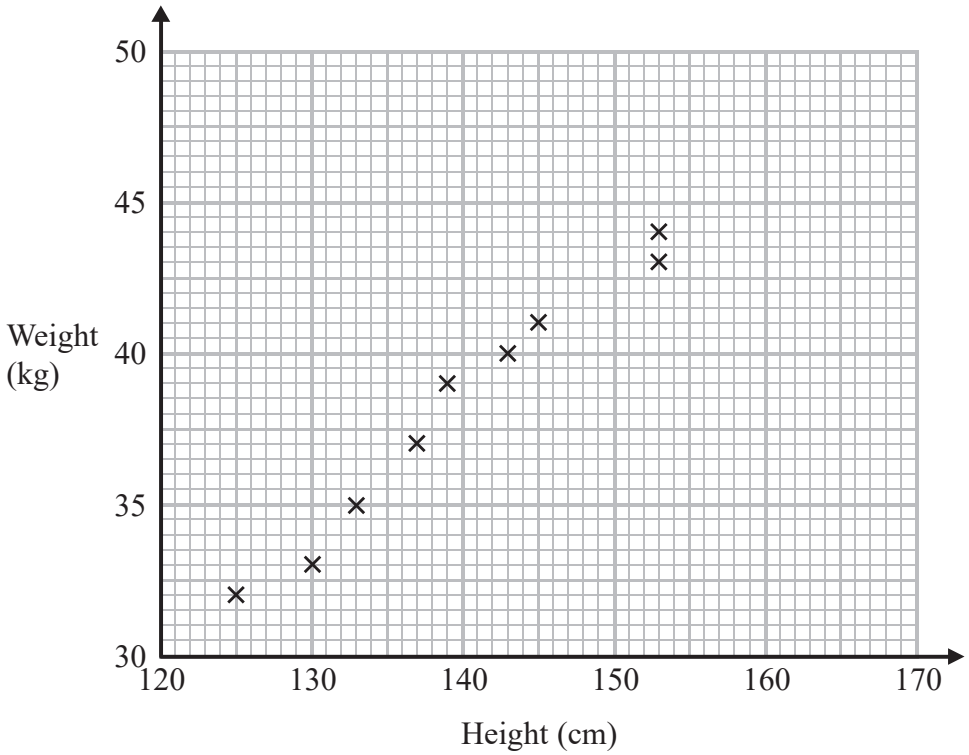
Answer ALL questions.

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

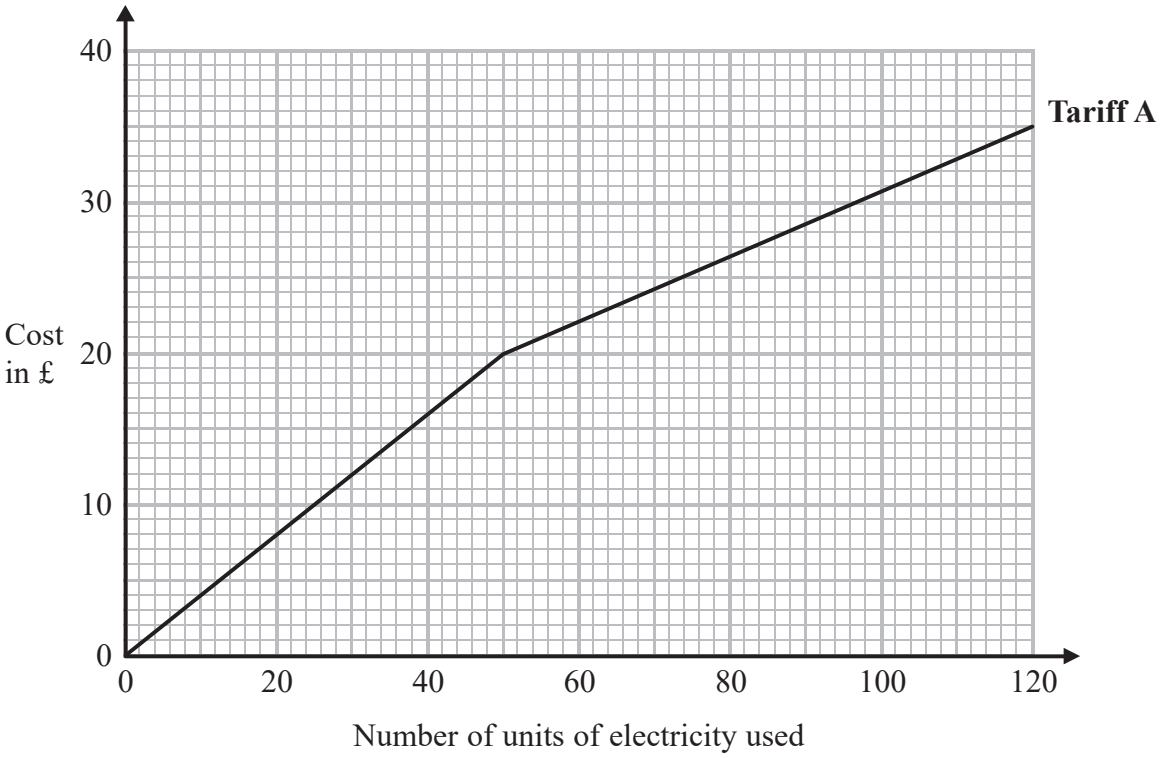
(2)

(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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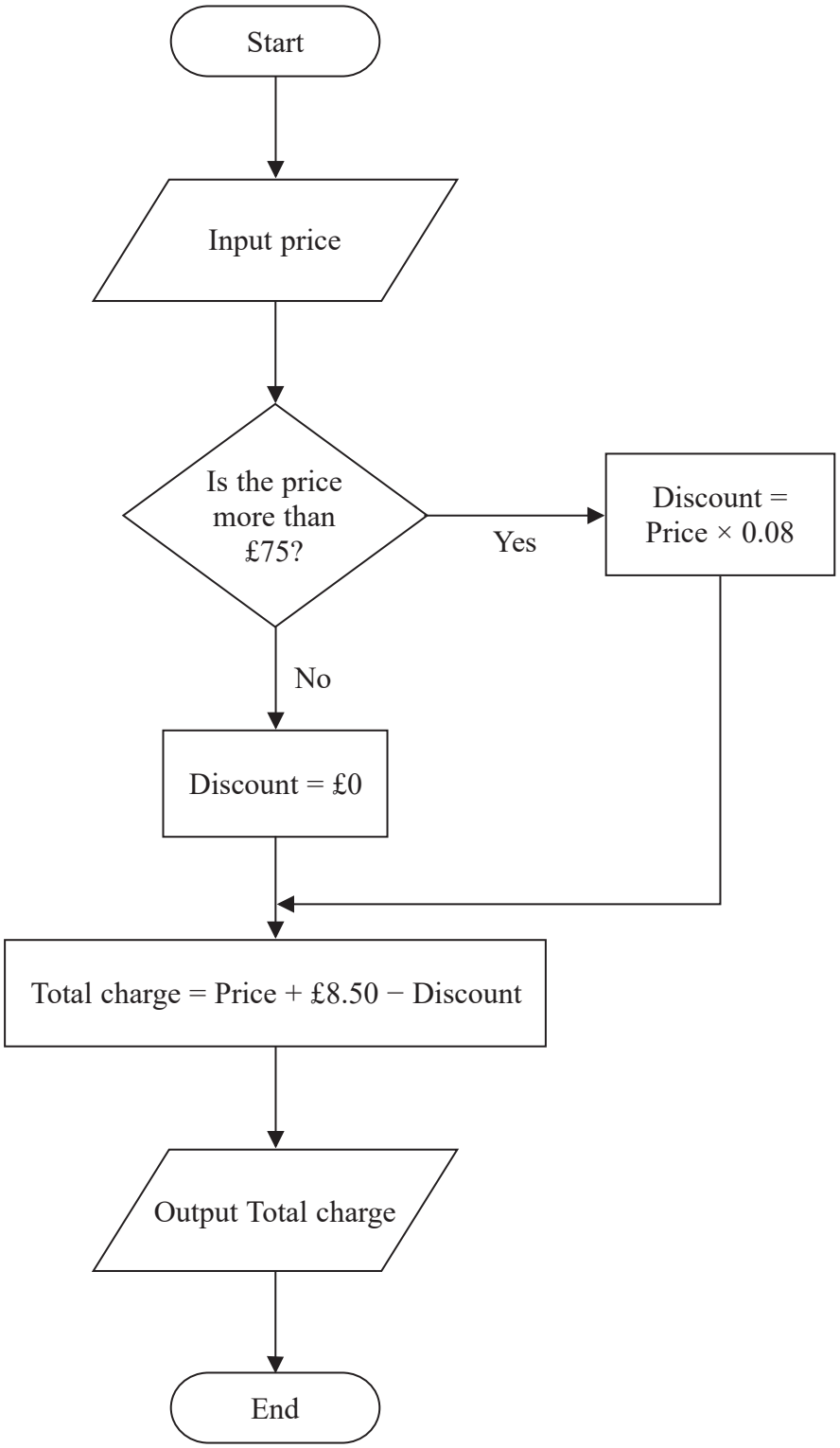
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5 Earl sells shoes online.

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)

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.

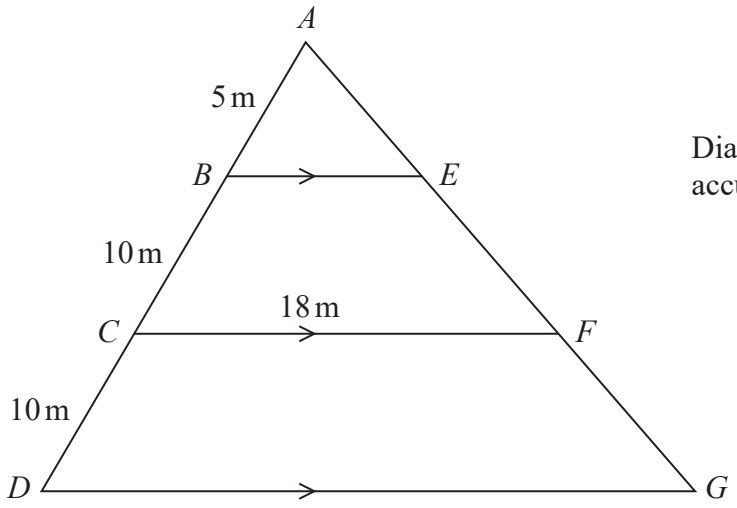


Diagram **NOT** accurately drawn

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.

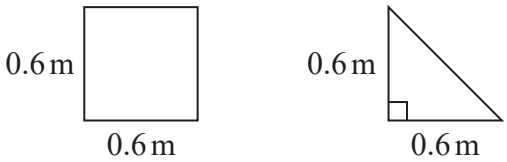


Diagram **NOT** accurately drawn

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

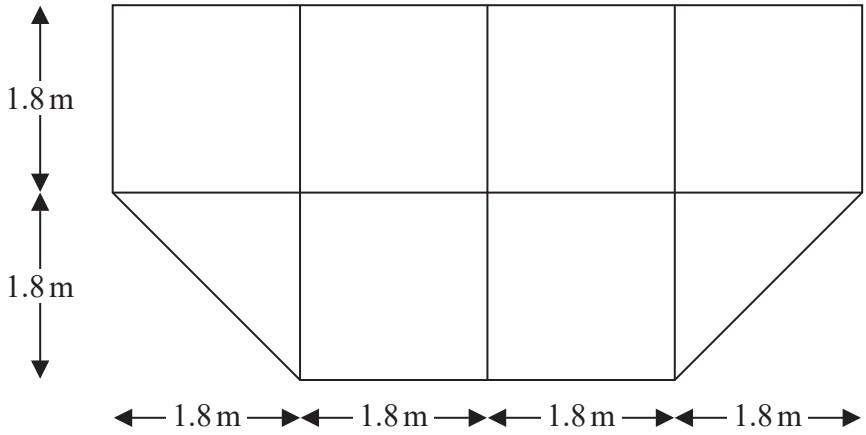


Diagram **NOT** accurately drawn

(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

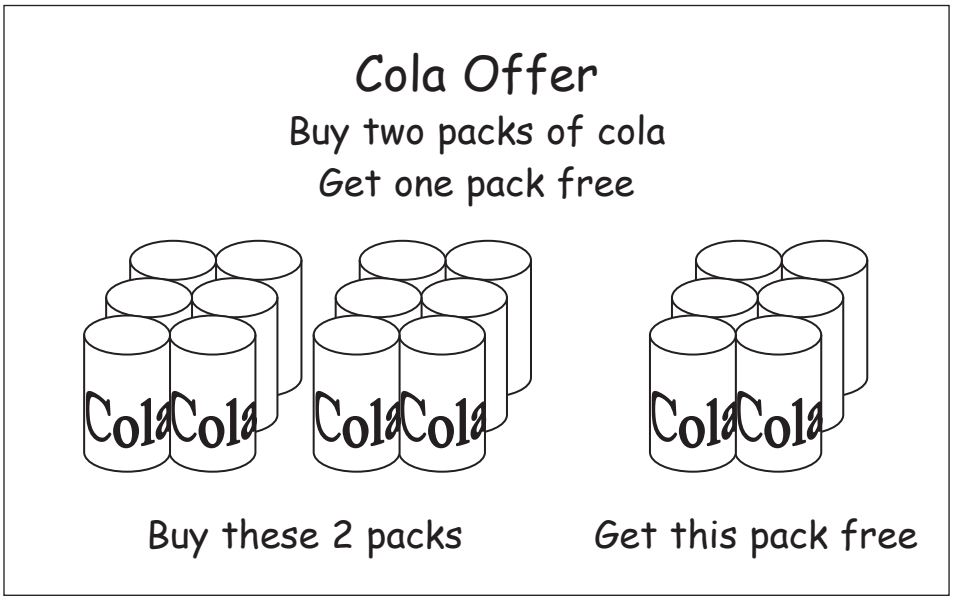
A pack of cola costs £2.95

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.

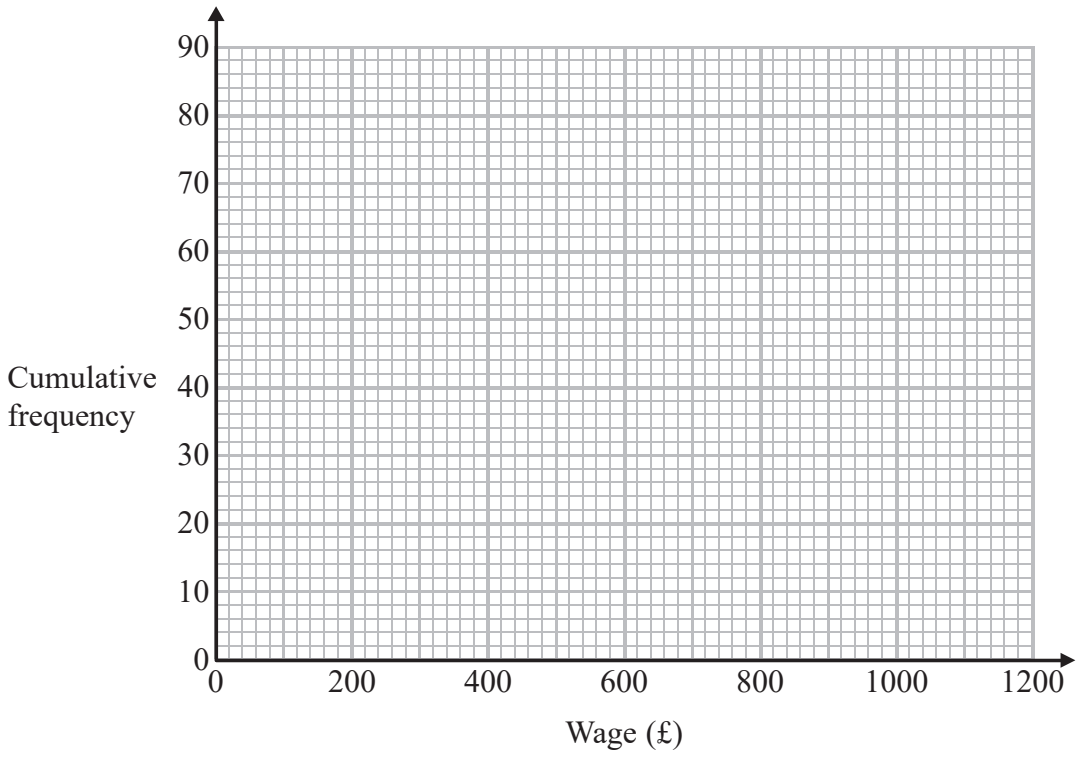
Wage (£W)	Frequency
$0 \leqslant W < 200$	18
$200 \leqslant W < 400$	26
$400 \leqslant W < 600$	14
$600 \leqslant W < 800$	12
$800 \leqslant W < 1000$	6
$1000 \leqslant W < 1200$	4

(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."

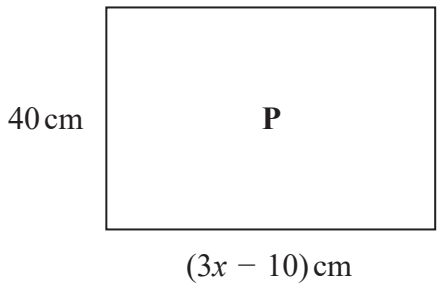
*(c) Is the charity correct?
You must show all your working.

(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.



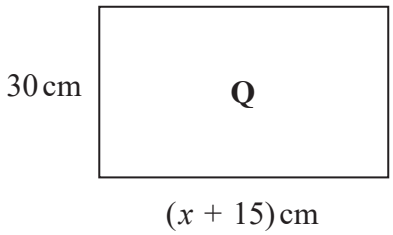


Diagram **NOT** accurately drawn

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 $3\,m^2$.

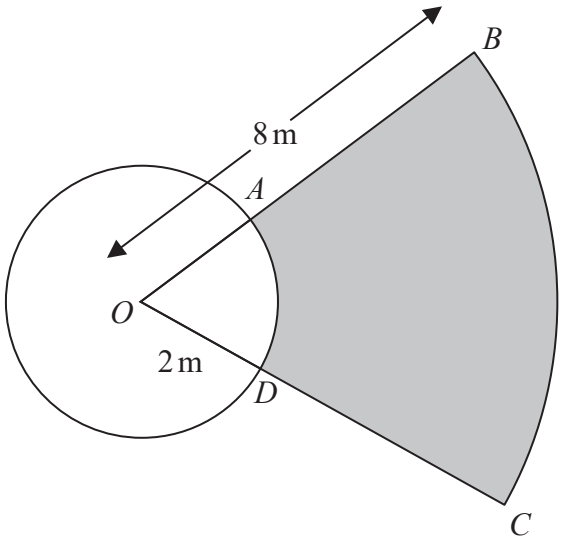


Diagram **NOT** accurately drawn

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.....

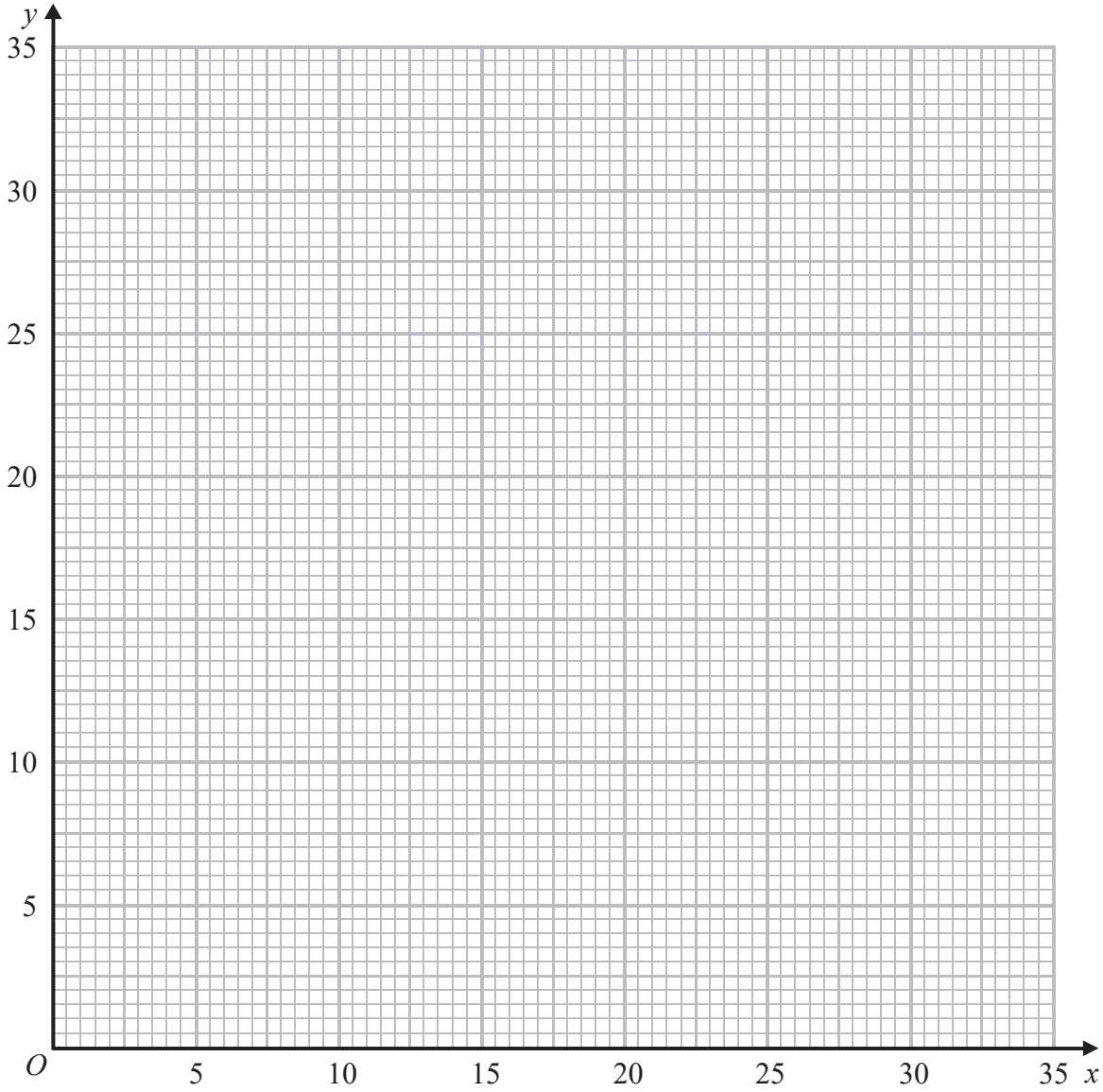
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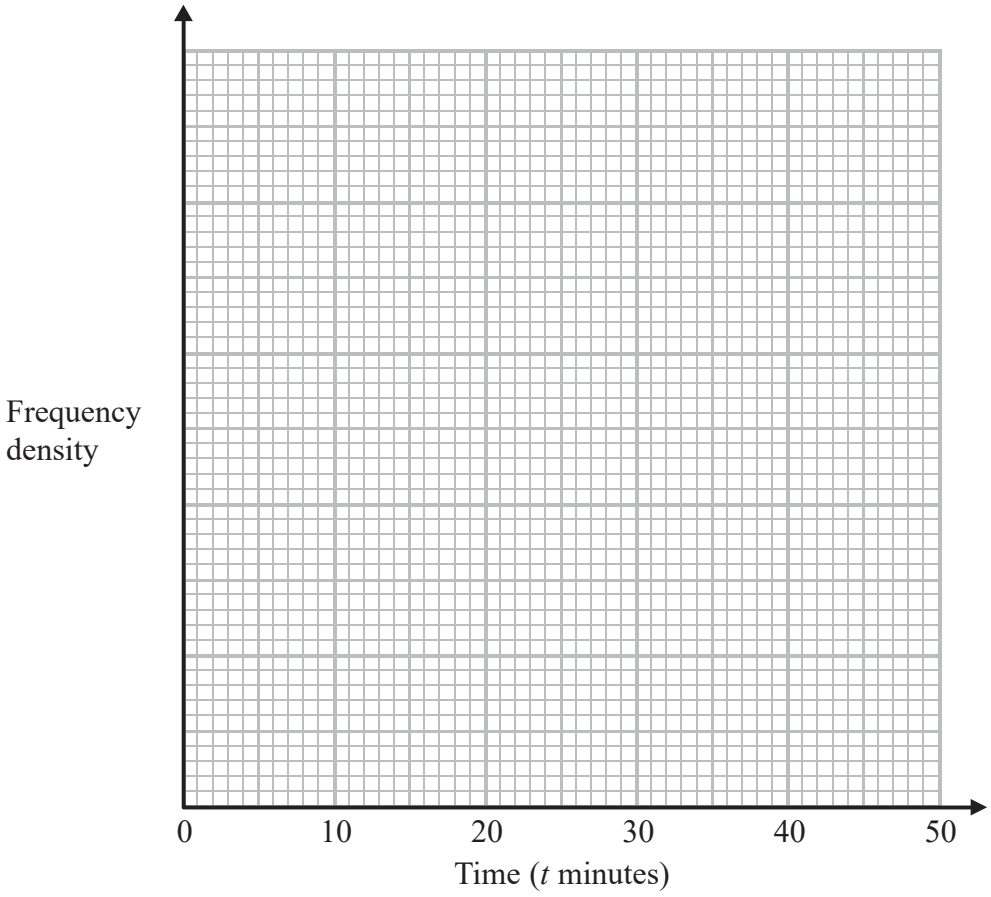
(Total for Question 19 is 10 marks)

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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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Write your name here

Surname	Other names

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Centre Number | | | | | |

Candidate Number | | | | |

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Wednesday 5 November 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

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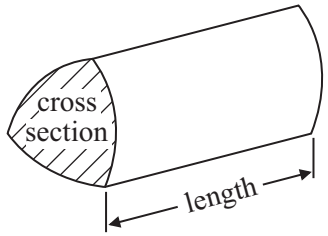
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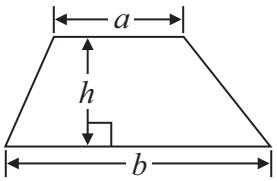
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You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

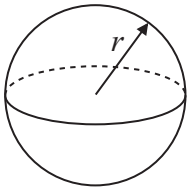


Area of trapezium = $\frac{1}{2}(a + b)h$



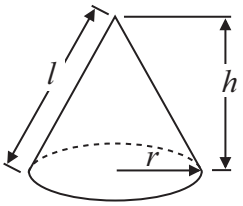
Volume of sphere = $\frac{4}{3}\pi r^3$

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

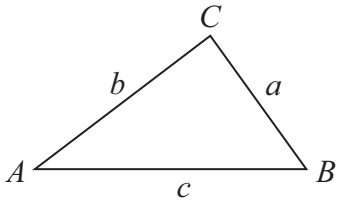


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 stages in your working.

1 Jane has to work out the cross-sectional areas of some circular containers.

She uses the expression $\frac{C^2}{4\pi}$ where C is the circumference of the container.

Work out the cross-sectional area when C is 65 cm.

.....cm^2

(Total for Question 1 is 2 marks)

2 Julie is going on holiday to France.

She changes £400 into euros (€).
The exchange rate is £1 = €1.20

(a) How many euros does Julie get?

€ .....

(2)

Julie brings back 150 euros (€) from her holiday in France.
She changes the euros into dollars ($).

The exchange rates are

£1 = €1.20
£1 = $1.56

(b) How many dollars does Julie get?

$ .....

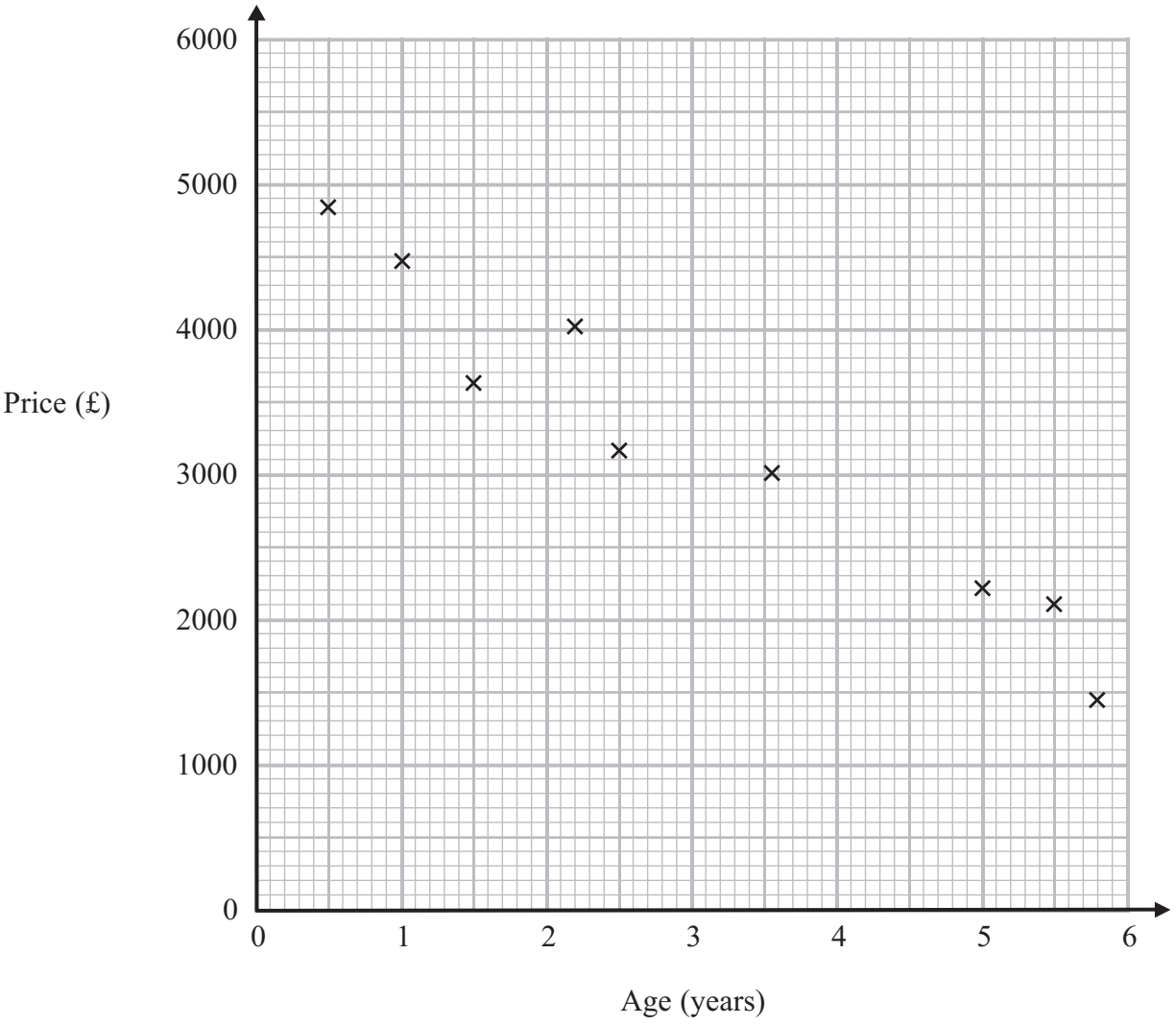
(3)

(Total for Question 2 is 5 marks)

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3 Jason sells cars.
Last month he sold 9 cars.
All the cars he sold were the same make and model.

The scatter graph shows the ages and prices of the cars.



Jason also sold a 4 year old car of the same make and model for £2300

(a) Show this information on the scatter graph.

(1)

A car of the same make and model is 3 years old.

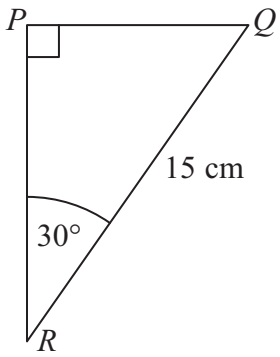
(b) Estimate the price of this car.

£ .....

(2)

(Total for Question 3 is 3 marks)

4 Here is a diagram of two shelf supports.



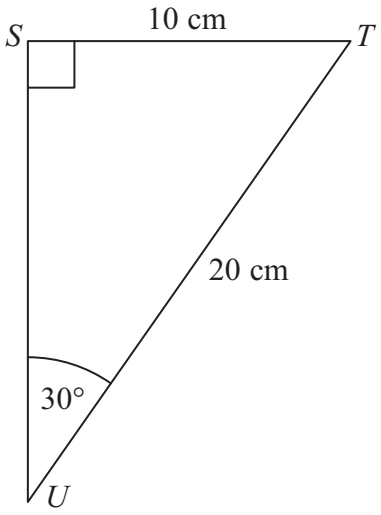


Diagram **NOT** accurately drawn

Triangle *PQR* is similar to triangle *STU*.

*(a) Why?

.....

.....

(1)

(b) Work out the length of *PQ*.

.....cm

(2)

(Total for Question 4 is 3 marks)

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5 Chris has two children, Beth and Amy.
Beth is 10 years older than Amy.

Chris says,

"I am twice as old as the sum of Beth's age and Amy's age."

Chris is 40 years old.

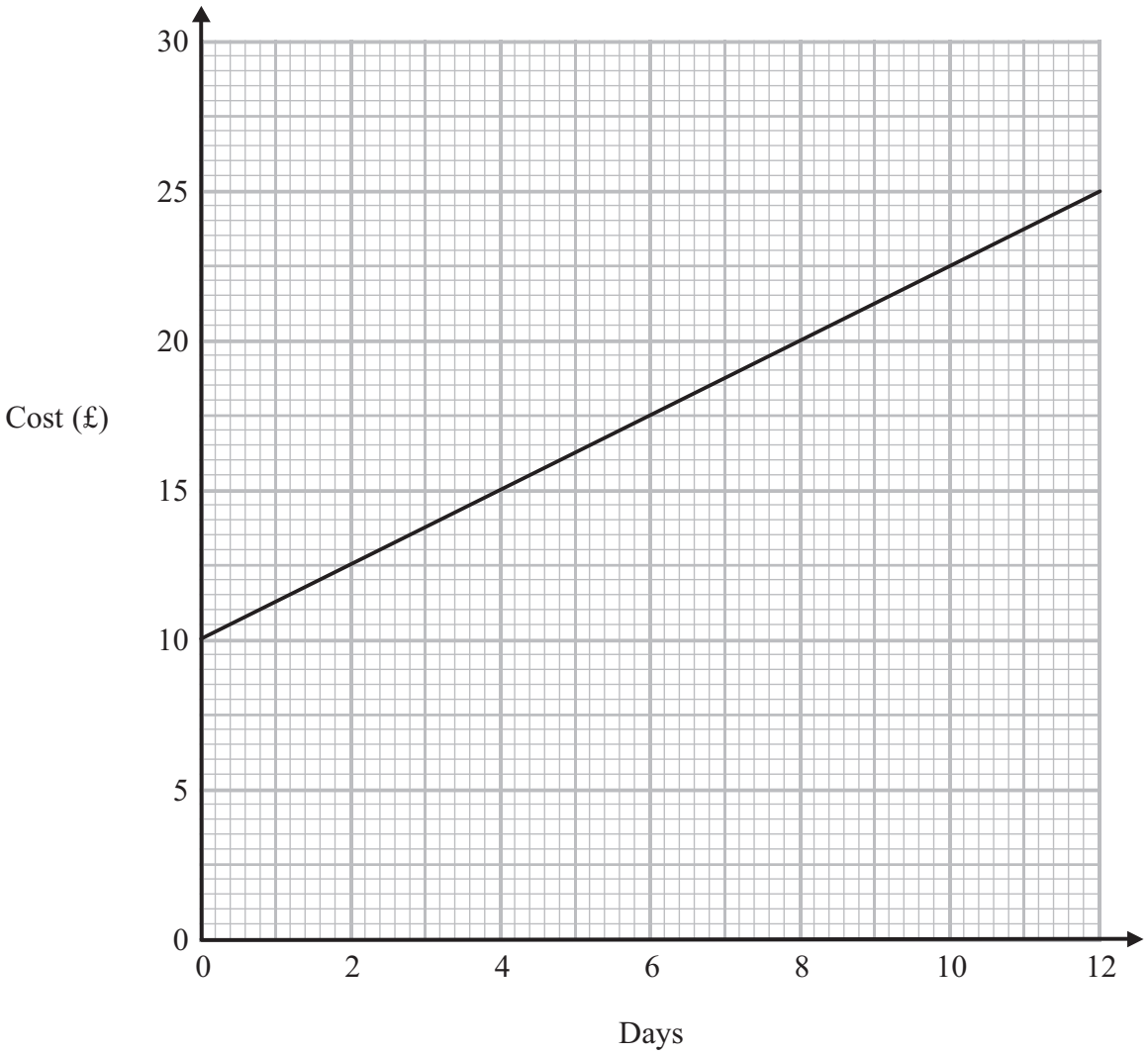
How old is Amy?

.....years old

(Total for Question 5 is 4 marks)

6 Salome hires a chainsaw from the **Saws are Us** company.

This graph shows the cost of hiring a chainsaw from **Saws are Us** for up to 12 days.



(a) Find the cost of hiring the chainsaw for 6 days from **Saws are Us**.

£ .....

(1)

The cost of hiring a chainsaw from **Saws are Us** is £10 plus a daily rate.

(b) Work out the daily rate.

£ .....

(1)

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Salome wants to compare the cost of hiring a chainsaw from **Saws are Us** and from **Saws to You.**

Saws to You charge £3 for each day of hire.

Salome hires chainsaws for different periods of time.
She wants to use the cheaper company.

(c) Which of these two companies is the cheaper to hire the chainsaw from?
You must show your working and explain your answer.

.....

(3)

(Total for Question 6 is 5 marks)

7 The lawn in Jamie's garden is in the shape of a trapezium.

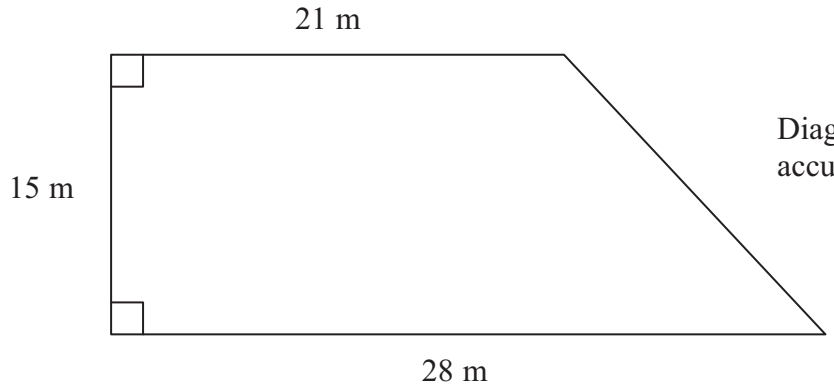


Diagram **NOT** accurately drawn

Jamie needs to put fertiliser on the lawn.
One kilogram of fertiliser covers 25 square metres.

Bags of fertiliser are sold in 3 sizes 2 kg, 5 kg and 10 kg.
Jamie wants to buy the least number of bags of fertiliser.

Work out this number of bags of fertiliser.
You must show all your working.

.....

(Total for Question 7 is 4 marks)

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8 Stefan buys his gas and electricity from the same company.

The cost of the gas he used is £128.50
The cost of the electricity he used is £172.70
Stefan gets a discount of 15% off these costs.

He pays VAT at 5% on these costs after getting the discount.

Work out the total amount Stefan has to pay.

£ .....

(Total for Question 8 is 5 marks)

9 This grouped frequency table gives information about the heights of some students when they were in Year 9

Height (h cm)	Frequency
$120 < h \leqslant 130$	2
$130 < h \leqslant 140$	5
$140 < h \leqslant 150$	10
$150 < h \leqslant 160$	8
$160 < h \leqslant 170$	5

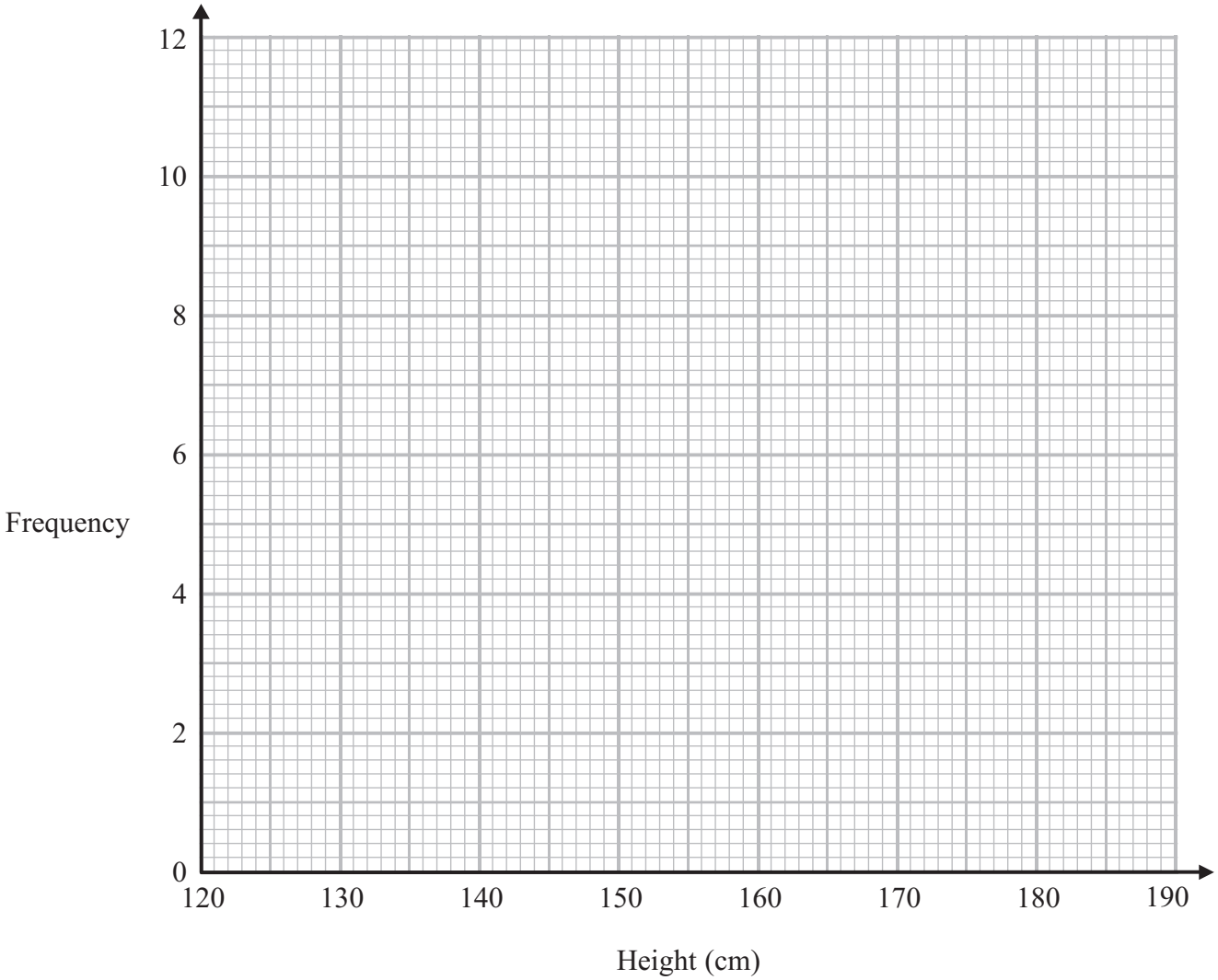
(a) Work out an estimate for the mean height.

.....cm

(4)

This grouped frequency table gives information about the heights of the same students when they were in Year 11

Height (h cm)	Frequency
$130 < h \leqslant 140$	1
$140 < h \leqslant 150$	7
$150 < h \leqslant 160$	8
$160 < h \leqslant 170$	10
$170 < h \leqslant 180$	4



(b) Draw a frequency polygon for the heights of the students in Year 11

(2)

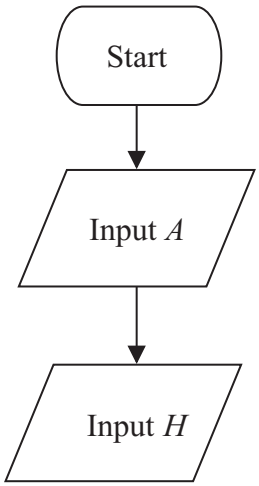
(Total for Question 9 is 6 marks)

10 The table shows information about the pay of workers in a factory.

Age of worker	Pay per hour
Less than 20 years	£5.03
20 years or older	£6.31

A worker aged A years works for H hours.
The worker is paid P pounds.

Complete the flow chart for working out the pay for any worker.



(Total for Question 10 is 4 marks)

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11 Sally is designing a question for a questionnaire to find out how much time people spend cycling.

(a) Design a question that Sally could use.

(2)

Sally lives in a small town.
She wants to make sure that the sample of people she asks is representative of the people living in the town.

(b) Write down the name of a sampling method she could use.

.....

(1)

(Total for Question 11 is 3 marks)

12 On Monday Barry buys 320 kg of gravel.
On Tuesday he buys some more of the gravel.
The amount of gravel he buys on Tuesday is 30% of the amount he buys on Monday.

(a) How many kilograms of gravel does Barry buy in total?

.....

(3)

In a sale the price of paving slabs is reduced by 70%.
Josie buys some paving slabs at the sale price of £90

(b) What was the original price of the paving slabs?

£ .....

(3)

(Total for Question 12 is 6 marks)

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13 The table shows the number of cruises a travel agent sold from July 2012 to June 2014
It also shows some of the 4-point moving averages.

Time period	Number of cruises sold	4-point moving average
Jul 2012 – Sep 2012	2	
Oct 2012 – Dec 2012	8	.....
Jan 2013 – Mar 2013	12	8.25
Apr 2013 – Jun 2013	9	8.75
Jul 2013 – Sep 2013	4	9.5
Oct 2013 – Dec 2013	10	9.75
Jan 2014 – Mar 2014	15	
Apr 2014 – Jun 2014	10	

(a) Work out the missing 4-point moving average.

.....

(2)

(b) What do the moving averages show about the trend in the number of cruises the travel agent sold?

.....

(1)

(Total for Question 13 is 3 marks)

14 The distance of the Earth from Mars is 5.5×10^7 kilometres.

(a) Write 5.5×10^7 as an ordinary number.

.....

(1)

The diameter of Jupiter is 143 000 kilometres.

(b) Write 143 000 in standard form.

.....

(1)

One light year is the distance travelled by light in one year.
One astronomical unit (au) is the average distance from the Sun to the Earth.

One light year = 9.461×10^{12} km
One astronomical unit (au) = 1.496×10^8 km

(c) How many astronomical units are there in a light year?
Give your answer in standard form correct to 3 significant figures.

.....

(2)

(Total for Question 14 is 4 marks)

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15 Here is a rectangular sheet of metal.
A square hole is cut out of the metal.

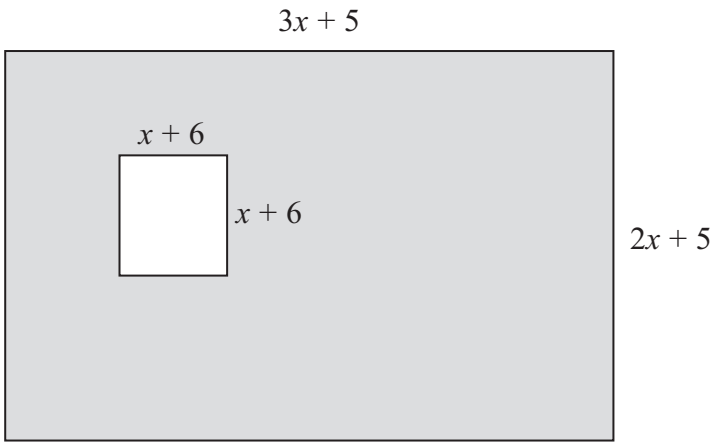


Diagram **NOT** accurately drawn

The length of the rectangle is $3x + 5$
The width of the rectangle is $2x + 5$
The square has sides of length $x + 6$
All measurements are in centimetres.

The perimeter of the square hole is $\frac{3}{5}$ of the perimeter of the rectangle.

Work out the length of a side of the square hole.

.....cm

(Total for Question 15 is 5 marks)

16 There are 80 singers in a choir.

The cumulative frequency table gives information about the lengths of time it takes the singers to get to a rehearsal.

Time (t) in minutes	Cumulative frequency
$0 < t \leqslant 10$	15
$0 < t \leqslant 20$	34
$0 < t \leqslant 30$	52
$0 < t \leqslant 40$	64
$0 < t \leqslant 50$	78
$0 < t \leqslant 60$	80

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

(b) Use your cumulative frequency graph to find an estimate for

(i) the median,

.....

(ii) the interquartile range.

.....

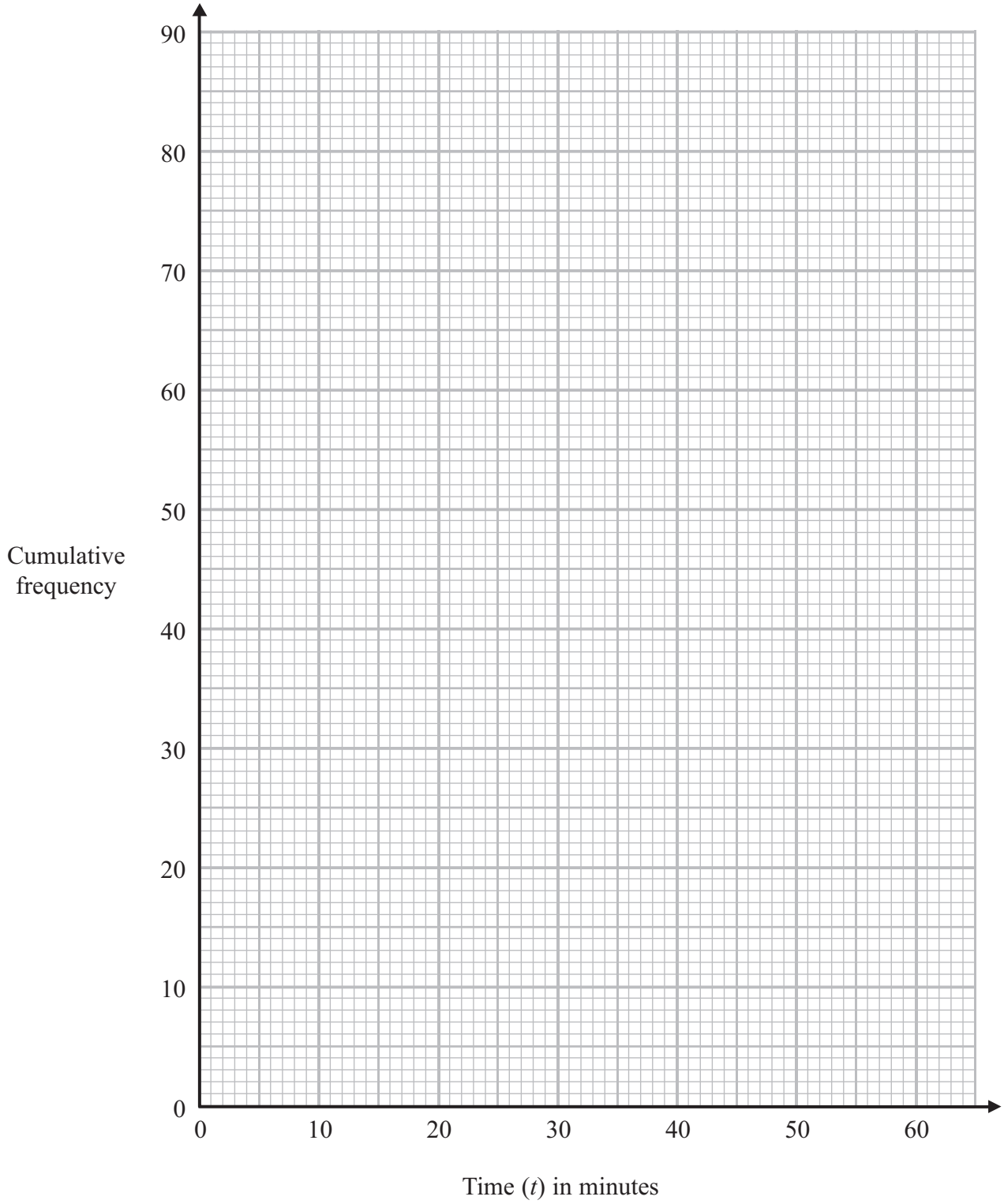
(3)

(c) Find an estimate for the number of singers who took longer than 45 minutes to get to the rehearsal.

.....

(2)

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(Total for Question 16 is 7 marks)

17 Indi and Rashmi buy some pens and some notepads.

Indi buys 3 pens and 6 notepads for a total of £7.80
Rashmi buys 2 pens and 5 notepads for a total of £5.90

Find the cost of one pen and find the cost of one notepad.

pen .....

notepad .....

(Total for Question 17 is 5 marks)

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18 Ellie makes statues in 3 sizes.



small medium large

The statues are mathematically similar.

A small statue is 10 cm high.
A medium statue is 15 cm high.
A large statue is 20 cm high.

It takes 72 m*l* of paint to paint the surface of a medium statue.

How much paint will be needed for a small statue?

.....m*l*

(Total for Question 18 is 3 marks)

***19** Adele grew 30 cabbages.

She gave fertiliser to 15 of the cabbages.
She did **not** give fertiliser to the other 15 cabbages.

Here are the final weights, in kilograms, of the 15 cabbages Adele gave fertiliser to.

1.5	1.5	1.6	1.6	1.6	1.7	1.8	1.8
2.0	2.0	2.0	2.0	2.2	2.5	2.6	

Here is some information about the final weights, in kilograms, of the 15 cabbages Adele did **not** give fertiliser to.

Smallest	1.0
Largest	2.1
Median	1.4
Lower quartile	1.2
Upper quartile	1.6

Compare the two distributions of weights.

(Total for Question 19 is 2 marks)

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20 Dave makes badges from a sheet of plastic.

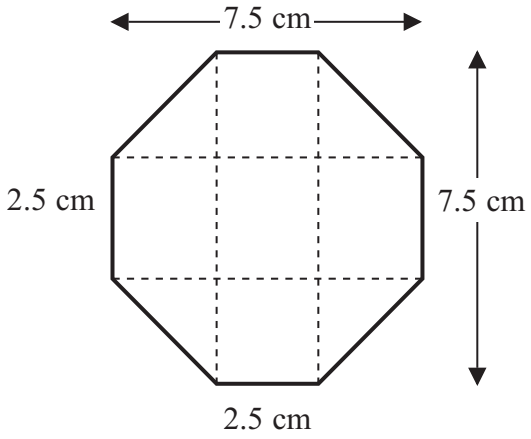


Diagram **NOT** accurately drawn

Each badge is in the shape of an octagon with rotational symmetry of order 4
Each badge has a height of 7.5 cm and a width of 7.5 cm.

The sheet of plastic has a length of 90 cm and a width of 60 cm.

Dave cuts as many badges as possible from the sheet of plastic.

What percentage of the sheet of plastic is not used?
You must show all your working.

.....%

(Total for Question 20 is 5 marks)

21 Brad owns a company that makes bikes.
He has a total of £4000 of materials for making bikes each week.
He wants to make at least 20 town bikes and at least 20 sports bikes each week.

The materials to make a town bike cost £50
The materials to make a sports bike cost £80

Let t represent the number of town bikes made each week.
Let s represent the number of sports bikes made each week.

(a) Explain why

(i) $t \geqslant 20$ and $s \geqslant 20$

.....

(ii) $50t + 80s \leqslant 4000$

.....

(2)

Brad employs 20 workers.
Each worker works for at least 30 hours each week.

It takes 10 hours to make a town bike.
It takes 15 hours to make a sports bike.

(b) Write down an inequality, in terms of t and s, for the time constraint.

.....

(2)

(c) On the grid, show by shading, the feasible region that satisfies all the conditions in parts (a) and (b).

(2)

Brad makes a profit of

£60 when he sells a town bike,
£80 when he sells a sports bike.

Brad wants to maximise his profit each week.
He uses the objective function $3t + 4s = k$

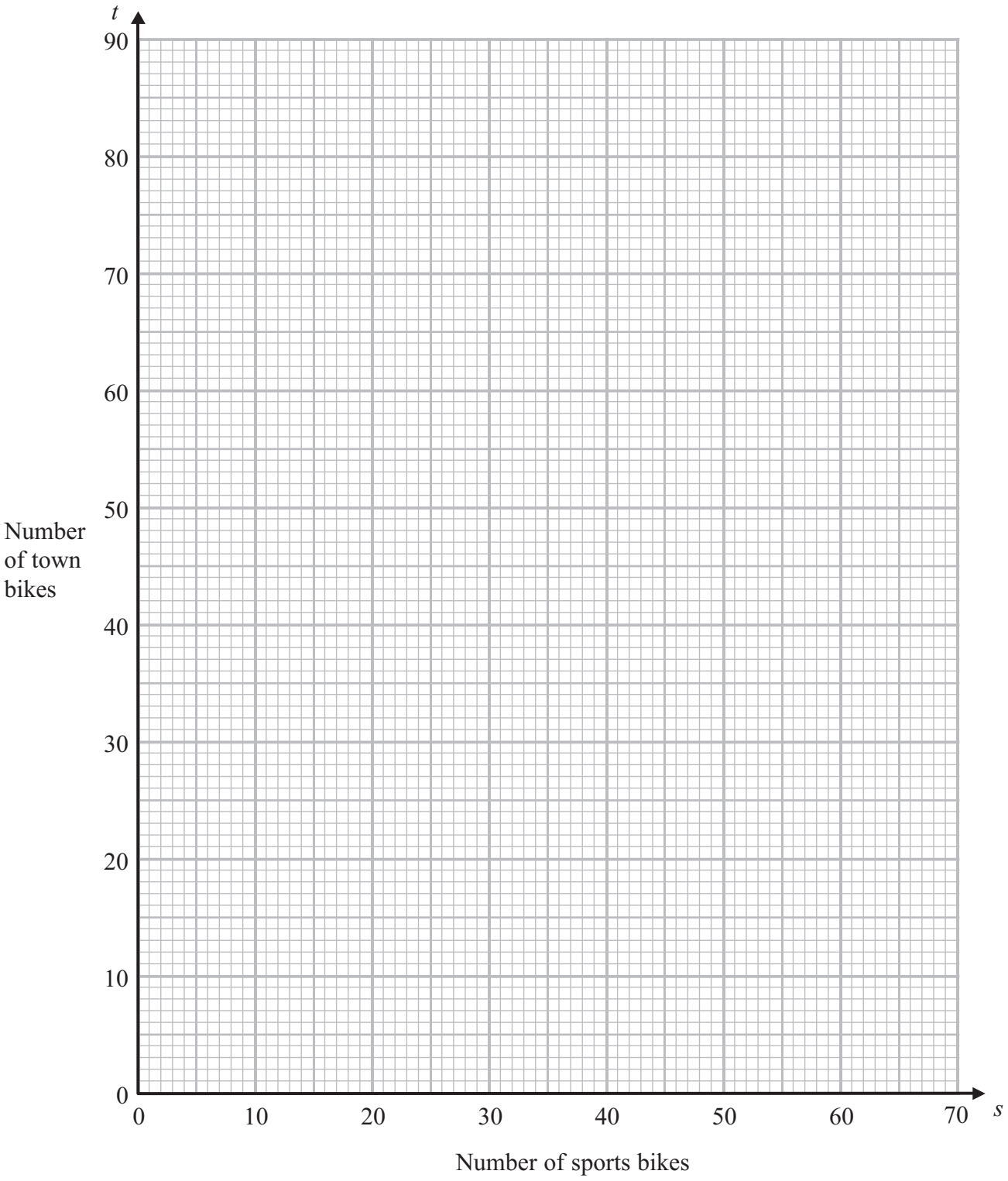
(d) How many town bikes and how many sports bikes does he need to make each week to maximise his profit?

town bikes .....

sports bikes .....

(2)

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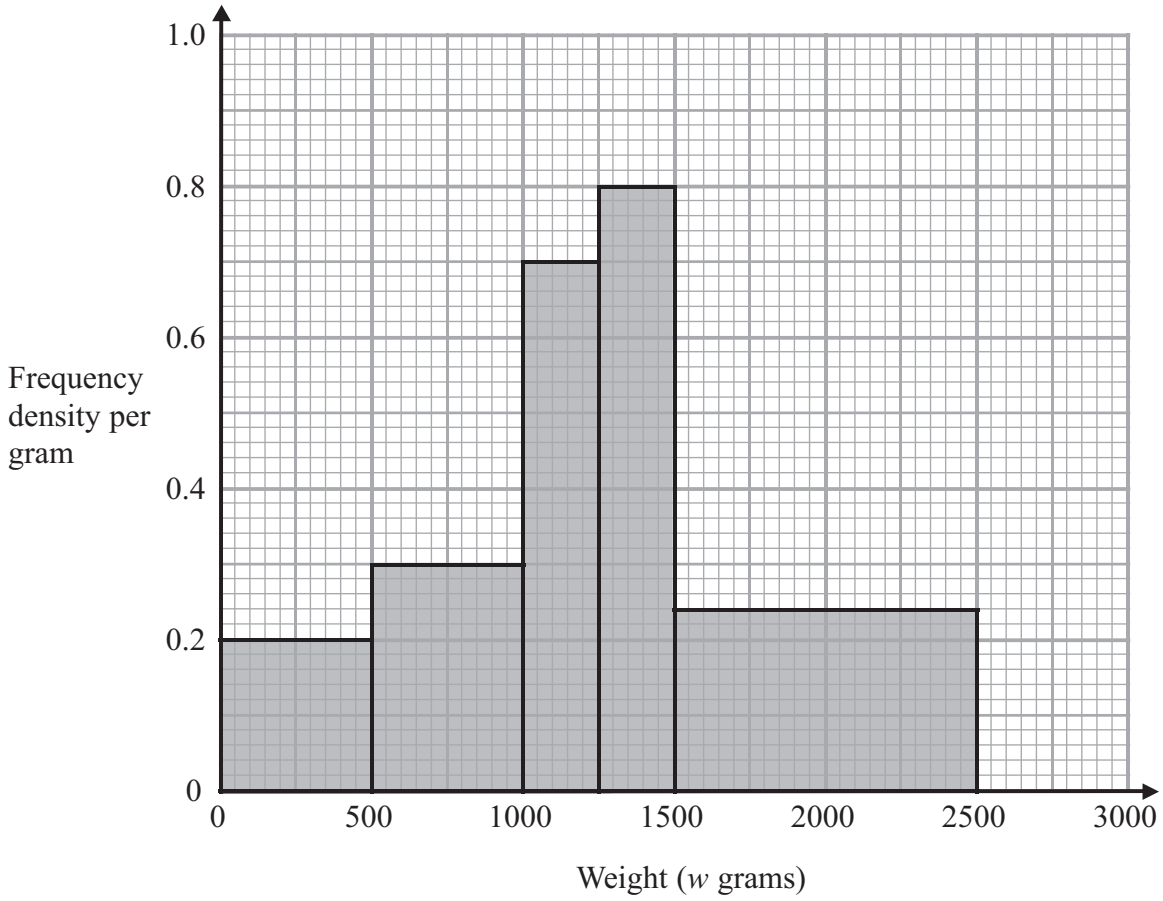


(Total for Question 21 is 8 marks)

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22 Jim works for a courier company.

The histogram shows some information about the weights of the parcels he delivered last week.



(a) Use the histogram to complete the frequency table.

Weight (w grams)	Frequency
$0 < w \leqslant 500$	
$500 < w \leqslant 1000$	
$1000 < w \leqslant 1250$	
$1250 < w \leqslant 1500$	
$1500 < w \leqslant 2500$	

(2)

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(b) Find an estimate of the median.

.....

(2)

(Total for Question 22 is 4 marks)

23 Sonia is going to carry out a survey of people in her village who are aged 15 – 34

The table shows information about these people.

Age	Male	Female
15 – 19	60	50
20 – 24	52	48
25 – 29	50	60
30 – 34	44	36
Total	**206**	**194**

Sonia is going to take a sample of 30 people stratified by age and gender.

How many males aged 20 – 24 should be in the sample?

.....

(Total for Question 23 is 2 marks)

24 Gail invests in an account that pays compound interest of 5% per annum.

How many years does it take to double the money in her investment?

.....

(Total for Question 24 is 2 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Application of Mathematics
Higher: (Calculator) Unit 1

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$\frac{65^2}{4\times\pi}$	336	2	M1 for $\frac{65^2}{4\times\pi}$ or 4225 written as a numerator or 12.56(637…) written as a denominator A1 for answer in range 336 to 337
2	(a)	400 × 1.20	480	2	M1 for 400 × 1.2 oe A1 cao
	(b)	150 ÷ 1.2 = 125 125 × 1.56 Or 1.56 ÷ 1.2 = 1.3 150 × 1.3	195	3	M1 for 150 ÷ 1.2 or 125 M1 for "125" × 1.56 A1 cao Or M1 for 1.56 ÷ 1.2 (=1.3) M1 for 150 × "1.3" A1 cao
3	(a)		Plot	1	B1 cao for plotted point
	(b)		3200	2	M1 for drawing a suitable line of best fit A1 for answer in range 3000 – 3400
4	*(a)		Explanation	1	C1 for all angles of the triangles are equal or two angles are equal (so all three are equal)
	(b)		7.5	2	M1 for 15 ÷ 2 oe A1 cao Or M1 for $\frac{3}{4}$ × 10 oe A1 cao

<table>
<tr><th colspan="6">PAPER: 5AM1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>5</td><td></td><td>$2(x + x + 10) = 40$
$4x + 20 = 40$
$4x = 20$
$x = 5$

Or
$2(x + x – 10) = 40$
$2x – 10 = 20$
$2x = 30$
$x = 15$

Or
<table><tr><td></td><td>Amy</td><td>Beth</td><td>Chris</td></tr><tr><td>$x = 2$</td><td>2</td><td>12</td><td>28</td></tr><tr><td>$x = 4$</td><td>4</td><td>14</td><td>36</td></tr><tr><td>$x = 6$</td><td>6</td><td>16</td><td>44</td></tr><tr><td>$x = 5$</td><td>5</td><td>15</td><td>40</td></tr></table></td><td>5</td><td>4</td><td>M1 for algebraic method to set up Amy and Beth’s ages as x and $x + 10$
M1 for setting up the equation $2(x + x + 10) = 40$ oe
M1 for $4x + 20 = 40$
A1 cao

Or
M1 for algebraic method to set up Beth and Amy’s ages as x and $x – 10$
M1 for setting up the equation $2(x + x – 10) = 40$ oe
M1 for $4 x – 20 = 40$
A1 cao

Or
M1 for establishing Amy is x and Beth is $x + 10$ (can be implied by one correct trial)
M1 for strategy to involve 3 trials with correct ages (Totals not needed) or 2 trials with correct ages and totals
M1 for a trial where Chris’ age < 40 and trial where Chris’ age > 40 or 5, 15 and 40 identified as the answer
A1 cao</td></tr>
</table>

PAPER: 5AM1H_01

<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>£17.50</td><td>1</td><td>B1 for 17.5(0)</td></tr>
<tr><td></td><td>(b)</td><td></td><td>£1.25</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th>Days</th><th>SAV</th><th>STY</th></tr><tr><td>3</td><td>13.75</td><td>9</td></tr><tr><td>4</td><td>15.00</td><td>12</td></tr><tr><td>5</td><td>16.25</td><td>15</td></tr><tr><td>6</td><td>17.50</td><td>18</td></tr><tr><td>7</td><td>18.75</td><td>21</td></tr></table></td><td>Comparison made</td><td>3</td><td>M1 for drawing line for Saws to You through the origin or for line with gradient 3
C2 for correct figures for 5 days and 6 days for both companies and making a statement of which is cheaper up to 5 days and which is cheaper for 6 days or more
(C1(dep M1) for making any correct comparison from their graphs)
Or
M1 for any 3 correct costs for Saws to You
C2 for correct figures for 5 days and 6 days for both companies and making a statement of which is cheaper up to 5 days and which is cheaper for 6 days or more
(C1 (dep M1) for making any correct comparison from their calculations for the two companies)</td></tr>
<tr><td>7</td><td></td><td>$\frac{1}{2}$ (21 + 28) × 15
$\frac{1}{2}$ (21 + 28) × 15 ÷ 25</td><td>2</td><td>4</td><td>M1 for $\frac{1}{2}$ (21 + 28) × 15 (= 367.5) oe
M1 for “367.5” ÷ 25
A1 for 14.7
B1 cao accept one 10 kg and one 5 kg</td></tr>
</table>

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			268.82	5	M1 for 128.50 + 172.70 = 301.20 M1 for $\frac{15}{100}\times$"301.20" = 45.18 M1 for $\frac{5}{100}\times$("301.20 – 5.18")(=12.801) M1 for "301.20" – "45.18" +"12.801" A1 accept 268.821 Or M1 for 128.50 + 172.70 = 301.20 M2 for (128.50+172.70) × 0.85 (M1 for (128.50 + 172.70) × 0.15) M1 for (128.50+172.70) × 0.85 × 1.05 A1 accept 268.821 Or M1 for $\frac{15}{10}\times 128.5(=19.275)$ or $\frac{15}{10}\times 172.70(=25.905)$ M1 for 128.50 – "19.275" (= 109.225) or 172.70 – "25.905" (= 146.795) M1 for $\frac{5}{10}\times 109.225 = 5.46125$ or $\frac{5}{100}\times 146.795 = 7.33975$ M1 for "114.68625" + "154.13475" A1 accept 268.821 SC B2 for 271.08

PAPER: 5AM1H_01

Question		Working	Answer	Mark	Notes
9	(a)	f | m | m×f 2 | 125 | 250 5 | 135 | 675 10 | 145 | 1450 8 | 155 | 1240 5 | 165 | 825 30 | | 4440 4440 ÷ 30	148	4	M1 f × m where m is a value in each interval (consistent and allow end points) with no more than one error M1 for Σf × m where the ms are the midpoints of the intervals M1(dep on 1st M) for dividing by their total frequency A1 for 148
	(b)		Points plotted at (135, 1), (145, 7), (155, 8), (165, 10), (175,4) and joined with line segments	2	B2 for correct plotting of 5 points and joining with line segments (B1 for points plotted correctly at midpoints of intervals OR joining points with line segments at the correct heights and consistent within the class interval (including end values) OR correct frequency polygon with one point incorrect OR correct frequency polygon with first and last point joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10		See end	Correct flow chart	4	B1 for including decision box for A < 20 oe B1 for including box for calculating total pay when A< 20 e.g. P = H ×5.03 or when A ≥ 20 e.g. P = H × 6.31 B1 for output box with Output £P oe C1 for fully correct flowchart with all boxes the correct shape
11	(a)		Question	2	B1 for question with a time frame B1 for at least 3 non-overlapping response boxes with units (this may be in the question) - do not condone inequality signs
	(b)		Stratified sample	1	B1 cao
12	(a)	$\frac{30}{100} \times 320 =$ 320 + 96 = 416	416	3	M1 for $\frac{30}{100} \times 320$ oe M1 for 320 + "96"oe A1 cao
	(b)	30% = 90 1% = 90 ÷ 30 = 3 100% = 3 × 100	300	3	M1 for 30% = (£)90 or 1 – 0.7 = 0.3 M1 for 100% = 90 ÷ 30 × 100 or 90 ÷ 0.3 A1 cao
13	(a)		7.75	2	M1 for (2 + 8 + 12 + 9) ÷ 4 A1 cao
	(b)		Trend given	1	C1 for there is an upward trend or cruises are getting more popular oe

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		55 000 000	1	B1 accept 55 million
	(b)		1.43×10^5	1	B1 cao
	(c)		6.32×10^4	2	M1 for $(9.461 \times 10^{12}) \div (1.496 \times 10^8)$ A1 for 6.32×10^4 to 6.33×10^4
15		e.g. $4x + 24 = \frac{3}{5}(10x + 20)$	12	5	M1 for writing a correct expression for the perimeter of the square or the rectangle e.g. $4(x + 6)$ or $10x + 20$ or for the semiperimeter M1 for equating the two (semi) perimeters correctly M1 for resolving the fraction e.g. $20x + 120 = 30x + 60$ or for rearranging the equation to the form. $a = bx + c$ M1 for $10x + 60 = 120$ or $24 = 2x + 12$ or $x = 6$ A1 cao
16	(a)			2	B2 for a fully correct cf graph [B1 for 4 or 5 consistent, correctly plotted points OR for a cf graph drawn through points other than the end points of each interval]
	(b)(i)		23	3	B1 ft from their cumulative frequency graph
	(ii)	37 – 13	23 - 24		M1 for identifying upper and lower quartiles A1 ft from their cumulative frequency graph
	(c)	80 – 72	7 - 9	2	M1 for reading 72 singers identified at 45 minutes A1 ft from their cumulative frequency graph

<table>
<tr><th colspan="6">PAPER: 5AM1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>17</td><td></td><td>3p + 6r = 780
2p + 5r = 590

(×2) 6p + 12r = 1560
(×3) 6p + 15r = 1770
Subtract
3r = 210 so r = 70
Substitute
3p + 420 = 780
3p = 360</td><td>p = £1.20
r = £0.70</td><td>5</td><td>M1 for writing down both equations correctly
M1 for correct process to eliminate either p or r (condone one arithmetic error)
A1 for either 70p or 120p oe
M1 (dep on previous M1) for substituting found value into an appropriate equation, or further elimination
A1 for either 120p or 70p oe

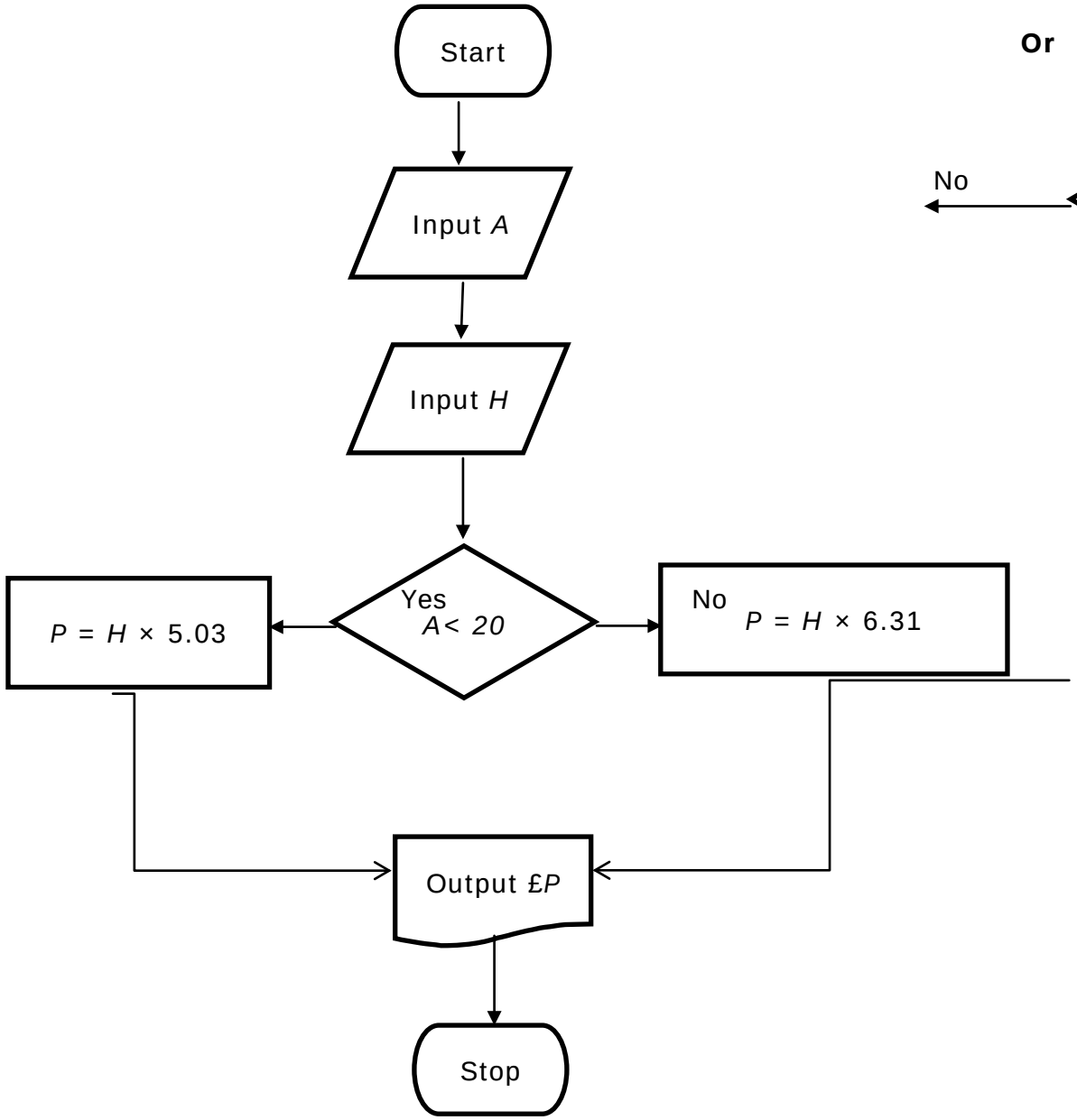
T & I:- B5 if fully correct, B0 otherwise</td></tr>
<tr><td>18</td><td></td><td>Linear sf 10 : 15 or 2 : 3
Area sf 4 : 9
72 ÷ 9 × 4</td><td>32</td><td>3</td><td>M1 for area scale factor is $2^2 : 3^2$ or 4 : 9 oe
M1 for 72 ÷ 9 × 4 oe
A1 cao</td></tr>
<tr><td>*19</td><td></td><td><table><tr><td></td><td>With</td><td>Without</td></tr><tr><td>Median</td><td>1.8 kg</td><td>1.4 kg</td></tr><tr><td>Range</td><td>1.1 kg</td><td>1.1 kg</td></tr><tr><td>IQR</td><td>0.4 kg</td><td>0.4 kg</td></tr></table></td><td>Comparison of data</td><td>2</td><td>C1 for comparison of medians or stating the range or interquartile range are the same. Values stated must be correct.
C1 for comparison relating the results in a context i.e. including the median and a measure of spread</td></tr>
</table>

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		Area Trapezium $\frac{1}{2}$ (7.5 + 2.5) × 2.5 = 12.5 4.25 × 1.75 = 7.4375 Area Octagon 2 × 12.5 + 7.5 × 2.5 = 43.75 No. of octagons is 12 × 8 = 96 Waste = 90 × 60 – 96 × 43.75 = 1200 % waste = $\frac{1200}{5400} \times 100$ = Or Area of square = 2.5 × 2.5 = 6.25 Area of triangle = $\frac{1}{2}$ × 2.5 × 2.5 = 3.125 Area of octagon = 5 × 6.25 + 4 × 3.125 = 43.75 Waste = 90 × 60 – 96 × 43.75= 1200 % waste = $\frac{1200}{5400} \times 100 =$ Or Area of triangle = $\frac{1}{2}$ × 2.5 + 2.5 = 3.125 Waste for 1 badge = 4 × 3.125 = 12.5 Total Waste = 96 × 12.5 = 1200 % waste = $\frac{1200}{5400} \times 100 =$	22.2	5	M1 for correct method to find area of a trapezium or a square and a triangle M1 for correct and complete method to find the area of the octagon M1 for correct calculation to find waste M1 for correct calculation for % waste $\frac{"1200"}{5400} \times 100$ A1 for answer in range 22.1 to 22.3 Or working with area of 4 triangles for waste M1 for correct method to find area of a square and a triangle M1 for correct and complete method to find the waste for one badge M1 for correct calculation to find total waste M1 for correct calculation for % waste $\frac{1200}{5400} \times 100$ A1 for answer in range 22.1 to 22.3 Or for working with triangles M1 for identifying the octagon is made up from 14 small triangles M1 for identifying waste is 4 small triangles M1 for establishing waste is $\frac{4}{18}$ area of one badge or $\frac{96 \times 4}{96 \times 18}$ area of the plastic sheet M1 for correct calculation for % waste $\frac{2}{9} \times 100$ oe A1 for answer in range 22.1 to 22.3

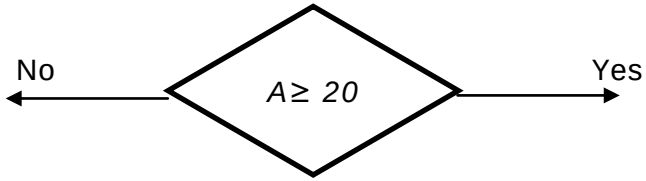
PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
21	(a)(i)		Explanation	2	B1 for 20 or more of each bike made
	(ii)		Explanation		B1 for materials cost must be less than 4000
	(b)		$10t + 15s \geq 600$	2	M1 for $10t + 15s$ A1 for ≥ 600
	(c)		Correct shading	2	B2 for plotting all 4 graphs correctly and identifying the feasible region (B1 for plotting at least 2 graphs correctly)
	(d)		20 sports 48 town	2	M1 for calculating values of the objective function at vertices of the feasible region to maximise profit A1 for 20 sports and 48 town Alternative M1 for drawing the objective function or to write down the objective function or draw a line parallel to $3t + 4s = k$ A1 for 20 sports and 48 town
22	(a)	500×0.2 500×0.3 250×0.7 250×0.8 1000×0.24	100 150 175 200 240	2	M1 for one weight group × its frequency density e.g. 500×0.2 A1 cao
	(b)	Total frequency is 865 Halfway is at 433	1250 – 1300	2	M1 for establishing middle of the frequency A1 for answer in range 1250 – 1300

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
23		$\frac{52}{400} \times 30$	4	2	M1 for $\frac{52}{400} \times 30$ or an answer of 3.9 A1 for 4
24		Years Value at end of year 1 1.05 2 1.1025 3 1.157625 4 1.21550625 5 1.276281563 6 1.340095641 7 1.407100423 8 1.477455444 9 1.551328216 10 1.628894627 11 1.710339358 12 1.795856326 13 1.885649142 14 1.979931599 15 2.078928179	15	2	M1 for writing an equation e.g. $1.05^n = 2$ or for a correct method to find total value up to the end of at least year 5 or for at least 3 trials of n into 1.05^n or using n log 1.05 = log 2 A1 for 15 years

Question 10.



Or



Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q03		$1\frac{1}{2}$ cm grid Crosses changed to filled in circles	
Q03	(a)	2300 changed to 2500	
Q06		$1\frac{1}{2}$ cm grid	
Q09	(a)	Frequency section of table is widened to allow working	
Q09	(b)	Vertical axis $1\frac{1}{2}$ cm for 1 Horizontal axis $1\frac{1}{2}$ cm for 5	
Q15		Square hole – shaded Rest of diagram unshaded x changed to y	
Q16		Cumulative frequencies: 15 35 50 65 78 80 Leeway will be needed as answers will be very approximate Grid: $1\frac{1}{2}$ cm for 5 on both axes	

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q18		Pictures removed	
Q21		Grid $1\frac{1}{2}$ cm for 5 on both axes	
Q22		1500 – 2500 raise height of bar to 0.3	

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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

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5/6/1/c2/

P 4 3 3 8 9 A 0 1 3 2

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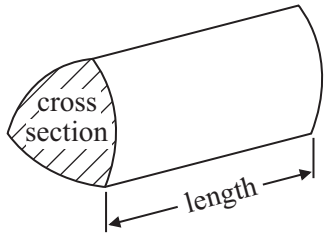
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GCSE Mathematics 2AM01

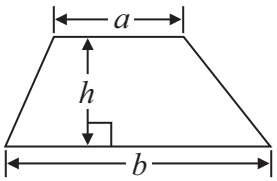
Formulae: Higher Tier

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 × length

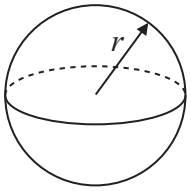


Area of trapezium = $\frac{1}{2}(a + b)h$



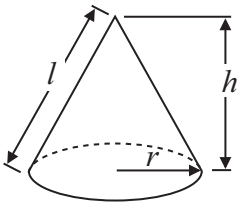
Volume of sphere = $\frac{4}{3}\pi r^3$

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

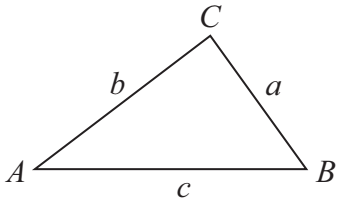


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 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)

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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.

£.....

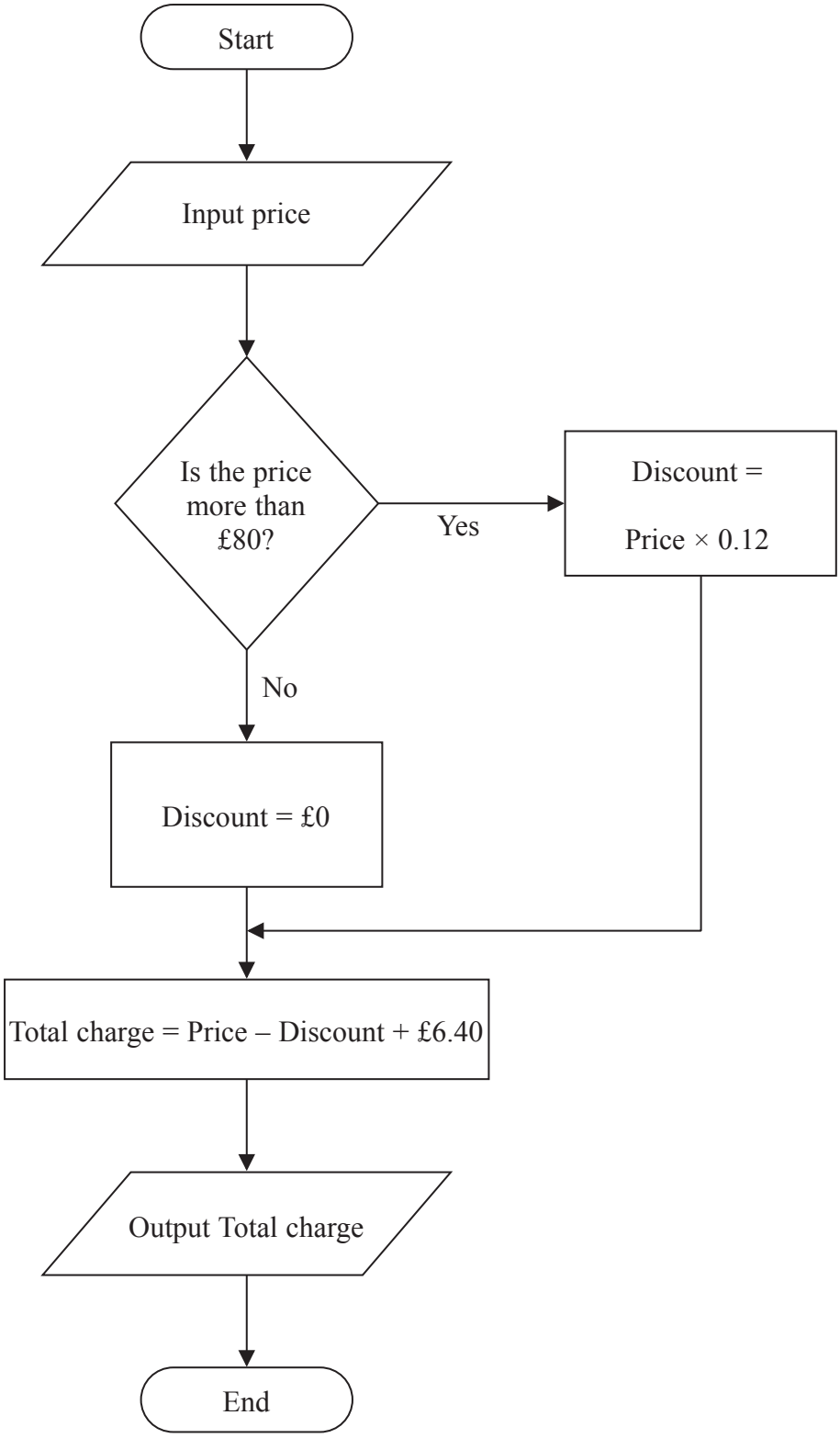
(3)

(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.



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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)

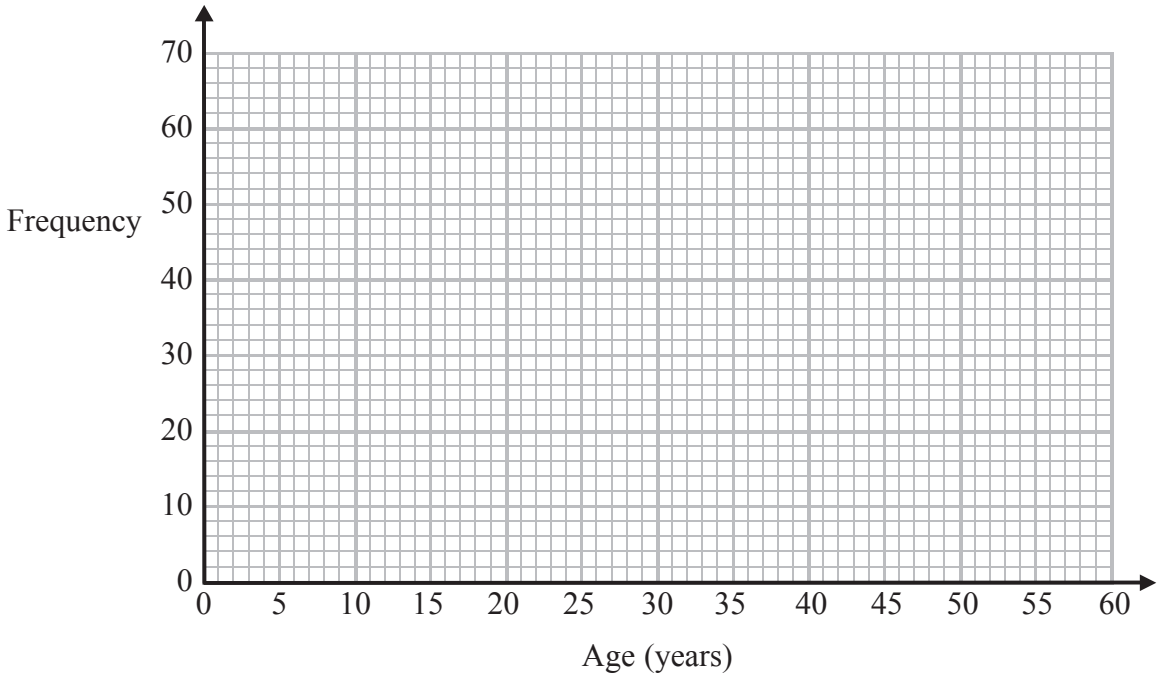
(Total for Question 4 is 5 marks)

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)

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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.

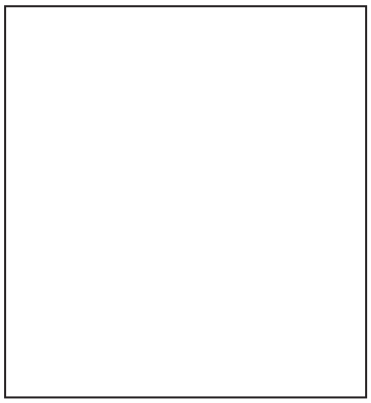


Diagram **NOT** accurately drawn

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.

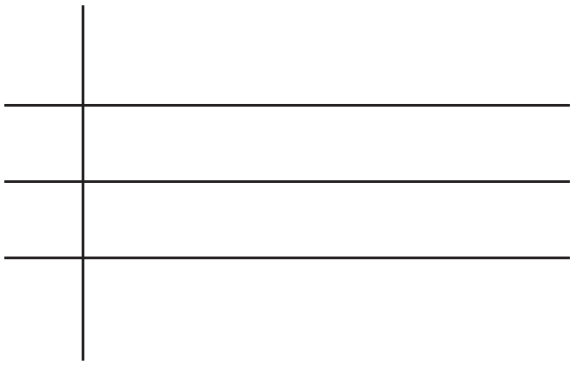
(Total for Question 6 is 5 marks)

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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

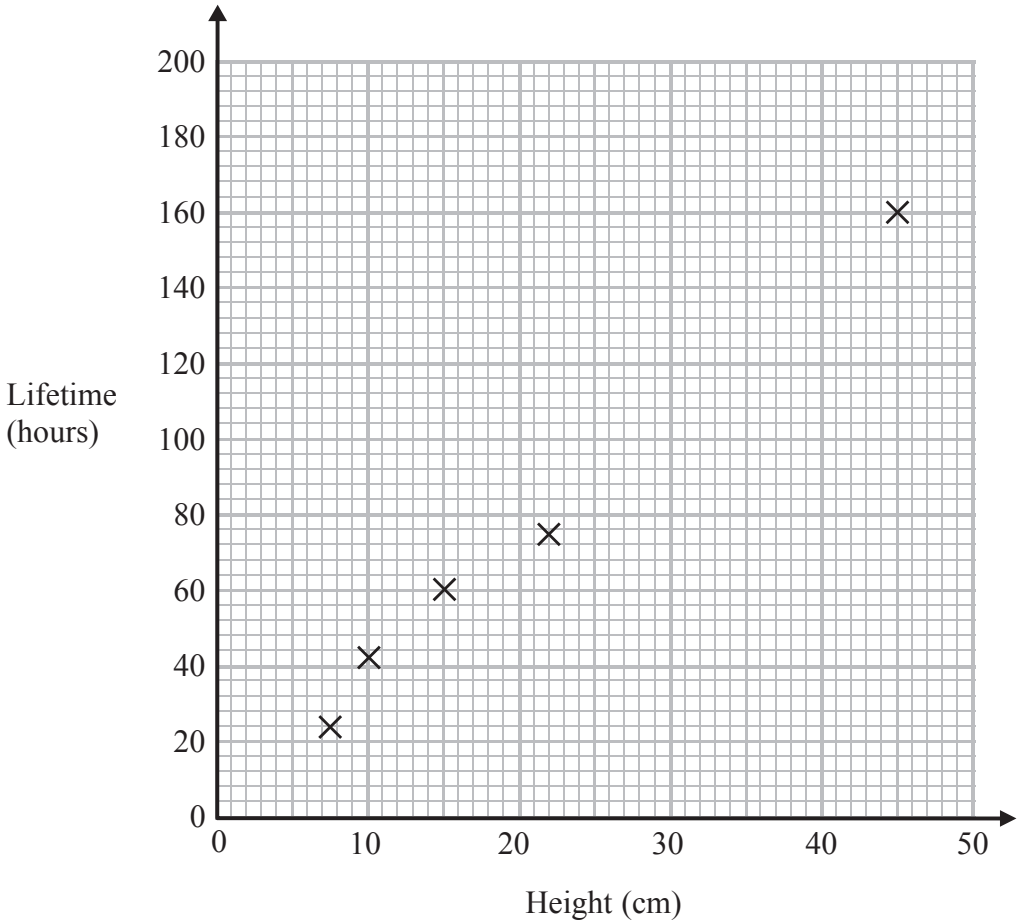
Show this information in an ordered stem and leaf diagram.
Include a key.



(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)

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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.

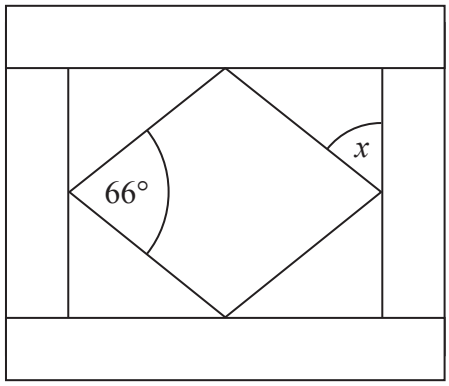


Diagram **NOT** accurately drawn

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)

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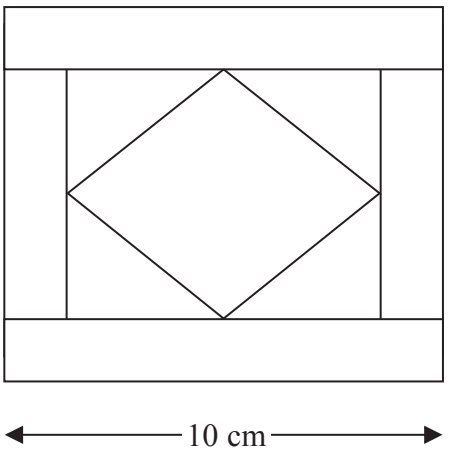
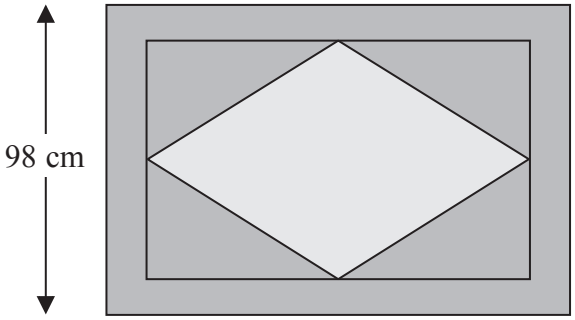


Diagram **NOT** accurately drawn



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)

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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

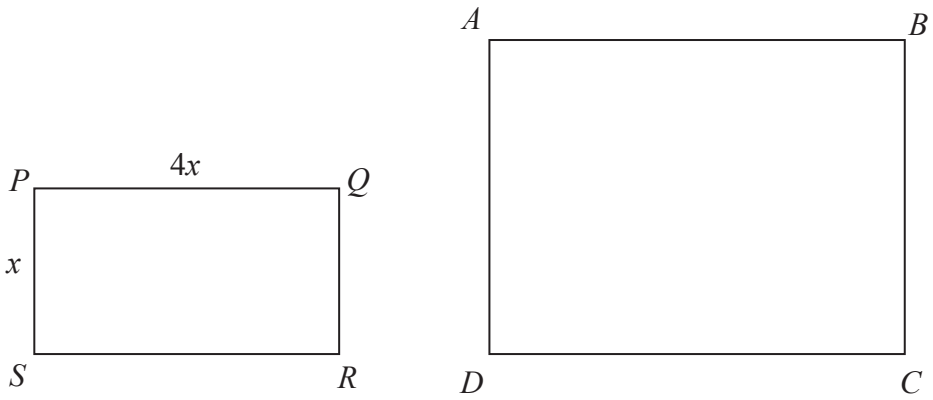
(2)

(Total for Question 12 is 4 marks)

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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

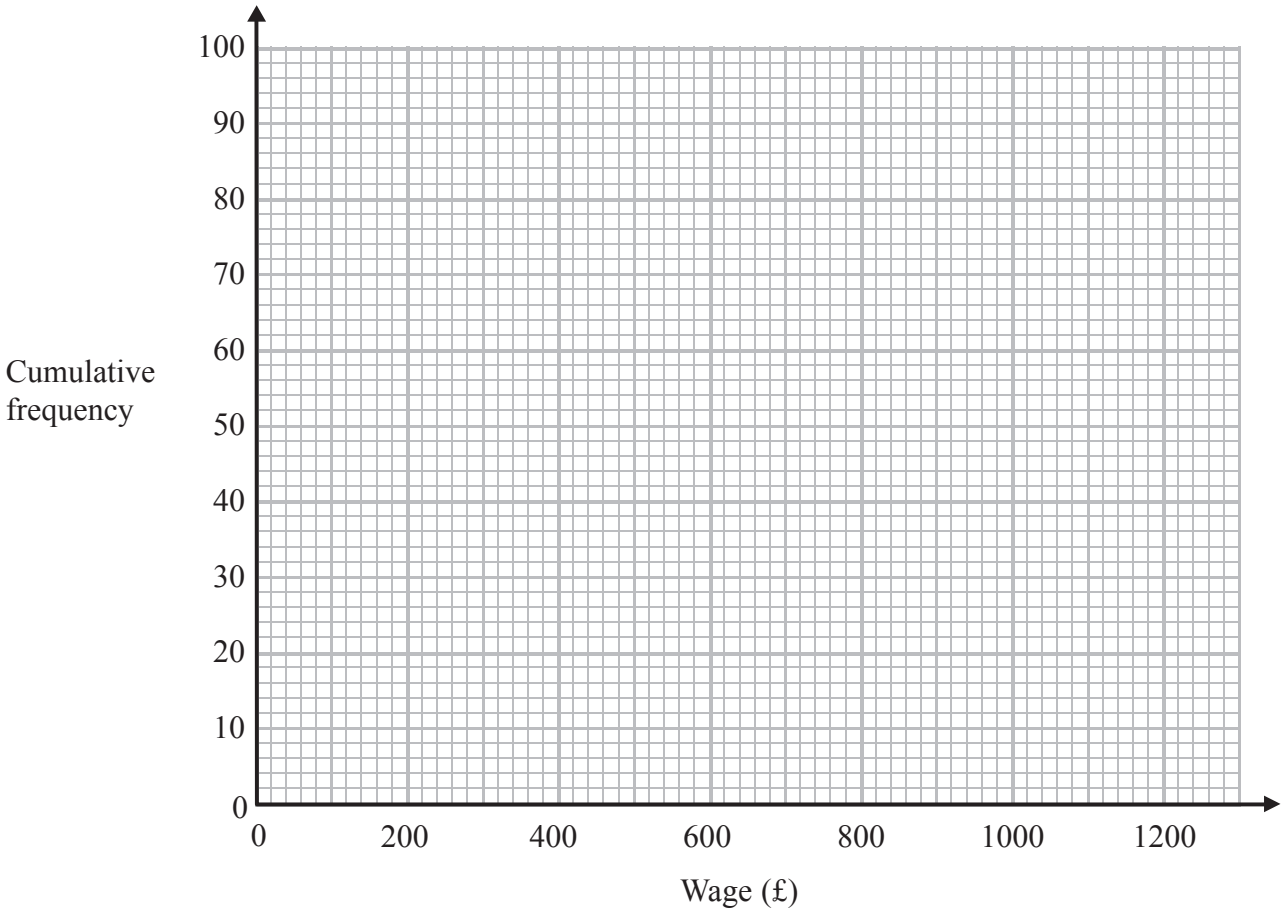
(a) Complete the cumulative frequency table.

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)

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(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."

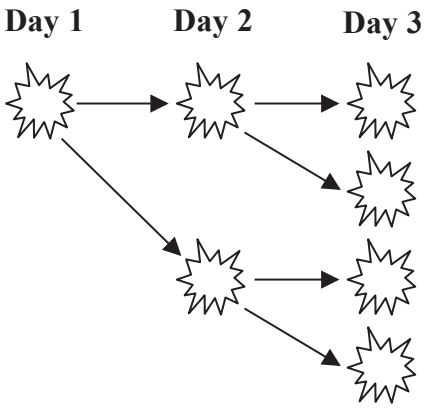
*(c) Is this claim correct?
You must show all your working.

(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)

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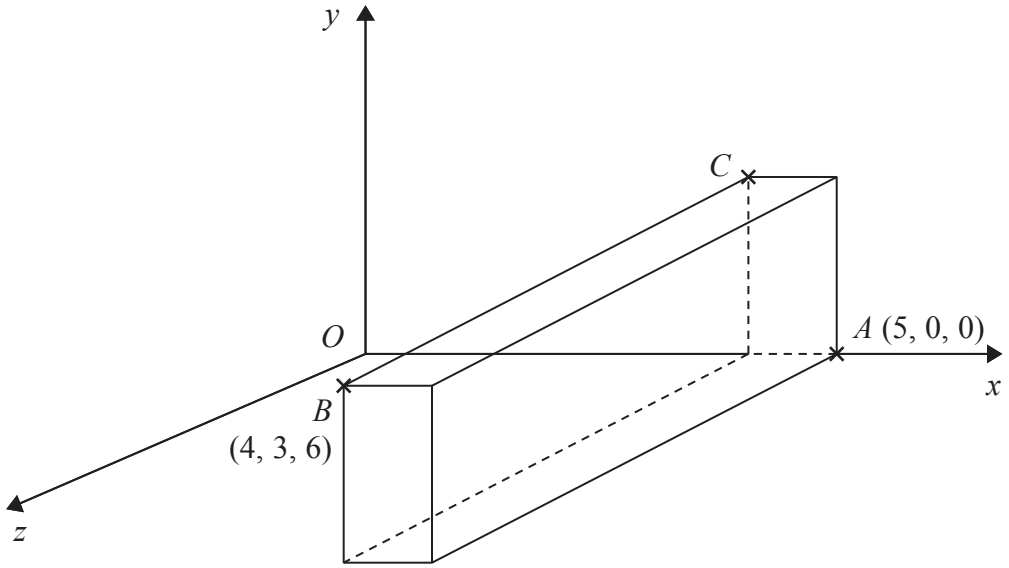
16 Amina invests £6000 in an account paying compound interest at an AER of 3.5% for 4 years.

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)

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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.

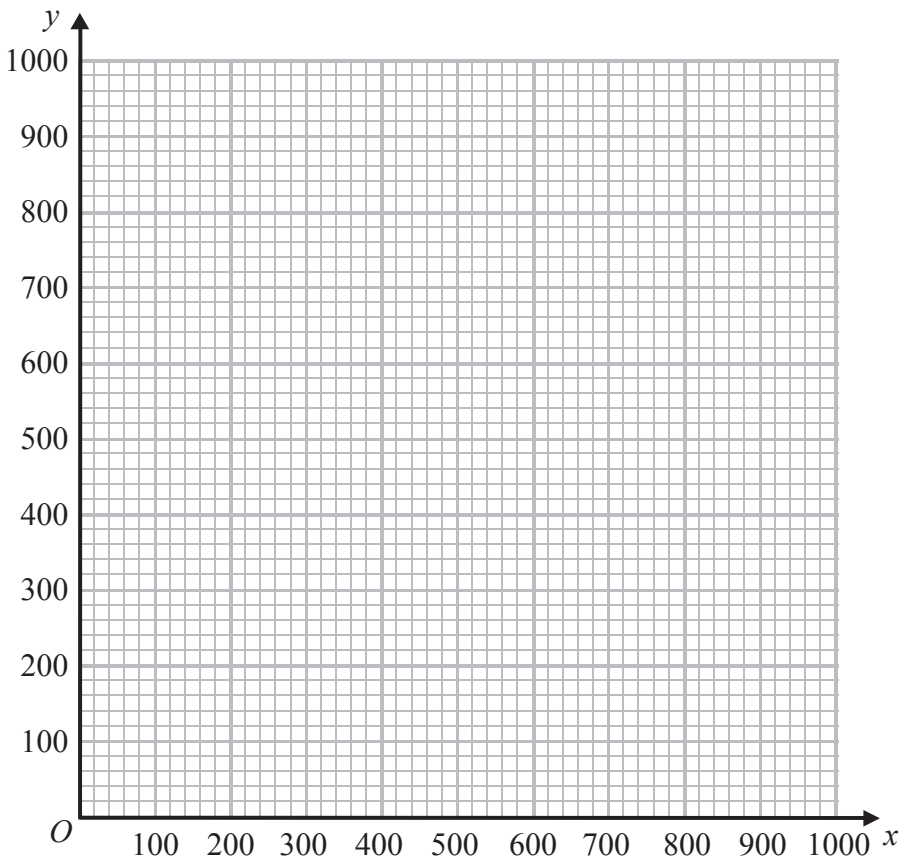
(a) Complete the table to show the algebraic inequality for each constraint. Give each inequality in its simplest form.

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)

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(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.

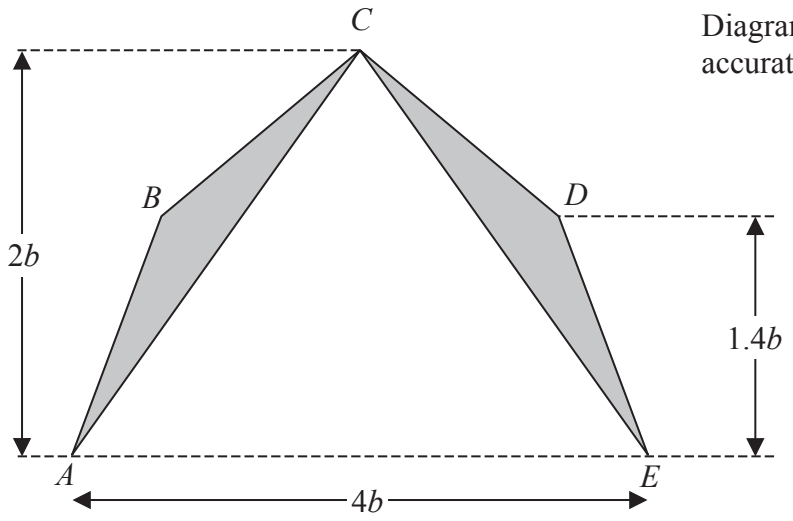


Diagram **NOT** accurately drawn

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)

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***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

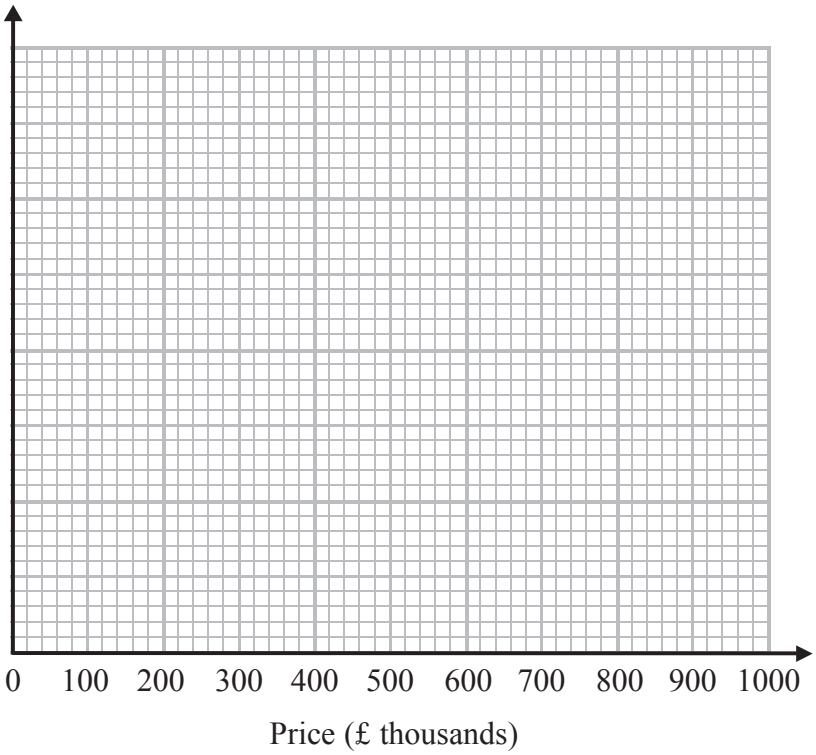
(Total for Question 21 is 5 marks)

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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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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Application of Mathematics (2AM01)
Higher Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where QWC is being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$30\,000 \div 6 = 5000$ $5000 \div 4 \times 3 =$ Or $\frac{1}{6} \times \frac{3}{4} = \frac{1}{8}$ $30\,000 \div 8$	3750	3	M1 for $30\,000 \div 6$ (=5000) M1 for '5000' ÷ 4 × 3 oe A1 cao Or M1 $\frac{1}{6} \times \frac{3}{4}\left(= \frac{1}{8}\right)$ M1 for $30\,000 \div 8$ oe A1 cao

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
2		$\frac{130}{100} \times 340 = 442$ or $\frac{30}{100} \times 340 = 102$ 340 + 102 = 442 Or $\frac{30}{100} \times 340 = 102$ 450 - 102 = 348	£442 Or £348 Or 32(.35)%	3	M1 for $\frac{100+30}{100}$ oe M1 for $\frac{130}{100} \times 340$ oe (=442) A1 442 Or M1 $\frac{30}{100} \times 340$ (=102) oe M1(dep) 340 + 102 (=442) A1 442 Or M1 $\frac{30}{100} \times 340$ (=102) oe M1 (dep) 450 - 102 (=348) or 450 – 340 (=110) A1 348 or 102 and 110 **Alternative method** M1 $\frac{450}{340}$ or $\frac{110}{340}$ M1 $\frac{450}{340} \times 100$ (= 132.35) or $\frac{110}{340} \times 100$ (= 32.35) A1 32(.35)

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)	$x + 2x + 2x + 4$	$5x + 4$	2	M1 for at least 2 terms out of x, $2x$, $2x + 4$ added A1 $5x + 4$ SC B1 for answer of $2x + 4$ if M0 scored
	(b)	$x = 6$ $5x + 4 = 5 \times 6 + 4$ Or 6 + 12 + 12 + 4	34	3	B1 $x = 6$ M1 ft on (a) for substituting 6 into their expression(s), A1 34 cao or B1 for 6 M1 for 6 + 12 + 12 + 4 A1 34 cao
4	(a)	$100 \times 0.12 = 12$ 100 - 12 + 6.40	94.40	2	M1 100×0.12 (=12) A1 94.4(0)
	(b)	45.60 - 6.40	39.20	1	B1 cao
	(c)		New decision box with 80 replaced by 70	2	B1 New decision box with correct shape B1 80 replaced by 70
5	(a)		Frequency polygon	2	**B2** Complete polygon (ignore histograms and any lines below an age of 20 or above a age of 54), but only award **B1** if there is a line joining the first to the last point. (**B1** One vertical or horizontal plotting error **OR** incorrect but consistent error in placing the midpoints horizontally **OR** correct plotting but not joined or joined with a curve).
	(b)		30 - 34	1	B1 cao
	* (c)		2 correct comments	2	C1 ft on average the women are younger C1 the range of the women is larger

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*6		Area = $15 \times 10 = 150$ 150 ÷ 20 = 7.5 7.5 litres requires 4 pots. 4 × 32.40 Or Area = $15 \times 10 = 150$ 20 × 2 = 40 150 ÷ 40 = 3.75 3.75 pots used requires 4 pots bought 4 × 32.40	£129.60	5	M1 for 15×10 (=150) M1 for '150' ÷ 20 M1 for '7.5' ÷ 2 (=3.75) M1 for '4' × 32.40 C1 (dep on M1) £129.60 Or M1 for 15×10 (=150) M1 for 20 × 2 (= 40) M1 for '150' ÷ '40' (=3.75) M1 for '4' × 32.40 C1 (dep on M1) £129.60 Or M1 for 2m by 10m M1 for 15 ÷ 2 M1 for '7.5' ÷ 2 (=3.75) M1 for '4' × 32.40 C1 (dep on M1) £129.60
7			0 | 0 8 9 1 | 2 2 2 3 5 6 6 2 | 0 4 8 8 3 | 1 Key 3|1 = 31 points	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors) B1 for a correct key eg 3 | 1 = 31 points (points not required)
8	(a)		Correct point plotted	1	B1 cao
	(b)		LOBF drawn	1	B1 for line of best fit drawn
	(c)		Answer in range 120 – 140	1	B1 answer in range 120 – 140
	(d)	200 ÷ 4 = 50	12.5	2	M1 200 ÷ 4 (=50) A1 answer in range 10 - 15

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	Opp angle = 66 180 - 66 = 114 114 ÷ 2 = 57	57	3	B1 opp angle = 66 M1 (180 - 66) ÷2 A1 cao
	(b)	98 ÷ 7 = 14 14 × 10	140	2	M1 for 98 ÷ 7 or 14 or 7 ÷ 98 oe A1 cao
	(c)	$14^2 = 196$ 20 × 196 =	3920	2	M1 20 × '14'^{2} oe A1 cao
10			=B2*20/100 7.50 =B2+C2+D2	4	B1 for (=) B2*20/100 oe B1 for 7.5(0) B1 for (=) B2 + C2 + D2 or (=) SUM(B2:D2) oe or (=) B2 + 7.5(0) + C2 or intention to add correct cells is clear B1 for using correct spreadsheet notation in both cases, condone missing =
11		a = cost(p) of an apple p = cost(p) of a pear $3a + 4p = 184$ $5a + 2p = 176$ $7a = 2 \times 176 - 184 = 168$	24, 28	4	B1 $3a + 4p = 184$ and $5a + 2p = 176$ oe M1 correct process to eliminate a or p M1(dep on M1) Substitute found value of a or p to find other variable A1 cao
12	(a)	25×10^{-9}	2.5×10^{-8}	2	M1 25×10^{-9} A1 cao
	(b)	$2.365 \times 10^{22} \div (9.46 \times 10^{15})$	2500000	2	M1 $2.365 \times 10^{22} \div (9.46 \times 10^{15})$ or 2.5×10^n or digits 25.... A1 2500000

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		$4x + x + 4x + x < 2x + x + 5 + 2x + x + 5$ $10x < 6x + 10$ Or $4x + x < 2x + x + 5$ $5x < 3x + 5$	$0 < x < 2.5$	5	B1 for $2x$ and $x + 5$ M1 $4x + x + 4x + x$ or $2x + x + 5 + 2x + x + 5$ oe M1 $4x + x + 4x + x < 2x + x + 5 + 2x + x + 5$ oe M1 $10x < 6x + 10$ oe A1 $(0 <) x < 2.5$ oe Or B1 for $2x$ and $x + 5$ M1 $4x + x$ or $2x + x + 5$ oe M1 $4x + x < 2x + x + 5$ oe M1 $5x < 3x + 5$ oe A1 $(0 <) x < 2.5$ oe

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	14, 46, 65, 78, 85, 90	Correct CF table	1	B1 cao
	(b)		Correct CF diagram	2	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error Or if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined A1 cao for correct graph with points joined by curve or straight line segments
	(c)	$90 \times 0.8 = 72$ At CF = 72, wage is £710 or At wage 685, cf = 70 $\frac{20}{90} \times 100 = 22\%$	Correct conclusion	4	M1 for 90×0.8 (=72) M1 for using CF to find estimate of wage A1 ft C1(dep on M1) suitable comment e.g. more than £685 Or M1 for using wage to find estimate of CF M1 for $\frac{'20'}{90} \times 100$ (=22.2) or $\frac{'70'}{90} \times 100$ (=77.8) A1 ft C1(dep on M1) suitable comment based on their evidence e.g. less than 80%

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		2^9	1	B1 cao
	(b)		2^0	1	B1 cao
	(c)	$2^9 \div 8 = 2^9 \div 2^3$	2^6	2	M1 $2^{'9'} \div 2^3$ or 64 A1 ft 'a'
16		$6000 \times (1+0.035)^4 =$ $6000 \times 1.1475... = 6885.13..$ 6885.13 - 6000 OR $6000 \times 1.035 = 6210$ $6210 \times 1.035 = 6427.35$ $6427.35 \times 1.035 = 6652.30725$ $6652.30725 \times 1.035 =$ 6885.13.. 6885.13 - 6000	885.13	4	M2 $6000 \times (1+0.035)^4$ or 6000×1.035^4 A1 6885.13 - 6885.14 A1 for 885.13 - 885.14 OR M1 6000×1.035 oe (= 6210) Or 6000×0.035 oe (=210) M1 (dep) '6210' × 1.035 and '6427.35' ×1.035 and '6652.30725'×1.035 A1 6885.13 - 6885.14 A1 for 885.13 - 885.14

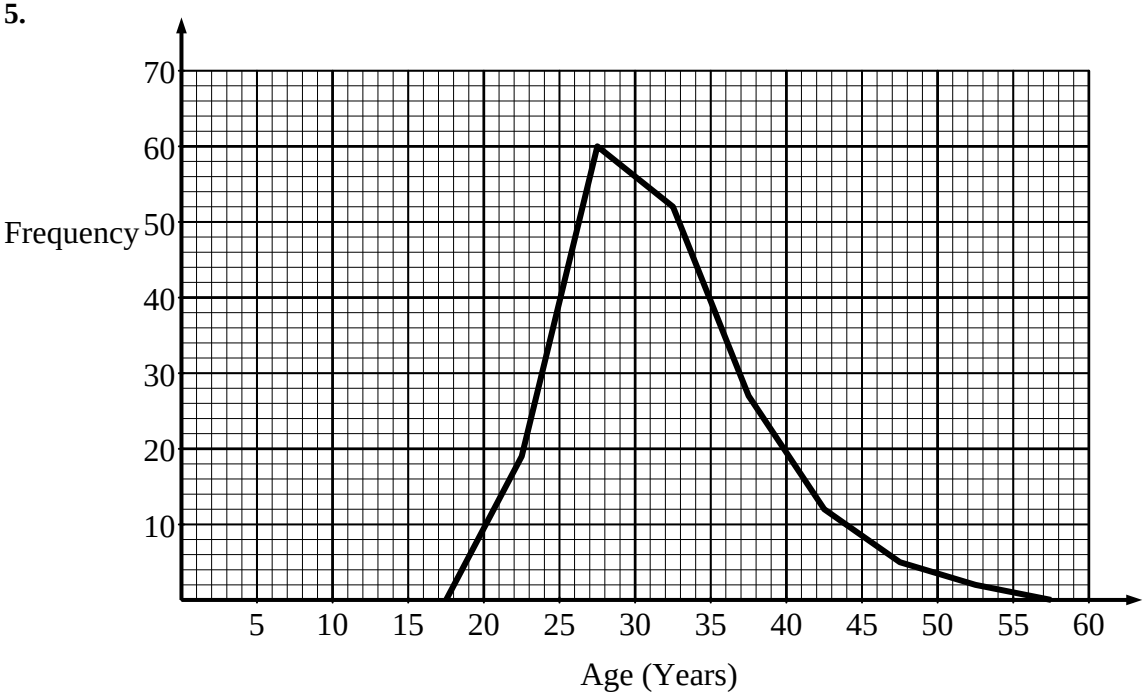
<table>
<tr><th colspan="6">PAPER: 5AM1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>17</td><td>(a)</td><td></td><td>(4, 3, 0)</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(b)</td><td>$\frac{5+4}{2}, \frac{0+3}{2}, \frac{0+6}{2}$</td><td>(4.5, 1.5, 3)</td><td>2</td><td>M1 $\frac{5+4}{2}, \frac{0+3}{2}, \frac{0+6}{2}$ oe
A1 cao</td></tr>
<tr><td>18</td><td>(a)</td><td></td><td>Suitable comment</td><td>1</td><td>B1 e.g. Stratified is better because there are a lot more woman than men in the population.</td></tr>
<tr><td></td><td>(b)</td><td>$\frac{69}{105+204} \times 60$</td><td>13</td><td>2</td><td>M1 $\frac{69}{309} \times 60$ (= 13.398)
or $\frac{69}{309} \times 100$ and $\frac{'22.3'}{100} \times 60$
A1 13</td></tr>
<tr><td>19</td><td>(a)</td><td></td><td>$y \geq 200$
$3x + 4y \leq 2100$</td><td>3</td><td>B1 cao
B2 $3x + 4y \leq 2100$ oe in least terms
(B1 for $90x + 120y \leq 63000$) oe</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Correct feasible region</td><td>3</td><td>B1 At least 1 correct line drawn
B1 All lines drawn ft candidate's answers to (a)
B1 fully correct region identified unambiguously</td></tr>
<tr><td></td><td>(c)</td><td>Corners
<table><tr><th>x</th><th>y</th><th>P</th></tr><tr><td>100</td><td>200</td><td>1600</td></tr><tr><td>100</td><td>450</td><td>2600</td></tr><tr><td>300</td><td>300</td><td>3600</td></tr><tr><td>366</td><td>200</td><td>3728</td></tr></table></td><td>3728</td><td>2</td><td>M1 for tests $8x + 4y$ at at least 2 corners or draws $8x + 4y = P$ (any P)
A1 3728</td></tr>
</table>

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		$BD = 3b$ Area $ACE = \frac{1}{2} \times 2b \times 4b = 4b^2$ Area $ABCDE =$ $\frac{1}{2} \times 3b \times 0.6b + \frac{1}{2}(3b + 4b) \times 1.4b$ $= 0.9b^2 + 4.9b^2 = 5.8b^2$ Area $= \left(5.8b^2 - 4b^2\right)$	$1.8b^2$	5	B1 $BD = 3b$ M1 Area $ACE = \frac{1}{2} \times 2b \times 4b$ $(= 4b^2)$ M1 Area $ABCDE = \frac{1}{2} \times '3b' \times 0.6b$ $(=0.9b^2)$ $+ \frac{1}{2}('3b'+4b) \times 1.4b$ $(=4.9b^2)$ M1 (dep on M1) $\left('5.8'b^2 - '4'b^2\right)$ A1 $1.8b^2$ oe

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
21		US 1 gal costs 20.88÷6=$3.48 1 litre costs $3.48÷3.79 = $0.918... I litre costs 0.918..× 0.77 Euros = 0.707..Euros Russia 1 litre costs 800 ÷25.58 = 31.27... Roubles 1 litre costs 31.27÷40.63 Euros = 0.769... Euros Or 25.58 litres = 25.58 ÷ 3.79 = 6.749.. US gallons 800 roubles = (800÷40.63)÷0.77 = $25.571.. Cost in $ of 1 US gallon in Russia is 25.571..÷6.749... = $3.788.. Cost in $ of 1 US gallon in US = 20.88÷6 = $3.48 Cost per litre for US petrol $0.918 or €0.707 or 28.7 rub Cost per gallon for US petrol $3.48 or €2.68 or 109 rub Cost per litre for Russian petrol 31.27 rub or €0.770 or $1 Cost per gallon for Russian petrol 118 rub or €2.92 or $3.79	Correct conclusion based on correct calculations	5	M1 for a conversion, gallons to litres or litres to gallons M1 for a conversion, roubles to US Dollars or US Dollars to roubles or convert both to Euros M1 for a conversion to common units and common currency A1 for two correct answers in the same currency and for the same unit C1 (dep on at least M1) for correct conclusion ft candidate's figures. eg M1 1 US gal costs 20.88÷6 (=3.48) M1 1 litre costs 3.48 ÷3.79 ..× 0.77 (=0.707..) M1 1 litre in Russia costs 800 ÷25.58 ÷40.63 (=0.769) A1 for 0.707 and 0.769 C1 (dep on at least M1) for correct conclusion ft candidate's figures.

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
22		FDs .13 .6 .76 .44 .19 .03	Correct histogram	3	B1 at least one correct FD B1 at least two correct FD B1 completely correct histogram Or B1 key B1 at least two columns of different width correct B1 completely correct histogram

5.


Frequency
70
60
50
40
30
20
10
5
10
15
20
25
30
35
40
45
50
55
60
Age (Years)

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q4	(c)	In the space below, or on the diagram, show … "on the diagram" is inserted	
Q5		Table – some frequencies changed 0, 20, 60, 55, 25, 10, 5, 2, 0 Graph – both axes 1½ cm for 5. Difficulty with accuracy for midpoints Q version *x* axis labelled only in 10's	
Q7		4 lines not 3 in the stem and leaf diagram. Key put at the top	
Q8		Scatter graph – *x* axis 3 cm for 10 with an intermediate line, *y* axis 3 cm for 20 with an intermediate line	
Q9	(a) (b) (c)	Size 2 Size × 2. Flag – the rhombus has dotty shading but the rest is unshaded Size × 2. Flag – the rhombus has dotty shading but the rest is unshaded	

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q14	(b)(c)	Frequency table – values changed 10, 30, 20, 15, 10, 5. This will alter the cumulative frequency table Grid – *x* axis – 1½ cm for 100, *y* axis – 3 cm for 10 with an intermediate line	
Q17		Model provided as well as diagram. Model on a base	
Q19		2 cm for 100 on both axes	
Q20		Diagram 2, b changed to *x*	
Q22		Frequencies changed 15, 30, 40, 45, 20, 15 Grid *x* axis 2 cm for 100, *y* axis 4 cm with intermediate (8 × 4 cm)	

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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

Wednesday 6 November 2013 – 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 ▶

P43602A

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6/5/5/5/5/

P 4 3 6 0 2 A 0 1 2 8

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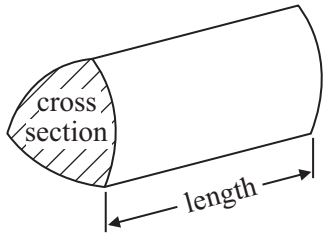
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GCSE Mathematics 2AM01

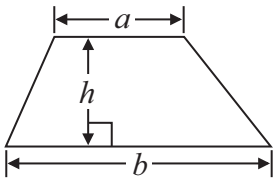
Formulae: Higher Tier

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 × length

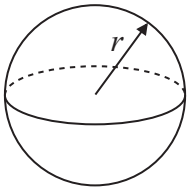


Area of trapezium = $\frac{1}{2}(a + b)h$



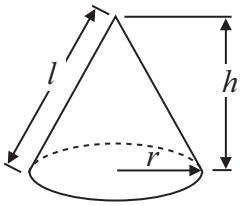
Volume of sphere = $\frac{4}{3}\pi r^3$

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

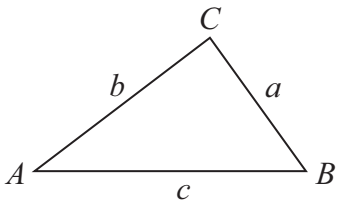


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 stages in your working.

1 Radios are made in a factory.

On Monday 10 000 radios are made.

$\frac{1}{20}$ of these radios are faulty.

(a) Work out the number of radios that are faulty.

.....

(2)

5 compact radios have a total weight of 4000 grams.

(b) Work out the total weight of 8 compact radios.

..... grams

(2)

(Total for Question 1 is 4 marks)

***2** The table gives information about the length of a lap at two motor racing tracks.

Motor racing track	Length of a lap
Brands Hatch	4048 yards
Silverstone	3.67 miles

At Brands Hatch, there are 85 laps in a race.
At Silverstone, there are 60 laps in a race.

1 mile = 1760 yards

Which race is the longer length?

(Total for Question 2 is 4 marks)

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3 Pete uses a 3-D grid to design a shed.

The diagram shows his design.

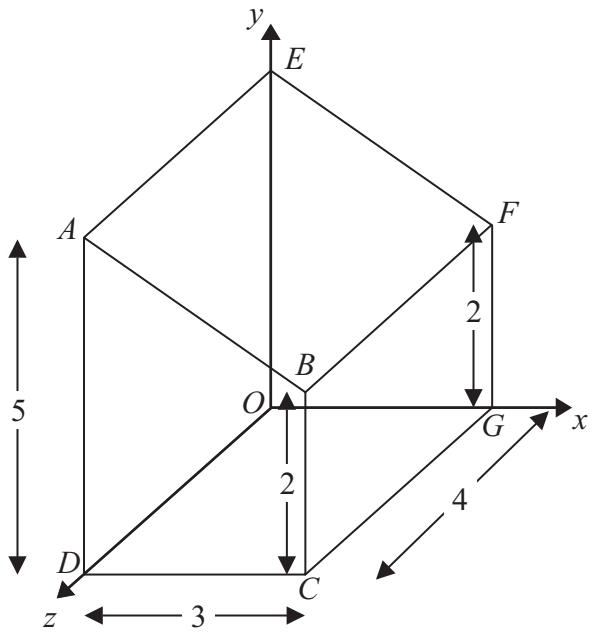


Diagram **NOT** accurately drawn

Point A is a corner of the shed.

(a) Write down the coordinates of point A.

(..... , ... ,.....)

(1)

Pete has to mark the midpoint of the line CG on his design.

(b) Write down the coordinates of the midpoint of the line CG.

(..... , ... ,.....)

(1)

In the diagram, all the measurements are in metres.

The wall $ABCD$ of the shed is a trapezium.

(c) Work out the area of the wall $ABCD$.

..... m^2

(2)

(Total for Question 3 is 4 marks)

4 Nails of length 35 millimetres are sold in three sizes of packets.

There are 20 nails in a small packet, costing £1.36
There are 50 nails in a medium packet, costing £3.30
There are 90 nails in a large packet, costing £6.03



*(a) Which size of packet is the best value for money?
You must show clearly how you got your answer.

(4)

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Nails of different lengths are sold in mixed packets.

Here are the lengths, in millimetres, of the nails in a mixed packet.

20	35	49	30	45
40	50	25	39	30
30	37	47	55	28

(b) Draw an ordered stem and leaf diagram for this information.

(3)

(c) Find the median length.

..... mm

(1)

(Total for Question 4 is 8 marks)

5 (a) A shop has a sale.

Sale
Normal prices reduced by 15%

The normal price of a jumper is £54

Work out the sale price of the jumper.

£ .....

(3)

(b) A different shop has a sale.

Sale
Normal prices reduced by 35%

The sale price of a coat is £113.75

Work out the normal price of the coat.

£ .....

(3)

(Total for Question 5 is 6 marks)

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***6** The diagram shows the plan of a floor.

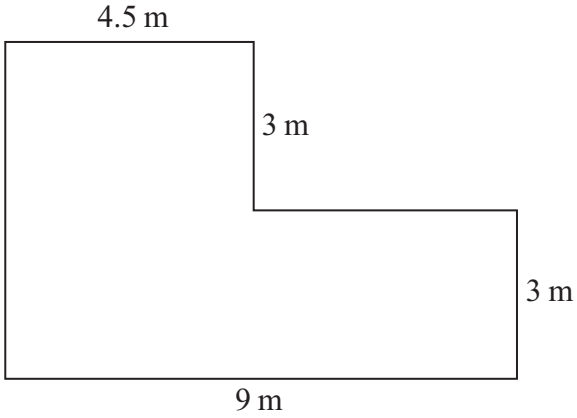


Diagram **NOT** accurately drawn

All the corners of the floor are right angles.

Jason wants to cover the floor completely with underlay.

Underlay is sold in rolls.
Each roll of underlay has a length of 5 m and a width of 1.5 m.
Each roll of underlay costs £59.99

Jason has £400 to spend.

Does Jason have enough money to buy the underlay he needs?

(Total for Question 6 is 4 marks)

7 On Saturday 75 people phoned a helpline.

The table gives information about the lengths, in minutes, of the phone calls.

Length of phone call (x minutes)	**Frequency**
$0 < x \leqslant 5$	35
$5 < x \leqslant 10$	20
$10 < x \leqslant 15$	12
$15 < x \leqslant 20$	8

(a) Find the modal class interval.

.....

(1)

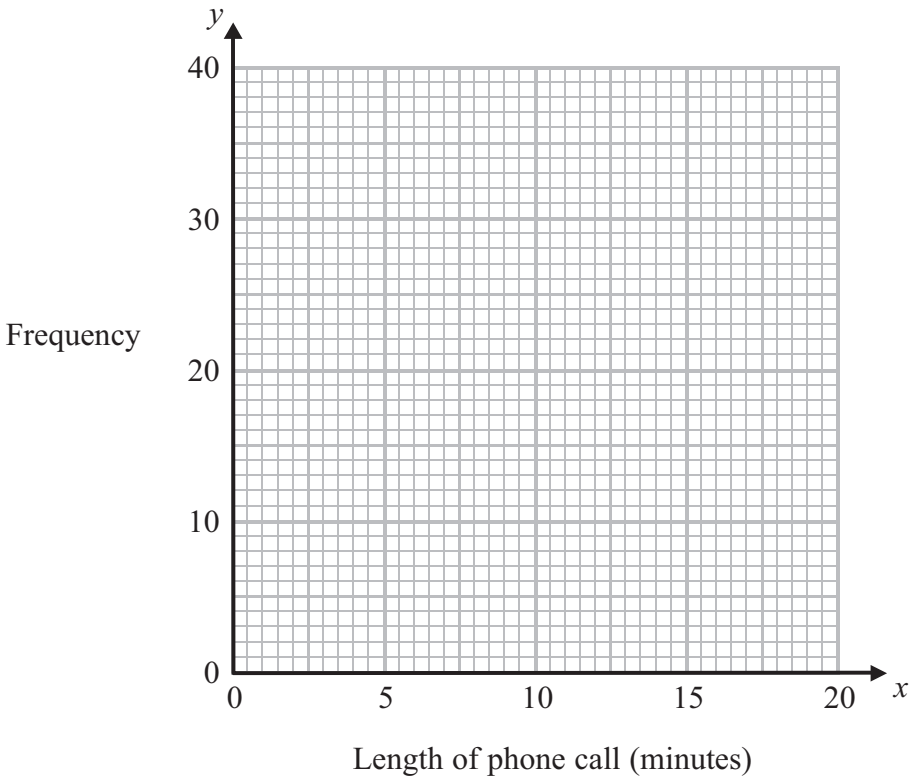
(b) Work out an estimate for the mean length of call.

..... minutes

(4)

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(c) On the grid, draw a frequency polygon to show the information in the table.



(2)

(Total for Question 7 is 7 marks)

8 Kim works for a company.

She is paid 40p per mile for each mile she has to drive.

Here is the spreadsheet Kim uses to calculate how much she will be paid for the distances she drove last week.

	A	B	C	D
1	**day**	**distance (miles)**	**pounds per mile**	**amount paid (£)**
2	Monday	80	0.4	32.00
3	Tuesday		0.4	
4	Wednesday		0.4	
5	Thursday		0.4	
6	Friday		0.4	
7	**total**			

Write down the formula to go

(i) in cell D3

.....

(ii) in cell B7.

.....

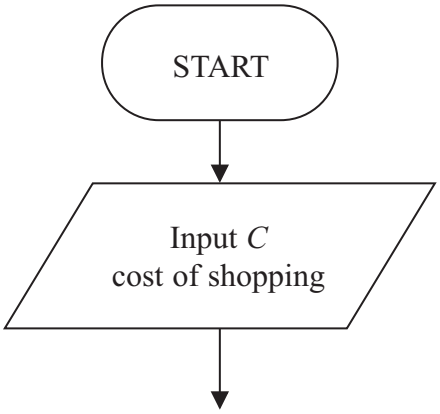
(Total for Question 8 is 3 marks)

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9 At Pete's Store you get £8 off the cost of your shopping when the cost of your shopping comes to more than £100

You can use a flow chart to work out the amount a customer pays at Pete's Store.

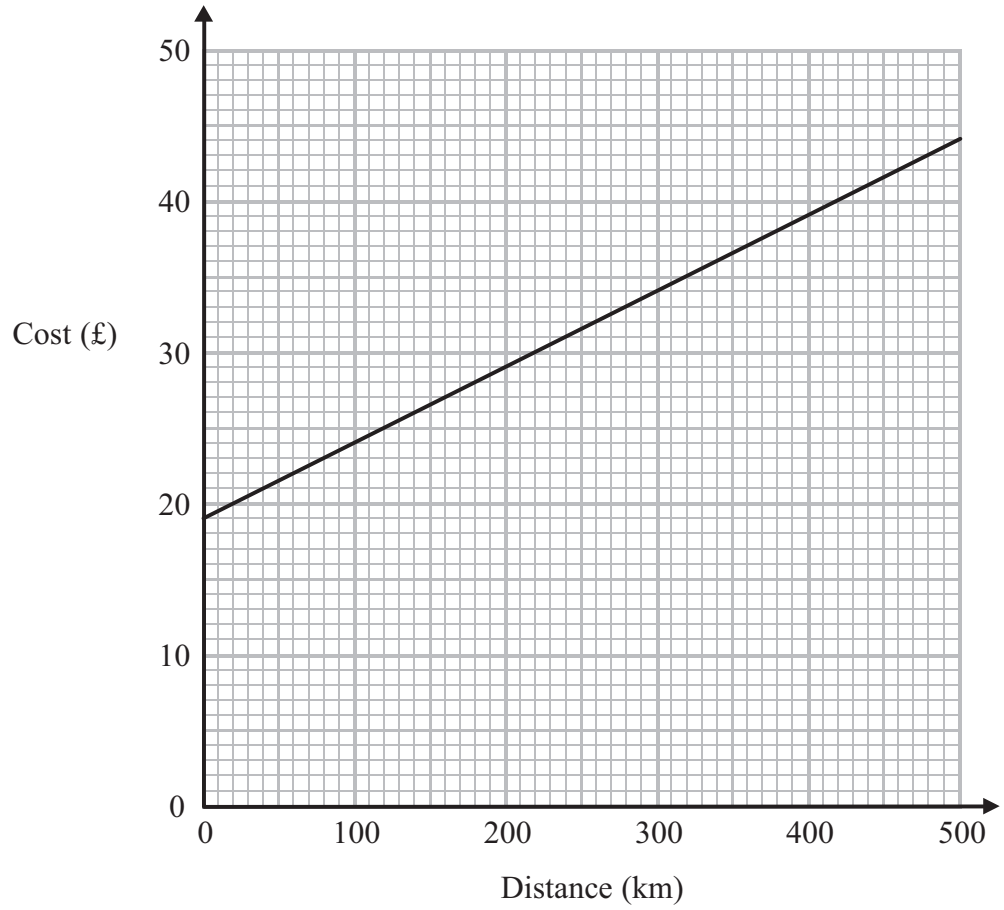
Complete the flow chart.
You must include an output box.



(Total for Question 9 is 5 marks)

10 Isha hires a motorbike.

You can use the graph to work out the cost of hiring the motorbike for different distances travelled.



(a) Work out the gradient of the line on the graph.

.....

(2)

Isha used the motorbike to visit a friend.
She estimated the cost of hiring the motorbike.
She travelled 50 km more than she estimated.

Isha paid more than she estimated.

(b) How much more?

.....

(2)

(Total for Question 10 is 4 marks)

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11 The diagram shows two digital photo frames.

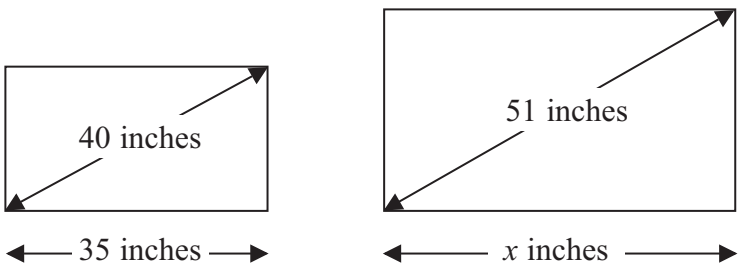


Diagram **NOT** accurately drawn

The frames are mathematically similar.

Work out the value of x.

..... inches

(Total for Question 11 is 3 marks)

12 The diagram gives information about a room.

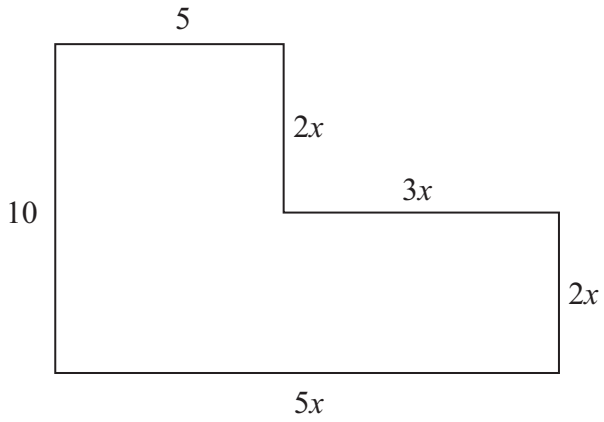


Diagram **NOT** accurately drawn

All the lengths are in metres.
All the corners are right angles.

Find the perimeter of the room.

..... m

(Total for Question 12 is 3 marks)

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13 Martha invests £1500 for 2 years in a savings account.
She is paid 5% per annum compound interest.

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

£ .....

(3)

Hussein invests £2000 at 0.25% 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.

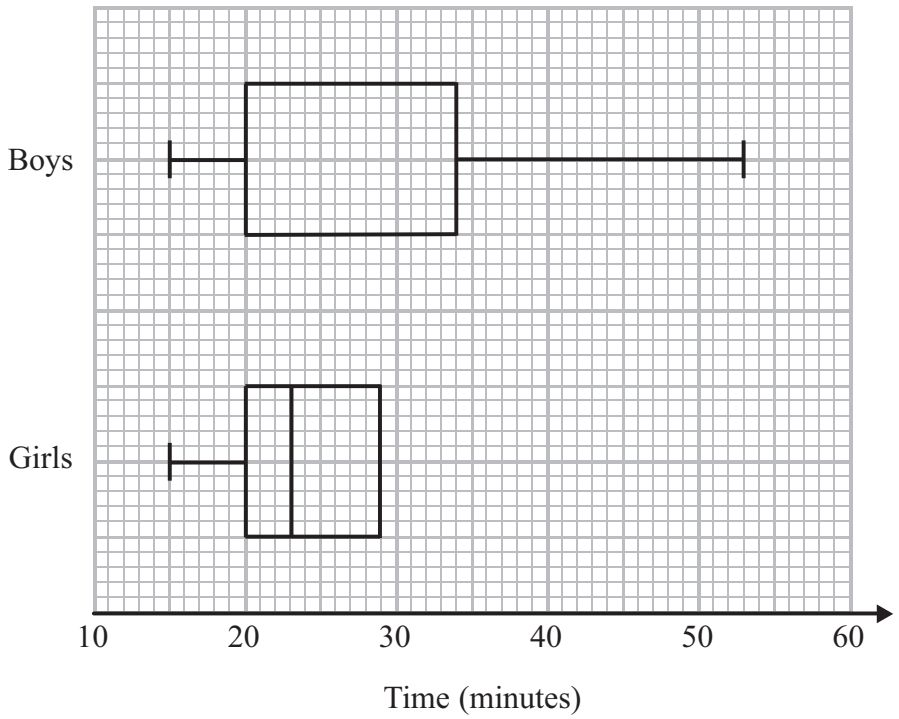
..... %

(3)

(Total for Question 13 is 6 marks)

14 The incomplete table and box plots give some information about the times taken, in minutes, by some students to type a letter.

	Boys	Girls
Median	26	
Range	38	30
Interquartile range		9



(a) Use the box plots to complete the table.

(2)

(b) Use the table to complete the box plots.

(2)

(c) Make two comparisons between the distribution of the times taken by the boys and the distribution of the times taken by the girls.

.....

.....

.....

.....

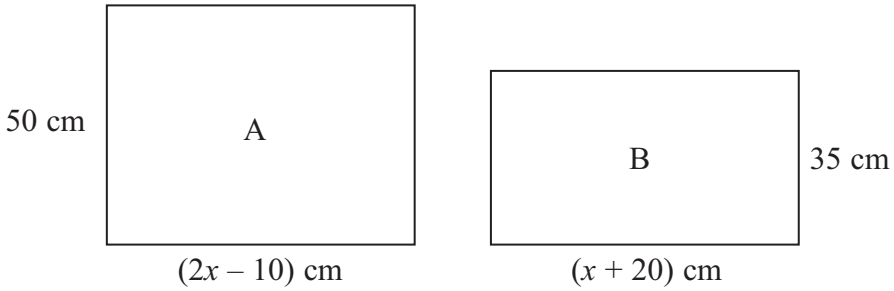
(2)

(Total for Question 14 is 6 marks)

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

Diagram **NOT** accurately drawn



Painting A has an area 1725 cm^2 bigger than the area of painting B.

Work out the area of painting A.

.....cm^2

(Total for Question 15 is 4 marks)

16 A human hair has a width of 1.25×10^{-4} m.

(a) Write 1.25×10^{-4} as an ordinary number.

.....

(1)

A cat hair has a width of 9×10^{-5} m.

A dog hair has a width 1.25 times greater than the width of a cat hair.

(b) Work out the width of a dog hair.
Give your answer in standard form.

..... m

(2)

(Total for Question 16 is 3 marks)

17 A company sells kites on the internet.
It sells Acrobat kites and Dragon kites.

2 Acrobat kites and 3 Dragon kites have a total weight of 575 g.

3 Acrobat kites and 1 Dragon kite have a total weight of 390 g.

Work out the weight of an Acrobat kite and the weight of a Dragon kite.

Acrobat kite ..... g

Dragon kite ..... g

(Total for Question 17 is 4 marks)

18 Fritz makes medals.
He makes small medals and he makes large medals.

The diagram shows a small medal and a large medal.

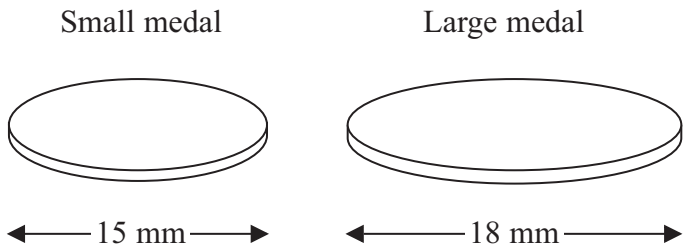


Diagram **NOT** accurately drawn

The medals are mathematically similar.

A small medal has a length of 15 mm.
A large medal has a length of 18 mm.

Each medal is made from silver.
The mass of a small medal is 25 g.

Fritz has 420 g of silver.

Fritz wants to make the same number of small medals as large medals.

(a) Work out the greatest number of medals Fritz can make.

.....

(4)

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Fritz covers the medals with varnish.

One tin of varnish covers exactly 100 large medals.

(b) Work out the number of small medals one tin of varnish can cover.

..... small medals

(2)

(Total for Question 18 is 6 marks)

19 The table shows the number of people who work in each of three factories.

Factory A	Factory B	Factory C
235	148	309

Kim takes a sample of the people in the three factories.

She takes the same number of people from each of the three factories.

(a) This is **not** a good sample.

Explain why.

.....

.....

(1)

Vince wants to take a sample of the people in the three factories stratified by factory.

He takes a sample of 20 people from factory A.

(b) Work out the number of people from factory B there should be in the sample.

.....

(3)

(Total for Question 19 is 4 marks)

20 Jenna wants to buy some machines for her factory.

She is going to buy

x type A machines

y type B machines.

The unshaded region on the grid gives information about the total number of machines that she can buy.



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(a) Write down, in terms of x and y, the inequalities represented by the unshaded region on the grid.

.....

(1)

Jenna has a maximum of 192 m^2 of floor space for the machines.

Each type A machine needs 24 m^2 of floor space.
Each type B machine needs 16 m^2 of floor space.

(b) (i) Show that $3x + 2y \leqslant 24$

(ii) Show the region $3x + 2y \leqslant 24$ on the grid.

(4)

Each type A machine makes a profit of £1000 per day.
Each type B machine makes a profit of £750 per day.

Jenna will buy some type A machines and some type B machines.
She wants to make the largest possible profit.

(c) (i) Write down the objective function.

.....

(ii) Work out how many of each type of machine Jenna should buy.

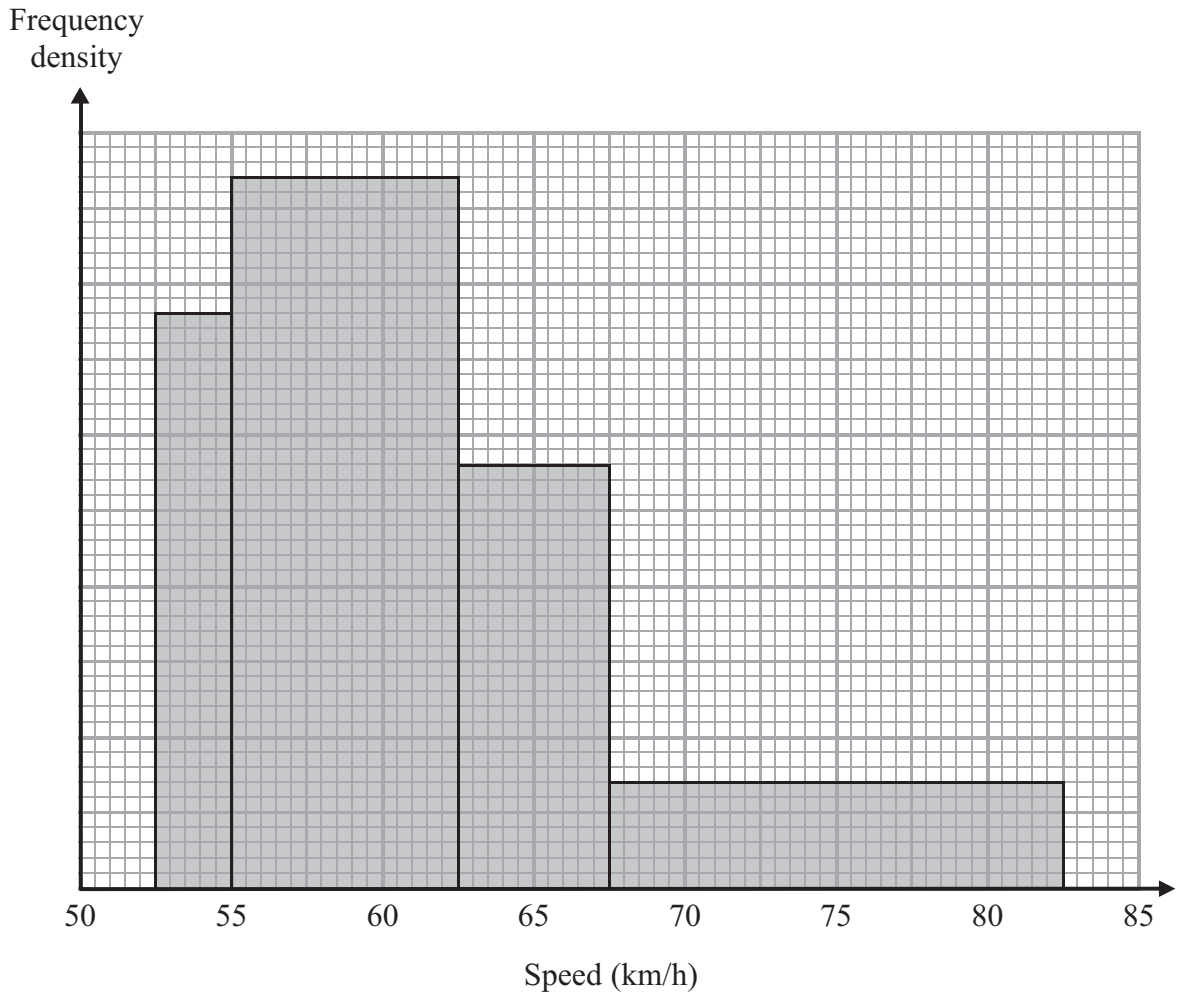
Type A .....

Type B .....

(3)

(Total for Question 20 is 8 marks)

21 The histogram gives information about the speeds, in km/h, of some cars on a road.



Work out an estimate for the median speed.

Give your answer correct to 1 decimal place.

You must show your working.

..... km/h

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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edexcel

Mark Scheme (Results)

November 2013

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Application of Mathematics (2AM01)
Higher Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where QWC is being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

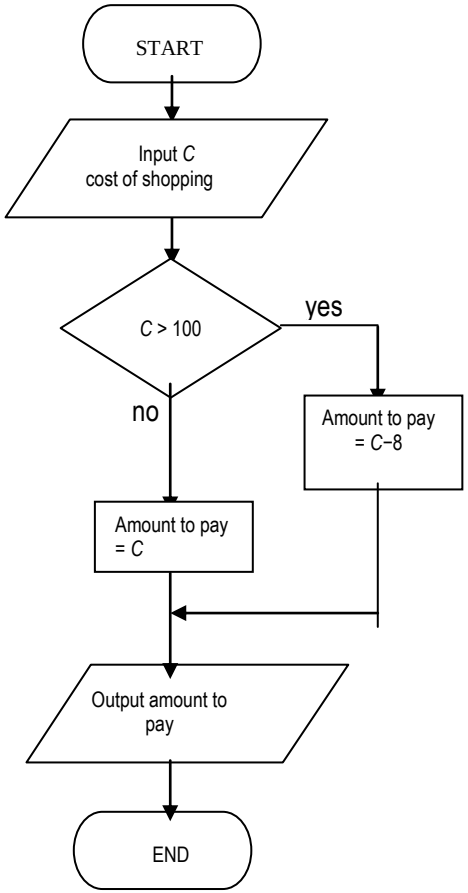
Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		500	2	M1 for $\frac{1}{20} \times 10000$ oe A1 cao
	(b)		6400	2	M1 for 4000 ÷ 5 × 8 oe. A1 cao
2		Conversion to miles BH: 4048 ÷ 1760 2.3 × 85 = 195.5 S: 3.67 × 60 = 220.2 Conversion to yards S: 3.67 × 1760 6459.2 × 60 = 387,552 BH: 4048 × 85 = 344,080 Comparison of 60 laps (eg in yards) (3.67 × 1760 – 4048) × 60 = 144,672 4048 × (85 – 60) = 101,200	Silverstone	4	M1 for method to calculate length of one lap at BH in miles M1 for method to find total length of race at each track in miles A1 for 195.5 and 220.2 or M1 for method to calculate length of one lap at S in yards M1 for method to find total length of race at each track in yards A1 for 387,552 and 344,080 or M1 for method to calculate length of one lap at S in yards M1 for method to compare the difference in the total length of 60 laps at each track with the length of 25 laps at BH A1 for 144,672 and 101,200 C1 (dep on at least M1) for a statement deducing the longer race, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each racing track.

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		(0, 5, 4)	1	B1 cao
	(b)		(3, 0, 2)	1	B1 cao
	(c)	Trapezium OR Triangle + rectangle (5+2)×3÷2 0.5×3×3 + 3×2 (= 4.5 + 6)	10.5	2	M1 for complete method to find area of ABCD A1 for 10.5 oe
4	*(a)	(I cost per nail) 1.36÷20=0.068, 3.30÷50=0.066, 6.03÷90=0.067 (II e.g. number of nails for £1) 20÷1.36=14.7, 50÷3.30=15.1, 90÷6.03=14.9 (III e.g. cost for 20 nails) 3.30÷50×20=1.32, 6.03÷90×20=1.34 (IV using multipliers) 50 ÷ 20 = 2.5 and 3.30 ÷ 1.36 = 2.42 90 ÷ 50 = 1.8 and 6.03 ÷ 3.30 = 1.82	Medium + reason	4	M1 for correct method to work out a unit cost for 2 boxes M1 for correct method to work out a unit cost for all 3boxes A1 for (£)0.068 and (£)0.066 and (£)0.067 oe C1 for correct conclusion based on their figures (consistent units) (dep on at least one M1 scored) or M1 for correct method to work out the number of nails for £1oe from 2 boxes M1 for correct method to work out the number of nails for £1oe from all 3 boxes A1 for 14.7 and 15.1 and 14.9 C1 for correct conclusion based on their figures (consistent units) (dep on at least one M1 scored) or M1 for correct method to work out the cost of 50 nails using the 20 nails cost oe M1 for correct method to work out the cost of 50 nails using the 20 nails cost and 90 nails using the 20 nail cost A1 for (£1.36), (£)1.32, (£)1.34 oe C1 for correct conclusion based on their figures (dep on at least one M1 scored) (consistent units)

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4 (cont)	*(a)				or M1 for correct method to compare multipliers for cost and number for 1 pair of boxes M1 for correct method to compare multipliers for cost and number for correct 2 pairs of boxes A1 for 2.5 and 2.42, 1.8 and 1.82 C1 for correct conclusion based on their figures (dep on at least one M1 scored) (consistent units)
	(b)	2 | 0 5 8 3 | 0 0 0 5 7 9 4 | 0 5 7 9 5 | 0 5	S&L diagram with key	3	M1 for correct stem and unordered leaves (condone two errors or omissions) A1 cao B1 for key, e.g. 2 | 0 means 20mm
	(c)		37	1	B1 cao
5	(a)	(1 – 0.15)×54	45.90	3	M1 for 0.15×54 (=8.1) or 1 – 0.15(=0.85) M1 for 54 – 0. 15×54 or 0.85×54 A1 cao
	(b)		175	3	M1 for 1 – 0.35(=0.65) M1 for 113.75÷(1 – 0.35) A1 cao

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*6		400 ÷59.99=6.6(7) rolls 6 rolls cover 6×1.5×5=45m^2 Floor area 4.5×6+4.5×3=40.5m^2 (<45) 3÷1.5=2 (4.5+4.5+9+9)÷5=5.4 5.4→6rolls 6×59.99=£359.94 (< £400)	Yes with correct figures	4	M1 for correct method to find number of rolls for £400 M1 for correct method to work out coverage for found number of rolls. M1 for correct method to find area of floor C1 for yes with 40.5 and 45 or M1 for an attempt to fit widths M1 for a correct method to find total number of rolls M1 for correct method to find total cost of rolls C1 for yes with (£)359.94
7	(a)		$0 < x \leq 5$	1	B1 cao
	(b)	35×2.5+20×7.5+12×12.5+8×17.5=527.5 527.5÷75	7.03	4	M1 for f × consistent part of interval (allow 1 error) M1 for f × mid interval (allow 1 error) M1 (dep on at least M1 scored) for '527.5'÷75 A1 for 7 – 7.04
	(c)		Frequency polygon- points plotted at (2.5, 35) (7.5, 20) (12.5,12) (17.5,8)	2	B2 for correct plotting of 4 points (±0.5 sq) and joining with line segments (B1 for points plotted correctly at mid points of intervals OR joining points with line segments at the correct heights and consistent within the class interval (including end values) OR correct frequency polygon with first and last points joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(i) (ii)		=0.4*B3 =SUM(B2:B6)	3	B1 for (=)0.4*B3 oe, eg C3*B3 B1 for (=)SUM(B2:B6) oe, e.g. (=)B2+B3+B4+B5+B6 B1 for using correct spreadsheet notation; condone missing "=" throughout.
9			Correct flow chart	5	B1 for > 100 (allow in words) B1 for 'yes' (consistent) leading to $C - 8$ oe (allow in words) B1 for output box following 'no' or '$C-8$' B1 for end box (stop) B1 for fully correct (condone omission of END box and of 'Amount to pay' = C box) **or** B1 for ≤ 100 (allow in words) B1 for 'no' (consistent) leading to $C - 8$ oe (allow in words) B1 for output box following 'no' or '$C-8$' B1 for end box (stop) B1 for fully correct (condone omission of END box and of 'Amount to pay' = C box)

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		0.05	2	M1 for method shown to work out gradient A1 for 0.05 oe
	(b)		2.50	2	M1 for '0.05' × 50 A1 for 2.5(0) or M1 for using graph to find the cost of 50 km, eg (35 – 30) ÷ 2 A1 for 2.5(0)
11			44.625	3	M2 for (51 ÷ 40) × 35 (M1 for 51 ÷ 40 or 40 ÷ 51 or 40 ÷ 35 or 35 ÷ 40 or ratio, e.g. 51:40 = x:35) A1 for 44 – 45
12		$2x + 2x = 10$, $x = 2.5$ $10 + 5 + 5 + 7.5 + 5 + 12.5$	45	3	M1 for correct equation to find the value of x or (x =) 2.5 M1 for correct method to find the perimeter, $10 + 5 + 2x + 3x + 2x + 5x$ oe, e.g. $2\times10 + 2\times5x$ A1 cao

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)	1500×1.05^2	1653.75	3	M1 for 1500×1.05 (= 1575) oe or 1500×0.05 (= 75) oe M1 for '1575' × 1.05 oe A1 for cao
	(b)		3.04	3	M1 for 2000×1.0025^{12} (= 2060.83(2) M1 for (– 2000) ÷ 2000 × 100 A1 for 3.04 OR M1 for 1.0025^{12} (= 1.0304) M1 for $(1.0025^{12} - 1) \times 100$ A1 for 3.04
14	(a)		(Median =) 23 (IQR =) 14	2	B1 for (median =) 23 B1 for (IQR =) 14
	(b)		Median=26 Greatest value = 45	2	B1 for boy's median drawn at 26 B1 for girl's whisker drawn to 45
	(c)		Comparison	2	B1 for comparison of a specific value (e.g. comparing max values or medians) B1 for comparison of spread e.g. range of one is greater than range of other or interquartile range of one is greater than other (if seen can accept comparison of skewness, e.g. both positively skewed, as an alternative to spread)

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$50(2x - 10) - 35(x + 20) = 1725$ $100x - 500 - 35x - 700 = 1725$ $65x - 1200 = 1725$ $65x = 1725 + 1200 = 2925$ $x = 2925 \div 65 = 45$ (A=) $50 \times 80 = 4000$	4000	4	M1 for $50(2x - 10) - 35(x + 20) = 1725$ oe M1 for an attempt to reducing to the form $65x = b$, $b > 0$ or (x =) 45 M1 for $50 \times (2 \times$ '45' $- 10)$ or $35 \times$ ('45' + 20) + 1725 A1 cao
16	(a)		0.000125	1	B1 cao
	(b)		1.125×10^{-4}	2	M1 for $1.25 \times 9 \times 10^{-5}$ oe or 11.25×10^{-5} or 0.0001125 oe A1 cao
17		let number of acrobat kites = x, let number of dragon kites = y $2x + 3y = 575$ $3x + y = 390$ $2x + 3y = 575$ $9x + 3y = 1170$ $7x = 595$ $x = 595 \div 7 = 85$ $y = 390 - 3 \times 85 = 135$ OR let number of acrobat kites = x, let number of dragon kites = y $y = 390 - 3x$ $2x + 3(390 - 3x) = 575$ $7x = 595$; $x = 85$ $y = 390 - 3 \times 85 = 135$	85, 135	4	M1 for attempt to derive equations, eg $2x + 3y = 575$ or $3x + y = 390$ M1 for full method to eliminate x or y; allow one error in calculation M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 85 and 135 OR M1 for attempt to derive equations, eg $2x + 3y = 575$ or $3x + y = 390$ M1 for full method to rearrange and substitute to eliminate x or y, allow one error in calculation M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 85 and 135

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		12	4	B1 for $\frac{18}{15}$ or $\frac{15}{18}$ oe M1 for $25 \times (1.2)^3$ oe M1 for 400 ÷ (25 + '43.2') A1 for 12 or 6 of each oe
	(b)		144	2	M1 for $100 \times \left(\frac{18}{15}\right)^2$ A1 cao
19	(a)		Reason	1	B1 for correct reason, e.g. not representative, biased oe
	(b)		12 or 13	3	M1 for (235 ÷ 692) × *N* = 20 or (N =) 58.8(9) M1 for (148 ÷ 692) × '59' A1 for 12 or 13 or M1 for (20 ÷ 235) × 100 or 8.5(%) seen M1 for (8.5 ÷ 100) × 148 A1 for 12 or 13 or M2 for 20 ÷ 235 × 148 (M1 for ratio, e.g. 20:235=*N* : 148) A1 for 12 or 13

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)		$x + y \leq 10$	1	B1 for $x + y \leq 10$ oe (accept $x + y < 10$)
	(b)(i)	$24x+16y \leq 192$ (÷8), $3x+2y \leq 24$ as required	$3x+2y \leq 24$	4	M1 for attempting to combine $24x$, $16y$ and 192 into a single inequality A1 for completing the algebra correctly
	(ii)		Inequality shaded		M1 for line drawn through (0,12) and (8,0) A1 for region shaded above line
	(c)(i)		$1000x + 750y$	3	B1 for $1000x + 750y$ oe
	(ii)	$1000 \times 4 + 750 \times 6 = £8500$	4 and 6		M1 for attempt to evaluate $1000x + 750y$, where x and y are integers and $x > 0$, $y > 0$ A1 for (type A=) 4 and (type B=) 6 oe or greatest profit=(£)8500
21		e.g. $1 \times 7.6 + 3 \times 9.4 + 2 \times 5.6 + 6 \times 1.4 = 55.4$ $55.4 \div 2 = 27.7$ $27.7-7.6 = 20.1$ $20.1 \div 9.4 = 2.138\ldots$ Median $= 55 + 2.138\ldots \times 2.5 = 60.345\ldots$	60.3	4	M1 for attempt to find the area of one bar M1 for attempt to find total area ÷ 2 (condone one error) M1 for correct attempt to locate median in second bar (condone one arithmetic error) A1 for 60.3(4...)

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Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Tuesday 11 June 2013 – 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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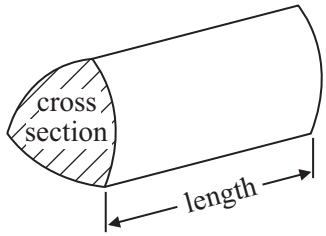
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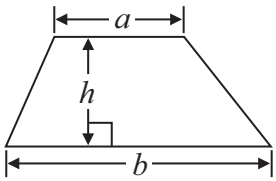
Formulae: Higher Tier

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

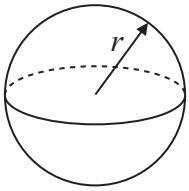


Area of trapezium = $\frac{1}{2}(a + b)h$



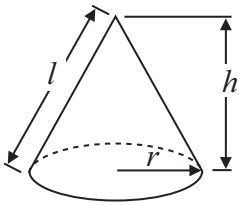
Volume of sphere = $\frac{4}{3}\pi r^3$

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

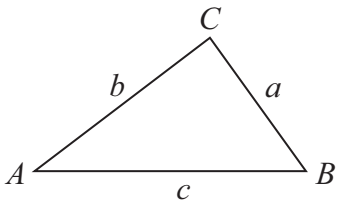


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 stages in your working.

1 Mabintou buys 9 plates for £12.15

Work out the cost of 5 of these plates.

£.....

(Total for Question 1 is 2 marks)

2 Liz books a holiday.

The normal price of the holiday is £860
Liz gets a discount of 12.5% off the normal price.

How much is the discount?

£.....

(Total for Question 2 is 2 marks)

3 Graham is going to carry out a survey on holidays.
He wants to find out how often people go on holiday.

(a) Design a question that Graham could use in his questionnaire.

(2)

Graham is going to stand outside a travel agents.
He is only going to give his questionnaire to the first 10 women coming out of the travel agents.

This may **not** be a good sample for Graham's survey.

(b) Give **two** reasons why.

Reason 1 .....

.....

.....

Reason 2 .....

.....

.....

(2)

(Total for Question 3 is 4 marks)

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*4 Peter wants to change £300 into dollars ($).
He goes to the post office to change his money.

The post office only has $20 notes.

The exchange rate is £1 = $1.58

Peter wants to change as much of his £300 as possible.

How many $20 notes will Peter get?

(Total for Question 4 is 4 marks)

5 The width of a kitchen cupboard is 57 cm correct to the nearest centimetre.

(a) Write down the **least** possible width of the cupboard.

..... cm

(1)

(b) Write down the **greatest** possible width of the cupboard.

..... cm

(1)

(Total for Question 5 is 2 marks)

6 A machine drills holes in a flat piece of metal.

The diagram shows the positions of the centres of two holes given as coordinates.

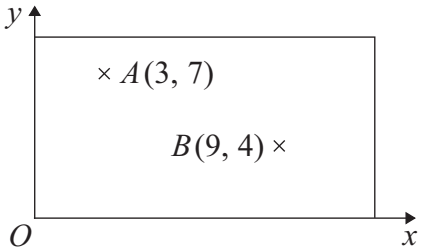


Diagram **NOT** accurately drawn

Hole A is at (3, 7).
Hole B is at (9, 4).

The machine is going to drill a hole at the midpoint of the line AB.

Work out the coordinates of the midpoint of the line AB.

(..... , ...)

(Total for Question 6 is 2 marks)

7 There are 240 passengers in an aeroplane.

$\frac{1}{5}$ of the passengers are in First class.

$\frac{3}{8}$ of the passengers are in Business class.

The rest of the passengers are in Economy class.

How many passengers are in Economy class?

.....

(Total for Question 7 is 3 marks)

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8 Mr Shah uses a spreadsheet to record the cost of 1 kg of bananas in his shop.
He also uses the spreadsheet to record the number of kilograms of bananas he sells.

The spreadsheet shows this information for 4 weeks.

	A	B	C	D
1		cost of 1 kg of bananas in pence	number of kg of bananas sold	
2	week 1	63	53	
3	week 2	67	72	
4	week 3	65	84	
5	week 4	68	69	
6				

Mr Shah also wants the spreadsheet to show

in cell C6, the total number of kilograms of bananas he sold in the 4 weeks
in cell D2, the total cost of all the bananas he sold in week 1

Write down,

(i) a formula for cell C6

C6 .....

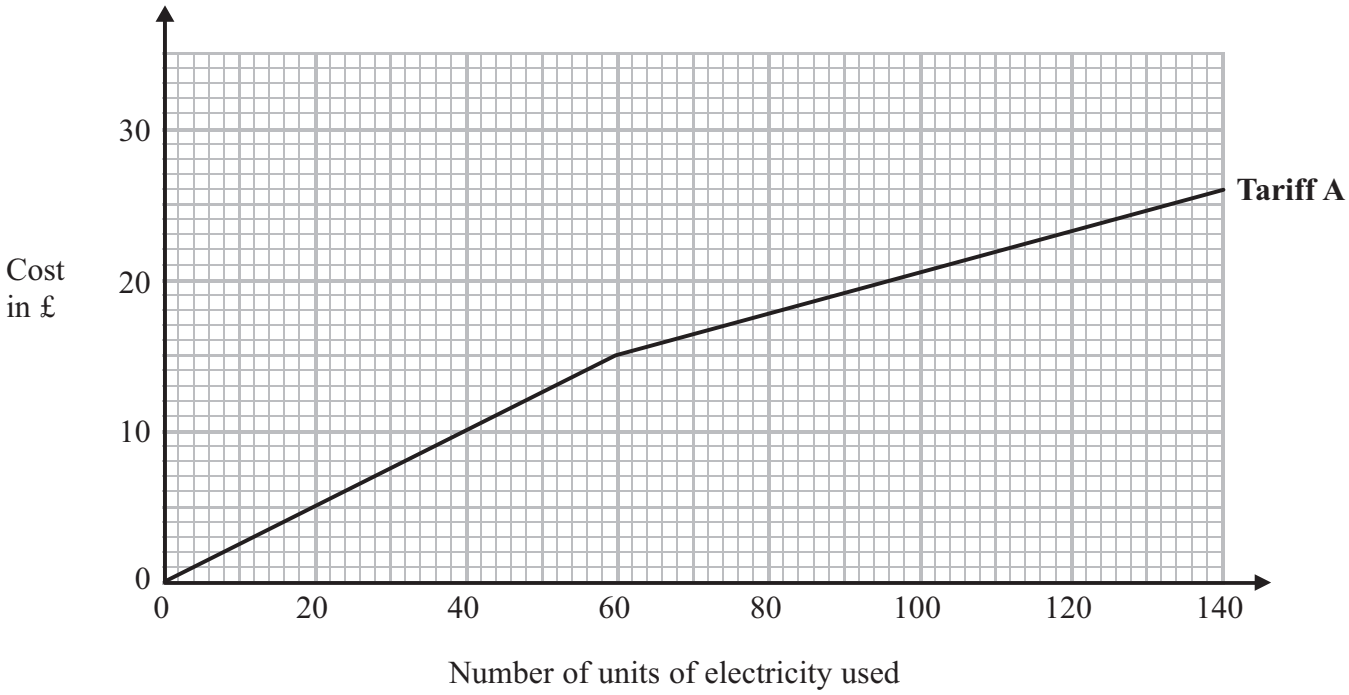
(ii) a formula for cell D2

D2 .....

(Total for Question 8 is 3 marks)

9 Kalinda pays on Tariff A for the number of units of electricity she uses.

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



(a) How much does Kalinda pay for each unit of electricity she uses up to a total of 60 units?

..... p

(2)

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

20p per unit of electricity used

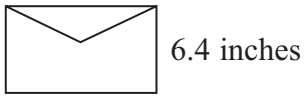
On average, Kalinda uses 90 units of electricity each month.
Kalinda wants to pay the least amount of money for the units of electricity she uses.

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

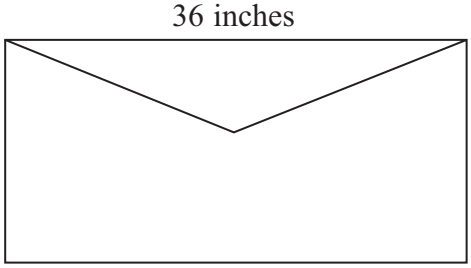
(3)

(Total for Question 9 is 5 marks)

10 A C5 envelope and a C1 envelope are mathematically similar.



C5 envelope



C1 envelope

Diagram **NOT** accurately drawn

A C5 envelope has a length of 9 inches and a width of 6.4 inches.
A C1 envelope has a length of 36 inches.

(a) Work out the width of a C1 envelope.

..... inches

(2)

A C3 envelope is mathematically similar to a C5 envelope.
A C3 envelope has a length of 18 inches and a width of 12.8 inches.

Debbie says,
"The area of the front of a C3 envelope is two times the area of the front of a C5 envelope."

(b) Is Debbie right?
You must explain your answer.

(2)

(Total for Question 10 is 4 marks)

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11 Richard is going to cover a bathroom wall with tiles.

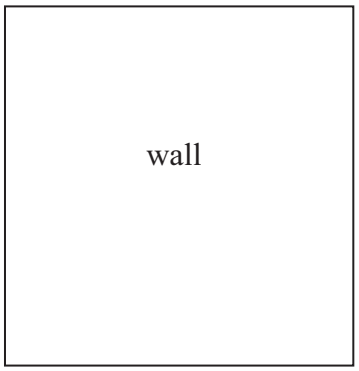
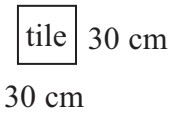


Diagram **NOT** accurately drawn



The wall is in the shape of a rectangle.
The wall is 1.8 m long and 2.4 m high.

The tiles are squares with sides of 30 cm.

There are 14 tiles in a box.

How many boxes of tiles does Richard need?
You must show all your working.

.....

(Total for Question 11 is 5 marks)

12 Becky, Chris and Dan are playing a game with marbles.

Becky has some marbles.
Chris has three times as many marbles as Becky.
Dan has four marbles more than Chris.

They have a total of 158 marbles.

Work out how many marbles Becky has.
You must show all your working.

.....

(Total for Question 12 is 4 marks)

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13 Sal asked 60 adults if they liked Chinese food best or Italian food best or Thai food best.

29 of the adults were women.
6 of the women liked Thai food best.
10 of the men liked Chinese food best.
8 of the 13 adults who liked Italian food best were women.

Work out the number of men who liked Thai food best.

.....

(Total for Question 13 is 4 marks)

14 Malcolm's salary is £28 000
His salary is increased by £700

(a) Work out the percentage increase in Malcolm's salary.

.....%

(2)

Malcolm puts £3000 into a savings account for 3 years.

The account pays compound interest of

4% per annum in the first year
4.6% per annum in the second year
4.6% per annum in the third year

(b) Work out how much money will be in Malcolm's account at the end of the third year.

£.....

(3)

(c) Work out the annual equivalent rate (AER) over these 3 years.
Give your answer correct to one decimal place.
You must show your working.

.....%

(3)

(Total for Question 14 is 8 marks)

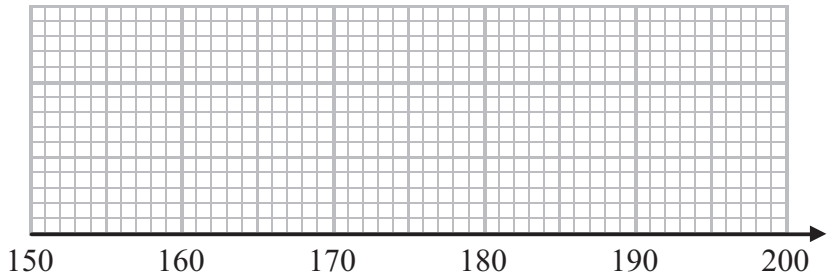
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15 Liam measured the heights, in centimetres, of the boys in his class.

The table shows some information about the heights.

Height of shortest boy	154 cm
Lower quartile	160 cm
Median	172 cm
Upper quartile	178 cm
Height of tallest boy	191 cm

(a) On the grid, draw a box plot to show this information.



(2)

Liam also measured the heights, in centimetres, of the girls in his class.

The girls have

a median height of 168 cm
a range of 42 cm

*(b) Compare the distribution of the heights of the boys with the distribution of the heights of the girls.

.....

.....

.....

.....

.....

(2)

(Total for Question 15 is 4 marks)

16 120 students did an English exam.

The cumulative frequency table gives information about their marks.

Mark (m)	Cumulative frequency
$0 < m \leqslant 20$	9
$0 < m \leqslant 40$	66
$0 < m \leqslant 60$	100
$0 < m \leqslant 80$	112
$0 < m \leqslant 100$	120

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

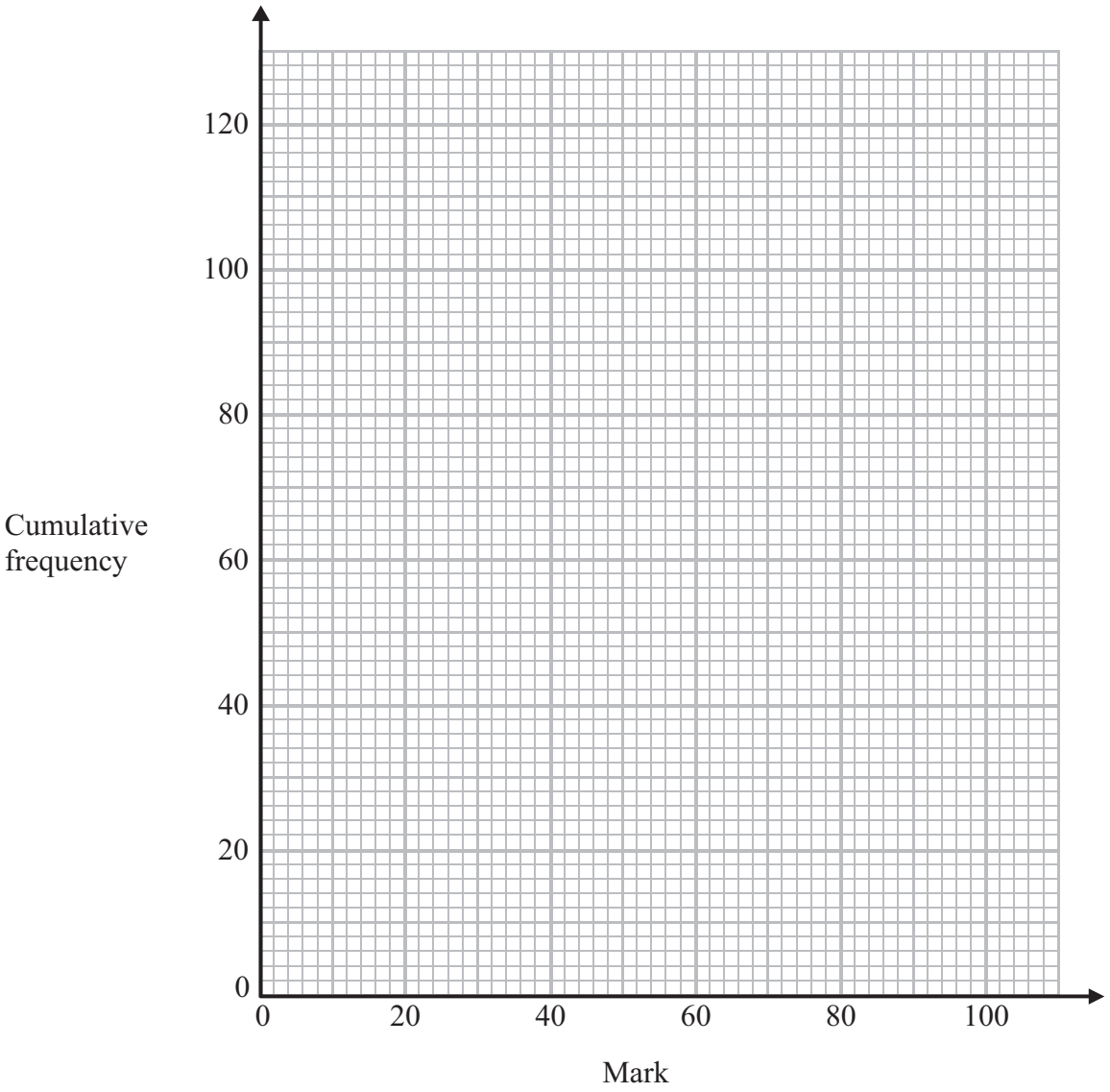
Students with a mark from 64 to 80 got a grade A.

(b) Work out an estimate for the percentage of students getting a grade A.

.....

(4)

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(Total for Question 16 is 6 marks)

17 A company makes two different desks.

The top of one desk is in the shape of a trapezium.
The top of the other desk is in the shape of a rectangle.

The diagram shows the tops of the two desks.

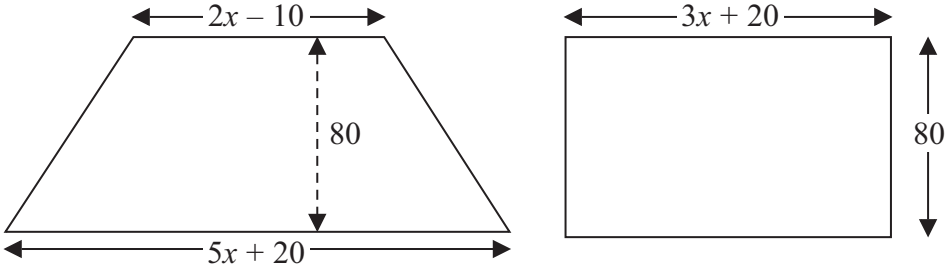


Diagram **NOT** accurately drawn

All measurements are in centimetres.

The tops of the two desks have the same area.

Work out the length, in centimetres, of the rectangular desk.
You must show all your working.

..... cm

(Total for Question 17 is 6 marks)

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18 The table shows the distance from Earth, in kilometres, of seven planets.

Planet	Distance from Earth (km)
Mercury	91.7×10^6
Venus	4.14×10^7
Mars	78.3×10^6
Jupiter	624.4×10^6
Saturn	1.25×10^9
Uranus	2.72×10^9
Neptune	43.5×10^8

(a) Write the distance in kilometres of Jupiter from Earth in standard form.

..... km

(1)

Saturn is further from Earth than Venus is.

(b) How many times further?
Give your answer correct to the nearest integer.

.....

(2)

(c) How many **miles** is Mars from Earth?
Give your answer correct to 1 significant figure.

.....miles

(2)

(Total for Question 18 is 5 marks)

19 In a sale, normal prices are reduced by 15%.

Janice buys a computer in the sale.
She pays £578

Work out what the normal price of the computer was.

£.....

(Total for Question 19 is 3 marks)

20 The table shows information about the ages of the people in a tennis club.

Age range	Frequency
under 18	67
18 to 35	52
36 to 60	124
over 60	63

The membership secretary gives a questionnaire to some of these people.
She takes a sample of exactly 50 people stratified by age range.

Work out the number of people aged 36 to 60 she should have in the sample.

.....

(Total for Question 20 is 2 marks)

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21 Alex and Ben go to a cafe with some friends.

Alex buys 4 cups of coffee and 3 cups of tea.
He pays a total of £6.95

Ben buys 5 cups of coffee and 2 cups of tea.
He pays a total of £7.20

Work out the cost of each cup of coffee and the cost of each cup of tea.

Cup of coffee.....

Cup of tea.....

(Total for Question 21 is 5 marks)

22 Dennis is going to buy some bookcases and some lamps to sell in his shop.

Each bookcase costs £18
Each lamp costs £12

Dennis has a maximum of £360 to spend.

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

(a) Show that $3x + 2y \leqslant 60$

(2)

The first constraint is $3x + 2y \leqslant 60$

The other constraints are $y \leqslant 2x$, $x + y \leqslant 24$

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

(4)

Dennis makes a profit of £20 for each bookcase he sells.
He makes a profit of £15 for each lamp he sells.

(c) Write down the objective function.

.....

(1)

(d) Use your objective function to find

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

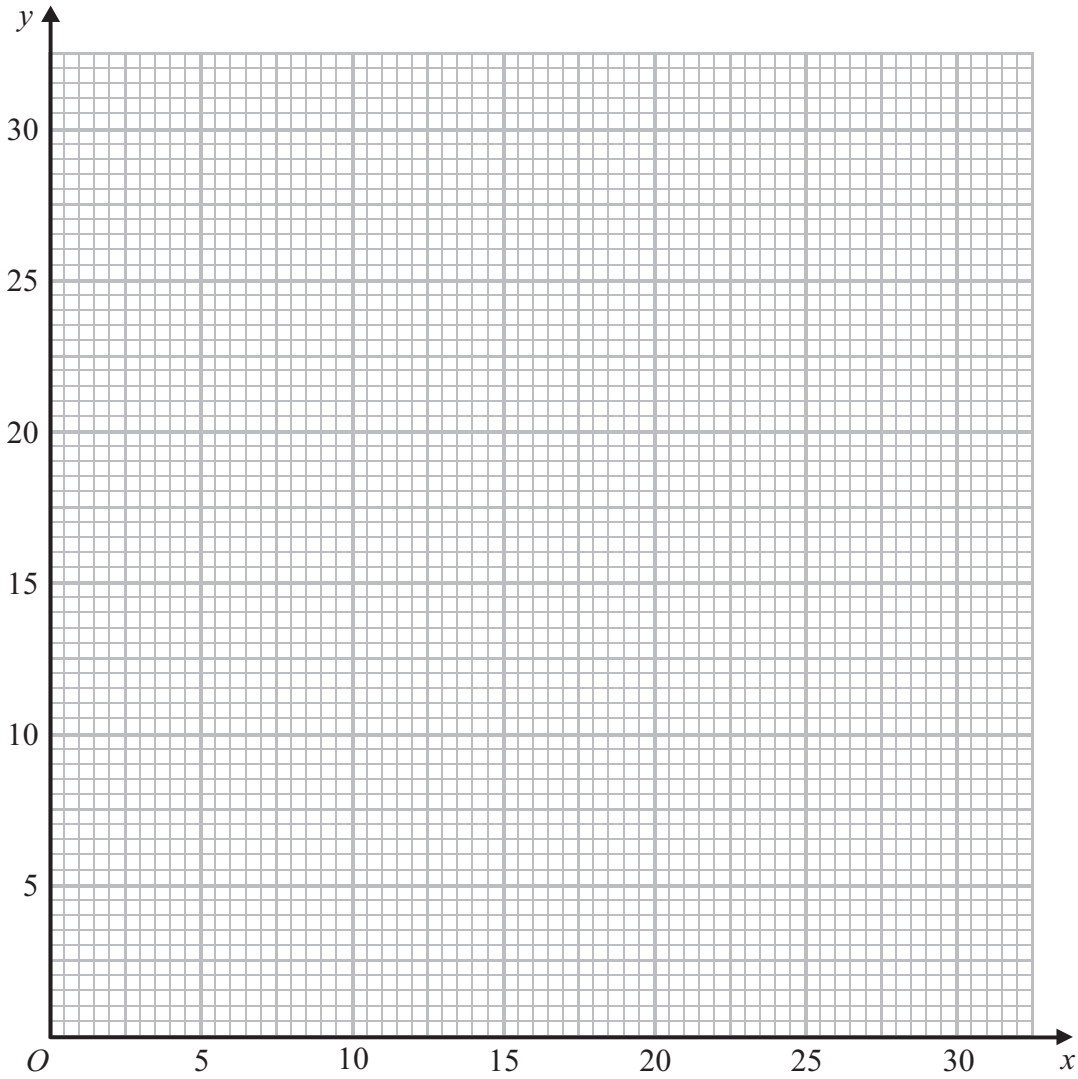
greatest profit £ .....

number of bookcases .....

number of lamps .....

(3)

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(Total for Question 22 is 10 marks)

Turn over for Question 23

23 The table gives information about the weights, in kg, of some parcels.

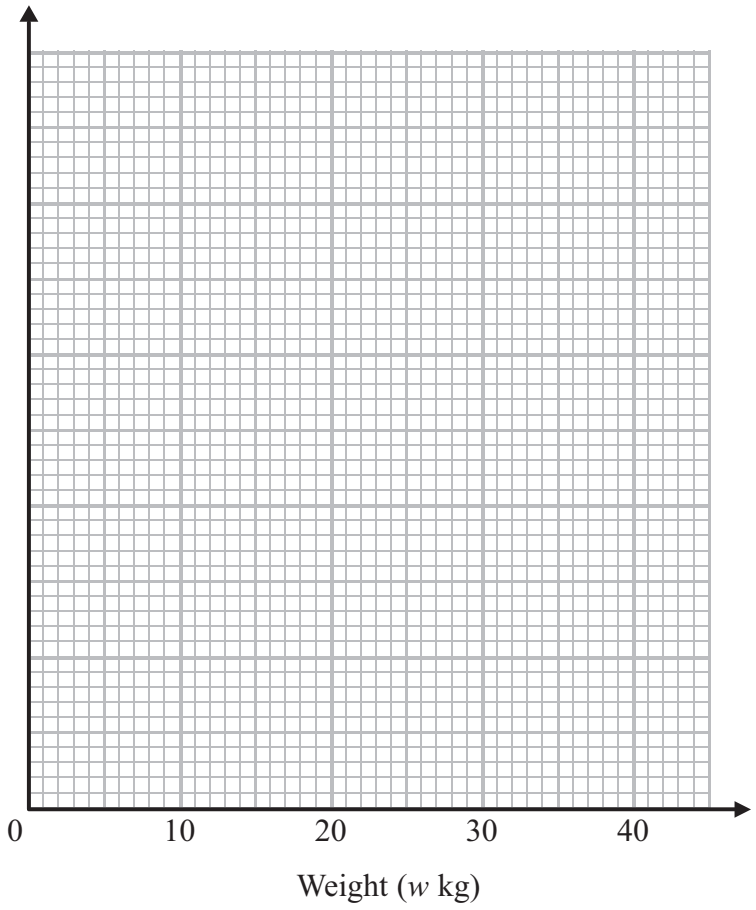
Weight (w kg)	Frequency
$0 < w \leqslant 5$	20
$5 < w \leqslant 10$	13
$10 < w \leqslant 20$	10
$20 < w \leqslant 40$	7

(a) Work out an estimate for the mean weight of a parcel.

..... kg

(4)

(b) On the grid, draw a histogram for the information in the table.



(3)

(Total for Question 23 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

Summer 2013

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Higher (Calculator) Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$12.15 \div 9 \times 5$	6.75	2	M1 for $12.15 \div 9 \times 5$ A1 cao
2		$\frac{12.5}{100} \times 860$	107.50	2	M1 for $\frac{12.5}{100} \times 860$ oe A1 for 107.50 or 107.5 SC: B1 for £752.5(0) without M1 scored
3	(a)		Suitable question with response boxes	2	B1 for a question about number of holidays within a time frame OR question about frequency of holidays with time frame(s) in response boxes. B1 for at least 3 correctly labelled non-overlapping response boxes (need not be exhaustive) OR 3 or more exhaustive response boxes which may overlap. [Do not accept inequalities in response boxes] NB Frequency tables or data collection sheets score B0
	(b)		Suitable reasons	2	B2 for two correct reasons relating to the types below (B1 for any one correct reason) Bias relating to gender with reason. Bias relating to travel agents with reason. Sample not random with reason. Sample size too small.

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*4		20 ÷ 1.58 (12.65…) 300 ÷ 12.65..=23.7	23	4	M1 for 20 ÷ 1.58 (12.65…) M1 for 300 ÷ '12.65..' (=23.7) **or** repeated addition **or** repeated subtraction A1 for 23.7 C1 for 23 clearly identified as final answer **or** M1 for 300 × 1.58 (=474) M1 for '474' ÷ 20 (=23.7) **or** 460 ÷ 20 A1 for 23.7 **or** 460 and 23 C1 for 23 clearly identified as final answer
5	(a)		56.5	1	B1 cao
	(b)		57.5	1	B1 for 57.5 (accept 57.499… or 57.4$\dot{9}$ with 9 shown to be recurring)
6			(6, 5.5)	2	M1 for complete correct method to find *x* **or** *y* coordinate A1 cao

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7		240 ÷ 5 (=48) 240 ÷ 8 × 3 (=90) 240 – '48' – '90'	102	3	M1 for correct method for number in First class 240 ÷ 5 (= 48) **or** number in Business class 240 ÷ 8 × 3 (= 90) M1 (dep) for 240 – '48' – '90' A1 cao **OR** M1 for attempt to find common denominator to add $\frac{1}{5}$ and $\frac{3}{8}$ with at least one fraction correct OR $\frac{23}{40}$ M1 (dep) for $[1-('\frac{8}{40}'+'\frac{15}{40}')]\times 240$ A1 cao **OR** M1 for attempt to convert both $\frac{1}{5}$ **and** $\frac{3}{8}$ to decimals with at least one decimal 0.2 or 0.375 correct OR 0.575 M1 (dep) for [1 – ('0.2'+ ' 0.375')] × 240 A1 cao
8	(a)(i) (a)(ii)		= C2 + C3 + C4 + C5 = B2 * C2	3	B1 for (=) C2 + C3 + C4 + C5 or (=)SUM(C2:C5) or clear intention to add correct cells B1 for (=) B2*C2 or (=) B2*C2/100 or clear intention to multiply correct cells. C1 for correct spreadsheet notation for both. Condone missing = sign. NB: do not accept '×' in place of '*'

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	15 ÷ 60	25p	2	M1 for 15 ÷ 60 oe or clear attempt to find gradient A1 for £0.25 or 25p
	(b)	0.2 × 90 (=18) From graph 90 units costs £19	Yes as cost will be lower	3	M1 for Tariff B price for 90 units 20 × 90 (=1800) **or** 0.2 × 90(=18) OR Tariff A price per unit $\frac{1900}{90}$ **or** $\frac{19}{90}$ B1 for reading from Tariff A graph at 90 units **or** £19 C1 for £18 and £19 with 'yes' or 21.(1…)p with 'yes' OR M1 for drawing the correct line (for Tariff B) through the origin with gradient 0.2 B1 for reading from Tariff A graph at 90 units **or** 19 seen C1 for £18 and £19 with 'yes'
10	(a)	36÷9×6.4	25.6	2	M1 for 36÷9 or 9÷36 or $\frac{36}{9}$ oe or $\frac{9}{36}$ oe A1
	(b)		No with explanation	2	M1 for $(12.8\div6.4)^2$ or $(18\div2)^2$ or 2^2 or 4 C1 for No with 4 and explanation showing area of C3 envelope is 4 × area of C5 envelope. OR M1 for 9×6.4(=57.6) or 12.8×18 (=230.4) **or** correct diagrammatic representation C1 for No with 57.6 and 230.4 and explanation showing area of C3 envelope is 4 × area of C5 envelope **or** 115.2 and area of C3 envelope is not 2× area of C5 envelope.

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		2.4 ÷ 0.3 = 8 1.8 ÷ 0.3 = 6 8 × 6 = 48 48 ÷14 = 3.42… 2.4 × 1.8 = 4.32 0.3 × 0.3 = 0.09 4.32 ÷ 0.09 = 48 48 ÷ 14 = 3.42…	4	5	B1 for correct conversion of units M1 for correct attempt to find how many rows of tiles using their units consistently. M1 for complete correct method to find the number of tiles needed. M1 for number of tiles ÷ 14 and round up A1 cao for 4 packs of tiles supported by correct working B1 for correct conversion of units M1 for correct method for Area of wall **and** Area of tile using their units consistently. M1 for complete correct method to find the number of tiles needed. M1 for number of tiles ÷ 14 and round up A1 cao for 4 packs of tiles supported by correct working
12		$x + 3x + 3x + 4 = 158$ $7x + 4 = 158$ $7x = 154$	22	4	M1 for $3x$ or $3x + 4$ seen M1 (dep) for forming equation x + '$3x$' + '$3x$+4' = 158 M1 for intention to isolate x term(s) in their equation if of the form $ax + b=158$ A1 22 cao dep on at least M1 awarded OR M1 for a correct trial with $x \geq 1$ to evaluate x, $3x$ and $3x + 4$ (algebraic expressions may not be seen) M1 for 3 values that sum to 158 M1 for intention to add 22 + 3×22 + 3×22 + 4 (=158) A1 for 22 cao dep on at least M1 awarded

<table>
<tr><th colspan="5">PAPER: 5AM1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>13</td><td></td><td>60 – 29 = 31
13 – 8 = 5
31 – 10 – 5 = 16

<table><tr><td></td><td>Th</td><td>C</td><td>It</td><td></td></tr><tr><td>W</td><td>6</td><td>15</td><td>8</td><td>29</td></tr><tr><td>M</td><td>16</td><td>10</td><td>5</td><td>31</td></tr><tr><td></td><td>22</td><td>25</td><td>13</td><td>60</td></tr></table></td><td>16</td><td>4</td><td>M1 for calculation of total Men 60 – 29 (=31 Men)
M1 for calculation for Men who like
Italian 13 – 8 (= 5 Men like Italian)
M1 for calculation for Men who liked Thai ‘31’ – 10 – ‘5’
A1 for 16

OR
M1 for a 2-way table or diagram with clear labelling showing at least 3 pieces of the given information correctly placed
M1 for correct method for one calculated entry in diagram:
Men 60-29(=31)
or Women and Chinese 29-8-6(=15)
or Men and Italian 13-8(=5)
M1 for 3 correct entries for Men or 2 correct entries for Thai that with correct arithmetic would lead to 16 (Men and Thai)
A1 for 16</td></tr>
</table>

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	$\frac{700}{28000} \times 100$	2.5	2	M1 for $\frac{700}{28000} \times 100$ oe A1 cao
	(b)		3413.64	3	M1 for 3000×0.04oe (=120) M1 for (3000 + '120')$\times 1.046^2$ oe A1 cao **or** M2 for $3000 \times 1.04 \times 1.046^2$ **or** 3000×1.13788064 (M1 for 3000×1.04 or 3000×1.046) A1 cao SC: B2 for 3413.6419….
	(c)		4.4%	3	M1 for $1.04 \times 1.046 \times 1.046$ (= 1.1378…) **or** $\frac{3413.64}{3000}$ (= 1.1378...) M1 for $\sqrt[3]{\text{'1.1378...'}} - 1$ (= 0.0439…) A1 4.39 – 4.4
15	(a)		box plot	2	B2 for fully correct box plot (B1 for 3 correctly plotted values with box **or** whiskers)
	(b)		comparisons	2	C1 for comparison of medians in context implied by height or taller/shorter C1 for comparison of range for boys and for girls.

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		cf graph drawn	2	M1 for 4 of 5 points plotted consistently within each interval A1 for a fully correct cf graph
	(b)		Correct percentage consistent with appropriate method used	4	B1 ft read off at cf=64 from a cf graph tolerance ½ square M1 for (112 – '102') (= 10) M1 for (112 – '102') ÷120 × 100 A1 ft dependent on previous M1
17		$\frac{1}{2}(2x - 10 + 5x + 20)$ $= 3x + 20$ $7x + 10 = 6x + 40$ $x = 30$ 3×'30' + 20	110	6	M1 for $\frac{1}{2}(2x - 10 + 5x + 20) \times 80$ **or** $(3x + 20) \times 80$ M1 for setting up correct equation **and** dealing with $\frac{1}{2}$ correctly M1 for correct method to isolate terms in x in their equation A1 for $x = 30$ M1 ft for 3×'30' + 20 A1 for 110 **Or** M1 for $\frac{1}{2}(2x - 10 + 5x + 20)$ M1 for $\frac{1}{2}(2x - 10 + 5x + 20) = (3x + 20)$ **and** dealing with $\frac{1}{2}$ correctly M1 for correct method to isolate terms in x A1 for $x = 30$ M1 ft for 3×'30' + 20 A1 ft for 110

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		6.244×10^8	1	B1 cao
	(b)	$1.25\times10^9 \div 4.14 \times 10^7$	30	2	M1 for $1.25\times10^9 \div 4.14 \times 10^7$ (=30.1932…) A1 for 30 – 30.2
	(c)	$78.3\times10^6 \times 5 \div 8$	50 000 000	2	M1 for correct method to convert 78.3×10^6 to miles eg $78.3 \times 10^6 \times 5 \div 8$ (=48 937 500) A1 for 50 000 000 or 5×10^7
19		$578 \div 0.85$	680	3	M1 for 100% – 15% (=85%) or 1 – 0.15 (=0.85) oe M1 for $578 \div 0.85$ A1 cao
20		$67 + 52 + 124 + 63 = 306$ $\frac{124}{306} \times 50$ (=20.26…)	20	2	M1 for $\frac{124}{306} \times 50$ (=20.26…) or 20.26… A1 cao
21		$4x + 3y = 695$ $5x + 2y = 720$ $8x + 6y = 1390$ $15x + 6y = 2160$ $7x = 770$ $x = 110$ $y = 85$	Coffee £1.1(0) Tea 85p	5	M1 for attempt to use variables for cost of cup of tea and cost of a cup of coffee. A1 for correct equations : $4x + 3y = 695$ and $5x + 2y = 720$oe M1 for correct process to eliminate either x or y (condone one arithmetic error) could be by multiplication of both equations and then addition/subtraction **or** by manipulation of one equation and then substitution into second equation M1 (dep) for substituting found value into either equation A1 for correct answers with units

PAPER: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)	$18x + 12y \leq 360$	$3x + 2y \leq 60$	2	M1 $18x + 12y$ linked to 360 A1 for complete correct algebraic process leading to $3x + 2y \leq 60$
	(b)		Graph	4	M1 for $2x = y$ drawn M1 for $3x + 2y = 60$ drawn M1 for $x + y = 24$ drawn A1 for indicating correct region
	(c)		$20x + 15y$	1	B1 for $20x + 15y$
	(d)		420, 12, 12	3	M1 for attempt to find profit at any point of intersection eg. $15 \times 16 + 20 \times 8$ or line $20x + 15y = k$ drawn M1 for identifying point where maximum profit occurs A1 for 420, 12, 12 cao
23	(a)	$2.5 \times 20 + 7.5 \times 13 + 15 \times 10 + 30 \times 7$ $=50 + 97.5 + 150 + 210$ $=507.5$ $507.5 \div 50$	10.15	4	M1 for finding fx consistently within interval including end points (allow 1 error) M1 (dep) for use of all correct midpoints M1 (dep on first M) for $\frac{\sum fx}{\sum f}$ A1
	(b)	$20 \div 5$, $13 \div 5$, $10 \div 10$, $7 \div 20$	Histogram with frequency density labelled	3	M1 for $20 \div 5 (=4)$ **or** $13 \div 5 (=2.6)$ **or** $10 \div 10 (=1)$ **or** $7 \div 20 (=0.35)$ A1 for bars of consistent areas for **all** given frequencies B1 for frequency density axis labelled **Or** M1 for 3 or more bars of consistent area drawn A1 for bars of consistent area for **all** given frequencies B1 for frequency density axis labelled

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q09		x-axis: 1.5 cm for 10. y-axis: 1.5 cm for £2,50 Top row of grid removed. Graph line: (0,0) to (60, 15) as standard paper. Then from (60, 15) to end going through (110, 20)	B1 for reading from Tariff A graph at 90 units (accept £17 - £19) M1 for Tariff B price for 90 units 20 × 90 (=1800) or 0.2 × 90(=18) OR Tariff A price per unit "18"/90 C1 for correct conclusion for £18 (for tariff B) and their Tariff A price or 20p with "no difference" oe OR B1 for reading from Tariff A graph at 90 units (accept £17 - £19) M1 for drawing the correct line (for Tariff B) through the origin with gradient 0.2 C1 for correct conclusion for £18 (for tariff B) and their Tariff A price

PAPER: 5AM1H_01			
Question		**Modification**	**Notes**
Q15		Values changed in table: 154 changed to 155, 160 stays the same, 172 changed to 175, 178 changed to 180, 191 changed to 195. 2 cm grid.	Standard mark scheme
Q16		Cumulative frequencies: 10, 60, 90, 110, 120 grid: 2 cm for 10 on both axes. (b): 64 to 80 changed to 65 to 80.	B1 ft read off at cf = 65 from a cf graph tolerance 5mm M1 for (110 – '95') (= 15) M1 for (110 – '95') ÷120 × 100 A1 ft dependent on previous M1
Q23		2 cm grid.	Standard mark scheme
Q17		*x* changed to *y*	Variable changed *x* to *y*
Q18		Top row removed from the table. Wording changed from seven planets to six planets.	Standard mark scheme
Q22		Grid: 1.5 cm for 2.5 on both grids.	Standard mark scheme
Q23		2 cm grid.	Standard mark scheme

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Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Tuesday 6 November 2012 – 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 ▶

P40681A

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6/6/7/5/4/

P 4 0 6 8 1 A 0 1 2 8

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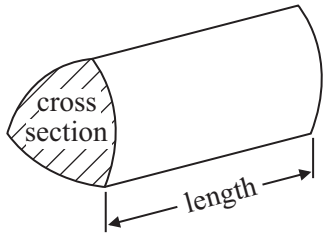
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GCSE Mathematics 2AM01

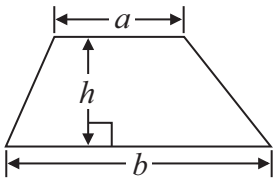
Formulae: Higher Tier

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 × length

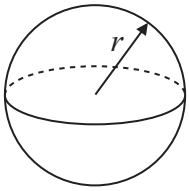


Area of trapezium = $\frac{1}{2}(a + b)h$



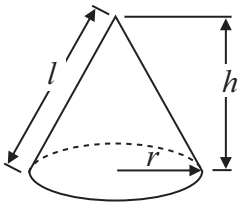
Volume of sphere = $\frac{4}{3}\pi r^3$

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

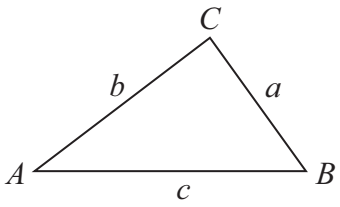


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 stages in your working.

1 Terry and June go on holiday to Norway.

Terry changes £375 into Kroner (Kr).

The exchange rate is £1 = 9.02 Kr.

(a) Work out how many Kroner (Kr) Terry gets for £375

..... Kr

(2)

In Norway June sees a jumper costing 675 Kr.

In London the same type of jumper costs £75

The exchange rate is £1 = 9.02 Kr.



(b) Work out the difference between the cost of the jumper in Norway and the cost of the jumper in London.

.....

(3)

(Total for Question 1 is 5 marks)

2 The diagram shows the plan of a hall floor.

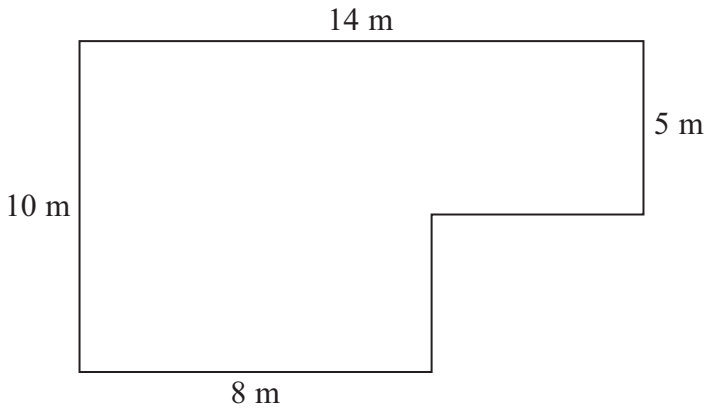


Diagram **NOT** accurately drawn

All the corners are right angles.

Jill is going to paint the hall floor.
It takes her 4 minutes to paint 1 m^2.

Jill starts painting at 7 am.
She has a 30-minute break at 11 am.

Work out the time Jill should finish painting the hall floor.

.....

(Total for Question 2 is 6 marks)

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3 Ben puts a cover over the sandpit in his garden.

The cover is in the shape of a trapezium.

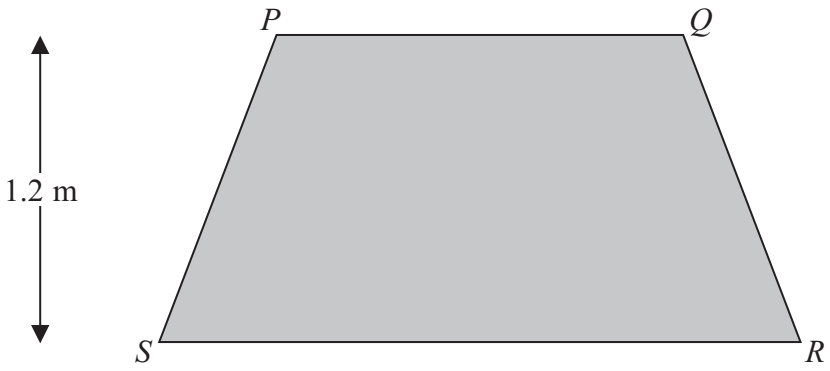


Diagram **NOT** accurately drawn

The cover has a height of 1.2 m.
The length of SR is 1.8 m longer than the length of PQ.

The cover has an area of 4.8 m^2.

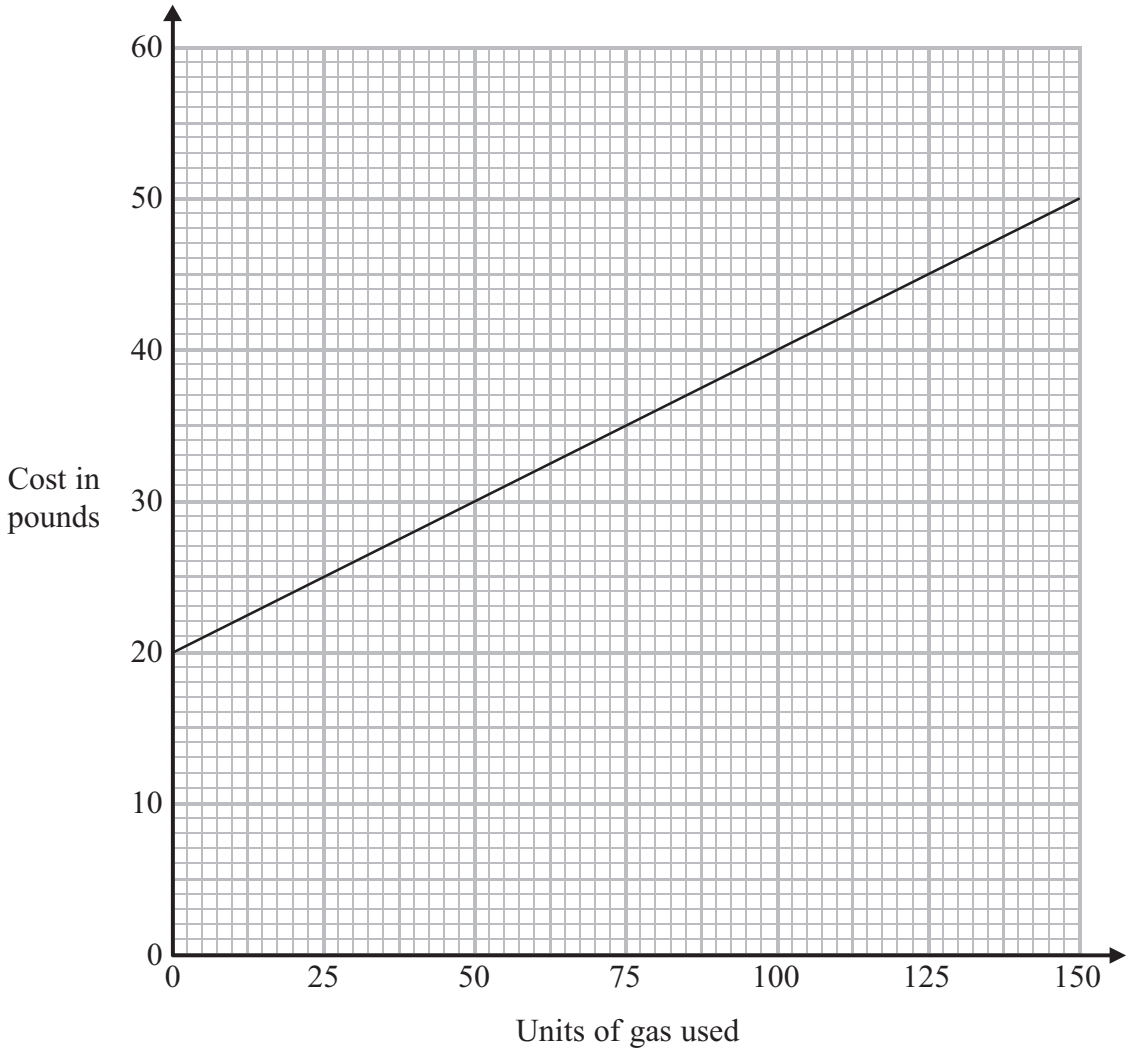
Work out the length of PQ.

..... m

(Total for Question 3 is 5 marks)

4 Simon has gas central heating.
He buys his gas from the Seagas company.

Simon draws this graph to show how much the company charges him for gas each month.



(a) Find the cost of using 75 units of gas.

£ .....

(1)

(b) (i) Find the gradient of the straight line graph.

.....

(ii) What is the cost of each unit of gas?

.....

(3)

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Simon wants to compare the cost of two other gas companies with what he pays to Seagas.
Here are their monthly charges.

Sandygas 50p per unit of gas used.

Gas&Air £30 monthly fee.
The first 25 units are free and each extra unit of gas costs 10p.

Simon uses between 75 and 100 units of gas each month.

*(c) Which company gives Simon the best deal, Seagas, Sandygas or Gas&Air?
You must show your working and explain your answer.

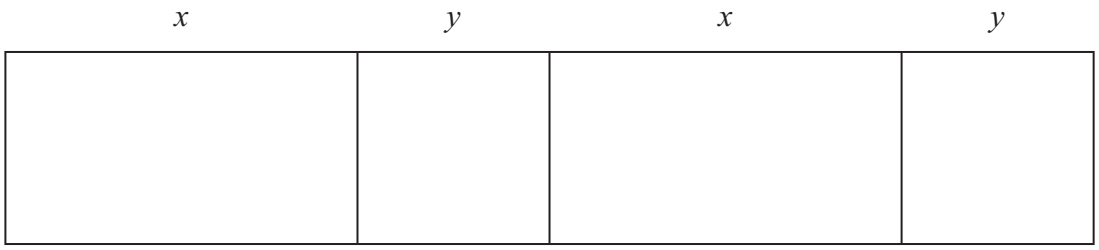
(4)

(Total for Question 4 is 8 marks)

5 Bob owns a shop that sells wallpaper.

Bob sets up a spreadsheet to work out the number of rolls of wallpaper needed for rooms of different sizes.
He ignores the doors and the windows in his calculations.

The diagram shows the four walls of a room.



The length of each long wall is x metres.
The length of each short wall is y metres.

To work out the number of rolls of wallpaper needed Bob has to divide the total wall length by 2

	A	B	C	D
1	**Length x**	**Length y**	**Total wall length**	**Rolls of wallpaper**
2	5	3		
3				

(a) Write in the formulae that need to go into C2 and D2

C2 Total wall length .....

D2 Rolls of wallpaper .....

(4)

(b) Work out the number of rolls of wallpaper needed.

.....

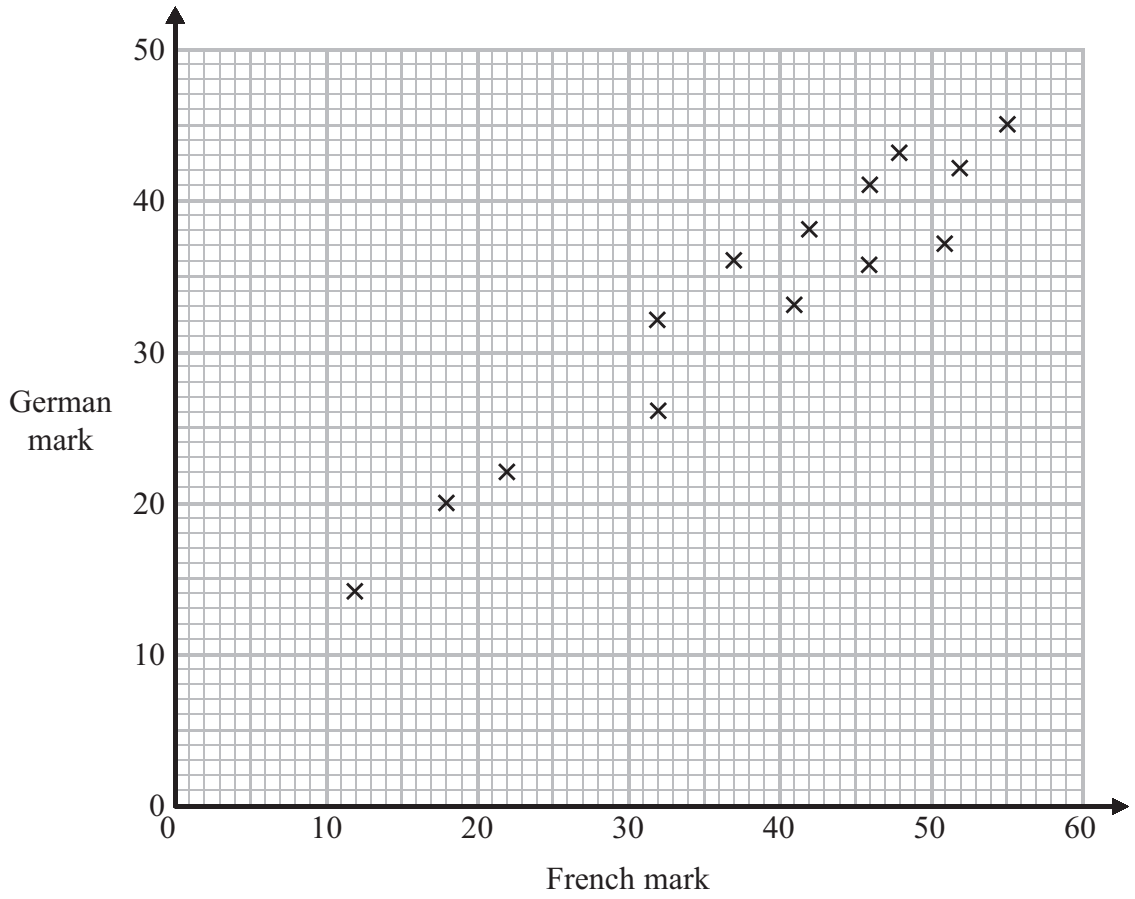
(1)

(Total for Question 5 is 5 marks)

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6 Mr Schmit's class did a French test and a German test on Monday.

Mr Schmit drew a scatter graph to show the students' marks.



Two students did the French test and the German test on Wednesday.
Here are their marks.

French mark	28	23
German mark	25	26

(a) Plot these marks on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

.....

(1)

Nathalie got a mark of 35 in the French test.

She did **not** do the German test.

(c) Estimate the mark Nathalie may have got for the German test.

..... marks

(2)

(Total for Question 6 is 4 marks)

*7 Lisa 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
8 cans of cola in a pack
12 burgers in a pack
10 buns in a pack

A pack of cola costs	£3.95
A pack of burgers costs	£4.95
A pack of buns costs	£1.95

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

Lisa sees this special offer for cola.



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

£ .....

(Total for Question 7 is 6 marks)

8 Ali takes his car to a garage.

The car has a 5000 mile service.
It also has an MOT test.

(a) Work out Ali's total bill.

Costs	
5000 mile service	£79 plus VAT at 20%
10 000 mile service	£99 plus VAT at 20%
MOT test	£39 plus VAT at 20%

£ .....

(3)

Ali bought his car for £20 000

The car depreciated by 20% the first year.
The car depreciated by 10% the second year.

(b) Work out the value of the car at the end of the second year.

£ .....

(3)

(Total for Question 8 is 6 marks)

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*9 Ann has some cards.
Beth has 4 cards more than Ann.
Cath has three times as many cards as Beth.

The total number of cards is 51

How many cards does each of the three people have?
You must show all your working.

(Total for Question 9 is 5 marks)

10 Neville saw this car for sale.

He got a discount of 25% off the price of the car.
He paid £7200 for the car.

Work out the price of the car before the discount.



£ .....

(Total for Question 10 is 3 marks)

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11 The table shows the number of 3D TVs sold by a shop from July 2010 to June 2012
The table also shows some of the 4-point moving averages.

Time period	Number sold	Moving average
Jul 2010 – Sep 2010	0	
Oct 2010 – Dec 2010	1	4.25
Jan 2011 – Mar 2011	6	8.0
Apr 2011 – Jun 2011	10	13.75
Jul 2011 – Sep 2011	15	15.25
Oct 2011 – Dec 2011	24	.....
Jan 2012 – Mar 2012	12	
Apr 2012 – Jun 2012	36	

(a) Work out the missing 4-point moving average.

.....

(2)

(b) Explain what these moving averages show.

.....

(1)

(Total for Question 11 is 3 marks)

12 There are 80 singers in a choir.
The cumulative frequency table gives information about the ages of the 80 singers.

Age (A) in years	Cumulative frequency
$20 < A \leqslant 30$	2
$20 < A \leqslant 40$	15
$20 < A \leqslant 50$	30
$20 < A \leqslant 60$	52
$20 < A \leqslant 70$	80

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

(b) Use your cumulative frequency graph to find an estimate for

(i) the median age,

.....

(ii) the interquartile range.

.....

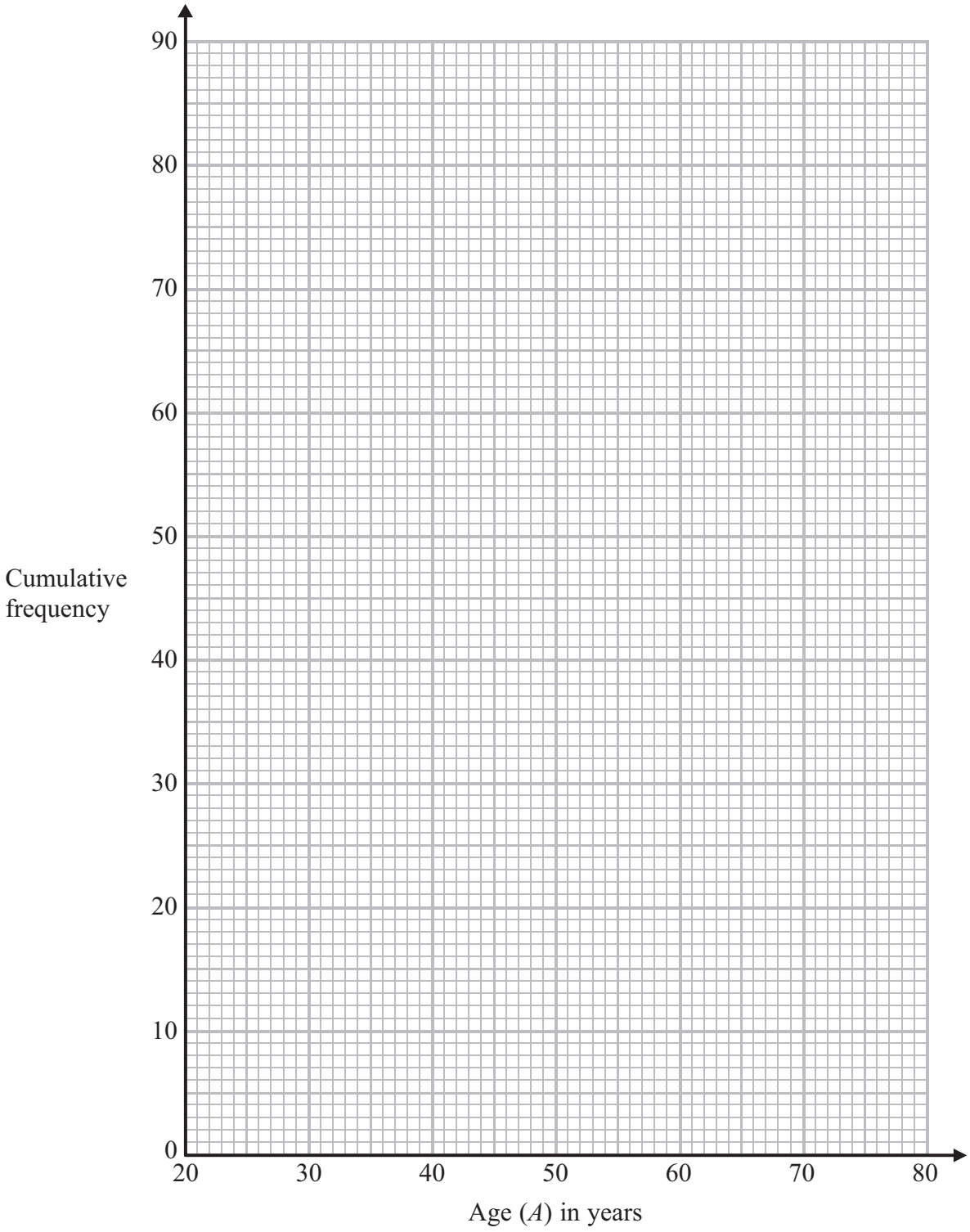
(3)

(c) Find an estimate for the number of singers over 63 years old.

.....

(2)

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(Total for Question 12 is 7 marks)

13 Joe and Ann buy some fruit from the same shop.

Joe buys 4 apples and 3 bananas for £2.50
Ann buys 3 apples and 4 bananas for £2.40

Work out the cost of

(i) one apple,
(ii) one banana.

(i) one apple ..... p

(ii) one banana ..... p

(Total for Question 13 is 5 marks)

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14 The distance of the Earth from the Sun is 93 million miles.

(a) Write 93 million in standard form.

.....

(1)

The distance of the Moon from the Earth is 2.49×10^5 miles.

(b) Write 2.49×10^5 as an ordinary number.

.....

(1)

Ångström units are used to measure the diameter of atoms.
One Ångström unit is 1×10^{-10} metres.

(c) How many Ångström units are there in 1 cm?

.....

(1)

(Total for Question 14 is 3 marks)

*15 Ade wants to compare the heights of the same type of plant in two different habitats.
All the measurements are in centimetres.

Here are the heights of 15 plants in a Marshland habitat.

87	95	98	102	102	105	107	107
110	112	115	119	120	125	135	

Here is some information about the heights of the plants in a Mountain habitat.

Smallest	25
Largest	103
Median	85
Lower quartile	65
Upper quartile	99

Compare the two distributions.

(Total for Question 15 is 3 marks)

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16 Here is part of a structure for a building.

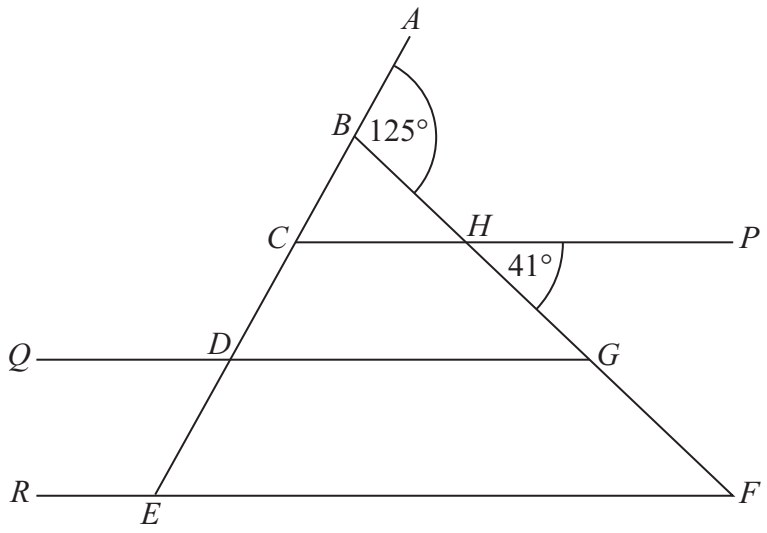


Diagram **NOT** accurately drawn

Triangles *BCH, BDG* and *BEF* are similar triangles.

Angle *ABH* = 125°.
Angle *PHG* = 41°.

(a) Find the size of angle *RED*.

..... °

(3)

BC = *CD* = *DE* = 10 m.
DG = 24 m.

(b) Find the length of

(i) *CH*,

..... m

(ii) *EF*.

..... m

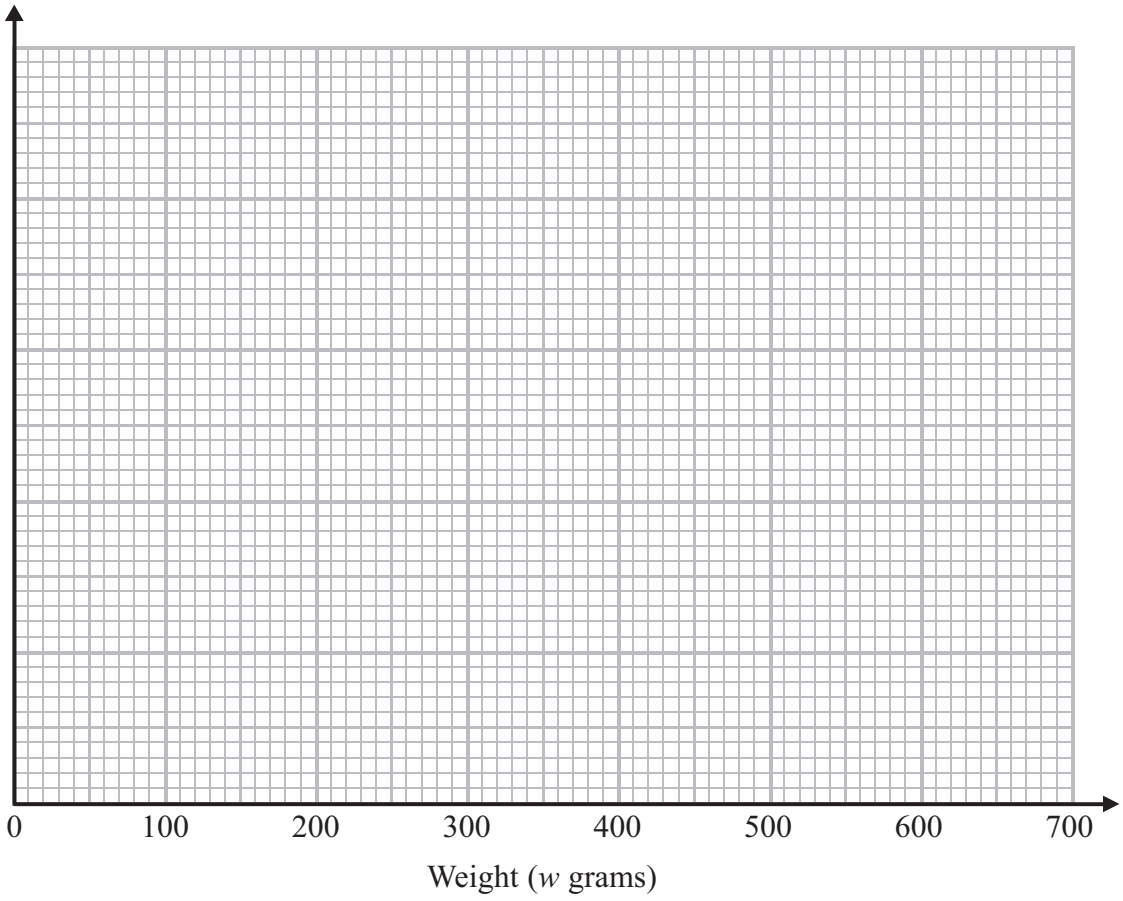
(4)

(Total for Question 16 is 7 marks)

17 The table shows some information about the weights of the fish Ryan caught last week.

Weight (w grams)	Frequency
$0 < w \leqslant 100$	2
$100 < w \leqslant 200$	4
$200 < w \leqslant 250$	8
$250 < w \leqslant 300$	6
$300 < w \leqslant 400$	12
$400 < w \leqslant 650$	5

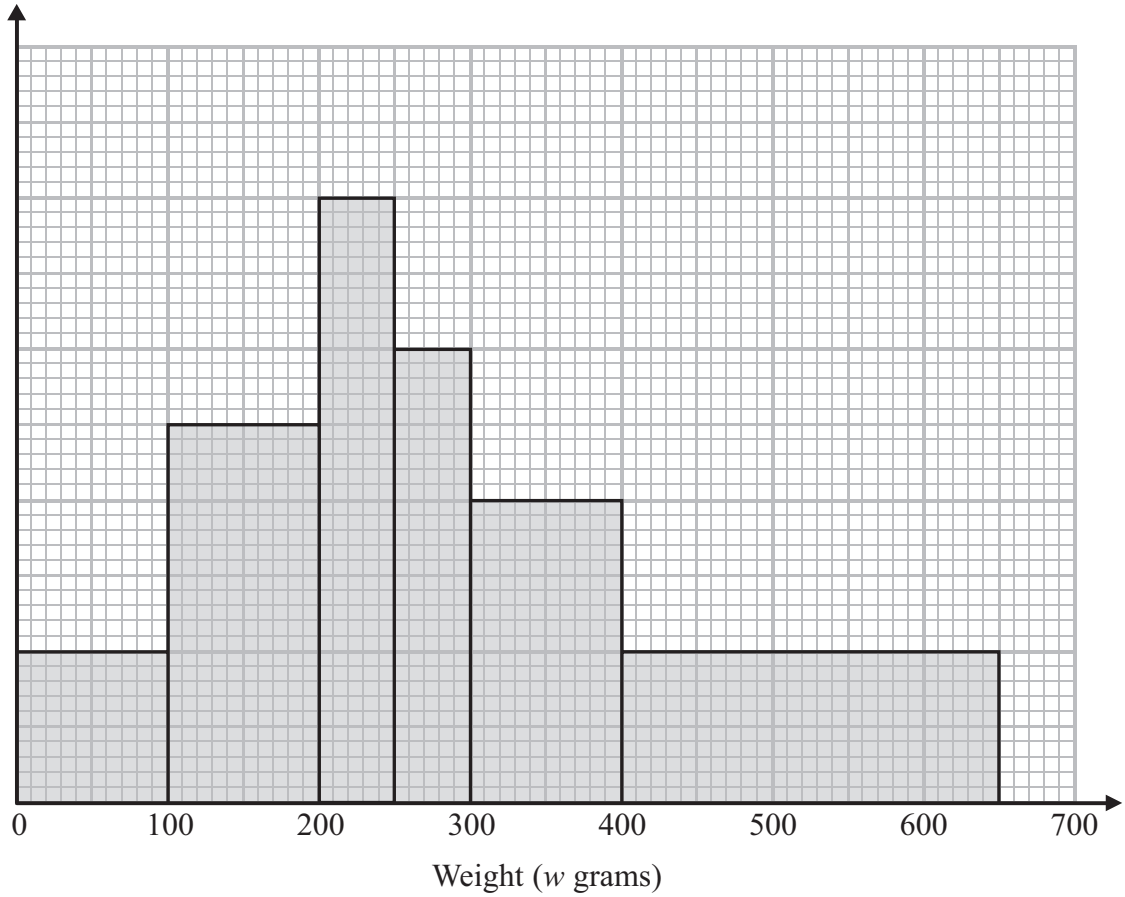
(a) Use the information in the table to draw a histogram.



(3)

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David drew this histogram for the weights of the fish he caught last week.



David caught 23 fish last week.

David took home all the fish with a weight of more than 450 g.

(b) What percentage of the number of fish David caught did he take home?
Give your answer correct to 3 significant figures.

.....%

(3)

(Total for Question 17 is 6 marks)

18 A company has two types of lorry, Type A and Type B.

The company has 6 Type A lorries
4 Type B lorries.

Type A lorries can carry up to 10 tonnes of recycled waste.
Type B lorries can carry up to 15 tonnes of recycled waste.

Type A lorries can make up to 8 return journeys each day.
Type B lorries can make up to 6 return journeys each day.

The company has 8 drivers.
The drivers are allocated a Type A lorry or a Type B lorry to drive each day.

The company has to move at least 540 tonnes of recycled waste each day.

Let t represent the number of Type A lorries used one day.
Let f represent the number of Type B lorries used the same day.

(a) Explain why

(i) $t + f \leqslant 8$

.....

(ii) $80t + 90f \geqslant 540$

.....

(2)

(b) Write down two additional inequalities involving t and f.

$t \geqslant 0, \quad f \geqslant 0$

.....

(1)

(c) On the grid, show by shading, the feasible region that satisfies the conditions.

(2)

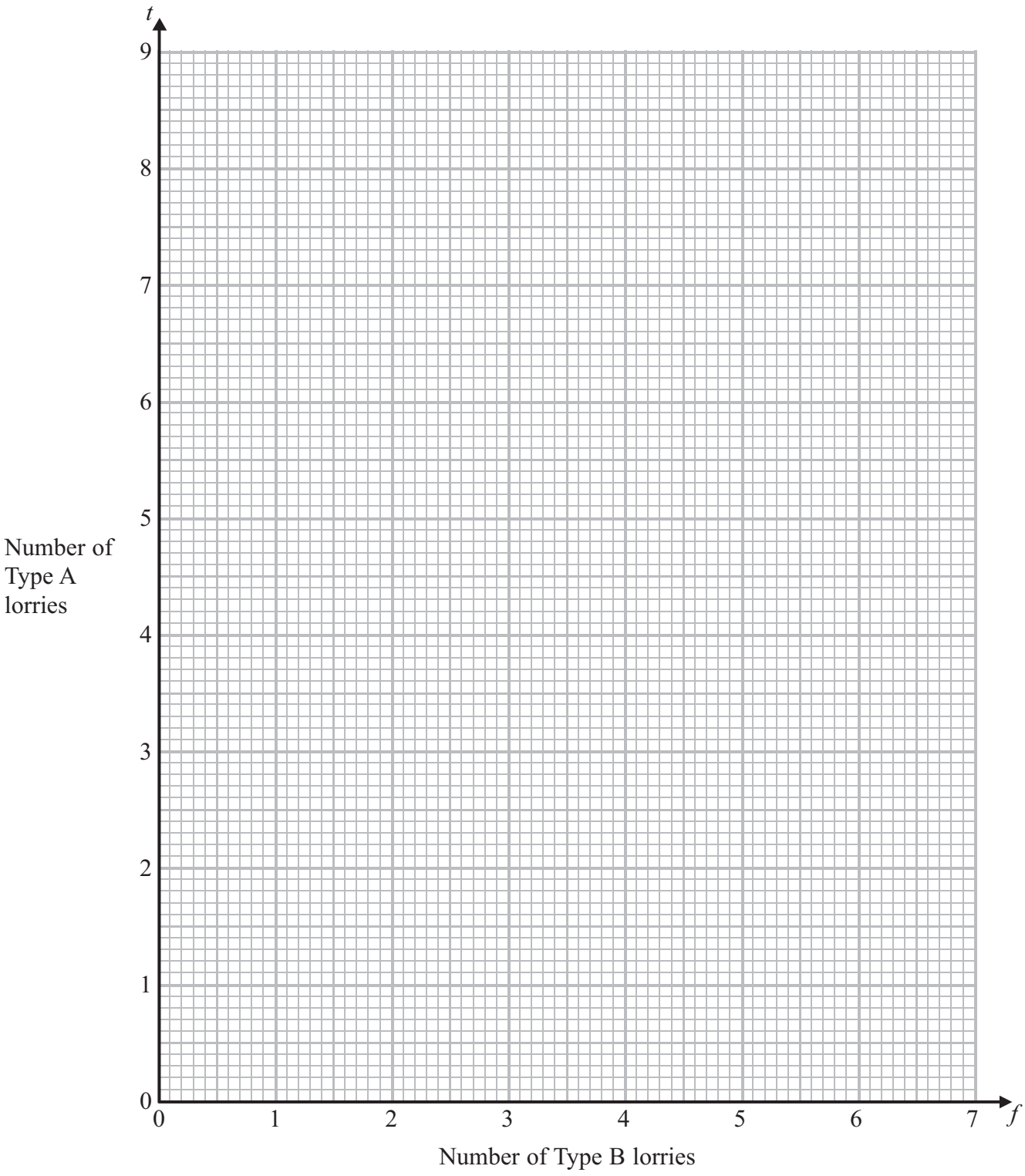
Each day the company makes a profit of
£200 when a Type A lorry is used,
£150 when a Type B lorry is used.

(d) How many of each type of lorry should the company use each day to maximise their profit?

.....

(2)

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(Total for Question 18 is 7 marks)

19 Eve sells coffee pots in 3 sizes.


Small


Medium


Large

All the coffee pots are mathematically similar.

The small coffee pot holds 512 m*l* of coffee.
The large coffee pot holds 1*l* of coffee.

The small coffee pot has a height of 12 cm.

(a) Work out the height of the large coffee pot.

..... cm

(3)

The medium coffee pot has a height of 13.5 cm.

(b) Work out how much coffee the medium coffee pot holds.

..... m*l*

(3)

(Total for Question 19 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

November 2012

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Higher (Calculator) Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	375 × 9.02	3382.50	2	M1 for 375 × 9.02 A1 for 3382.5(0) (SC B1 for answer of 3382 or 3383 if M0 scored)
	(b)	675 ÷ 9.02 = 74.83 £75 – 74.83 **OR** 75 × 9.02 = 676.50 676.50 – 675 = 1.50 1.50 ÷ 9.02 = 0.166…	£0.17 or 17p or 1.50 Kr	3	M1 for 675 ÷ 9.02 (= 74.83...) M1(dep) for 75 – '74.83' A1 for £0.17 or 17p **OR** M1 for 75 × 9.02 (= 676.5) M1(dep) for '676.5' – 675 A1 for 1.5(0) Kr **OR** M1 for 75 × 9.02 (= 676.5) M1(dep) for '676.5' – 675 = 1.5 and '1.5' ÷ 9.02 A1 for £0.17 or 17p
2		Split shape into two rectangles 14 × 10 – 5 × 6 or 14 × 5 + 5 × 8 Area = 110 m² 110 × 4 = 440 minutes 440 ÷ 60 = 7 hours 20 minutes 07:00 + 30 mins + 7 h 20 min	14 50	6	M1 for attempt to find area of shape, eg 14 × 10 – 5 × 6 or 14 × 5 + 5 × 8 or 8 × 10 + 6 × 5 or 8 × 10 + 6 × 5 or 110 seen M1 (dep) for '110' × 4 (= 440) or 60 ÷ 4 (=15) M1 for attempt to find number of hours needed, eg '440' ÷ 60 oe eg '110'÷ (60 ÷ 4) or 7 × 60 (= 420) or 7 (hrs) seen A1 for 7 (hrs) 20 (mins) or $7\frac{1}{3}$ (hrs) or 7.33 (hrs) M1 for 7 + 30 (mins) + '7 (hrs) 20 (mins)' (condone 7 (hrs) 33 (mins)) may be implied by answer A1 for 14 50 or 2 50pm or eg 'ten to 3pm'

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		½ (x + x + 1.8) × 1.2 = 4.8 2x + 1.8 = 4.8 ÷ 0.6 2x +1.8 = 8 2x = 6.2	3.1	5	M1 for attempt to use trapezium formula, eg ½ × (a + b) × 1.2 = 4.8 or ½ × (a + 1.8) × 1.2 = 4.8 may be implied by sight of 8 M1 for correct attempt to remove brackets, eg (a + b =) 4.8 ÷ 1.2 × 2 or 8 seen M1 for (a + b =) x + x +1.8 (= '8')oe M1 for correct attempt to isolate x on one side of equation, eg x + x = '8' – 1.8 A1 for 3.1 **OR** M1 for attempt to use trapezium formula, eg ½ × (a + b) × 1.2 = 4.8 or ½ × (a + 1.8) × 1.2 = 4.8 may be implied by sight of 8 M1 for correct attempt to remove brackets, eg (a + b =) 4.8 ÷ 1.2 × 2 or 8 seen M2 (dep on first M1)for finding a and b such that a + b = '8' and a – b = 1.8 (M1 for attempt to eliminate a or b, eg 2a = '8' + 1.8 oe) A1 for 3.1 **OR** M1 for (a + b =) x + x +1.8 oe M1 for ½ (x + x +1.8) × 1.2 = 4.8 oe M1 for correct attempt to remove brackets, eg 2x + 1.8 = 4.8 ÷ 0.6 or 1.2x + 1.08 = 4.8 condone one arithmetic error M1 for attempt to isolate x on one side of equation, eg 2x = 8 – 1.8 or 1.2x = 4.8 – 1.08 A1 for 3.1 **OR** M1 for ½ × 1.8 × 1.2 (= 1.08) M1 for 1.2 × x + '1.08' oe M1 for 1.2 × x + '1.08' = 4.8 oe M1 for correct attempt to isolate x on one side of equation, eg 2x = 4.8 – '1.08' A1 for 3.1

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		35	1	B1 cao
	(b)(i)	30 ÷ 150	0.2	3	M1 for right angled triangle drawn or diff y ÷ diff x A1 for 0.2 oe, eg $\frac{30}{150}$
	(ii)		20p		B1 for 20p or £0.20 or ft their (b)(i)
	(c)	<u>75 units</u> Gas&Air = £35 Seagas = £35 Sandygas = £37.50 <u>100 units</u> Gas&Air = £37.50 Seagas = £40 Sandygas = £50 **OR** <u>Gas&Air</u> (75) = £35 (100) = £37.50 <u>Seagas</u> (75) = £35 (100) = £40 <u>Sandygas</u> (75) = £37.50 (100) = £50	Gas&Air with comparisons	4	M1 for attempt to calculate 75 units and 100 units for at least one company A1 for (Seagas =) 35 and 40 OR (Sandygas =) 37.5(0) and 50 OR (Gas&Air =) 35 and 37.5(0) oe A1 for (Seagas =) 35 and 40 AND (Sandygas =) 37.5(0) and 50 AND (Gas&Air =) 35 and 37.5(0) oe C1 (dep on M1) for Gas&Air or ft their calculations **OR** M1 for attempt to calculate 75 units or 100 units for at least two companies A1 for two of (75 units) 35, 35, 37.5(0) or for two of (100 units) 37.5(0), 40, 50 A1 for all of (Seagas =) 35 and 40, (Sandygas =) 37.5(0) and 50, (Gas&Air =) 35 and 37.5(0) oe C1 (dep on M1) for Gas&Air or ft their calculations **OR** M1 for straight line drawn through (0, 0) or (75, 37.5) or for line with gradient 0.5 OR for straight line drawn through (75, 35) or (100, 37.5) or for line with gradient 0.1 A1 for straight line through (75, 37.5) and (100, 50) A1 for straight line through (75, 35) and (100, 37.5) C1 (dep on M1) for Gas&Air or ft 'straight lines' for Sandygas and Gas&Air [NB tolerance ±2mm square]

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Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		= 2*A2 + 2*B2 = C2/2	4	B1 for doubling the length and the width either singly or together eg 2*(x + y) or 2*x and 2*y or 2*(A2+B2) or 2*A2 and 2*B2 or 2*SUM(A2:B2) B1 for adding the lengths either before or after doubling, eg A2+B2 B1 for attempt to dividing their spreadsheet formula by 2 or their cell C by 2, eg C2/2 B1 (dep on two formulas) for correct spreadsheet formula notation (condone missing =)
	(b)		8	1	B1 for 8 or ft their formulas
6	(a)		(28,25) and (23, 26) plotted	1	B1 for both points plotted correctly tolerance ±2mm square
	(b)		Positive	1	B1 for positive
	(c)		28 − 34	2	B2 for 28 – 34 (B1 for 26 – 36)
*7		8 cans of cola 12 burgers 10 buns LCM is 120 Cola 5 × 2 × £3.95=£39.50 Burgers 10 × £4.95 = £49.50 Buns 12 × £1.95 = £23.40	£112.40	6	M1 for attempt to find LCM of 8, 12 and 10, eg by listing multiples or 120 seen M1 for (cola =)120 ÷ 8 (= 15) packs or (burgers =) 120 ÷ 12 (= 10) packs or (buns =) 120 ÷ 10 (= 12) packs M1 for (packs of cola =) $\frac{2}{3} \times '15'$ (= 10) M2 for (total cost =) $\frac{2}{3} \times '15' \times 3.95 + 10 \times 4.95 + 12 \times 1.95$ (M1 for total cost for their packs of cola, burgers and buns) C1 (dep on first M1) for £112.4(0) or ft their costs with work for cola, burgers and buns clearly identified

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)	(79 + 39) × 1.2 118 × 1.2 **OR** 79 × 1.2 + 39 × 1.2 94.80 + 46.80 **OR** $\frac{20}{100}$ × (79 + 39) = 23.60 118 + 23.60 **OR** $\frac{20}{100}$ × 79 = 15.80 $\frac{20}{100}$ × 39 = 7.80 15.80 + 7.80 + 118	141.60	3	M1 for 79 × 1.2 (= 94.8) or 39 × 1.2 (= 46.8) oe M1 for 79 × 1.2 + 39 × 1.2 oe A1 for 141.6(0) **OR** M1 for $\frac{20}{100} \times 79$ (= 15.8) and $\frac{20}{100} \times 39$ (= 7.8) M1 for $\frac{20}{100} \times 79 + 79 + \frac{20}{100} \times 39 + 39$ A1 for 141.6(0) **OR** M1 for $\frac{20}{100} \times (79 + 39)$ (= 23.6) oe M1 for $\frac{20}{100} \times (79 + 39) + 79 + 39$ oe A1 for 141.6(0)
	(b)	20 000 × 0.8 = 16 000 16 000 × 0.9 = 14 400 **OR** $\frac{20}{100}$ × 20 000 = 4000 20 000 – 4000 = 16 000 10% × 16 000 = 1600 16 000 - 1600	14 400	3	M1 for 20 000 × 0.8 oe or 16 000 seen M1 for '16 000' × 0.9 oe A1 for 14 400 **OR** M1 for $20000 - 0.2 \times 20000$ oe or 16 000 seen M1 for $'16000' - 0.1 \times '16000'$ oe A1 for 14 400

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Question		**Working**	**Answer**	**Mark**	**Notes**
*9		$x + x + 4 + 3(x + 4) = 51$ $2x + 4 + 3x + 12 = 51$ $5x + 16 = 51$ $5x = 35$ $5x = 35 \div 5$	Ann 7 Beth 11 Cath 33	5	M1 for $x + 4$ or $3(x + 4)$ oe seen M1 for x + '$x + 4$' + '$3(x + 4)$' M1 x + '$x + 4$' + '$3(x + 4)$' = 51 A1 for 7 or 11 or 33 C1 for Ann 7, Beth 11, and Cath 33 oe **OR** M1 for using a value for n, eg $n + 4$ or $4 \times n$ M1 for attempting a trial using n, $n + 4$ and $3(n + 4)$ M1 for at least 2 trials with correct totals for 'n' A1 for 11 or 33 C1 for Ann 7, Beth 11, and Cath 33 oe
10		$7200 \div 0.75$ $75\% = 7200$ $1\% = 7200 \div 75 = 96$ $100\% = 96 \times 100$	9600	3	M2 for $7200 \div (1 - 0.25)$ A1 for 9600 **OR** M1 for $7200 \div 75$ or 96 seen M1 for '96' $\times$ 100 A1 for 9600
11	(a)	$15 + 24 + 12 + 36 = 87$ $87 \div 4$	21.75	2	M1 for $(15 + 24 + 12 + 36) \div 4$ A1 for 21.75
	(b)		upward trend in sales	1	B1 for upward trend (in sales) oe or more sets are sold over time or number of sets sold going up oe

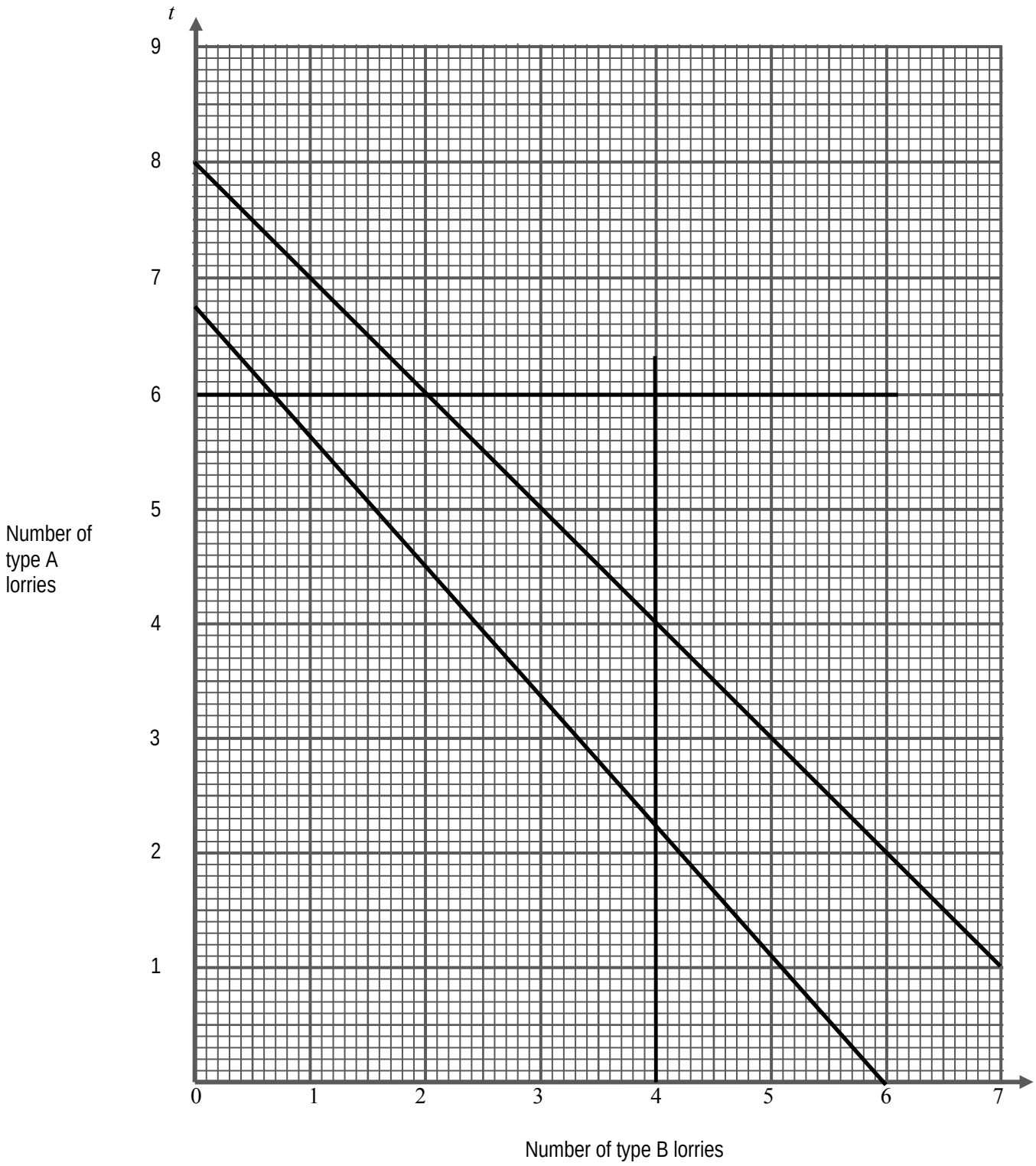
5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		graph	2	B2 for fully correct cf graph (accept ogive) condone graph starting at (30, 0) [B1 for 4 or 5 points plotted consistently or for cf graph drawn through points other than end points of intervals]
	(b)(i)		53 – 57	3	B1 for 53 – 57 or ft their cf graph (tolerance ±2mm square)
	(ii)	63 – 43	20		M1 for 'upper quartile (from cf = 60)' – 'lower quartile (from cf = 20)' (tolerance ±2mm square) A1 for 17 – 23 or ft their cf graph
	(c)	80 – 60 **OR** $80 - (52 + [80 - 52] \times \frac{3}{10})$ 80 – 60.4 = 19.6	19 – 23	2	M1 for 80 – '60 (from $A = 63$)' for their cf graph (tolerance ±2mm square) or 80 – $(52 + [80 - 52] \times \frac{3}{10})$ oe A1 for 19 – 23 [SC B1 for 90 – '60 (from $A = 63$)' (tolerance ±2mm square)]
13		eg $4a + 3b = 250$ $3a + 4b = 240$ (×3) $12a + 9b = 750$ (×4) $12a + 16b = 960$ Subtract $7b = 210$ so $b = 30$ Substitute $4a + 90 = 250$ $4a = 250 - 90 = 160$ **OR** Eliminates b first or substitutes back into any equation	(i) 40 (ii) 30	5	B1 for correct equations expressed in terms of two variables (oe) M1 for correct process to eliminate either variable (condone one arithmetic error) A1 for either (£)0.4 or (£)0.3 oe M1 (dep on first M1) for correct substitution of their found variable OR M1 (dep on first M1) for correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both (i) 40 and (ii) 30 SC (if M0 scored) B1 for (i) 40 or (ii) 30

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		9.3×10^7	1	B1 cao
	(b)		249 000	1	B1 cao
	(c)		100 000 000	1	B1 for 100 000 000 or accept 1×10^8 or 10^8 or 100 million oe
*15			Comparison of data	3	C1 for relevant comparison of spread, eg range or IQR C1 for relevant comparison of median (accept average in place of word median) C1 for a different relevant comparison, eg highest values
16	(a)	Angle *CBH* = 180 – 125 = 55° Angle *CHB* = 41° Angle *BCH* = 180 – (55 + 41) = 84° Angle *RED* = 180 – 84	96	3	B1 for (*CBH* =) 55 seen or (*CHB* =) 41 M1 for (*BCH* =) 180 – ('55' + 41) (= 84) A1 for 96 **OR** B1 for (*CHB* =) 41 seen M1 for (*BCH* =) 125 -41 (= 84) A1 for 96
	(b)(i)	*CH* = ½ × 24	12	4	M1 for ½ × 24 oe, eg $\frac{10}{20} = \frac{CH}{24}$ A1 for 12
	(ii)	*EF* = 24 × 1.5	36		M1 for 24 × 1.5 oe, eg $\frac{20}{30} = \frac{24}{EF}$ or ft '12' × 3 A1 for 36

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)		e.g. bars at height 1 cm, 2 cm, 8cm, 6 cm, 6 cm, 1 cm plus frequency density scale	3	M1 for frequency/class width or eg 0.02, 0.04, 0.16, 0.12, 0.12, 0.02 (minimum 4 seen) A1 for bars with consistent areas for all frequencies B1 for appropriate frequency density scale or correct key [NB apply same mark-scheme for different frequency density scale]
	(b)	$\frac{4}{23}\times 100$	17.3 – 17.4	3	B1 for (number of fish =) 4 M1 for $\frac{'4'}{23}\times 100$ A1 for 17.3 – 17.4 **OR** B1 for (area =) 8 M1 for $\frac{'8'}{46}\times 100$ A1 for 17.3 – 17.4

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)(i)		connects lorries and number of drivers	2	B1 for connecting lorries and number of drivers , eg there are only 8 drivers
	(ii)		connects total waste with number of trips and lorry capacity		B1 for connecting total waste with number of trips and lorry capacity, eg 8 trips each with 10 tonnes plus 6 trips each with 15 tonnes must be 'greater than or equal to' how much needs to be moved (540 tonnes)
	(b)		$t \leq 6$ $f \leq 4$	1	B1 for $t \leq 6$ and $f \leq 4$ (accept $y \leq 6$ and $x \leq 4$)
	(c)		plotting graphs	2	B2 for identifying the region ft $t \leq$ '6' and $f \leq$ '4' (B1 for at least 3 correct graphs (ignore shading) ft $t \leq$ '6' and $f \leq$ '4')
	(d)	Profit = $200t + 150f$	6 Type A 2 Type B	2	M1 for calculating a profit, eg $200 \times 6 + 150 \times 2$ (= 1500) A1 for 6 Type A and 2 Type B or $t = 6$ and $f = 2$ **OR** M1 for identifying an objective function, eg $200t + 150f = 600$ A1 for 6 Type A and 2 Type B or $t = 6$ and $f = 2$ or $y = 6$ and $x = 2$

Diagram for Q18



5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)	512 : 1000 $8^3 : 10^3$ $12 \div 8 \times 10$ OR $\left(\frac{h}{12}\right)^3 = \frac{1000}{512}$ $h^3 = \frac{1000 \times 12^3}{512}$	15	3	M1 for $\sqrt[3]{512}$ (= 8) and $\sqrt[3]{1000}$ (= 10) or 512 : 1000 = $8^3 : 10^3$ oe or (sf =) 0.8 or 1.25 seen M1 (dep) for 12 ÷ '8' × '10' oe or 12 : 15 or 12 × '1.25' or 12 ÷ '0.8' A1 for 15 **OR** M1 for $\left(\frac{h}{12}\right)^3 = \frac{1000}{512}$ oe or $\sqrt[3]{\frac{1000}{512}}$ or $\sqrt[3]{\frac{512}{1000}}$ M1 (dep) for (h^3 =) $\frac{1000 \times 12^3}{512}$ oe (= 3375) A1 for 15
	(b)	12 : 13.5 = 8 : 9 $8^3 : 9^3$ = 512 : 729 OR $\frac{v}{512} = \left(\frac{13.5}{12}\right)^3$ $v = 512 \times \left(\frac{13.5}{12}\right)^3$	729	3	M1 for 12^3 and 13.5^3 or 12 : 13.5 = 8 : 9 oe M1(dep) for $8^3 : 9^3$ or 512 : 729 A1 for 729 **OR** M1 for $\left(\frac{13.5}{12}\right)^3$ or $\left(\frac{12}{13.5}\right)^3$ oe M1 (dep) for $512 \times \left(\frac{13.5}{12}\right)^3$ or $512 \div \left(\frac{12}{13.5}\right)^3$ oe A1 for 729

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Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Monday 11 June 2012 – Afternoon
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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P 4 0 6 5 5 A 0 1 2 4

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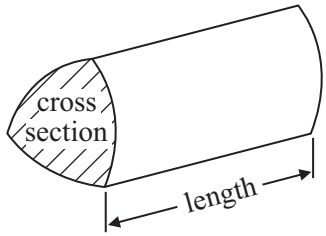
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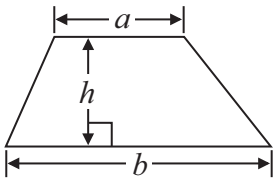
Formulae: Higher Tier

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

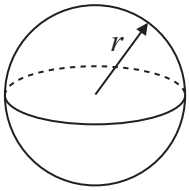


Area of trapezium = $\frac{1}{2}(a + b)h$



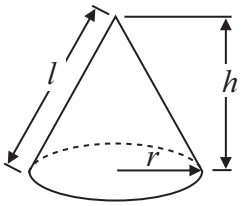
Volume of sphere = $\frac{4}{3}\pi r^3$

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

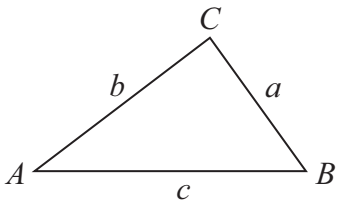


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 stages in your working.

1 An internet bookshop uses this advert.

> **Each day every 3rd customer gets a mystery prize.**
>
> **Each day every 20th customer gets free postage and packaging.**

On Tuesday the internet bookshop had 150 customers.

(a) How many of the 150 customers got a mystery prize?

.....

(2)

(b) How many of the 150 customers got free postage and packaging?

.....

(2)

(c) How many of the 150 customers got both a mystery prize **and** free postage and packaging?

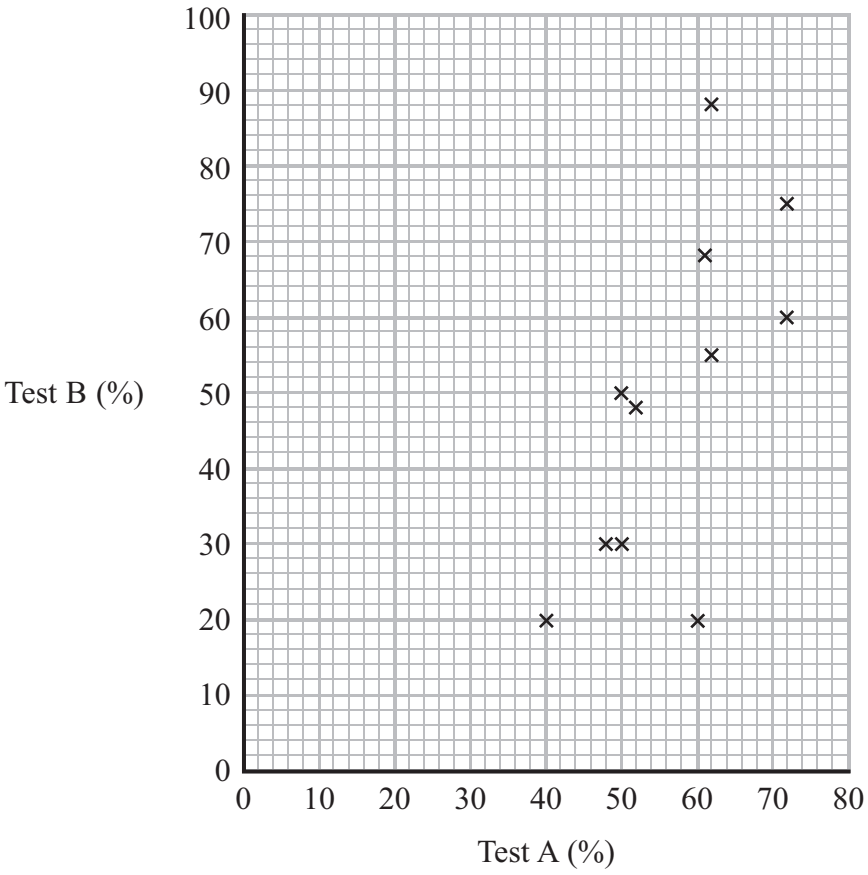
.....

(2)

(Total for Question 1 is 6 marks)

2 A teacher gives her class two tests.
She records the marks for each test as a percentage.

The scatter graph shows this information.



The teacher has the marks for one more pupil.

This pupil got 76% in test A.
The pupil got 92% in test B.

(a) Show this information on the scatter graph.

(1)

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(b) Describe the relationship between the percentage marks in test A and the percentage marks in test B.

.....

.....

(1)

One student missed test B.
This student got 65% in test A.

(c) Estimate this student's percentage for test B.

.....%

(2)

(Total for Question 2 is 4 marks)

***3** Alan, Ben and Clara are playing a game with cards.

Alan has p cards.
Ben has twice as many cards as Alan.
Clara has 3 cards less than Ben.

They have a total of 17 cards.

Work out how many cards each person has.

(Total for Question 3 is 5 marks)

4 Sui Lin buys items needed for winter sports.
She then sells these items.

Sui Lin sets up a spreadsheet as shown below.
Here is an extract of the spreadsheet.

	A	B	C	D
1	**Item**	**Buys (£)**	**Sells (£)**	**Profit or Loss (£)**
2	Skis	50	55	
3	Snowboard	200	180	
4	Shovel	45	55	
5	Poles	10	8	
6	Bindings			
7	**Total**			

Sui Lin buys bindings for £90
She sells the bindings for £102

(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)

(c) Use the information in the table to work out Sui Lin's percentage profit when she sold the shovel.

.....%

(2)

(Total for Question 4 is 7 marks)

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5 This is a list of ingredients for making macaroni cheese for 4 people.

Ingredients for **4** people

100 m*l* milk
200 g cheese
175 g dried macaroni
40 g butter
50 g plain flour

Work out the amount of each ingredient needed to make macaroni cheese for **10** people.

.....m*l* milk

.....g cheese

.....g dried macaroni

.....g butter

.....g plain flour

(Total for Question 5 is 3 marks)

6 Susan records the times, in minutes, 40 patients wait to see the doctor.

Information about these times is shown in the table.

Time (t minutes)	Frequency
$0 < t \leqslant 6$	12
$6 < t \leqslant 12$	15
$12 < t \leqslant 18$	8
$18 < t \leqslant 24$	3
$24 < t \leqslant 30$	2

Calculate an estimate for the mean time each patient waits.

..... minutes

(Total for Question 6 is 4 marks)

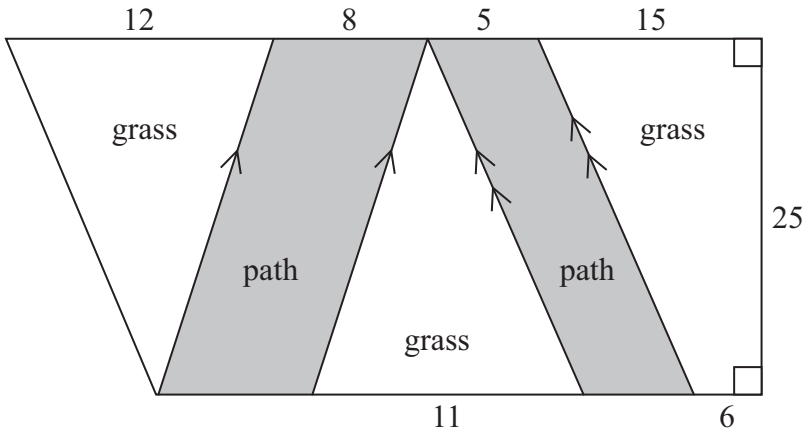
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*7 David is planning his garden.

There will be two paths in the garden.
The rest of the garden will be grass.

The diagram shows David's plan for his garden.

Diagram **NOT** accurately drawn

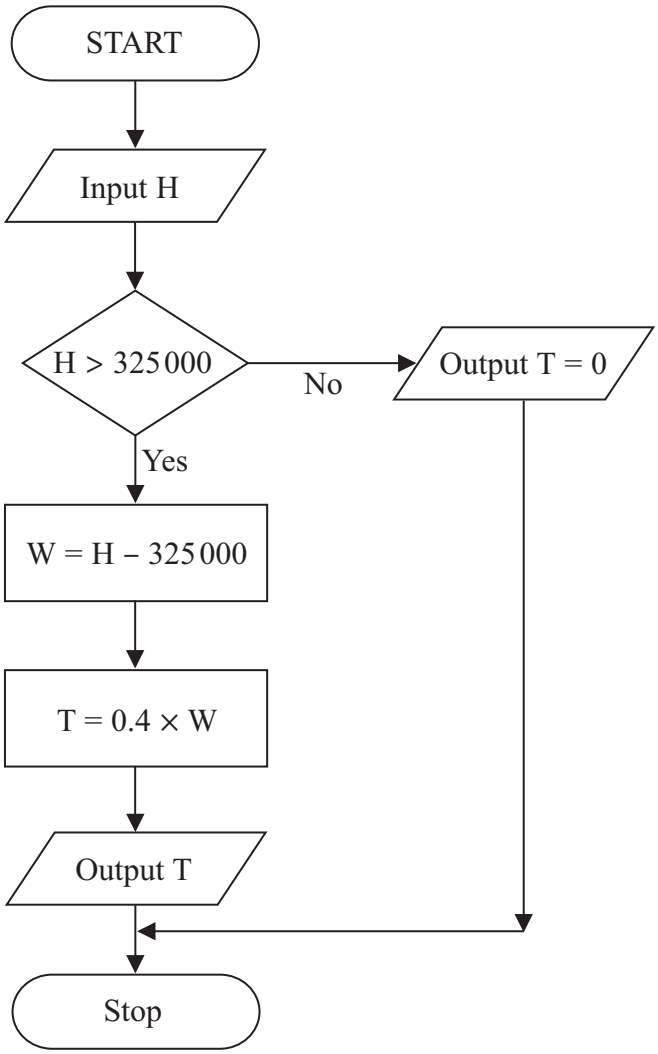


All measurements on the diagram are given in feet.

Work out the total area of the grass.

(Total for Question 7 is 4 marks)

8 Here is a flowchart to calculate tax on inheritance.



An inheritance, £H, is £100 000

(a) Use the flowchart to calculate the tax, £T.

T = ...

(1)

An inheritance is £400 000

(b) Calculate the tax.

T = ...

(3)

(Total for Question 8 is 4 marks)

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***9** Here are three oil cans.



Diagrams **NOT** accurately drawn

A **B** **C**

Given that 8 pints = 1 gallon,
put the cans in order of capacity.

(Total for Question 9 is 4 marks)

10 Angie is making a top for a table.

The diagram shows the top of the table.

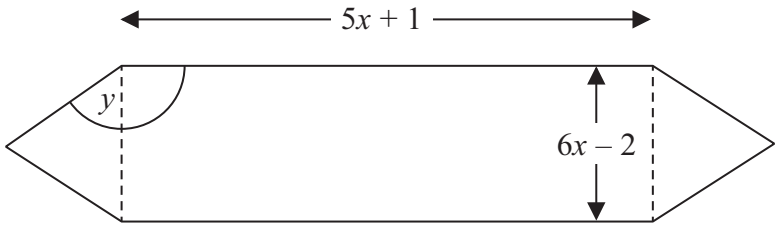


Diagram **NOT** accurately drawn

The top is made from a rectangle and two equilateral triangles.
All lengths are given in metres.

(a) Write down the size of the angle y.

.....°

(1)

The top of the table has a perimeter of 11 m.

(b) (i) Calculate the value of x.

.....

(ii) Find the length of the shortest side of the top of the table.

.....m

(6)

(Total for Question 10 is 7 marks)

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11 A council is planning to have a skating rink built.

The council uses this question on a questionnaire.

How often would you use a skating rink?

A lot	Occasionally	Not a lot
☐	☐	☐

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

1 .....

.....

2 .....

.....

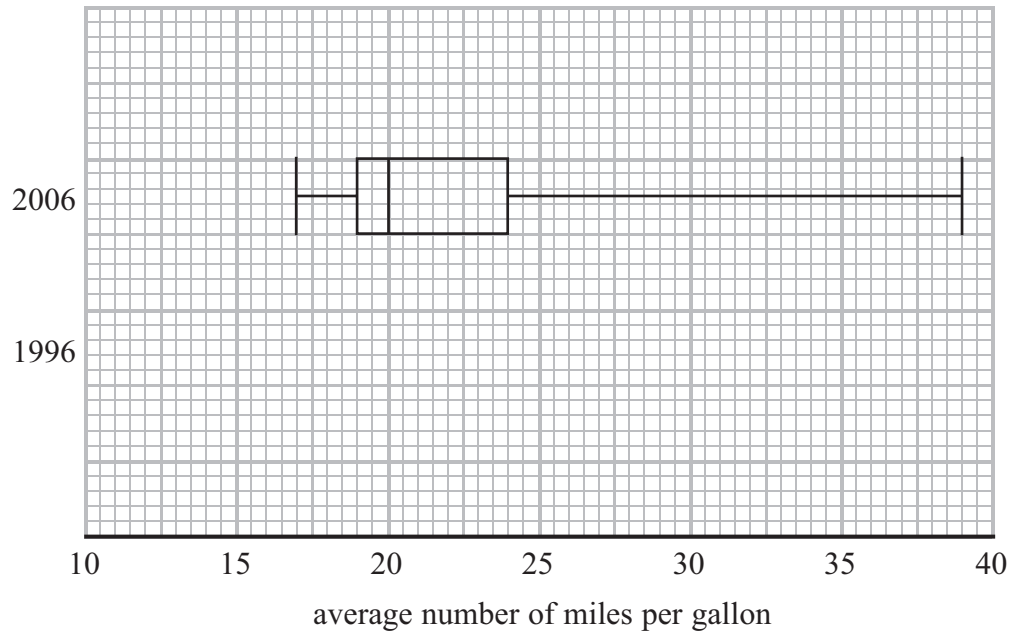
(2)

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

(2)

(Total for Question 11 is 4 marks)

12 The box plot shows information, from 2006, about the distribution of the average miles per gallon (mpg) from a random sample of cars.



(a) Write down the median for the sample of cars in 2006

.....mpg

(1)

(b) Work out the interquartile range for the sample of cars in 2006

.....mpg

(2)

The table below shows information, from 1996, about the distribution of the average number of miles per gallon (mpg) from a random sample of cars.

	Smallest	**Lower quartile**	**Median**	**Upper quartile**	**Largest**
Average number of miles per gallon	15	17	18	22	30

(c) On the grid above, draw a box plot to show the information in the table.

(3)

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(d) Compare these two distributions.

.....

.....

.....

.....

.....

.....

(2)

(Total for Question 12 is 8 marks)

13 Wall insulation reduces annual heating costs by 15%.
After he insulated the walls of his home, Gordon's annual heating cost was £765

If he had not insulated the walls of his home, work out what Gordon's annual heating cost would have been.

£.....

(Total for Question 13 is 3 marks)

14 Here is the tip of an arrow.
It is in the shape of an arrowhead.

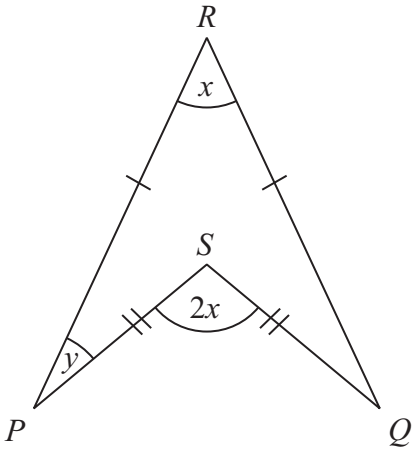


Diagram **NOT** accurately drawn

$PR = QR$
$PS = QS$
Angle $PRQ = x$
Angle $PSQ = 2x$
Angle $RPS = y$

(a) Find y in terms of x.
You must show all your working.

(3)

(b) Given also that the line PS bisects the angle RPQ, find the value of x in this arrowhead.

.....

(3)

(Total for Question 14 is 6 marks)

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15 One day Sadie and Gohil both buy petrol and oil from the same petrol station.

Sadie buys 30 litres of petrol and 4 litres of oil.
Sadie pays a total £46.00

Gohil buys 24 litres of petrol and 8 litres of oil.
Gohil pays a total of £45.20

Find the cost of one litre of petrol and the cost of one litre of oil.

Petrol £.....

Oil £.....

(Total for Question 15 is 5 marks)

16 Sam invests £5000 at 2.8% per annum compound interest for 4 years.

(a) Work out the value of Sam's investment at the end of 4 years.

£.....

(3)

Andy invests £12 000 in a variable rate compound interest account.

The interest is

2% for the first year
3.5% for the second year
5% for the third year

(b) (i) Work out the value of Andy's investment at the end of 3 years.

£.....

(ii) Work out the annual equivalent rate, AER, for Andy's investment over these 3 years.
Give your answer correct to 2 decimal places.
You must show your working.

.....%

(5)

(Total for Question 16 is 8 marks)

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17 Here are two solid dark chocolate spheres.
The two spheres are mathematically similar.

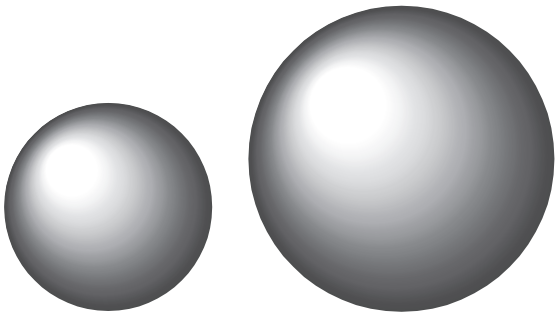


Diagram **NOT** accurately drawn

Twice as much dark chocolate is used to make the large sphere than is used to make the small sphere.

Calculate the scale factor for the radius of the small sphere to the radius of the large sphere.

.....

(Total for Question 17 is 2 marks)

18 For a Young Enterprise scheme some students are making hats and scarves.

Each week the students can make

up to 300 hats
up to 350 scarves
no more than a total of 500 hats and scarves.

Let x be the number of hats the students make per week.
Let y be the number of scarves the students make per week.

(a) For each condition, write down an inequality in x and/or y.

.....

(3)

(b) On the grid opposite, show by shading, the region that satisfies these inequalities.

(3)

The students make a profit of

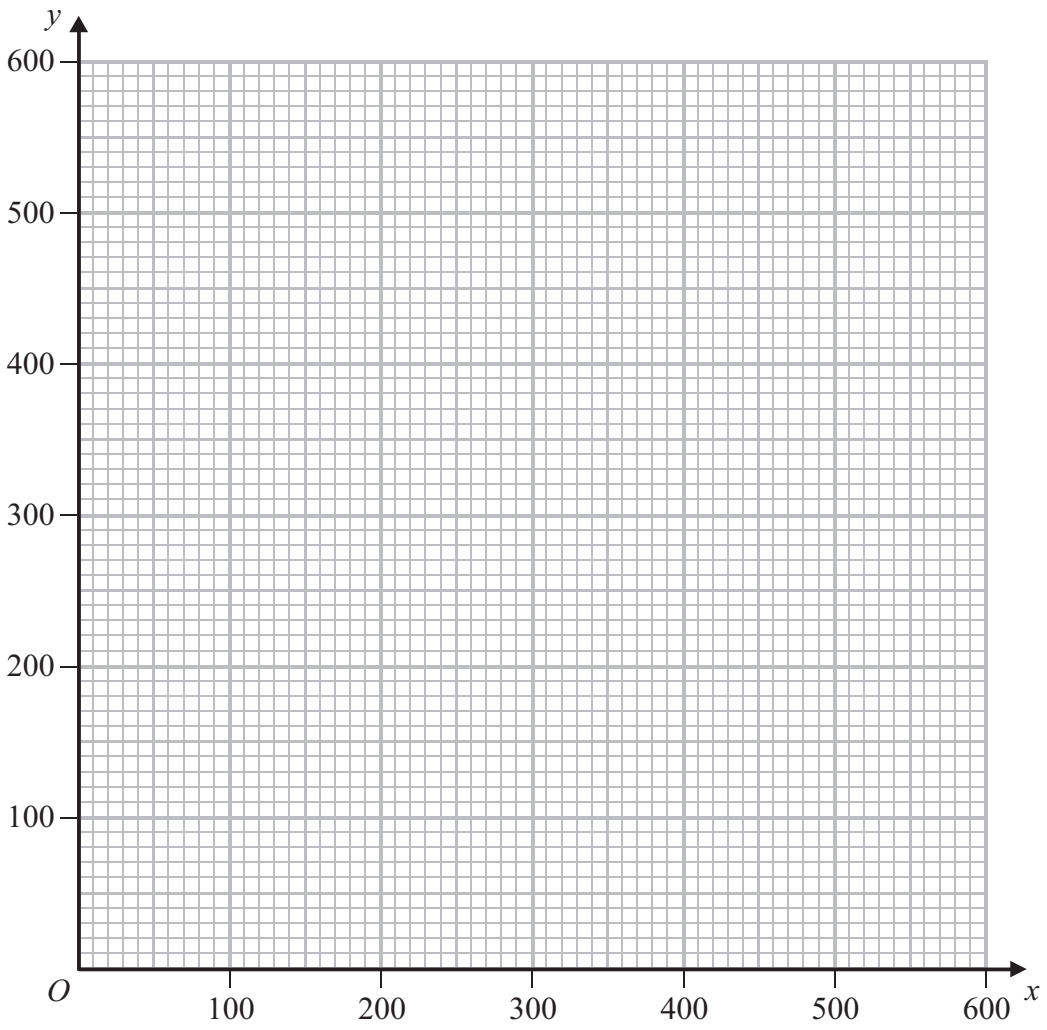
£1.50 on each hat sold
£1 on each scarf sold.

(c) Work out the greatest total profit the students can make in a week.
You must show your working.

£.....

(4)

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(Total for Question 18 is 10 marks)

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19 The table and histogram show information about the haemoglobin levels in the blood of some hospital patients.

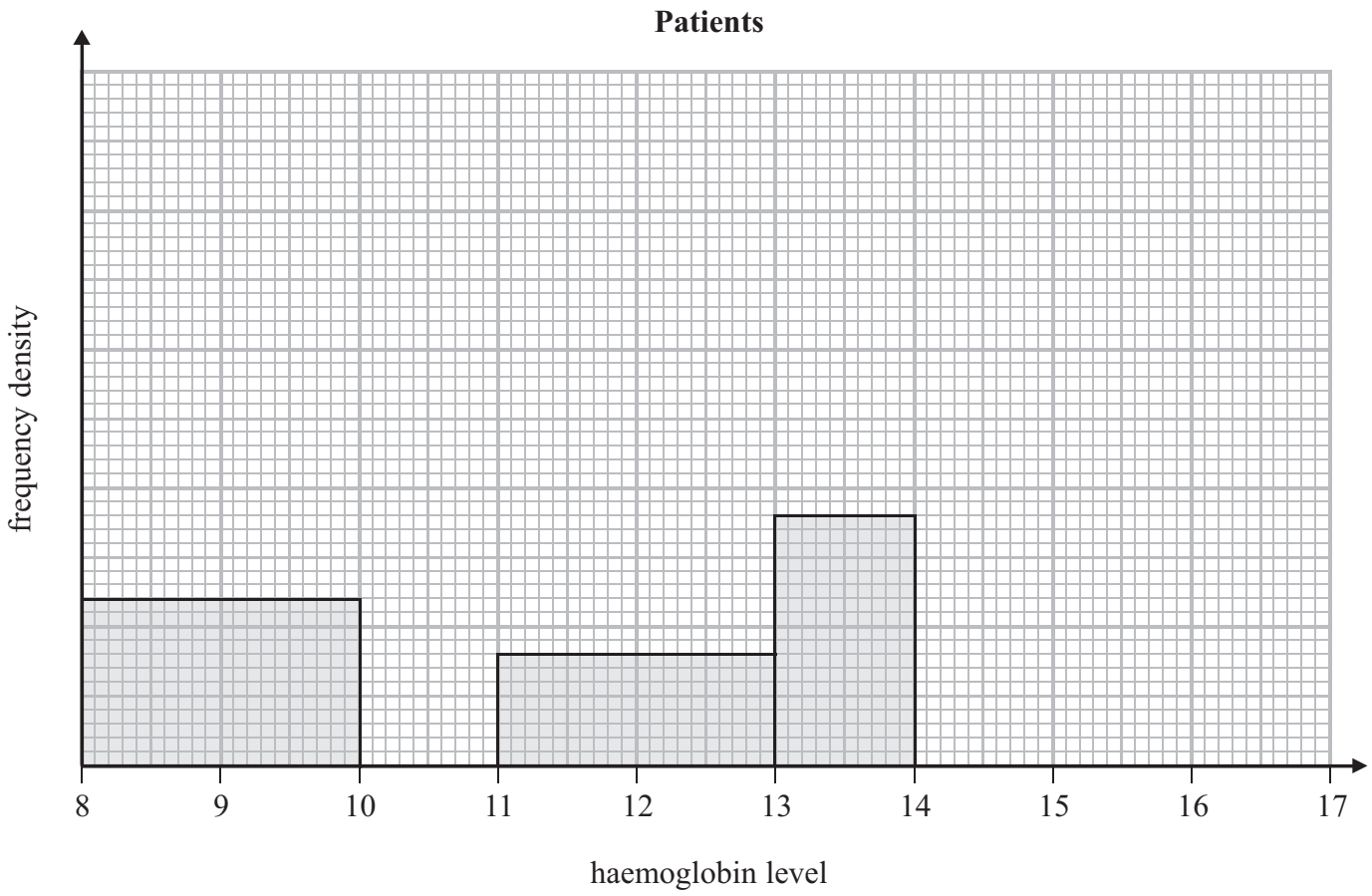
haemoglobin level	frequency
$8 < h \leqslant 10$	12
$10 < h \leqslant 11$	9
$11 < h \leqslant 13$	
$13 < h \leqslant 14$	
$14 < h \leqslant 17$	6

(a) Use the table to complete the histogram.

(2)

(b) Use the histogram to complete the table.

(2)



(Total for Question 19 is 4 marks)

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20 The table shows the number of people working in the three departments of a large company.

Department	Number of people
hardware	253
clothing	247
electrical	280

The owner of the company wants to know if people like working for the company. She takes a sample of all the people stratified by department.

There are 40 people from the clothing department in the sample.

Work out the number of people from the electrical department in the sample.

.....

(Total for Question 20 is 2 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

Summer 2012

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Higher (Calculator) Paper 1H

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Summer 2012

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	150÷3 OR 3,6,9,12,15,(…)	50	2	M1 for 150÷3 or at least the first 5 multiples of 3 which may come from addition or subtraction A1 cao
	(b)		7	2	M1 for 150÷20 or 7.5 seen or multiples of 20 up to 140 or up to 160 or subtracting 20s down to 10 or −10 A1 cao
	(c)	3×20 = 60 150 ÷ 60 **OR** 20,40,60,80,100,120,140 3, 6, …, 60, …, 120, …	2	2	M1 for 20×3 or 60 seen or 150÷60 oe A1 cao **OR** M1 for listing 20 times table with 60 or 120 identified or listing 3 times table with 60 or 120 or 180 identified A1 cao (SC B1 for 2.5)
2	(a)		Point at (76, 92)	1	B1 point plotted ±0.5 small square
	(b)		Relationship described	1	B1 Description of dynamic relationship ie the greater the score in test A the greater the score in test B or positive correlation B0 If contradiction is made
	(c)		Line of best fit	2	M1 for an appropriate line of best fit or a vertical line drawn at 65 or a point plotted at (65, answer) A1 for an answer in the range 60-70 inclusive

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*3		$p + 2p + 2p - 3 = 17$ $5p - 3 = 17$ $5p = 20$ $p = 4$, so 4, 8, 5	4, 8, 5	5	M1 for $2p$ or $2p-3$ seen M1 for p +'$2p$' + '$2p - 3$' M1 for p +'$2p$' + '$2p - 3$' = 17 A1 for 4 or 8 or 5 C1 for Alan 4,Ben 8 and Clara 5 oe **OR** M1 for choosing a value for p M1 for attempting a trial M1 for attempting at least 2 trials with totals A1 for 4 or 8 or 5 C1 for Alan 4,Ben 8 and Clara 5 oe
4	(a)		(Bindings) 90 102	2	B2 for (£)90 and (£)102 (B1 for one correct entry)
	(b)		= C2–B2 = B2+B3+B4+B5+B6	3	B1 for (=) C2–B2 oe B1 for (=) B2+B3+B4+B5+B6 or (=)SUM(B2:B6) oe or intention to add correct cells is clear B1 for using correct spread sheet notation in both cases condone missing =
	(c)	10÷45x100	22.2	2	M1 10÷45×100 A1 22.2 oe
5			250 500 437.5 100 125	3	M1 for identifying the scale factor eg 10÷4 can be implied by one correct answer A1 for three correct A1 for all correct

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		3×12+9×15+15×8+21×3+27×2	10.2	4	M1 for finding at least 4 products *ft* consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints M1 (dep on 1st M) for 'Σft'÷40 A1 cao
*7		Some area examples ½x12x25=150 8x25=200 ½x11x25=137.5 5x25=125 ½x21x25=262.5 ½x44x25=550 ½x70x25=875 40x25=1000	550 ft^2	4	M1 Using the correct dimensions to calculate an area M1Complete method to find the area of the grass A1 cao C1dep on a previous M mark correct units communicated
8	(a)		0	1	B1 cao
	(b)		£30 000	3	M1 for 400 000–325 000 or 75 000 seen M1 (dep) for 0.4×'(400 000–325 000)' A1for (£) 30 000

5AM1H_01

Question		Working	Answer	Mark	Notes
*9		<table><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>l</td><td>38</td><td>40.5−40.95</td><td>38.8−40</td></tr><tr><td>g</td><td>8.35−8.44</td><td>9</td><td>8.75</td></tr><tr><td>p</td><td>66.5−68.4</td><td>72</td><td>70</td></tr></table>	A,C,B	4	(litres) M1 for 9×4.5 (=40.5) or 70÷1.75 (=40) M1 for 9×4.5 (=40.5) and 70÷1.75 (=40) A1 for 40.5−40.95 and 38.8−40 **OR** (galls) M1 for 38÷4.5 (=8.4 or better) or 70÷8 (=8.75) M1 for 38÷4.5 (=8.4 or better) and 70÷8 (=8.75) A1 for 8.35−8.44 and 8.75 **OR** (pints) M1 for 38×1.75 (=66.5) or 9×8 (=72) M1 for 38×1.75 (=66.5) and 9×8 (=72) A1 for 66.5−68.4 and 72 C1 (dep on M1) for correct order identified with quantities, ie A,C,B or B, C, A **or** ft correct order from their quantities
10	(a)		150	1	B1 cao
	(b)(i)	$2(5x+1)+4(6x-2)=11$ $34x-6=11$ $34x=17$	0.5	6	M1 $2(5x+1)$ oe or $4(6x-2)$ oe seen M1 for forming an equation '$2(5x+1)$'+' $4(6x-2)$'$=11$ M1 Intention to rearrange at least one term A1 oe (Units can be ignored)
	(ii)	$6\times0.5-2$	1		M1 '0.5' substituted into correct expression A1 ft

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		No time period of how long a visit is Non-exhaustive responses Overlapping boxes/subject to interpretation	2	B2 for TWO aspects from No time period for length of visit Non-exhaustive responses Overlapping boxes ie no number quantities/open to interpretation B1 ONE correct aspect
	(b)		Question including time period and proper response boxes	2	B1 for a question about payment with a time frame for length of use B1 for at least 3 correctly labelled response boxes non-overlapping which may not be exhaustive OR for an exhaustive list of 3 or more options which could overlap
12	(a)		20	1	B1 cao
	(b)	24–19	5	2	M1 'UQ'–'LQ' A1 answer in range 3–7
	(c)	15,17,18,22,30	Box plot drawn	3	B3 for fully correct box plot (B2 for 3 correctly plotted values including box and tails) (B1 for 2 correctly plotted values including box or tails or 5 correct values plotted and no box or tails)
	(d)		Comments on range, inter quartile range, skew or median acceptable	2	B2 two relevant comparisons one spread (IQR or range) and one about the median (average is acceptable in place of the word median) B1 one comparison made

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		85%=765 765÷85×100	900	3	M1 for (100–15)%=765 M1 (dep) 765÷'85'×100 oe A1 cao
14	(a)	(180–2x)÷ 2=90–x (180–x) ÷2–(90–x)	$y = \frac{x}{2}$	3	Use of Isosceles triangle M1 (180–2x) ÷2 or 90–x or (180–x)÷2 or 90 – $\frac{x}{2}$oe seen M1 a correct unsimplified equation in y eg y=(90-$\frac{x}{2}$)-(90-x) A1 cao OR for left hand side of triangle and angles in a triangle are 180˚ M1 angles $\frac{x}{2}$ and 180-x indicated on diagram or using angle notation M1 a correct unsimplified equation in y *eg* 180=$\frac{x}{2}$+180-x+y A1 cao OR for angles in a quadrilateral M1 angle 360-2x labelled AND used in the solution M1 a correct unsimplified equation in y eg 360=360-2x+x+2y A1 cao
	(b)	x–180=2x 3x=180	60	3	M1 Correct equation set up in x or y or combination of x and y eg 180=2x+$\frac{x}{2}$+$\frac{x}{2}$ or 180=4y+y+y or 180=x+4y M1 3x=180 or 6y=180 AND y=$\frac{x}{2}$ A1 cao

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$30x+4y=46$ (×2) $24x+8y=45.20$ (×0.5) Eg $60x+8y=92$ $24x+8y=45.20$ $36x=46.8$ $x = \frac{46.8}{36}$ Eg $30x+4y=46$ $12x+4y=22.60$ $18x=23.4$ $x = \frac{23.4}{18}$ **OR** Eliminates x first Or substitution back into any correct equation	Petrol £1.30 Oil £1.75	5	B1 for correct equations expressed in terms of two variables (oe) M1 for correct process to eliminate either variable (condone one arithmetic error) A1 for either x = £1.30 or £1.75 oe M1 (dep on 1st M1) for correct substitution of their found variable **OR** M1 (indep of 1st M1 for a correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both x =£1.30 and £1.75 oe SC B1 for x = £1.30 B1 for y= £1.75 oe if M0 scored

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$5000x1.028^4$	5583.96	3	M1 1+ 0.028oe or 5000x0.028 M1 $5000x1.028^4$ oe or a complete method for compound interest year on year A1 cao
	(b)(i)	12000×1.02×1.035×1.05	£13301.82	5	M1 12000 × 1.02 × 1.035 × 1.05 oe or a complete method not using a multiplier A1 cao
	(ii)	3.492753115	3.49		M1 $\frac{13301.82}{12000}$ or 1.108485 M1 $(\sqrt[3]{\frac{13301.82}{12000}}-1) \times 100$ A1 cao Or M1 1.02×1.035×1.05 or 1.108485 seen M1 ($\sqrt[3]{1.02 \times 1.035 \times 1.05}$ -1)x100 A1 cao
17		$\sqrt[3]{2}$	1.26	2	M1 Volume scale factor 2 indicated A1 $\sqrt[3]{2}$ oe

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		$x+y\leq 500$ $x\leq 300$ $y\leq 350$	3	B1 $x+y\leq 500$ B1 $x\leq 300$ B1 $y\leq 350$ If zero scored SC B1 for $x+y$? 500 and x ? 300 and y ? 350 where ? is any inequality
	(b)		Inequalities drawn and shaded	3	M1 for one of their lines drawn M1for their other two lines drawn A1 for indicating a combined region all shading consistent NB: line segments should be drawn between x=0 and x=500: for A1 shading must be consistently in or out
	(c)	(0,350) (300,0) (150,350) (300,200)	£650	4	M1 for stating 2 or more points of intersection M1 (dep) for finding 1.5x+y for a point of intersection M1 (dep on M2) for stating the maximum of their values A1 cao SC: B2 for £650 when no method marks can be awarded
19	(a)	20 small sq=1	Height 18,4	2	B2 for 2 correct histogram bars ±2mm; heights at 3 and 1.2 (B1 1 correct bar)
	(b)		8,9	2	M1 for frequency = fd × column width, implied by 1 frequency correct **or** fd correctly marked on vertical axis 0.8cm to 2 **OR** identifying 20 small sq=1 A1 8 and 9 both correct

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		40÷247×280	45	2	M1 40÷247×280 OR 280÷(247÷40) oe OR (247÷780)y=40, y=126.315 and 280÷780x126.315 oe A1 45

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Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Wednesday 9 November 2011 – Afternoon
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 ▶

P40607A

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6/6/6

P 4 0 6 0 7 A 0 1 2 8

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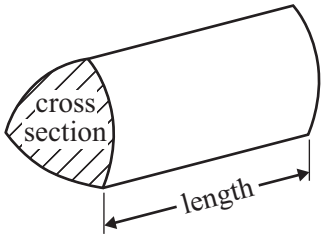
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GCSE Mathematics 2AM01

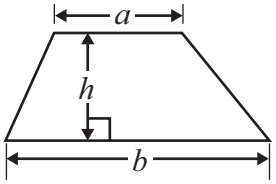
Formulae – Higher Tier

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 × length

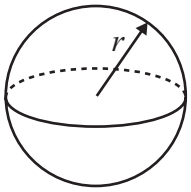


Area of trapezium $= \frac{1}{2}(a + b)h$



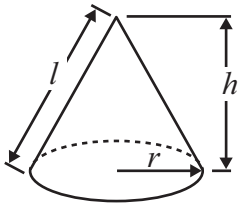
Volume of sphere $= \frac{4}{3}\pi r^3$

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

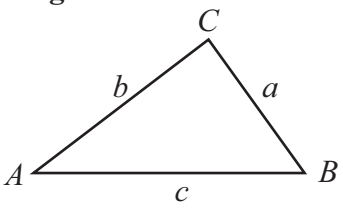


Volume of cone $= \frac{1}{3}\pi r^2 h$

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

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Last week, Imran's pay was £208
This week his pay is 5% more than last week.

Work out Imran's pay this week.

£ .....

(Total for Question 1 is 3 marks)

2 Here is a list of ingredients for making a Cheese Soufflé.

Cheese Soufflé
3 eggs
1 oz butter
$\frac{1}{2}$ oz flour
$\frac{1}{4}$ pint milk
3 oz grated cheese

Imperial Units		Metric Units
1 oz	=	28 g
1 pint	=	568 m*l*

(a) Complete the list of ingredients using metric units.

Cheese Soufflé
3 ..... eggs
..... g butter
..... g flour
..... m*l* milk
..... g grated cheese

(2)

Jemma wants to make 12 Cheese Soufflés.

(b) Work out how much milk she will need.
Give your answer in litres.

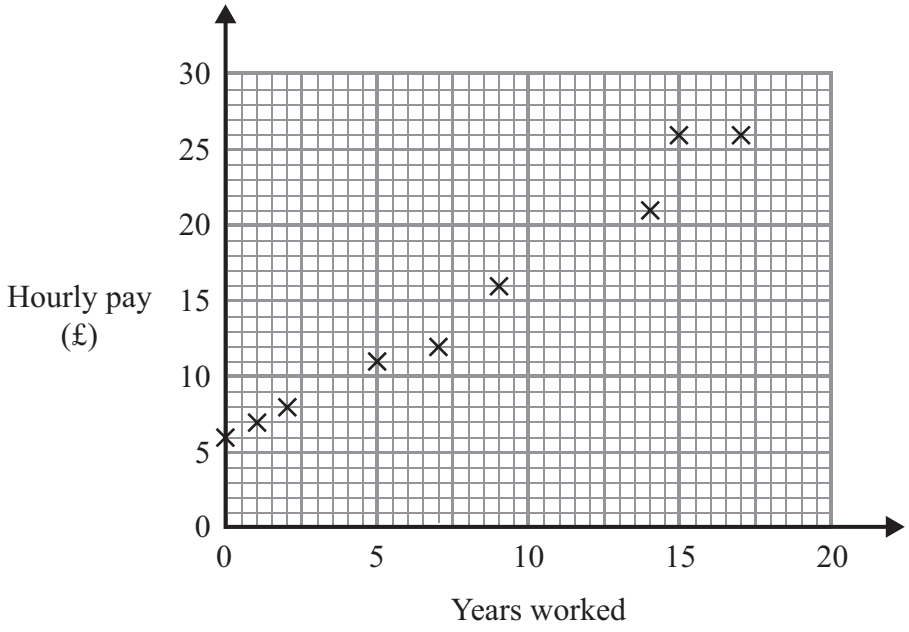
..... litres

(2)

(Total for Question 2 is 4 marks)

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3 The scatter graph shows some information about 9 people who work for a company.
It shows the number of years each person has worked.
It also shows each person's hourly pay in pounds.



Sara has worked for the company for 10 years.
Her hourly pay is £19

(a) Show this information on the graph.

(1)

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

(1)

(c) Describe the relationship this scatter graph shows.

.....

.....

(1)

(Total for Question 3 is 3 marks)

4

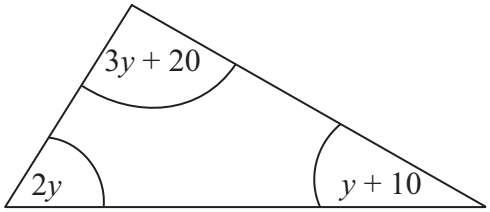


Diagram **NOT** accurately drawn

(i) Find an expression, in terms of y, for the sum of the three angles in the triangle. Simplify your expression.

.....

(ii) Find y.

$y =$ ..... °

(4)

(Total for Question 4 is 4 marks)

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5 The table gives information about the number of cars at a ferry port and the number of people in each car.

Number of people	Number of cars
1	33
2	140
3	109
4	165
5	41
6	12

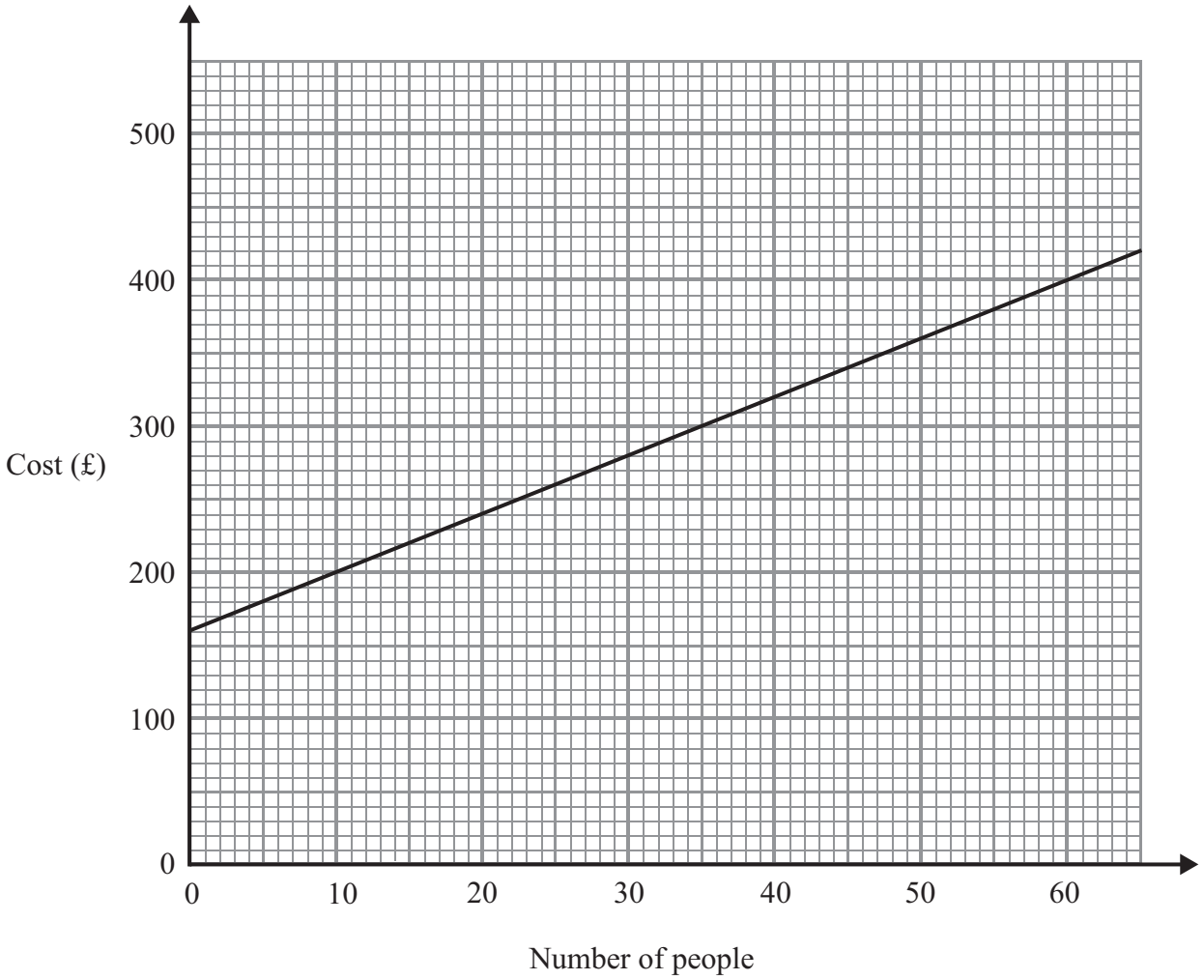
Work out the mean number of people per car.

.....

(3)

(Total for Question 5 is 3 marks)

6 Liam is organising a conference for a number of people.
He is going to use the Grange Hotel.
He can use the graph below to work out the cost, in pounds, for different numbers of people.



(a) (i) Work out the gradient of the line on the graph.

.....

There are 20 more people at the conference than Liam had expected.

(ii) How much does this add to the cost of the conference?

£.....

(4)

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Liam is also organising a conference at the Bellevue Hotel.
The cost is £20 plus £8 per person.
The table shows information about the cost at this hotel for different numbers of people.

Number of people	10	20	30	40	50	60
Cost (£)	100	180	260	340	420	500

(b) For how many people will the cost at the Grange Hotel be the same as the cost at the Bellevue Hotel?

.....

(3)

(Total for Question 6 is 7 marks)

*7 The table shows some information about the average adult spending in 2008 as a percentage of average **total** adult spending in 2008.

Item	Percentage
food	11%
housing	11%
leisure	13%
clothes	5%
transport	14%
household goods	8%
other items	38%

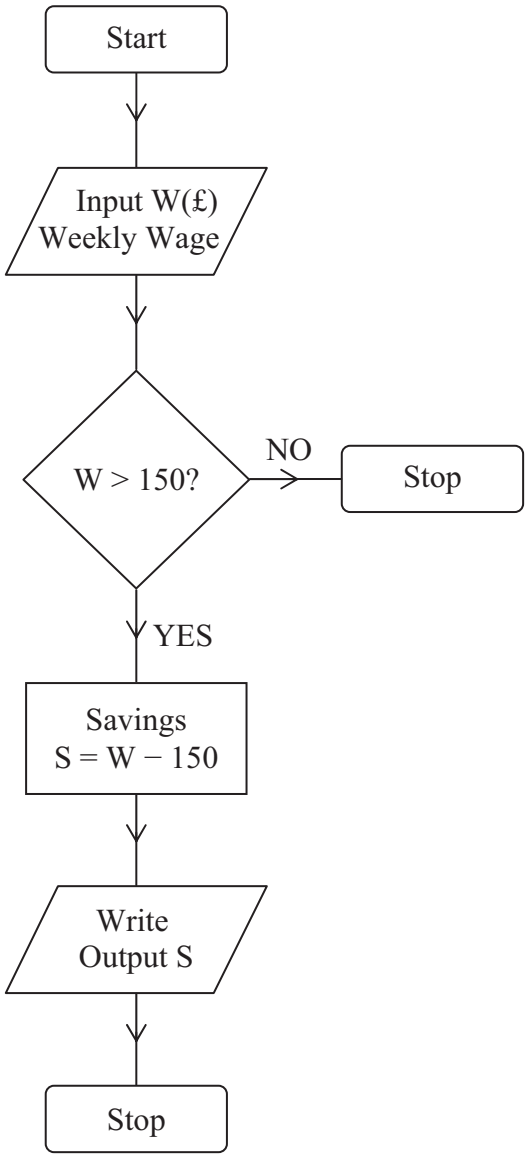
In May 2008, Katie spent a total of £425
She spent £48.45 of the £425 on food.

Compare the percentage that Katie spent on food with the average adult spending on food.

(Total for Question 7 is 3 marks)

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8 Samina uses this flow chart to work out how much money she can save each week.



One week Samina's wage was £187.50

(i) Write down the Input W.

£ .....

(ii) Work out the Output S.

£ .....

(Total for Question 8 is 2 marks)

9 James is going to cover a rectangular floor with flooring.
The floor has a length of 6 m.
It has a width of 4.5 m.

Flooring is sold in packs.
One pack of flooring covers an area of 1.44 m^2.
Each pack costs £12.87

James buys the least number of packs so that he has enough flooring to cover the floor.

Work out how much money James pays for the flooring.

£ .....

(Total for Question 9 is 4 marks)

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10 The table shows the weight in grams of some UK coins.

Coin	Weight (g)
50p	8.00
20p	5.00
10p	6.50
5p	3.25
2p	7.12
1p	3.56

(a) Work out the value of 1 kg of 50p coins.

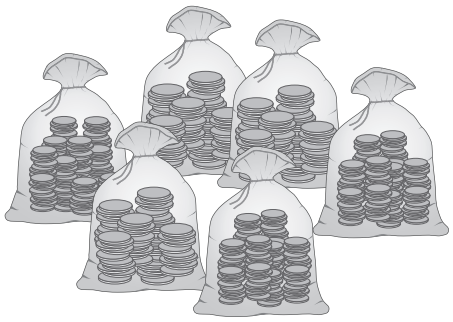
.....

(2)

Jeff works in a bank.

A customer gives him 5 bags of 2p coins.
Each bag weighs 356 g.

The customer also gives him 5 bags of 1p coins.
Each bag weighs 356 g.



*(b) Compare the total value of the bags of 2p coins with the total value of the bags of 1p coins.

(2)

(Total for Question 10 is 4 marks)

11 Karine wants to find out how far people travel from their home to the nearest cinema.

(a) Design a suitable question Karine can use on a questionnaire.

(2)

Karine did a survey on the distances people travelled from their home to the nearest cinema.
She gave a questionnaire to 5 of her friends.

This may **not** be a good method to do the survey.

(b) Explain why.

.....

.....

(1)

(Total for Question 11 is 3 marks)

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12 A table top is made from a triangle and a trapezium.

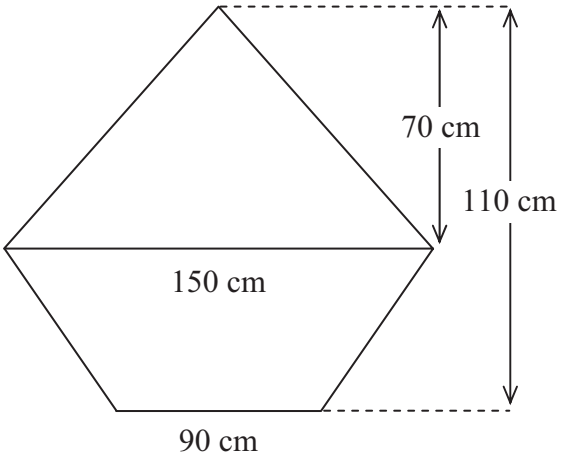


Diagram **NOT** accurately drawn

Work out the area of the table top.

..... cm²

(Total for Question 12 is 4 marks)

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13 The tables show some information about the population of the United Kingdom (UK) in 2003 and in 2008

2003		
	Area (km²)	**Number of people per km²**
England	130 281	383
Northern Ireland	13 576	125
Scotland	77 925	65
Wales	20 732	142

2008	
	Percentage of total UK population
England	84%
Northern Ireland	4%
Scotland	9%
Wales	3%

In 2008, the total population of the UK was 61 million.

The population of **England** increased between 2003 and 2008

Work out this increase.
Give your answer correct to 2 significant figures.

.....

(Total for Question 13 is 5 marks)

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14 A machine part is made by cutting a small square from the centre of a large square piece of steel.

The dimensions of the machine part are shown on the diagram.
All measurements are in cm.

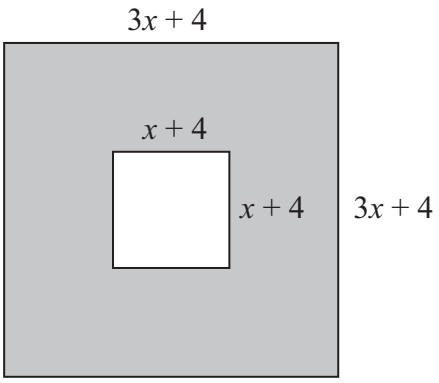


Diagram **NOT** accurately drawn

The perimeter of the small square is two thirds of the perimeter of the large square.

Work out the length of a side of the small square.

..... cm

(Total for Question 14 is 5 marks)

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15 The table shows some information about eight planets.
It shows their distance from the Sun and their mass.

Planet	Distance from the Sun (km)	Mass (kg)
Earth	150×10^6	5.97×10^{24}
Jupiter	778.3×10^6	5.898×10^{27}
Mars	228×10^6	6.42×10^{23}
Mercury	57.91×10^6	3.302×10^{23}
Neptune	4498×10^6	1.024×10^{26}
Saturn	1427×10^6	5.68×10^{26}
Uranus	2871×10^6	8.683×10^{25}
Venus	108.21×10^6	4.869×10^{24}

(a) Which planet has the smallest mass?

.....

(1)

(b) Write, in standard form, the distance of Mars from the Sun.

.....

(2)

(c) Kelly says,

"The mass of Jupiter is more than 1000 times the mass of the Earth".

Is Kelly correct?
Explain your answer.

(2)

(Total for Question 15 is 5 marks)

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16 Jenny is organising a party.

She buys some paper plates and some plastic cups.

Paper plates are sold in packs.
There are 25 plates in a pack.
Each pack costs 78p.

Plastic cups are sold in packs.
There are 35 cups in a pack.
Each pack costs £1.10

Jenny buys exactly the same number of plates and cups.

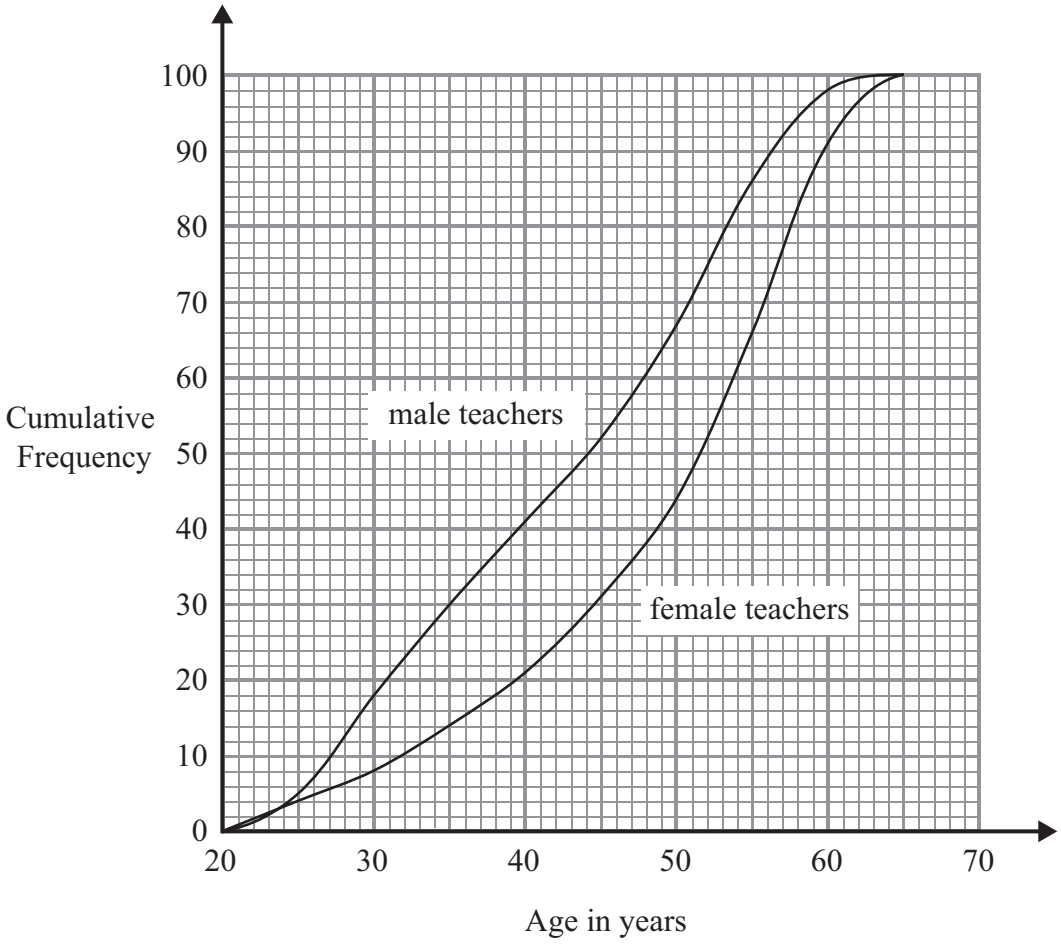
What is the least amount of money she pays?

£ .....

(Total for Question 16 is 5 marks)

17 A student did a survey of teachers' ages.

The cumulative frequency curves show information about the ages of the male teachers and the ages of the female teachers.



(a) Find an estimate for the number of the male teachers older than 50 years of age.

.....

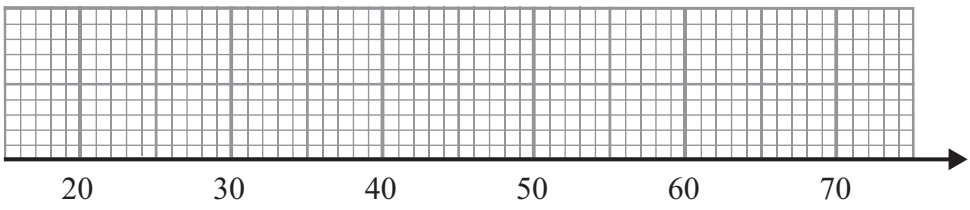
(2)

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The youngest male teacher was 21 years of age.
The oldest male teacher was 65 years of age.

(b) On the grid, draw a box plot to show the distribution of the ages of the male teachers.

male teachers

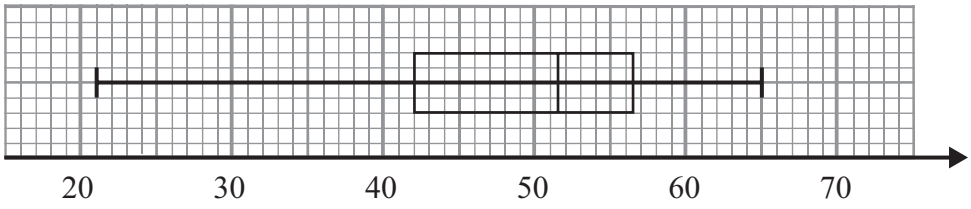


Age in years

(4)

The box plot below shows information about the ages of the female teachers.

female teachers



Age in years

(c) Make two comparisons between the distributions of the ages of male teachers and female teachers.

.....

.....

.....

.....

(2)

(Total for Question 17 is 8 marks)

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18 Jeff invests £500 in a bank account for 4 years.

The bank pays compound interest at an annual rate of

3.5% for the first year
2.0% for each of the other 3 years

(a) Work out how much Jeff has in his account after 4 years.

£ .....

(3)

(b) Work out the annual equivalent rate (AER) over these 4 years.
Give your answer to one decimal place.
You must show your working.

.....%

(3)

(Total for Question 18 is 6 marks)

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19 The throwing area for a sports event is formed from the sectors of two circles with centre O.

The area of sector AOD is $0.5\,m^2$.

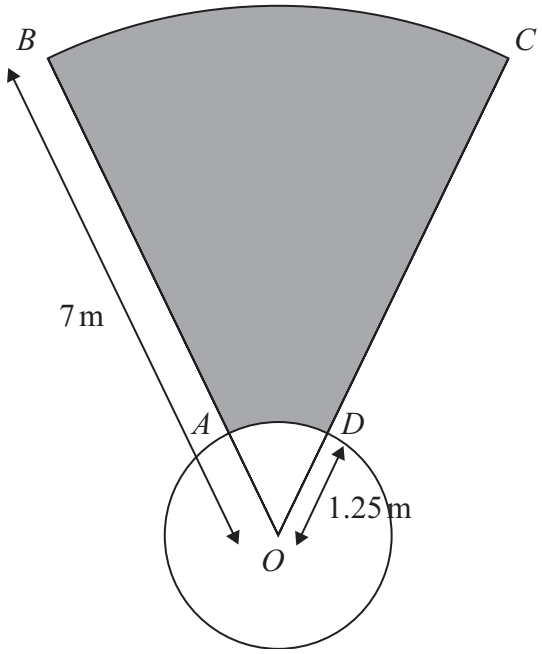


Diagram **NOT** accurately drawn

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 19 is 5 marks)

20 The table shows some information about the population of a town.

	Population size
Male children	1650
Male adults	5346
Female children	2085
Female adults	5968

Nhabi 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.

Nhabi decides to take a sample.

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

.....

.....

(1)

Nhabi takes a stratified sample of 200 people.

(b) Calculate the number of male adults that should be in his sample.

.....

(2)

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Jess takes a random sample of 150 people in the town.
Sixty of these people have not been to their doctor in the last year.

(c) Estimate the number of people in the town who have not been to their doctor in the last year.

.....

(2)

(Total for Question 20 is 5 marks)

21 Jean owns a flower shop.

Jean needs at least 60 bunches of flowers.
She buys x bunches of daffodils and y bunches of tulips to sell in her shop.

(a) Express this information as an inequality.

.....

(1)

Jean pays 40 pence for each bunch of daffodils.
She pays 80 pence for each bunch of tulips.

Jean does not want to pay a total of more than £40

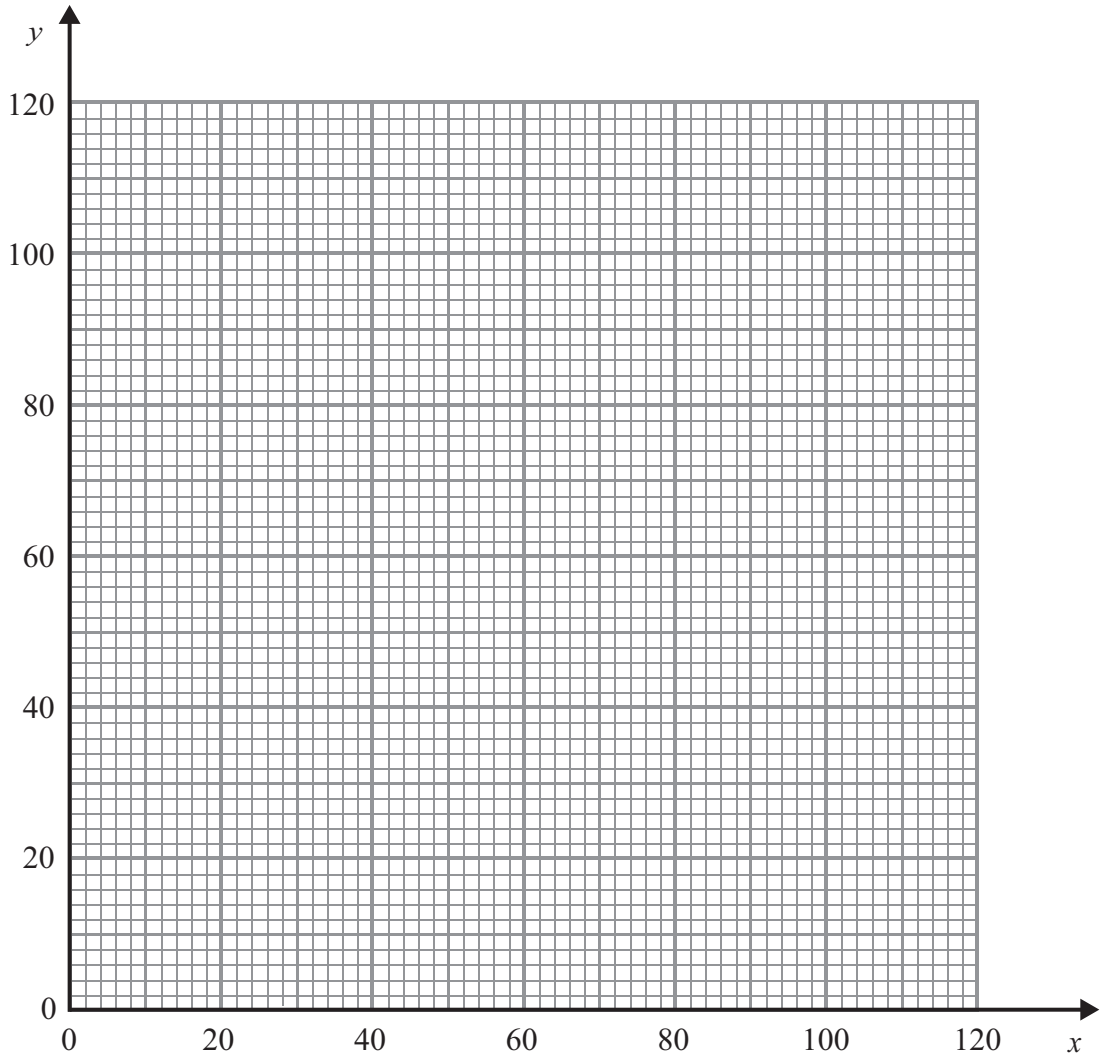
(b) Show that $x + 2y \leqslant 100$

(2)

Jean is going to buy at least 20 bunches of tulips.

(c) On the grid, show by shading, the region which satisfies all the above three conditions.

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(3)

Jean will make a profit of 20 pence on each bunch of flowers she sells.
She sells all the bunches of daffodils and bunches of tulips.

(d) Work out the greatest total profit that Jean will make.

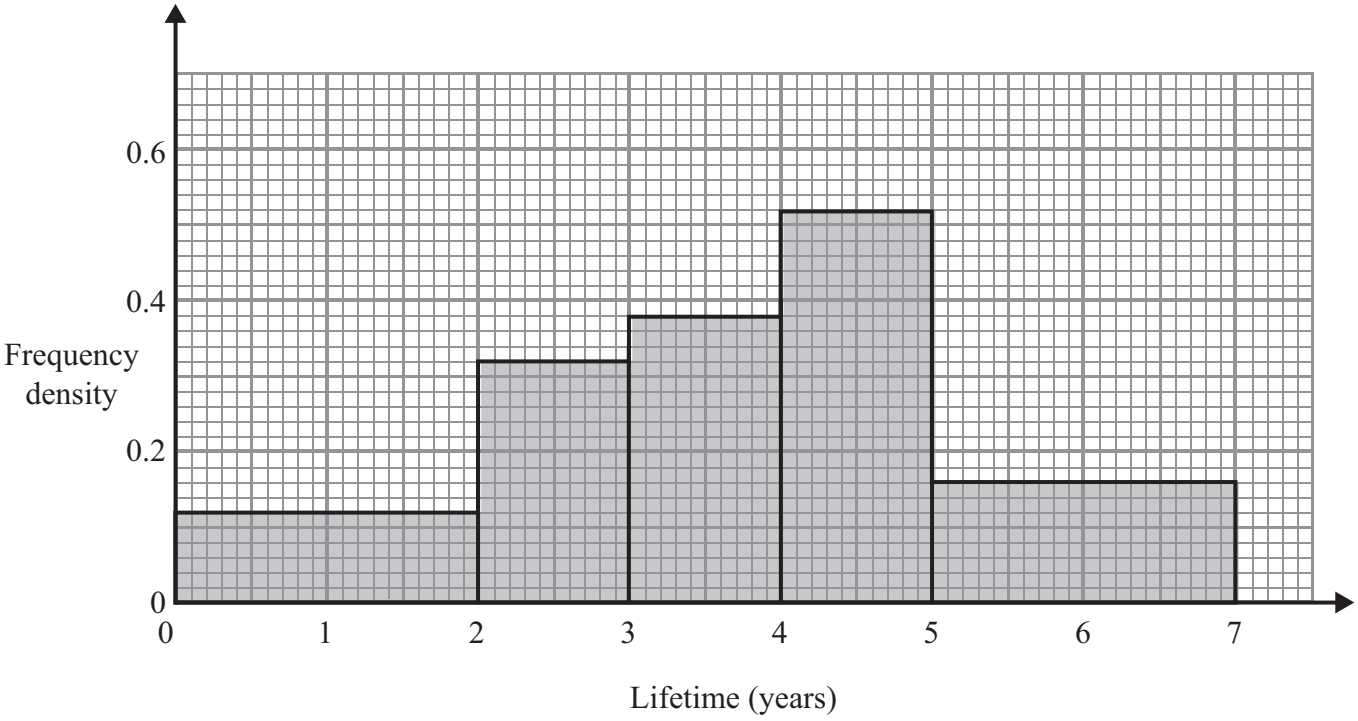
£ .....

(2)

(Total for Question 21 is 8 marks)

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22 The histogram shows information about the lifetime of some electrical components.



Work out the proportion of the components with a lifetime of between 1 and 6 years.

.....

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

November 2011

Applications of Mathematics (GCSE)
Unit 1: 5AM1H_01 (Higher)

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$\frac{5}{100} \times 208$ 208 + 10.40 1.05 × 208	218.40	3	M1 for 0.05 × 280 or 10.4(0) M1(dep) for 208 + "10.40" A1 for 218.40 OR M2 for 1.05 × 208 oe A1 for 218.40
2	(a)		28g butter 14g flour 142m*l* milk 84g cheese	2	M1 for use of 1 ounce = 28g or 1 pint= 568m*l* (may be implied by at least 2 correct quantities) A1 cao
	(b)	12 × 142	1.704	2	M1 for 12 × "142" or sight of figures 1704 A1 ft (accept 1.7, 1.70)
3	(a)		Point plotted	1	B1 for plotting (10, 19) tol ±1 sq
	(b)		Line of best fit	1	B1 for a straight line passing between (1, 4) and (1, 8) and between (17, 24) and (17, 28) – see diagram.
	(c)		Relationship described	1	B1 for 'as the number of years they have done their job increases, so does their (hourly) pay' oe OR B1 'positive correlation' oe
4	(i)	$3y + 20 + 2y + y + 10$	$6y + 30$	4	M1 for $3y + 20 + 2y + y + 10$ A1 for $6y + 30$ (=180)
	(ii)	$6y + 30 = 180$ $y = (180 - 30) \div 6$	25		M1 for "$6y + 30$" = 180 or correct sequence of operations using "$6y + 30$" and 180 A1 ft on an equation of the form $ay + b = 180$ T&I B2 for 25, B0 otherwise

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		$(1 \times 33) + (2 \times 140) + (3 \times 109) + (4 \times 165) + (5 \times 41) + (6 \times 12) =$ $33 + 280 + 327 + 660 + 205 + 72$ $1577 \div 500$	3.154	3	M1 for at least 5 of 1×33 (=33), 2×140 (=280), 3×109 (=327), 4×165 (=660), 5×41(=205), 6×12 (=72) or for 1577 M1 (dep) for $\Sigma fx \div \Sigma f$ A1 for 3.154 or 3.15 or 3.2
6	(a)(i)	eg $80 \div 20$	4	4	M1 for attempt to find the gradient eg $80 \div 20$ or drawing a right-angled triangle with the line as hypotenuse. A1 for 3.5 to 4.5
	(ii)	20×4	80		M1 for $20 \times$ "4" or clear attempt to find the costs for a difference of 20 or method shown on graph A1 ft on "4"
	(b)	$4n + 160 = 8n + 20$ $8n - 4n = 160 - 20$ $4n = 140$ $n = 140 \div 4$	35	3	M1 for plotting at least 2 points on grid M1 draw line to intersect with given graph A1 cao OR M1 for working out the cost at the Grange hotel for one value of n not already in the table eg $15 \times 8 = 120$, $120 + 20$ M1 for working out the cost at the Grange hotel for $n = 35$ eg $35 \times 8 = 280$. $280 + 20$ A1 cao OR M1 for $4"n" + 160 = 8"n" + 20$ M1 for clear correct method to isolate terms in n and number terms on opposite sides of a four term equation eg. $8n - 4n = 160 - 20$ A1 cao (SC B2 for 33 – 34 if no marks scored)

Question		Working	Answer	Mark	Notes
7		$\frac{48.45}{425}\times 100$ OR $\frac{11}{100}\times 425 = 46.75$	Katie spends more	3	M1 for $\frac{48.45}{425}\times 100$ A1 for 11.4 C1 (dep on M1)for conclusion ft from comparison of two percentages OR M1 for $\frac{11}{100}\times 425$ or for 10% = 42.5(0), 1% = 4.25, 42.5(0) + 4.25 A1 for 46.75 C1 (dep on M1)for correct ft from comparison of "46.75" and 48.45
8	(i) (ii)		187.50 37.50	2	B1 for W = 187.5(0) B1 for S = 37.5(0)
9		6 × 4.5 27 ÷ 1.44 19 × £12.87	£244.53	4	M1 for 6 × 4.5 M1 for "6 × 4.5" ÷ 1.44 M1 for "19" × £12.87 A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	$\frac{1000}{8} \times 50$	£62.50	2	M1 for $\frac{1000}{8} \times 50$ or $\frac{1000}{8} \times 0.5$ oe or digits 625(0) A1 for £62.50 or 6250p or £62.50p
	(b)	5 × 356g = 1780g, 1780 ÷ 7.12 = 250 250 × 2p = 500p 5 × 356g = 1780g, 1780÷3.56 = 500 500 × 1p = 500p OR 356 ÷ 7.12 = 50, 50 × 2p = 100p 5 × 100p = 500p 356 ÷ 3.56 = 100, 100 × 1p = 100p 5 × 100p = 500p OR 1p coins are half the weight of 2p coins A bag of 2 p coins must have half the number of coins as a bag of 1p coins	both have the same value + evidence	2	M1 for correct attempt at finding the value of the coins in a pack or 5 packs Eg 5 × 356g ÷ 7.12 = 250, 250 × 2p = 500p or 5 × 356g ÷ 3.56 = 500, 500 × 1p = 500p OR 356 ÷7.12 × 2p = 100p (5 × 100p = 500p) or 356 ÷ 3.56 × 1p = 100p (5 × 100p = 500p) C1 (dep)for valid conclusion based on correct working OR M1 For reasoning from the comparative weights and values of the 1p and 2p coins e.g. Weight of 1p coin is half of the weight of a 2p coin so there are twice as many 1p coins in a bag as there are 2ps C1 (dep) for valid conclusion based on correct reasoning

Question		Working	Answer	Mark	Notes
11	(a)		Appropriate question including distance units + response boxes	2	B1 for appropriate question stem and inclusion of distance units (units may be given with response boxes) B1 for at least 3 correctly labelled, non-overlapping response boxes or for at least 3 correctly labelled exhaustive response boxes
	(b)		Valid reason	1	B1 for a valid reason. eg "her friends may all live near each other", "sample size is too small" oe
12		$\frac{1}{2} \times 70 \times 150$ $\frac{1}{2}(90+150) \times 40$ $5250 + 4800$	10050	4	M1 for correct method to work out the area of the triangle eg $\frac{70 \times 150}{2}$ oe or 5250 M1 for correct method to work out the area of the trapezium eg $\frac{90+150}{2} \times (110-70)$ oe or 4800 M1 (dep on at least one of the previous Ms) for '5250' + '4800' A1 cao
13		$\frac{84}{100} \times 61$ 383 × 130281 51 240 000 − 49 897 623 = 1342377	1 300 000	5	M1 for correct method to work out 84% of 61 million eg $\frac{84}{100} \times 61$ or digits 5124 seen A1 for 51.2(4) million oe M1 for 383 × 130281 or digits 4989....seen M1 (dep on at least 1 previous M1) for "51.24" − "49.89…" A1 1 300 000 – 1 350 000 oe

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$4(x + 4) = 4x + 16$ $4(3x + 4) = 12x + 16$ $4x + 16 = ⅔(12x + 16)$ $12x + 48 = 24x + 32$ $12x = 16$	5⅓	5	M1 for a correct expression for at least one perimeter. M1 for "$4x + 16$" = ⅔"$(12x + 16)$" oe M1 for $12x + 48 = 24x + 32$ or $4x + 16 = 8x + \frac{32}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" + 4 OR M2 for $x + 4 = ⅔(3x + 4)$ M1 for $3x + 12 = 6x + 8$ or $x + 4 = x + \frac{8}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" + 4 T&I B4 for 5.33 or better

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		Mercury	1	B1 cao
	(b)		2.28×10^8	2	B2 cao (B1 for $a \times 10^8$, $a \neq 2.28$ or 2.28×10^n, $n \neq 8$)
	(c)	$M_J \div M_E = 987.9....$ OR $1000 \times 5.97 \times 10^{24} = 5.97 \times 10^{27}$ OR $5.898 \times 10^{27} \div 1000 = 5.898 \times 10^{24}$	No + reason	2	M1 for mass of Jupiter ÷ mass of Earth or mass of Earth × 1000 or mass of Jupiter ÷ 1000 A1 No with supporting reason(s) eg 5.97×10^{27} OR M1 both masses written as ordinary numbers A1 No + 1000 × correctly written mass of Earth
16		25 50 75 100 125 150 **175** 35 70 105 140 **175**	10·96	5	M1 for attempt to find the LCM of 25 and 35 eg at least 3 correct multiples of 25 and at least 3 correct multiples of 35 or 2 factor trees with at least one correct A1 for 175 M1 for at least one of $\frac{"175"}{25}$ or "5" or $\frac{"175"}{35}$ or "7" or 5.50 or 5.46 either unassociated or associated with the correct pack. M1 for "5" × £1.10 + "7" × 78p A1 cao. OR M2 for attempt to find the number of packs of cups and plates eg sight of 5 (× 35) or 7 (× 25) A1 for 5 (× 35) and 7 (× 25) M1 for 5 × £1.10 + 7 × 78p A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)	100 − 67	33	2	M1 for use of graph at 50 years or sight of 66, 67, 68 A1 for 32,33,34
	(b)	Median = 44 – 44.5 LQ = 32 – 33, UQ = 51.5 – 52	Box plot drawn	4	B4 for fully correct box plot (B3 for 4 correct values plotted including box and tails) (B2 for 3 correct values plotted including box and tails or 5 correct values plotted and no box and tails) (B1 for 2 correct values plotted including box and tails or for a correct median or quartile)
	(c)		comparison	2	B2(ft) for at least two of : Comparison of a measure of location e.g. median age of male teachers is less than median age of female teachers Comparison of spread e.g. IQR for male teachers is greater than IQR for female teachers or the ranges are the same Comparison of skewness e.g. the age distribution of female teachers is more negatively skewed than the age distribution of male teachers (B1 ft for one of them)

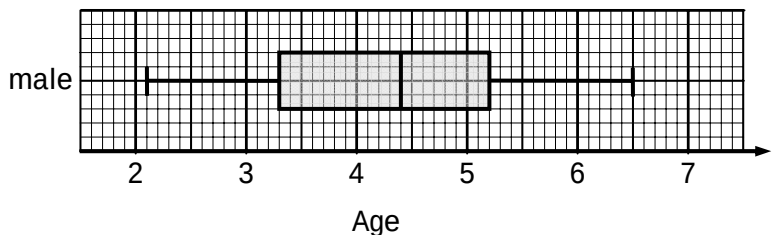
5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)	$500 \times 1.035 \times 1.02^3$ $= 549.17514$ Or $500 \times 1.035 = 517.50$ $517.50 \times 1.02 = 527.85$ $527.85 \times 1.02 = 538.407$ $538.407 \times 1.02 = 549.17514$	549.18 or 549.17	3	M1 for use of 1.035 or 1.02 oe (may be implied by sight of 517.50 or 510 or 547.50) M1 for $500 \times 1.035 \times 1.02^3$ oe A1 for 549.17 - 549.18
	(b)	$1.035 \times 1.02^3 = 1.09835028$ $\sqrt[4]{1.09835028} = 1.023729495$	2.4	3	M1 for 1.035×1.02^3 M1 for $\sqrt[4]{1.0983(...)}$ or $1.0237(....)$ A1 for 2.4 (accept 2.37……) OR M1 for $\frac{"a"}{500}$ M1 for $\sqrt[4]{(\frac{"a"}{500})}$ A1ft (Note: Do not accept answer without working)

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		$\left(\frac{7}{1.25}\right)^2 \times 0.5 = 31.36 \times 0.5$ 15.68 – 0.5 Or angle AOD = $\frac{0.5}{1.25^2} \times \frac{360}{\pi} = 36.6(6....)$ $36.6(6...) \times 7^2 \times \frac{\pi}{360} = 15.68$ 15.68 – 0.5 Or Area of small circle = $\pi \times 1.25^2 = 4.908(7...)$ Area of sector AOD: area of small circle = 1: 9.817… Area of sector OBC = $\pi \times 7^2 \div 9.817... = 15.68$ 15.68 – 0.5	15.2	5	M1 for $\frac{7}{1.25}$ or sight of 5.6 M1 $\left(\frac{7}{1.25}\right)^2 \times 0.5$ A1 for 15.68 M1(dep on 1st M) for "15.68" – 0.5 A1 for 15.18- 15.2 OR M1 angle AOD = $\frac{0.5}{1.25^2} \times \frac{360}{2\pi}$ M1 area of large sector = $36.6(6...) \times 7^2 \times \frac{\pi}{360}$ A1 for 15.68 M1(dep on 1st M) for "15.68" – 0.5 A1 for 15.18- 15.2 OR M1 for finding ratio of area of small sector to area of small circle or sight of 0.101(…) M1 for attempt to find the corresponding fraction of area of large circle A1 for 15.68 m² M1(dep on 1st M) for "15.68" – 0.5 A1 for 15.18- 15.2

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)		reason	1	B1 for reason e.g. Nhabi needs a sample in the same proportions as the population.
	(b)	$1650 + 5346 + 2085 + 5968$ $\frac{5346}{15049} \times 200$	71	2	M1 for $\frac{5346}{15049} \times 200$ or $\frac{15049}{200} = 75.245$ and $\frac{5346}{'75.245'}$ A1 for 71 (accept 72)
	(c)	$\frac{60}{150} \times (1650 + 5346 + 2085 + 5968)$	6019 or 6020	2	M1 for $\frac{60}{150} \times (1650 + 5346 + 2085 + 5968)$ oe A1 6019 or 6020
21	(a)		$x + y \geq 60$	1	B1 cao
	(b)	$40x + 80y \leq 4000$ Or $0.4x + 0.8y \leq 40$		2	M1 for $40x + 80y$ or $0.4x + 0.8y$ A1 cao
	(c)			3	M2 for all three lines drawn correctly (solid or dotted) ft (a) (M1 for 1 or 2 lines drawn correctly (solid or dotty)) ft (a) A1 for correct region cao
	(d)		£16.00	2	M1 for identification of (60, 20) on diagram or in working space A1 cao

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
22		Area $(1 < l < 6) = (0.12 \times 1) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 1)$ $= 1.50$ Total Area$= (0.12 \times 2) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 2)$ $= 1.78$ Proportion $= \frac{1.50}{1.78}$	0.84 or $\frac{75}{89}$	4	M1 for attempt to use frequency density × width e.g. 0.12×2 or 0.24 M1 for $(0.12 \times 2) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 2)$ or 1.78 seen M1 for $((0.12 \times 1) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 1))$/"1.78" A1 for answer which rounds to 0.84 or 84% or $\frac{75}{89}$ or equivalent vulgar fraction OR M1 for attempt to use area e.g. sight of any one of 4.8, 6.4, 7.6, 10.4 or 6.4 (cm^2) oe M1 for 4.8 + 6.4 + 7.6 + 10.4 + 6.4 or 35.6 (cm^2) oe seen M1 for (2.4 + 6.4 + 7.6 + 10.4 + 3.2) "35.6" oe A1 for answer which rounds to 0.843 or 84.3%% or $\frac{75}{89}$ or equivalent vulgar fraction

17(b)



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Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Monday 6 June 2011 – Afternoon
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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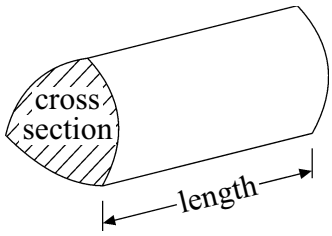
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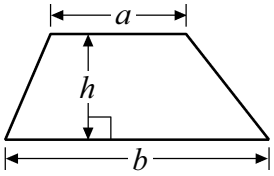
Formulae – Higher Tier

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

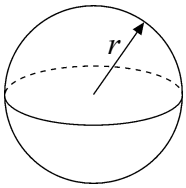


Area of trapezium $= \frac{1}{2}(a+b)h$



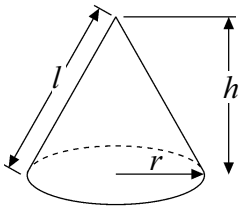
Volume of sphere $= \frac{4}{3}\pi r^3$

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

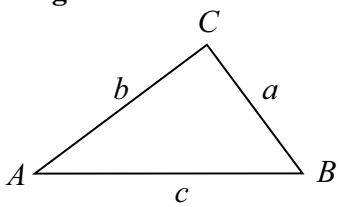


Volume of cone $= \frac{1}{3}\pi r^2 h$

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

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Brian wants to go on holiday.
He is going to take out a loan of £500 to help pay for the holiday.

Brian will have to pay back the £500 plus 20% interest over 12 months.
He will pay back the same amount of money each month.

How much money will he need to pay back each month?

£ .....

(Total for Question 1 is 4 marks)

2 Joe uses a spreadsheet to record details of the wages paid to four workers.
One week he will enter their wages in columns A, B, C and D in the spreadsheet.

	A	B	C	D	E	F
1	Ali	Ben	Charlie	Dave	total wage	mean wage
2						

Joe also wants the spreadsheet to record

in cell E2 the total wage of these 4 workers
in cell F2 the mean wage of these 4 workers

Write down,

(i) a formula for cell E2,

E2 .....

(ii) a formula for cell F2.

F2 .....

(Total for Question 2 is 3 marks)

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3 The table gives information about he number of boxes of strawberries filled by each of 100 farm workers.

Number of boxes	Frequency
$160 < x \leqslant 180$	5
$180 < x \leqslant 200$	25
$200 < x \leqslant 220$	48
$220 < x \leqslant 240$	22

(a) Write down the modal class interval.

.....

(1)

(b) Work out an estimate for the mean.

.....

(4)

(Total for Question 3 is 5 marks)

4 Ralph posts 40 letters.
Some of the letters are 1st class.
Some of the letters are 2nd class.

The number of 2nd class letters is 4 times the number of 1st class letters.

(a) (i) Work out the number of 1st class letters.

.....

It costs 41p to post a 1st class letter.
The total cost of posting all 40 letters is £13.52

(ii) Work out the cost of posting one 2nd class letter.

..... p

(5)

Jake is a postal worker.
He has to deliver some parcels.
Each parcel has a weight of 900 g.
The total weight of the parcels he carries must not be more than 16 kg.

(b) What is the greatest number of parcels that Jake can carry?

..... parcels

(3)

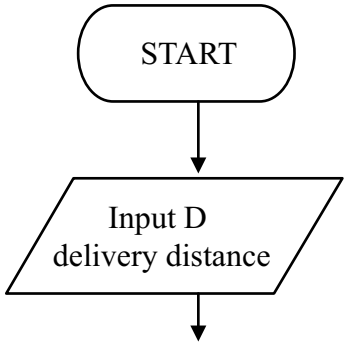
(Total for Question 4 is 8 marks)

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5 A shop sells carpets.
There is a delivery charge for delivering carpets to customers' homes.
For up to 5 miles the delivery charge is £20
For more than 5 miles the delivery charge is £30

A flowchart is used to work out the delivery charge.

Complete the flowchart.



(Total for Question 5 is 5 marks)

6 Martin's house has a meter to measure the amount of water he uses.
Martin pays on Tariff A for the number of water units he uses.

The graph opposite can be used to find out how much he pays.

(a) (i) Find the gradient of this line.

.....

Martin reduces the amount of water he uses by 15 units.

(ii) How much money does he save?

£ .....

(4)

Instead of Tariff A, Martin could pay for his water on Tariff B.

The table shows how much Martin would pay for his water on Tariff B.

Number of water units used	0	20	40	60	80	100
Cost in £	12	18	24	30	36	42

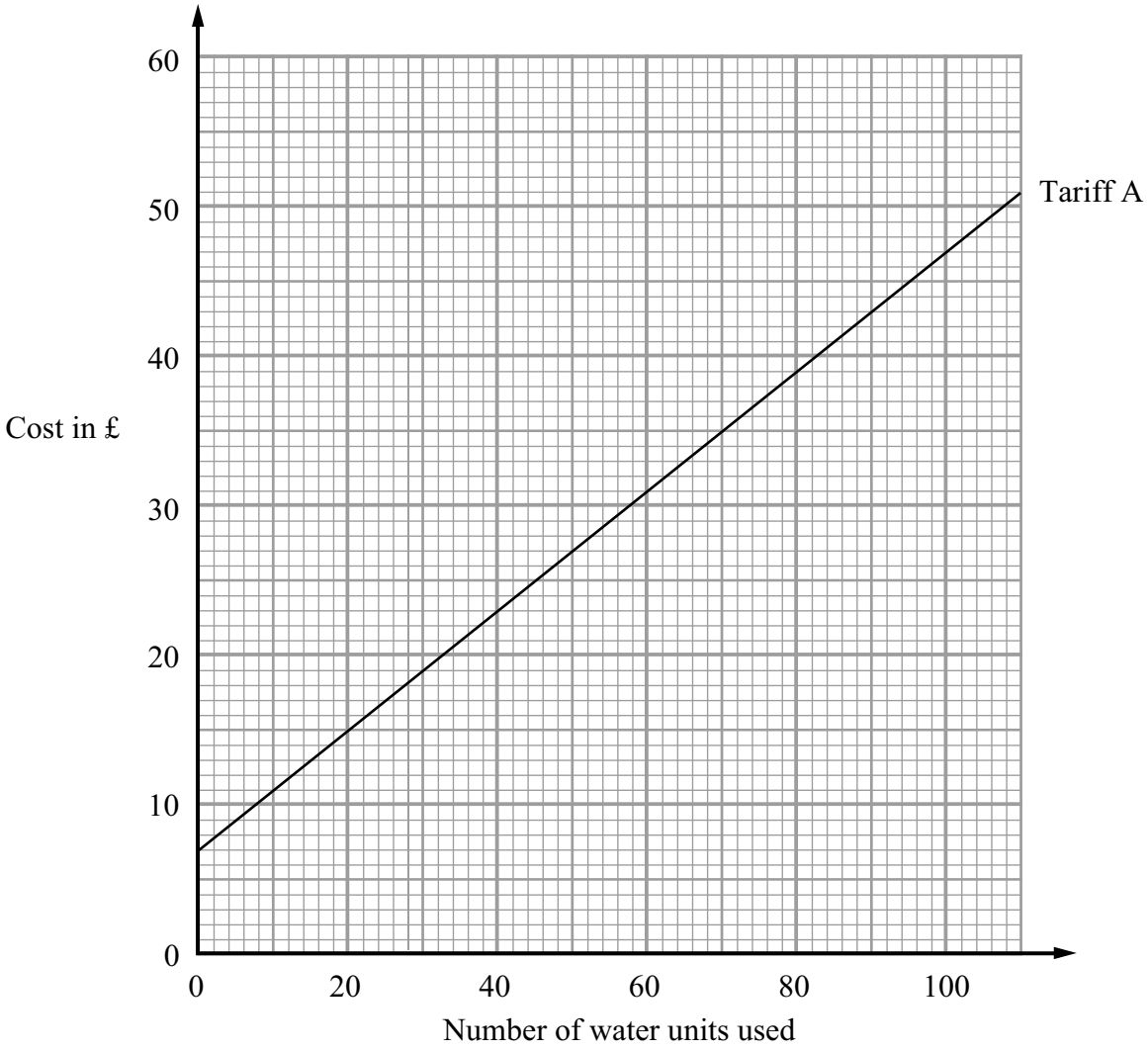
(b) (i) On the grid opposite, draw a line for Tariff B.

(ii) Write down the number of water units used when the cost of Tariff A is the same as the cost of Tariff B.

..... units

(3)

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(Total for Question 6 is 7 marks)

7 A machine drills holes into blocks.
The position of each hole is given as a 3D coordinate.
The diagram shows a rectangular block on a 3D grid.

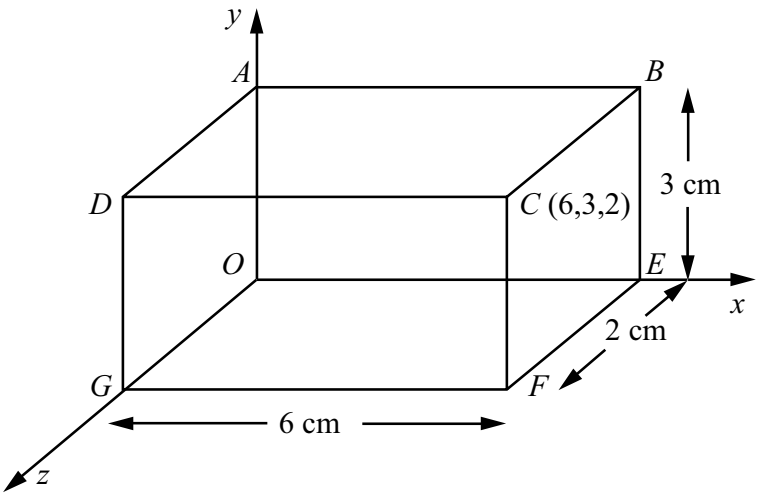


Diagram **NOT** accurately drawn

Point *C* is (6,3,2).
The machine has to drill a hole in the middle of face *CBEF*.

Work out the 3D coordinates of the middle of face *CBEF*.

(....., ..., ...)

(Total for Question 7 is 2 marks)

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***8** These two photographs are similar rectangles.

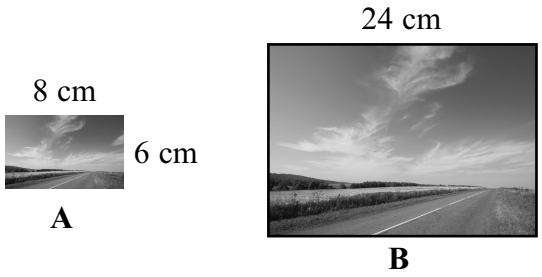


Diagram **NOT** accurately drawn

Photograph **A** has a length of 8 cm and a width of 6 cm.
Photograph **B** has a length of 24 cm.

The two photographs are similar rectangles.

Work out the width of photograph B.

(Total for Question 8 is 4 marks)

9 Saleem invests £2000 at 4% per annum compound interest for 3 years.

Work out the total amount of money he has at the end of 3 years.

£ .....

(Total for Question 9 is 3 marks)

10 Derek wants to make a patio using paving stones.

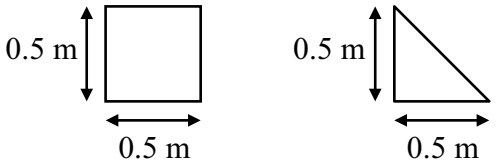


Diagram **NOT** accurately drawn

He will use square paving stones and triangular paving stones as shown in the diagram above.

The patio will be in the shape of an octagon as shown below.

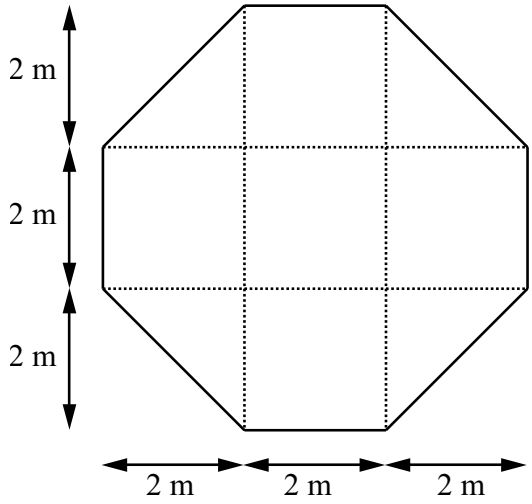


Diagram **NOT** accurately drawn

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

square paving stones .....

triangular paving stones .....

(4)

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Derek needs to paint his patio with sealant.
He needs 1 litre of sealant for every 5.6 m^2 of patio.

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

..... litres

(4)

(Total for Question 10 is 8 marks)

11 The price of a cooker is £720 including VAT at 20%.

What is the price without the VAT?

£ .....

(Total for Question 11 is 3 marks)

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12 Harry is putting together bolt fixtures.
They are made from bolts, washers and nuts.
Each bolt fixture has

1 bolt
1 washer
1 nut.



Bolt Fixture

Bolts are sold in packs of 20
Washers are sold in packs of 24
Nuts are sold in packs of 25

Harry must use all the bolts, washers and nuts he buys.

(i) What is the smallest number of packs of bolts, packs of nuts and packs of washers he needs to buy?

..... packs of bolts

..... packs of washers

..... packs of nuts

(ii) How many bolt fixtures will he be able to make from these packs?

..... bolt fixtures

(Total for Question 12 is 4 marks)

13 Diane bought a printer.
It cost £69.99 plus VAT at 20%.



(a) Work out the cost of the printer.

£ .....

(3)

The printer uses black cartridges and colour cartridges.

In April, Diane bought 3 black cartridges and 2 colour cartridges and paid a total of £95.40
In May, Diane bought 5 black cartridges and 3 colour cartridges and paid a total of £151.50

The cost of each black cartridge did not change.
The cost of each colour cartridge did not change.

(b) Find the cost of each black cartridge and the cost of each colour cartridge.

Black cartridge £ .....

Colour cartridge £ .....

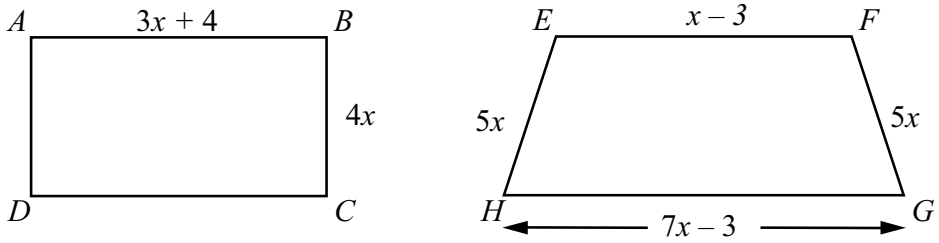
(5)

(Total for Question 13 is 8 marks)

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14 *ABCD* is a rectangle.
EFGH is a trapezium.

Diagram **NOT** accurately drawn



The perimeters of these two shapes are the same.
All measurements are in centimetres.

(i) Work out the value of x.

x = ...

(ii) Write down the length and the width of the rectangle.

length ..... cm

width ..... cm

(Total for Question 14 is 6 marks)

15 When a person exercises, their pulse rate increases.
The time it takes for their pulse rate to return to normal after exercise is called the recovery time.

A group of people did some exercise.

The table below shows some information about their recovery times.

Recovery time (t seconds)	**Cumulative frequency**
$0 < t \leqslant 20$	0
$0 < t \leqslant 40$	7
$0 < t \leqslant 60$	16
$0 < t \leqslant 80$	34
$0 < t \leqslant 90$	47
$0 < t \leqslant 100$	59
$0 < t \leqslant 120$	68
$0 < t \leqslant 140$	74

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

A different group of people did the same exercise.
Their recovery times had a median of 61 seconds and an interquartile range of 22 seconds.

*(b) Compare the recovery times of these two groups of people.

.....

.....

.....

.....

.....

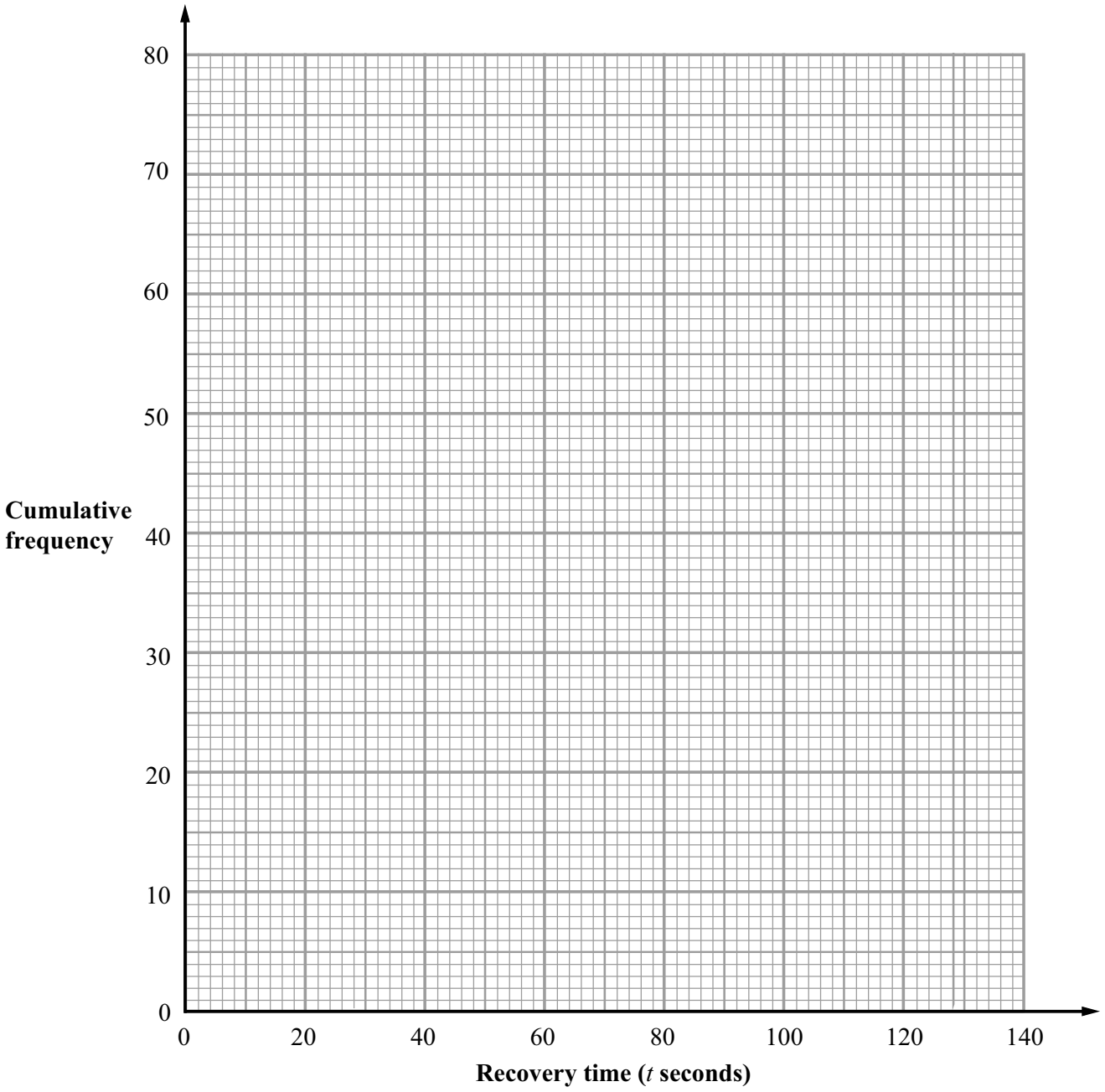
.....

.....

.....

(5)

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(Total for Question 15 is 7 marks)

16 Maryanne is going to take a survey of students in her school.

The table below shows the number of students in each year group.

Year Group	Boys	Girls	Total
7	85	65	150
8	72	75	147
9	74	78	152
10	77	72	149
11	93	107	200
			798

Maryanne wants to take a sample of 80 students.

(a) Explain if she should sample the same number of students from year group 8 and from year group 11

.....

.....

.....

(1)

Maryanne wants to take a sample of 80 students, stratified by year group and by gender.

(b) Work out the number of year group 8 boys she should have in her sample.

.....

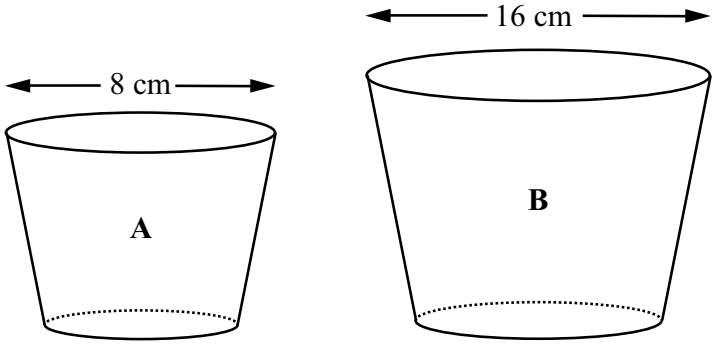
(3)

(Total for Question 16 is 4 marks)

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17 Martin has two solid shapes.

Diagram **NOT** accurately drawn



The two solid shapes are mathematically similar.
The top of shape **A** is a circle with diameter 8 cm.
The top of shape **B** is a circle with diameter 16 cm.

Martin uses one tin of paint to paint shape **A**.

(a) Work out how many tins of paint he will need to paint shape **B**.

..... tins

(2)

Martin made these solid shapes from metal.
The metal to make shape **A** cost £1.50

(b) How much did the metal cost to make shape **B**?

£ .....

(3)

(Total for Question 17 is 5 marks)

18 Hassan is making some toys to sell at a school fair.
Hassan takes 40 minutes to make Toy A.
Hassan takes 20 minutes to make Toy B.

He has a total of 20 hours available to make toys.

He makes x of toy A.
He makes y of toy B.

(a) Show that $2x + y \leqslant 60$

(2)

His constraints are $2x + y \leqslant 60$, $x \geqslant 6$, $y \geqslant 2x$

(b) On the grid, draw straight lines and use shading to represent these constraints.

(4)

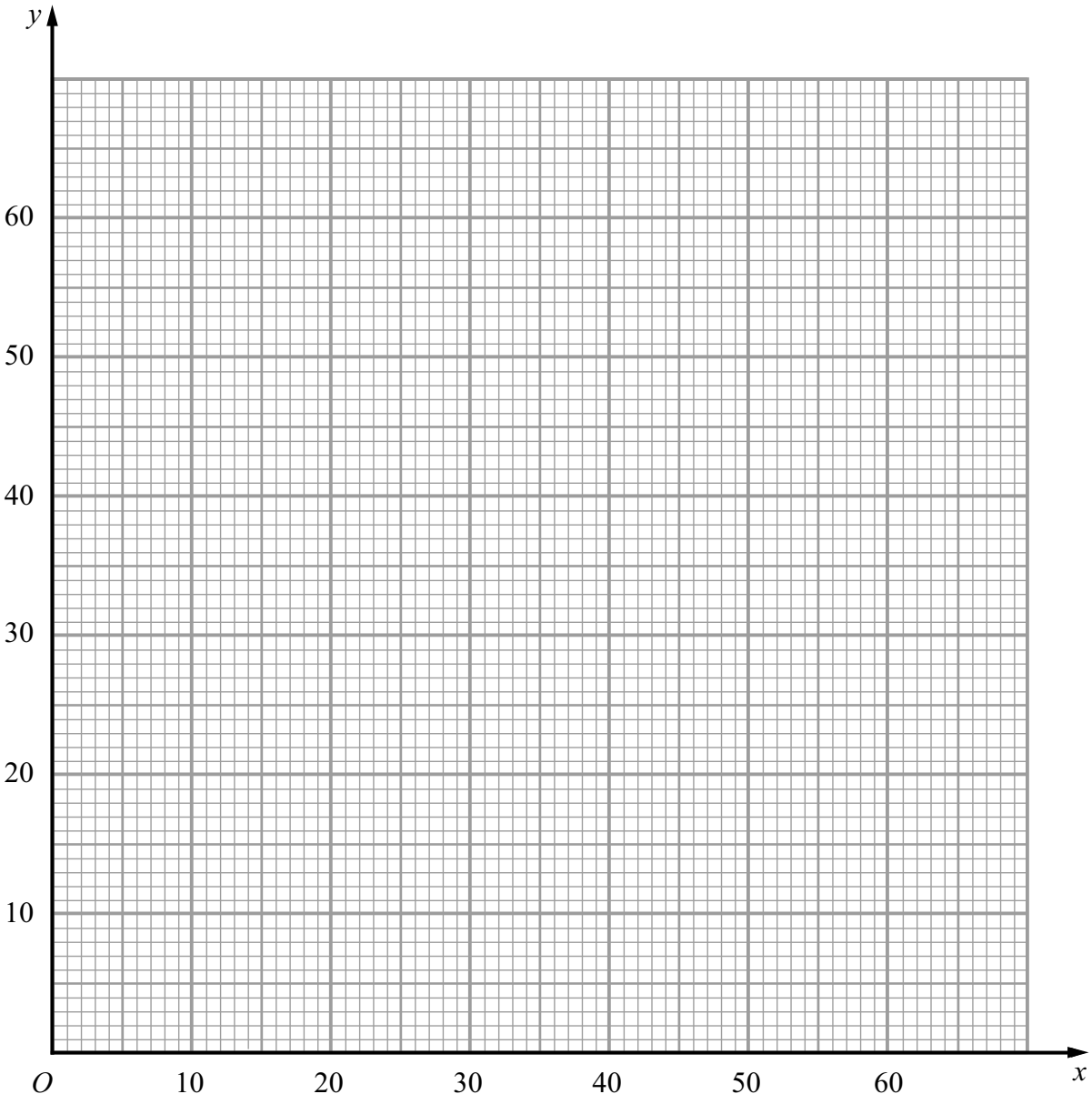
Hassan is going to sell toy A for £3
He is going to sell toy B for £2

(c) Work out the greatest amount of money Hassan could get.

£ .....

(4)

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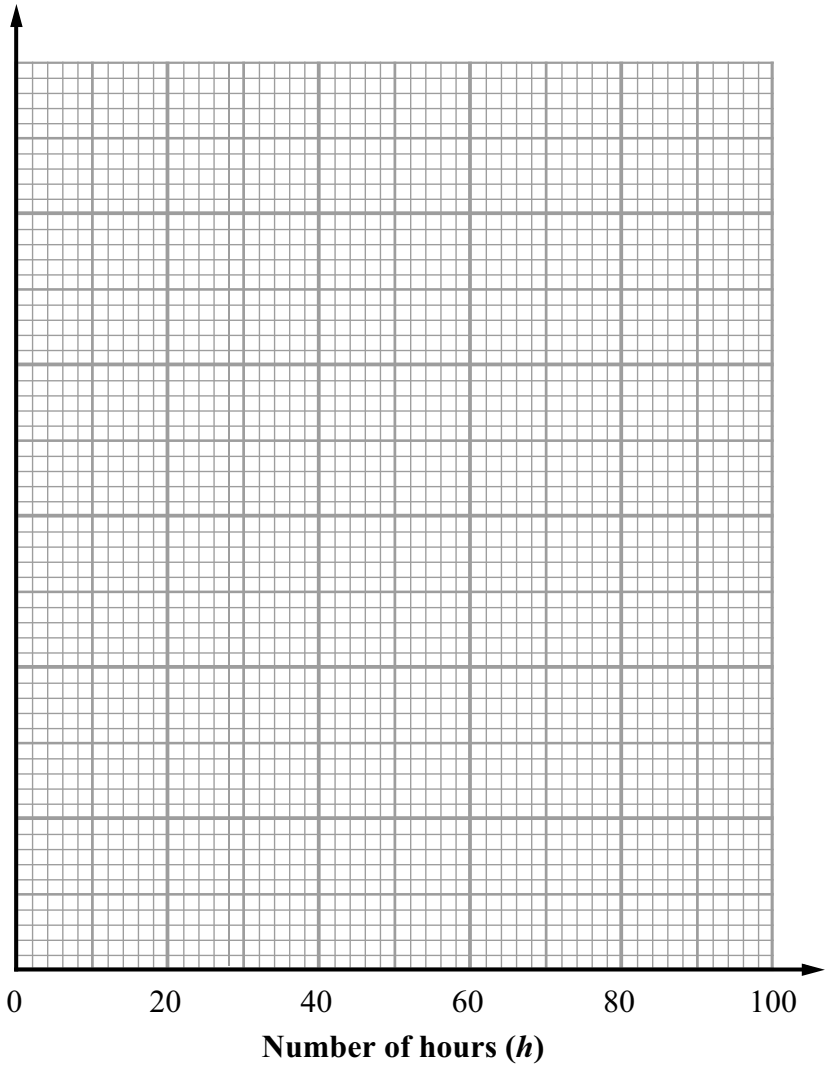


(Total for Question 18 is 10 marks)

19 The table below shows some information about the number of hours projector bulb lasted before they had to be replaced.

Number of hours (h)	Frequency
$0 < h \leqslant 20$	10
$20 < h \leqslant 30$	20
$30 < h \leqslant 40$	50
$40 < h \leqslant 60$	30
$60 < h \leqslant 100$	10

Draw a histogram to show the information in the table.



(Total for Question 19 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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Mark Scheme (Results)

June 2011

Applications of Mathematics (GCSE)
Unit 1: 5AM1H_01 (Higher)

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		500 × 1.2 (oe) = 600 600 ÷ 12 =	50	4	M2 for 500 × 1.2 (=600) (oe) (M1 for 500 × 0.2 (=100) (oe) M1 for 600 ÷ 12 or 100 ÷ 12 or 1.2 ÷ 12 or 500 ÷ 12 A1 cao SC: B2 for an answer of 8.33 or 8.34
2	(i) (ii)		E2 total: A2+B2+C2+D2 F2 mean: E2/4	3	B1 for =A2+B2+C2+D2, =SUM(A2:D2) B1 for =E2/4, =(A2+B2+C2+D2)/4, =AVERAGE(A2:D2) B1 for using correct spreadsheet notation; condone missing "=" throughout. NB: do not accept "÷" in place of "/": this would be counted as incorrect notation.
3	(a) (b)	 (5×170) + (25×190) + (48×210) + (22×230) = 850 + 4750 + 10080 + 5060 = 20740 ÷ 100 =	$200 < x \leq 220$ 207.4	1 4	B1 for $200 < x \leq 220$ (accept 200 to 220) M1 for $f \times h$ for at least 3 consistent values of h in or at either end of intervals M1 (dep) for use of all correct mid-interval values M1 (dep on 1st M1) for $\Sigma fh \div \Sigma f$ A1 cao

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)(i)	1:4 = 8:32 OR 40÷5=8	8	5	M1 40÷5 (=8) oe A1 cao
	(ii)	8×41 = 328 or 3.28 13.52-3.28=10.24 10.24÷32=0.32	32		M1 "8" × 41 (=328) or "8" × 0.41 M1 (1352-"328") ÷ (40-"8") or 1024 ÷ 32 A1 cao NB: mark digits (ignore currency) but final answer must have units shown
	(b)	16 kg is 16000 g (or 900g is 0.9 kg) 16000 ÷ 900 OR 16 ÷ 0.9 =17.777… Round down.	17	3	M1 conversion 16 × 1000, 900 ÷ 1000, sight of 16000 or 0.9 M1 "16000" ÷900, 16 ÷ "0.9" (=17.777) oe A1 cao

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		Decision box with > 5 NO leading to "charge £20" YES leading to "charge £30" Write down & stop. **OR** Decision box with ≤ 5 NO leading to "charge £30" YES leading to "charge £20" Write down & stop.	Completed flow chart	5	B1 with > 5 (allow in words) B1 for NO leading to "charge £20" accept C for charge B1 for YES leading to "charge £30" accept C for charge [NB: -B1 for missing "charge" or other statement with the amount] B1 end box (stop) B1 for correctly shaped boxes **OR** B1 with ≤ 5 (allow in words) B1 for NO leading to "charge £30" accept C for charge B1 for YES leading to "charge £20" accept C for charge [NB: -B1 for missing "charge" or other statement with the amount] B1 end box (stop) B1 for correctly shaped boxes NB: do not penalise if the YES or NO are put in a box.
6	(a)(i)	Find the gradient eg by drawing a triangle against the graph, find *y*/*x*	0.3-0.5	4	M1 method to find gradient eg 16/40, 8/20, triangle drawn. A1 0.3-0.5 SC: B1 for a negative gradient within the range.
	(ii)	Pick two points 15 units apart, and read off values associated with these, finding the difference	4 - 8		M1 eg 15×"0.4"=6; read off values from graph 15 apart ±1mm A1 6 ± 2
	(b)(i)	Draw line	46 - 54	3	B1 plot at least 4 points ±1 mm B1 draw line from 0 units to at least 100 units (within overlay)
	(ii)	Read off solution from intersection			B1ft 46-54 from single intersection point of two straight line segments

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			(6, 1.5, 1)	2	M1 identification of any other vertex as a 3D coordinate, or at least one coordinate. A1 cao
8		(24 ÷ 8) × 6 = 18 cm	18 cm	4	M2 for (24÷8) ×6 (M1 for 24÷8, 8÷6, 6÷8, 8÷24 or a ratio eg ?:6=24:8 etc) A1 cao C1 (indep) for units: cm
9		2000 × 0.04 = 80 2080 × 0.04 = 83.20 2163.20 × 0.04 = 86.528 2249.72 or 2249.73	2249.72 or 2249.73	3	M2 for 2000×1.04^3 (=2249.728) OR M1 for 2000 × 0.04 or sight of 80, 2080, 2240 M1 for compound percentage calculation (eg 2080×0.04, 2163.20, or sight of 83.20 or 86.528 A1 for 2249.72 or 2249.73

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	4 sq paving stones per $1m^2$ Large squares: 16 stones each = 5×16=80 Each large triangle: 4 small triangle & 6 sqs 4 lg triangles: 16 triangle stones & 24 square stones Total stones: square 104, triangle 16	104 square stones 16 triangular stones OR 80 square stones 64 triangular stones	4	M1 divides the shape into triangles and squares, or triangles, of any size (by diagram or calculation) M1 divides the shape into triangles and squares, or triangles, of the correct size (by diagram or calculation) A1 gives the number of square stones as 104 or 80 A1 gives the number of triangular stones as 16 or 64 SC: for one answer correct award B2 if at most M1 awarded.
	(b)	Area of squares: 5×4=20 area of triangles: 4×2=8 Total area: 28 "28" ÷5.6 = OR Area of square = 0.5×0.5=0.25 Area of triangle = 0.5×0.5×0.5=0.125 Total area = "104" × 0.25 + "16" × 0.125 = 26 + 2 =28 "28" ÷5.6 =	5	4	M1 for square 5×2×2 (=20) or triangles 4×2×2÷2 (=8) or finding the area of an appropriate shape as part of a general method. M1 for "20" + "8" (=28) or for any appropriate whole method. M1 for "28" ÷5.6 A1 cao OR M1 for 0.5×0.5(=0.25) or 0.5×0.5×0.5 (=0.125) M1 for "104" × 0.25 + "16" × 0.125 (=28) (=26+2) M1 for "28" ÷ 5.6 A1 ft
11		$720 \times \frac{100}{120}$ oe	600	3	M2 for $720 \times \frac{100}{120}$ oe (M1 for 720 = 120 % or $x \times 1.20 = 720$) A1 cao

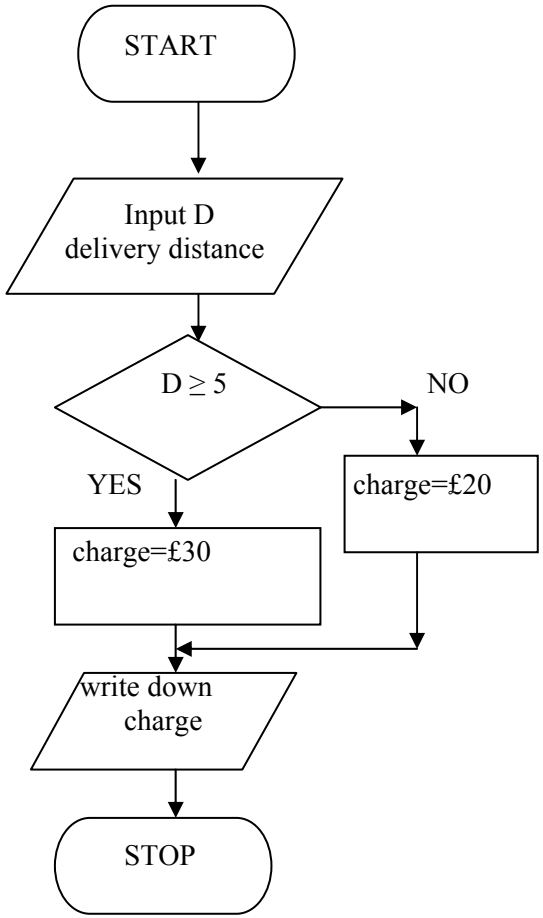
5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12		2×2×5 (=20) 2×2×3 (=24) 5 × 5 (=25)	30 25 24 600	4	M2 for an attempt to find LCM by eg lists of multiples, or summing of 20s, 24s, 25s, with at least 3 numbers in each lists (M1 for an attempt to find multiples of one of the numbers 20s, 24s, 25s, with at least 3 numbers for any one of these numbers) A1 for 30, 25, 24 cao A1 for 600 cao OR M1 expansion of either numbers into its prime factors in a factor tree eg 2×2×2, 2×2×3, 5×5 M1 for "600" ÷ 20, 24, 25 oe A1 for 30, 25, 24 cao A1 for 600 cao
13	(a)	69.99 × 1.20 = 83.988	83.99 or 83.98	3	M2 for 69.99 × 1.20 oe or sight of 83.988 (M1 for 69.99 × 0.20 oe or sight of 13.998 or 14) A1 cao
	(b)	$3x+2y=95.40$ $5x+3y=151.50$	Black (x) 16.8(0) Colour (y) 22.5(0)	5	M1 for attempt to derive the equations A1 derivation of equations: $3x+2y=95.40$, $5x+3y=151.50$ M1 for correct process to eliminate either x or y (condone one arithmetic error) M1 (dep) for substituting found value into either equation A1 cao SC: B2 for one value found with no working

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		4x+4x+3x+4+3x+4=14x+8 5x+5x+x-3+7x-3=18x-6 18x-6=14x+8 4x=14 x=14/4 = 3.5 oe Area of trapezium = Length is 3*x*+4 = 3×3.5+4= Width is 4*x* = 4×3.5 =	*x*=3.5 L= 14.5 W= 14	6	M1 4x+4x+3x+4+3x+4 (=14x+8) M1 5x+5x+x-3+7x-3 (=18x-6) M1 equating eg 18x-6=14x+8 (4x=14) A1 x=14/4 = 3.5 oe A1 for 14.5 or "3.5" × 3+4 ft A1 for 14 or "3.5" × 4 ft
15	(a)		cf graph	2	B1 for 4 or 5 points plotted correctly ±1 full (2 mm) B1 (dep) for points joined by curve or straight line segments provided no gradient is negative – ignore any part of graph outside range of points
	(b)	median: 37 → 82 IQR: 18.5 → 63, 55.5 → 96 so 96 – 63 = 33 median: 82, 61 IQR 22, 23	median: 82, (61 given) IQR: 33, (22 given) with comment about each comparison	5	B1 for reading off median at 37 to give 81-83 M1 reading off IQR figures from 18.5, 55.5 eg 63, 96 A1 for IQR 29-37 C1 for a simple comparative comment relating to both medians or both IQRs C1 for a more complex comparative comment (in context) relating both medians or both IQRs
16	(a)		Explanation	1	B1 for explanation relating to bias, or that sampling equal numbers does not reflect the fact that there are not equal numbers in the two year groups
	(b)	$80 \times \frac{72}{798}$	7	3	M1 for $80 \times \frac{72}{798}$ A1 for 7.218… A1 for 7

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)	$1:2^2$ is 1:4	4	2	M1 sight of $1:2^2$ or 1:4 A1 cao
	(b)	$1:2^3$ £1.50 × 2^3 =£1.50×8=	£12	3	M1 sight of 2^3 (but not 8, as this is the diameter in the question) M1 for sight of 2^3 × £1.50 or 8 x £1.50 A1 cao
18	(a)	20 h = 20 × 60 = 1200 min 40x + 20y ≤ 1200	2x + y ≤ 60	2	M1 sight of $40x + 20y$ linked to 1200 A1 oe
	(b)	$y \geq 2x$ and x ≥ 6 drawn & shaded y≥x/5 drawn & shaded combined region indicated		4	M1 for $y \geq 2x$ drawn & shaded M1 for x≥6 drawn & shaded M1 for $2x+y \leq 60$ drawn & shaded A1 cao for indicating a combined region NB: line segments should be drawn between x=0 and x=30; for at least M2 shading must be consistently in or out; accept incorrect line style for M marks (dashed and solid lines acceptable).
	(c)	use of x + y = 600	114	4	M1 indication of use of any of the intersection points M1 for attempt to find the number of toy A,B to maximum (eg A 6, B 48) M1 for use of money to calculate max: use of intersection point (x,y) as 3×x+2×y eg 6×£3+48×£2 A1 cao SC: without intersection point: B2 for A 6, B 48

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Question		**Working**	**Answer**	**Mark**	**Notes**
19		Bar heights: 1,4,10,3,0.5 fd: 0.5,2,5,1.5,0.25	Bar heights 1,4,10,3,0.5	4	M2 frequency density applied to at least 1 column (could be implied by one bar correct) (M1 Frequency density given as 5 bulbs = 1cm^2 or as stated figures in calculations) A2 all bars correct (A1 at least 3 columns (bars) correct) NB: candidates do not need to label the vertical axes.

Question 5 flowchart:



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