Issue one

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Sample Assessment Materials

Edexcel GCSE in Mathematics A - Linear (1MA0)

Ofqual

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Contents

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- 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.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 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 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.

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

Write your name here

Surname	Other names

Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 1 (Non-Calculator)

Foundation Tier

Sample Assessment Material
Time: 1 hour 45 minutes

Paper Reference
1MA0/1F

You must have:
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

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 must not be used**.

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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S 3 7 7 0 7 A 0 1 3 0

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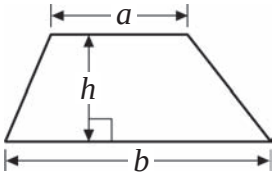
GCSE Mathematics 1MA0

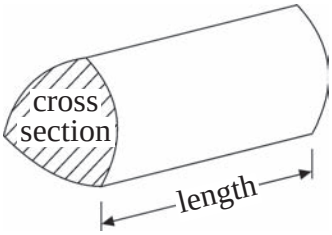
Formulae: Foundation Tier

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

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



Volume of prism = area of cross section × length



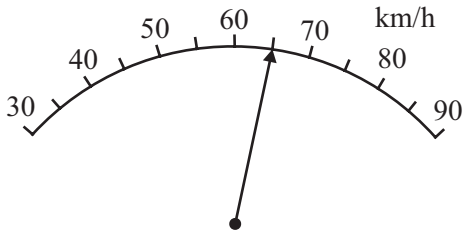
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

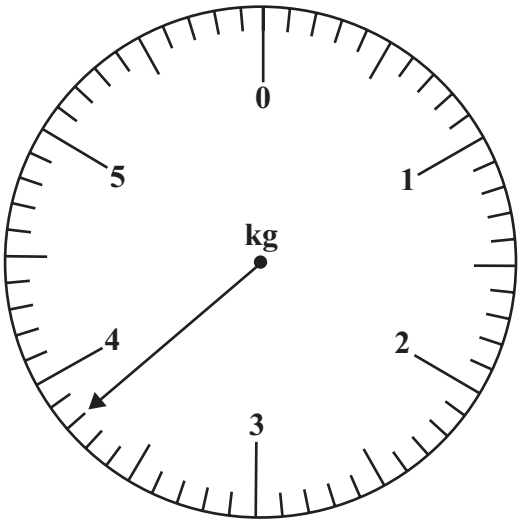
1 (a) Write down the reading on this scale.

(1)



..... km/h

The scale shows the weight of Sam's dog.



Sam's baby brother weighs 5 kg.

(b) Work out the difference in weight between Sam's baby brother and Sam's dog.

(2)

..... kg

(Total for Question 1 = 3 marks)

2 A bus seats 47 people.
Another 6 people can stand.

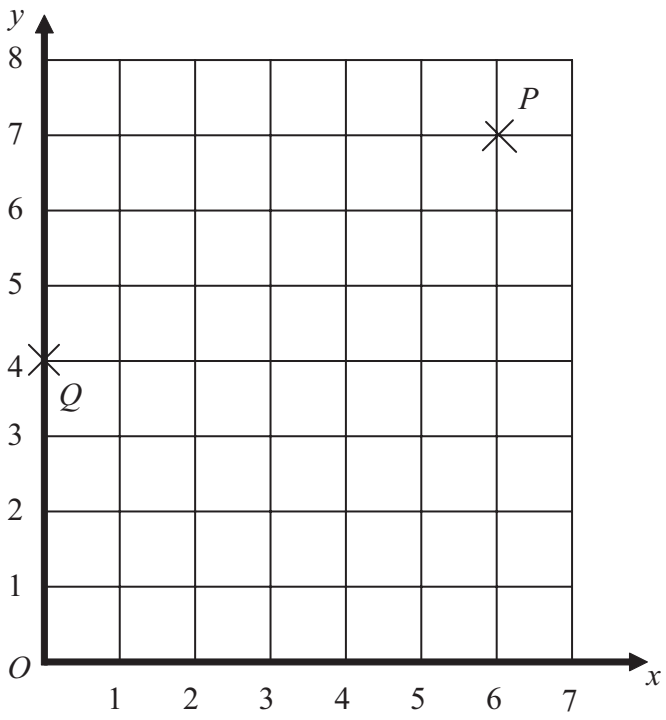
There are 44 people on the bus.
The bus stops.

8 people get off the bus.
19 people want to get on the bus.

Can the bus hold all the people who want to get on the bus?
Explain your answer.

(Total for Question 2 = 2 marks)

3 Here is a coordinate grid.



(a) Write down the coordinates of the point *P*.

(1)

(……, ……)

R is the midpoint of *PQ*.

(b) Write down the coordinates of the point *R*.

(2)

(……, ……)

The point *B* is on the *x*-axis.
The line *BP* is parallel to the *y*-axis.

(c) Write down the coordinates of the point *B*.

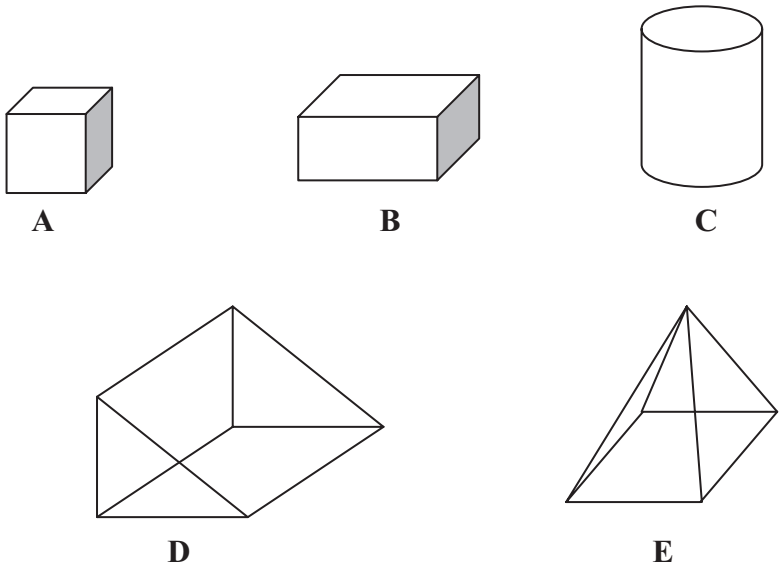
(2)

(……, ……)

(Total for Question 3 = 5 marks)

4 Ben is planning to make some blocks for a child.

The diagram shows some 3-D shapes.



(a) Write down the mathematical name of the 3-D shape **C**.

(1)

.....

(b) Write down the number of edges on the 3-D shape **D**.

(1)

.....

(c) Write down the letters of all the 3-D shapes that have 5 faces.

(1)

.....

Ben is going to make one of the boxes, the 3-D shape **B**.
The 3-D shape is to be 4 cm high, 5 cm wide and 6 cm long.

(d) (i) In the space below draw an accurate net of the solid shape **B**.

(ii) Find the length and width of the smallest rectangle of card needed for the net.

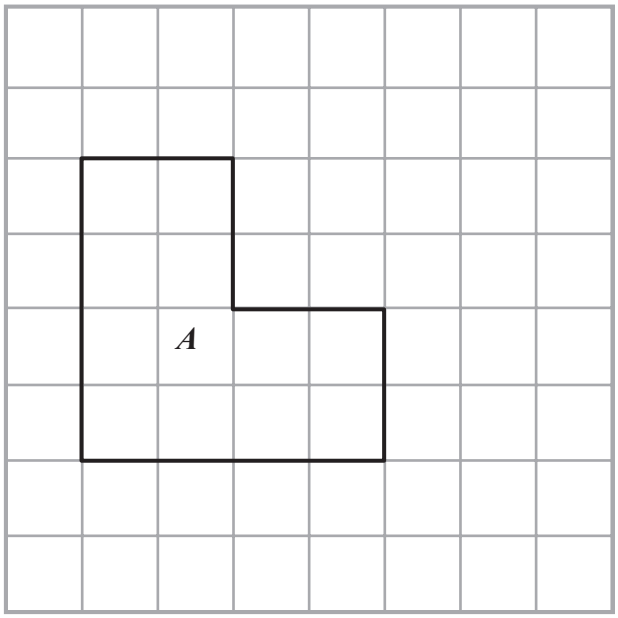
(5)

Smallest width .....

Smallest length .....

(Total for Question 4 = 8 marks)

5



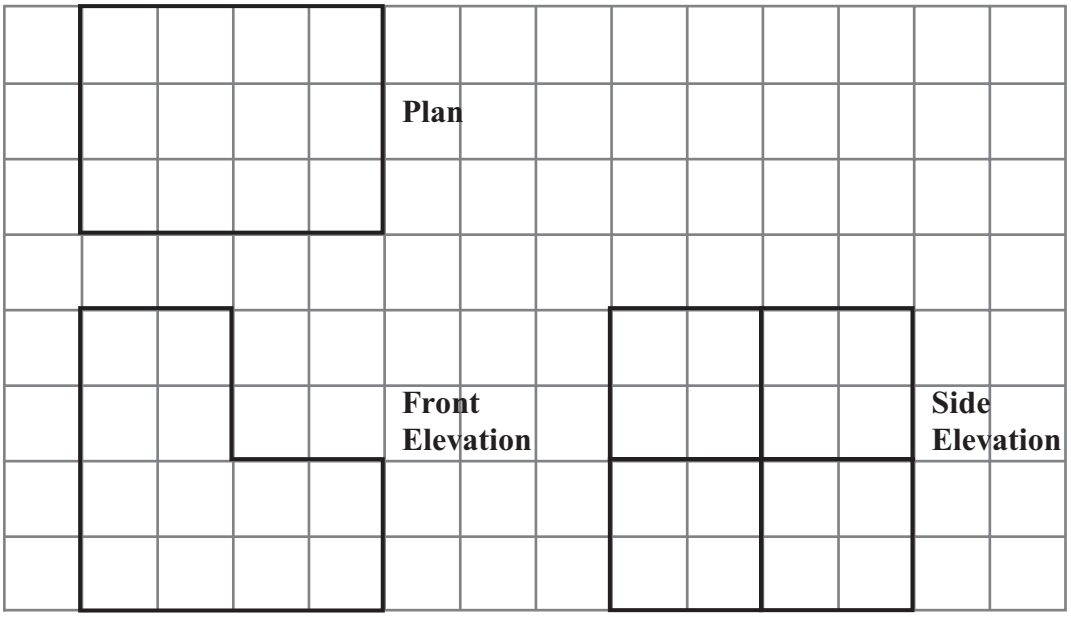
Shape *A* has been drawn on a centimetre grid.

(a) Find the perimeter of shape *A*.

(1)

.....

The diagram shows the plan, the front elevation and the side elevation of a 3-D solid made from one centimetre cubes drawn full size.



(b) Find the volume of the 3-D shape.

(4)

.....

(Total for Question 5 = 5 marks)

6 Laura and Jaz were worried about the amount of traffic in their town.

The town council aims to reduce the percentage of lorries to 25% of the total number of vehicles.

Laura and Jaz carried out a survey of the types of vehicles passing Laura's house during 10 minutes one Saturday morning.

Here is a list of the vehicles they saw.

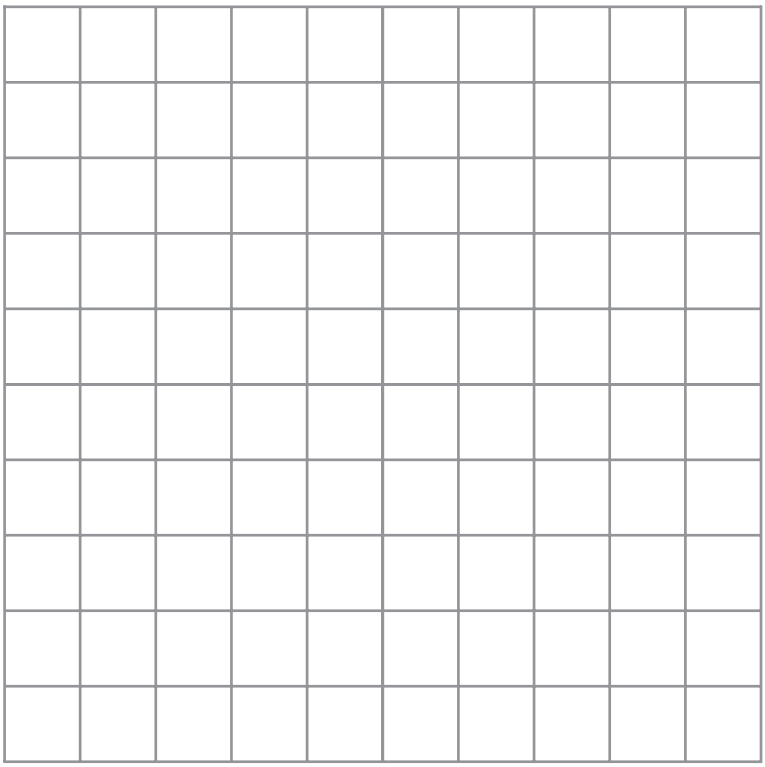
Car	Van	Lorry	Motorbike	Bus	Car
Van	Car	Car	Van	Lorry	Motorbike
Motorbike	Motorbike	Van	Lorry	Motorbike	Car
Car	Bus	Lorry	Car	Lorry	Motorbike

Laura and Jaz were going to give a talk about the results of their survey.

***** (a) Design a suitable chart or table Laura could use and a different chart or table that Jaz could use to make a summary of the list of vehicles they saw.

Use the space below or the grid provided.

(6)



The council's aim was to reduce the percentage of lorries in the town to be less than 25%.

(b) Did the council succeed? You must explain your answer.

(2)

.....

.....

Laura and Jaz's survey was not a good one.

(c) Explain how Laura and Jaz could design a better survey to investigate the council's plan.

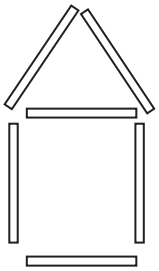
(2)

.....

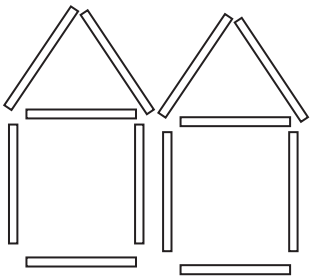
.....

(Total for Question 6 = 10 marks)

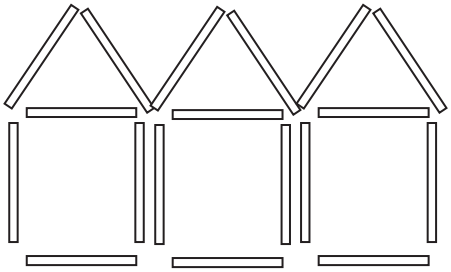
7 Here are some patterns made from sticks.



Pattern number 1



Pattern number 2



Pattern number 3

(a) Draw Pattern number 4 in the space below.

(1)

(b) How many sticks are used for Pattern number 10?

(2)

.....

Jim says there is a pattern with 123 sticks in it.

(c) Is Jim correct? You must explain your answer.

(2)

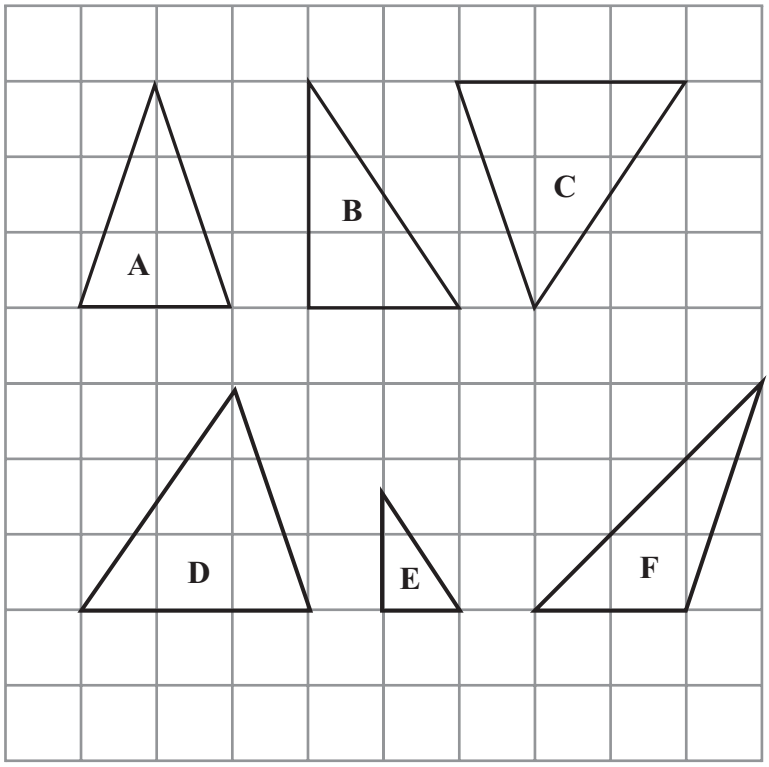
.....

.....

.....

(Total for Question 7 = 5 marks)

8 These triangles have been drawn on a centimetre grid.



(a) Write down the letters of the **two** triangles that are congruent.

(1)

..... and .....

(b) Write down the letters of **two different** triangles that are similar.

(1)

..... and .....

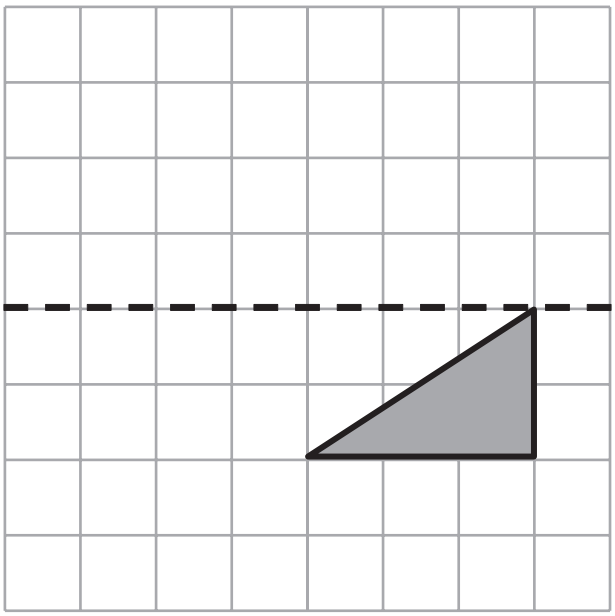
(c) Find the area of triangle **D**.

(1)

.....

(Total for Question 8 = 3 marks)

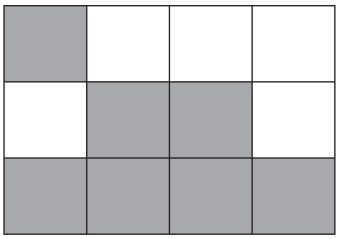
9



(a) Reflect the shaded shape in the mirror line.

(1)

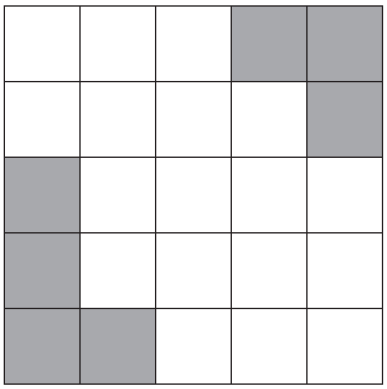
Here is a pattern made with squares.



(b) Shade one square to make a black and white pattern with only **one** line of symmetry.

(1)

Here is another pattern made with squares.



(c) Shade **three** more squares to make a pattern with rotational symmetry of order 2.

(1)

(Total for Question 9 = 3 marks)

10 (a) Simplify $7x + 3x - 4x$

(1)

.....

(b) Solve $3y - 2 \geqslant -8$

(2)

.....

(Total for Question 10 = 3 marks)

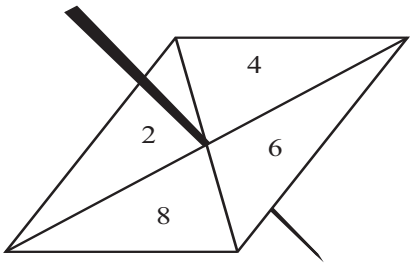
***11** Chris owns a clothes shop.
He bought 50 shirts at £12 for each shirt.
He chose the selling price of each shirt so that he would make a profit of 30% on each shirt.
He sold 20 shirts at this price.

Chris then reduced the selling price of each shirt by 15%.
He then sold the remaining shirts at this reduced selling price.

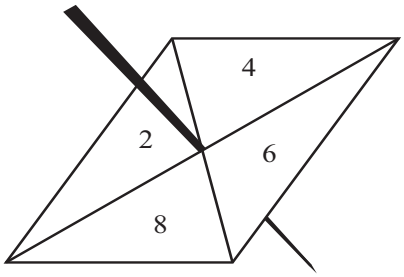
Has Chris made a profit or loss?
You must explain your answer clearly.

(Total for Question 11 = 8 marks)

12 Here are two **fair** 4-sided spinners.
One is a Blue spinner and one is a Red spinner.



Blue Spinner



Red Spinner

Each spinner has four sections numbered 2, 4, 6 and 8.

Each spinner is to be spun once.

Total score = Blue spinner score + Red spinner score

(a) List the different ways that the total score can be 8

(2)

.....

Ali and Shazia play a game.
In each round of the game, Ali spins the Blue spinner once and Shazia spins the Red spinner once.
Ali wins when the Blue spinner score is greater than the Red spinner score.

(b) Work out the probability that Ali will win the first round.

(4)

.....

(Total for Question 12 = 6 marks)

13 Parul has £1.70

She wants to buy a drink and something to eat.

(a) What are the different combinations she can buy?

(2)

Ben's Burger Bar

Burgers

Single burger	£0.85
Single burger with cheese	£0.95
Double burger	£1.55
Double burger with cheese	£1.70

Fries		Cola	
Regular	£0.65	Regular	£0.85
Large	£0.99	Large	£1.10

Meal Deals

Regular

Single burger with regular fries and regular cola £2.09

Large

Double burger with cheese large fries and large cola £3.49

.....

Ken buys

2 double burgers with cheese,
1 large fries
and 1 large cola.

He pays with a £10 note.

(b) He gets the best price.
What change should he get?

(3)

£.....

(Total for Question 13 = 5 marks)

14 Simon is a salesman.
He gets paid expenses of 40p for every mile that he drives during work.
He also gets £12 expenses as a meal allowance for any day that he drives during work.
The table gives information about the number of miles Simon drove on 5 days in one week.

Day	Number of miles
Monday	48
Tuesday	37
Wednesday	0
Thursday	78
Friday	21

(a) Work out Simon's total expenses.

(4)

£.....

Sasha works for the same company.
She gets paid expenses of 40p for each mile she drives during work.

Last year she worked for 48 weeks.

Her total **expenses** for driving for the year were £2116.80

(b) Work out an estimate for the average number of miles Sasha drove during work each week last year.

(3)

.....

(Total for Question 14 = 7 marks)

***15** Emma says

"Since 3 is half way between 2 and 4 then $\frac{1}{3}$ will be half way between $\frac{1}{2}$ and $\frac{1}{4}$"

Emma is wrong.

Show that $\frac{1}{3}$ is not half way between $\frac{1}{2}$ and $\frac{1}{4}$

Show your working here.

(Total for Question 15 = 3 marks)

16 (a) Solve $5p - 16 = 4$

(2)

$p =$ .....

(b) Solve $2q - 4 = 5q + 5$

(2)

$q =$ .....

$y = 3(2x - 1) - 2(5 + 3x)$

(c) Find the value of y.

(2)

$y =$ .....

(Total for Question 16 = 6 marks)

17 A bag contains red, yellow and blue balls.

The probability of drawing a red ball at random is $\frac{1}{2}$.

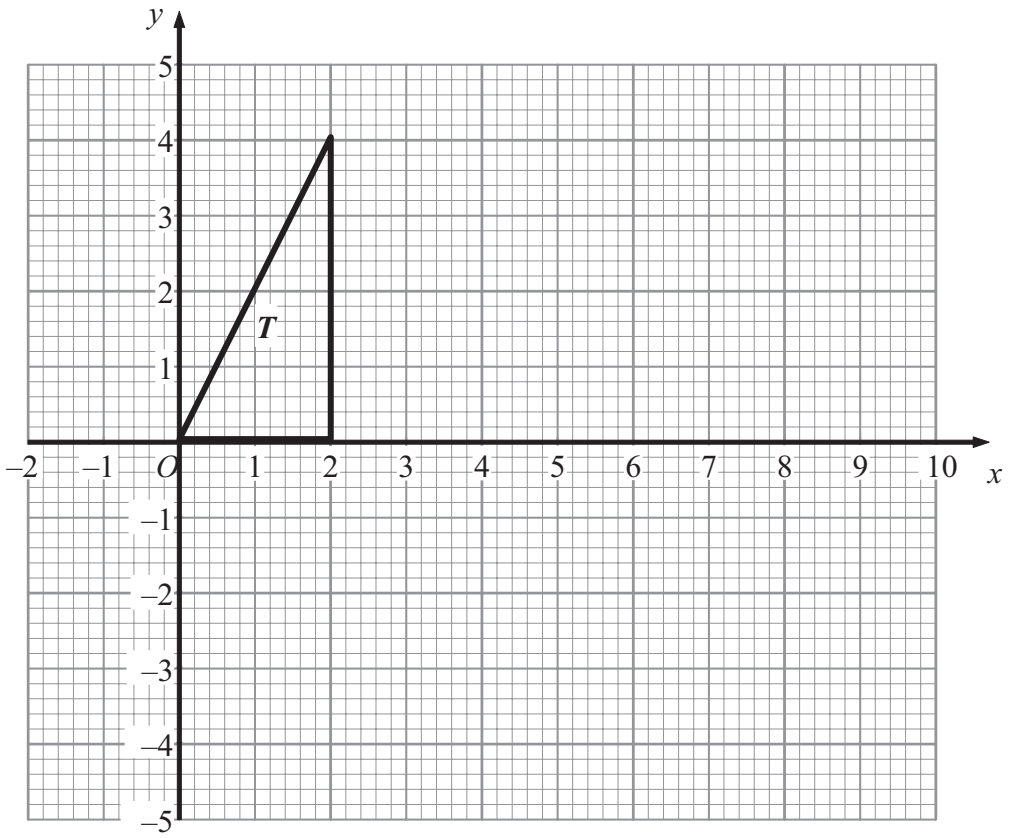
The probability of drawing a yellow ball at random is x.
The probability of drawing a blue ball at random is $4x$.

Work out the probability that a blue ball is selected.
Give your answer as a numerical value.

.....

(Total for Question 17 = 3 marks)

18



The shape ***T*** is rotated by 180° about the point (3, 0) to give the shape ***U***.

The shape ***U*** is rotated by 180° about the point (6, 0) to give the shape ***V***.

Describe fully the single transformation that will map shape ***T*** to shape ***V***.

.....

.....

(Total for Question 18 = 3 marks)

19 This spinner is used at a fairground.

When the spinner lands on a **W**, the customer wins a prize.

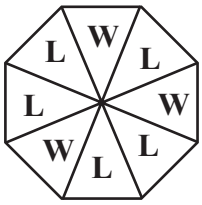


Diagram **NOT** accurately drawn

The fairground owner expects a 1000 customers to have a go.
Estimate the number of prizes the owner should buy.
Give reasons for your answer.

(Total for Question 19 = 3 marks)

20 (a) Factorise $5x - 10y$

(1)

.....

(b) Factorise fully $3pq - 12p^2$

(2)

.....

(Total for Question 20 = 3 marks)

21

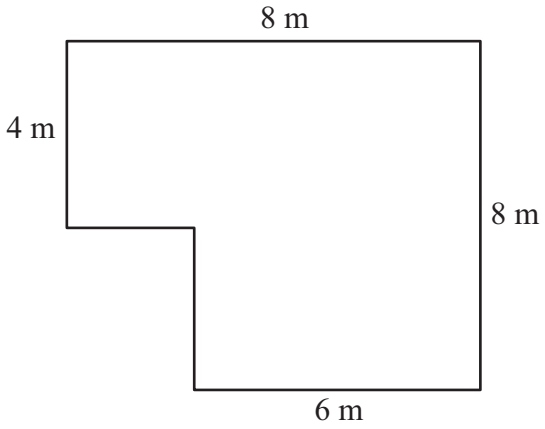


Diagram **NOT** accurately drawn

The diagram is a plan of the floor of Nikola's room.
All the angles are right angles.
Nikola is going to lay flooring to cover all the floor.

She can choose either carpet tiles or wood strips.

Carpet tiles come in packs of 32 and are square. They measure 50 cm by 50 cm.
Wood strips come in packs of 10 and are rectangular. They measure 2 m by 25 cm.

She only wants to use one type of flooring and buy as few packs as she can.
Which type of flooring should she choose?

.....

(Total for Question 21 = 6 marks)

TOTAL FOR PAPER = 100 MARKS

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.	(a)		65	1	B1 cao
	(b)	5 – 3.8	1.2	2	M1 5 – 3.8 A1 cao
					Total for Question: 3 marks
2.		44 – 8 = 36 36 + 19 = 55 47 + 3 = 53 **OR** 44 + 19 – 8 = 55 47 + 6 = 53 **OR** 47 – 44 = 3 3 + 8 = 11 19 – 11 – 6= 2	2 (with appropriate reason)	2	M1 Clear attempt to find the number of spaces available on the bus after the bus stops A1 reason for answer which must comment on the difference between 55 and 53
					Total for Question: 2 marks

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3.	(a)		(6, 7)	1	B1 cao
	(b)		(3, 5.5)	2	M1 Clear attempt to find the mean of either *x* or *y* coordinates of P and Q A1 cao **OR** M1 identifies the midpoint of PQ on the diagram A1 cao SC B1 for exactly one coordinate correct
	(c)		(6, 0)	2	M1 for B correctly placed on the *x* axis A1 for (6, 0)
					Total for Question: 5 marks
4. **FE**	(a)		cylinder	1	B1 cao
	(b)		9	1	B1 cao
	(c)		D, E	1	B1 cao
	(d)(i)		Net	5	B3 fully correct (B2 5 correct faces) (B1 a net of a cuboid)
	(ii)		14 cm × 18 cm		B1, B1 ft on d(i)
					Total for Question: 8 marks
5.	(a)		16 cm	1	B1 cao (units included)
	(b)		48 cm^3	4	M1 3-D drawing or sketch M1 4 × 4 × 2 and 2 × 2 × 4 / 4 × 4 × 4 and 2 × 2 × 4 M1 adding or subtracting A1 cao (units included)
					Total for Question: 5 marks

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
6. **FE**	(a)		Correct table **WITH EITHER** Bar chart **OR** Pictogram **OR** Pie Chart	6	B1 Table with at least 2 columns with car, lorry, van, motorbike and bus rows M1 tally column completed or headed frequency column with at least two entries correct A1 correct frequencies (7, 4, 5, 6, 2) **WITH EITHER** B1 labelled axes with a uniform scale M1 bars labelled all the same width A1 bars all correct (ft from a) **OR** B1 labelled pictogram M1 5 classes + key A1 all correct (ft from a) **OR** B1 circle with 5 sectors labelled M1 correct calculation of at least one angle A1 all sectors correct (ft from a)
	(b)	25% of 24 = 6	Yes as 5< 6	2	M1 finding 25% of 24 A1 Yes as 5 < 6, (ft from a)
	(c)		Survey at different places Survey at different times Do a bigger survey	2	B2 2 or more reasons (B1 1 reason) Ignore irrelevant reasons
					Total for Question: 10 marks

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
7.	(a)		Correct diagram	1	B1 4 identical shapes to the previous patterns
	(b)		60	2	M1 continues pattern 6, 12, 18, as far as the 10th A1 cao **OR** M1 indicates that the number of sticks is 6 times the pattern number A1 cao **OR** M1 doubles 30 sticks for pattern number 5 A1 cao
	(c)	123 ÷ 6 leaves a remainder of 3, so 'no'	No + justification	2	M1 Attempts to divide 120 by 6 A1 'No' + comment on remainder **OR** M1 Starts at 6 and builds up to 120 and 126 A1 'No' + sight of 120 and 126
					Total for Question: 5 marks
8.	(a)		C and D	1	B1 cao
	(b)		B and E	1	B1 cao
	(c)		4.5 cm^2	1	B1 cao
					Total for Question: 3 marks

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9.	(a)		Correct reflection	1	B1 cao
	(b)		Correct square	1	B1 cao
	(c)	See pattern at end	Correct squares	1	B1 cao
					Total for Question: 3 marks
10.	(a)		$6x$	1	B1 cao
	(b)		$y \geq -2$	2	M1 attempt to isolate y A1 cao
					Total for Question: 3 marks
11. **QWC i, ii, iii**		50 shirts at £12 each = £600 Selling Price for profit of 30% = £12 × 1.3 = £15.60 20 shirts at £15.60 = £312 Reduced selling price = £15.60 × 0.85 = £13.26 30 shirts at £13.26 = £397.80 £397.80 + £312 > £600	Yes, together with appropriately set out working which supports answer	8	B1 for price of 50 shirts M1 for £12 × 1.3 A1 for £15.60 A1 for 20 shirts = £312 M1 for £15.60 × 0.85 A1 for £13.26 A1 for 30 shirts = £397.80 C1 Yes stated together with a statement which supports the correct answer **QWC: With clear working attributed correctly**
					Total for Question: 8 marks

1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.	(a)		(2, 6)(4, 4) (6, 2)	2	M1 lists as ordered pairs or in a table with at least 2 entries A1 all 3 correct entries
	(b)		$\frac{6}{16}$	4	M1 lists the sample space (at least 4 pairs) A1 fully correct M1 identifies cases where Ali wins A1 cao
					Total for Question: 6 marks
13. **FE**	(a)		2 correct combinations	2	B1 Single burger and regular cola oe B1 Regular fries and regular cola oe –1 for each extra incorrect
	(b)	Best is Cost 3.49 + 1.70 = 5.19 Change = 10.00 – 5.19	£4.81	3	M1 2 correct individual costs found M1 sum and subtract from £10 A1 cao SC B2 5.24 (B1 2 × 1.70 + 0.99 + 0.85 = (5.24))
					Total for Question: 5 marks
14. **FE**	(a)	48 + 37 + 78 + 21 = 184 184 × 40 = 7360 4 × 12 = 48 73.60 + 48	£121.60	4	M1 find the total miles M1 total miles × 40 or × 0.4(0) M1 mileage expenses + 4 × 12 or + 5 × 12 A1 cao
	(b)	2000 ÷ 50 = 40 4000 ÷ 40 = 100 **OR** 2000 ÷ 0.4 = 50000 50000 – 50 = 100 **OR** 0.4 × 50 = 20 2000 ÷ 20 = 100	100	3	M1 for sight of 2000 , or 50, or 20000 M1 dep for an attempt to find cost per week or mileage per year A1 100 **OR** M1 sight of 2000, or 50 M1 dep 0.4 × 50 and 2000 ÷ '20' A1 100
					Total for Question: 7 marks

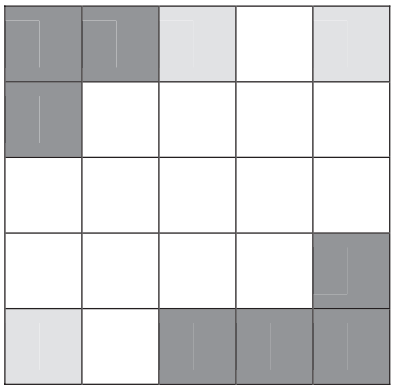
1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
15. **QWC ii, iii**		$\frac{1}{2} = \frac{4}{8}; \frac{1}{4} = \frac{2}{8}$ So $\frac{3}{8}$ is half way **OR** use of 0.5 and 0.25 to get 0.375 and compare to 0.33 **OR** $\frac{1}{2} - \frac{1}{3} = \frac{1}{6}$ **and** $\frac{1}{3} - \frac{1}{4} = \frac{1}{12}$ followed by conclusion **OR** use of 0.5 and 0.25 and differences of 0.5 – 0.33(3,...) and 0.33(3...) – 0.25	Coherent and well structured argument with appropriate reason	3	M1 to change both fractions to equivalent fractions M 1(dep on at least one correct equivalent fraction) to find midpoint C1 conclusion following correct work by stating that $\frac{3}{8}$ is not equal to $\frac{1}{3}$ **QWC: Decision should be stated with supporting reason given** **OR** M1 use of 0.5 and 0.25 M1 (dep on at least correct decimal one find midpoint) C1 conclusion following correct work and sight of 0.37(5) and 0.33(3..) **QWC: Decision should be stated with supporting reason given** **OR** M1 for working out differences M1 For a correct method of calculating differences of fractions using equivalent fractions C1 conclusion following from $\frac{1}{6}$ **and** $\frac{1}{12}$ **QWC: Decision should be stated with supporting reason given** **OR** M1 for working out differences M1 for a correct method of calculating differences of fractions using equivalent fractions C1 conclusion following from $\frac{1}{6}$ **and** $\frac{1}{12}$ **QWC: Decision should be stated with supporting reason given** **OR** M1 use of 0.5 and 0.25 M1(dep on at least one correct decimal) for working out differences C1 for conclusion based on 0.17(or better) and 0.08(23...) **QWC: Decision should be stated with supporting reason given**
					Total for Question: 3 marks

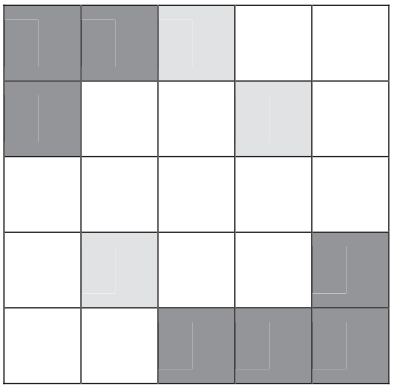
1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
16.	(a)	$5p = 20$	4	2	M1 add 16 to both sides A1 cao
	(b)	$-4-5=5q-2q$	–3	2	M1 for correct method isolate $\pm 3q$ A1 cao
	(c)	$6x-3-10-6x=$	–13	2	M1 at least one expansion correct A1 cao
					Total for Question: 6 marks

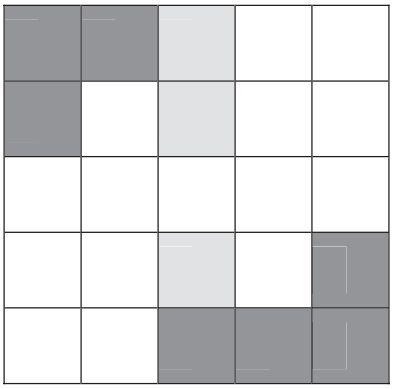
1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
17.		$x + 4x + \frac{1}{2} = 1$ $5x = \frac{1}{2}$, $x = \frac{1}{10}$ **OR** Choose a suitable number of balls (say 10) 5 will be red The other 5 need to be shared out in the ratio 1:4, hence 1 yellow and 4 blue	$\frac{4}{10}$	3	M1 $x + 4x + \frac{1}{2} = 1$ A1 $x = \frac{1}{10}$ A1 $\frac{4}{10}$ oe
					Total for Question: 3 marks
18.		Rotates shape about (3,0) by 180° to give $\boldsymbol{U}$ Rotates $\boldsymbol{U}$ about (6, 0) to give $\boldsymbol{V}$ (see graph at end)	Translation by $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$	3	B3 Translation by $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ (B2 translation by 6 to the right or just $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ on its own) (B1 translation or move to the right 6) If no marks earned from a description then B1 $\boldsymbol{U}$ correctly placed B1 $\boldsymbol{V}$ correctly placed
					Total for Question: 3 marks

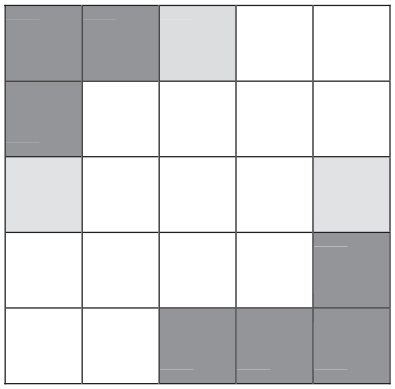
1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
19.		Number of prizes should buy is $\frac{3}{8} \times 1000$ = 375 **OR** Each triangle should win 1000 ÷ 8 times (=125) So 3 × 125 = 375	(376) and justification that matches answer	3	M1 estimate of probability A1 for answer > $\frac{3}{8}$ of 1000 C1 for justification that matches answer Number of prizes between 376 and 500 **OR** M1 1000 ÷ 8 A1 for answer > $\frac{3}{8}$ of 1000 C1 for justification that matches answer Number of prizes between 376 and 500
					Total for Question: 3 marks
20.	(a)		$5(x-2y)$	1	B1 cao
	(b)		$3p(q-4p)$	2	B2 $3p(q-4p)$ (B1 correct partial factorisation, for example, $p(3q-12p)$, $12p(\frac{1}{4}q-p)$, $p(aq+bp)$ where a and b are numbers
					Total for Question: 3 marks

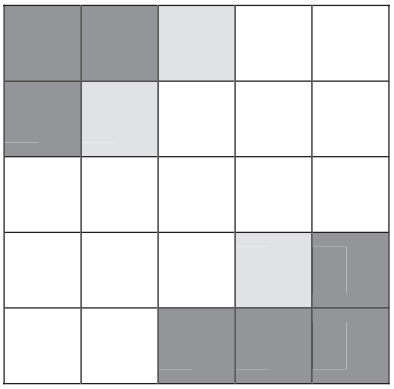
1MA0/1F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
21 **FE**		Area of the room = 4 × 8 + 4 × 6 = 56 Area of a tile = 0.5 × 0.5 = 0.25 Number of tiles = 56 ÷ 0.25 = 224 Cost = 4 × 224 **OR** No of tiles around room = 2 × lengths of room = 8, 16, 16, 12 Total number of tiles = 8 × 16 + 8 × 12 = 224 Cost = 4 × 224	£ 896	6	M1 for full method for finding the area of the room A1 at least one area correct B1 for area of tile = 0.25m^2 or 2500 cm^2 or 4 tiles = 1m^2 M1 for area of room ÷ area of a tile M1 for 4 × number of tiles A1 cao **OR** M1 for doubling each length to show number of tiles for each side B1 for 8, 16, 16 and 12 M1 for a full method of finding the number of tiles (12×16+8×4) A1 for at least one 'section' correct M1 for 4 × '224' A1 cao
					Total for Question: 6 marks

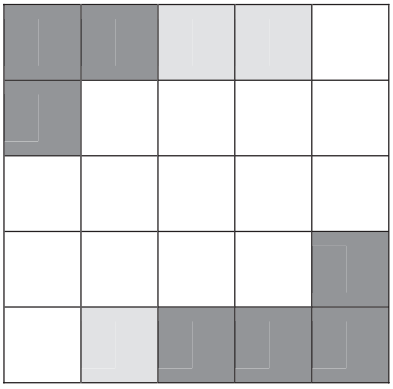






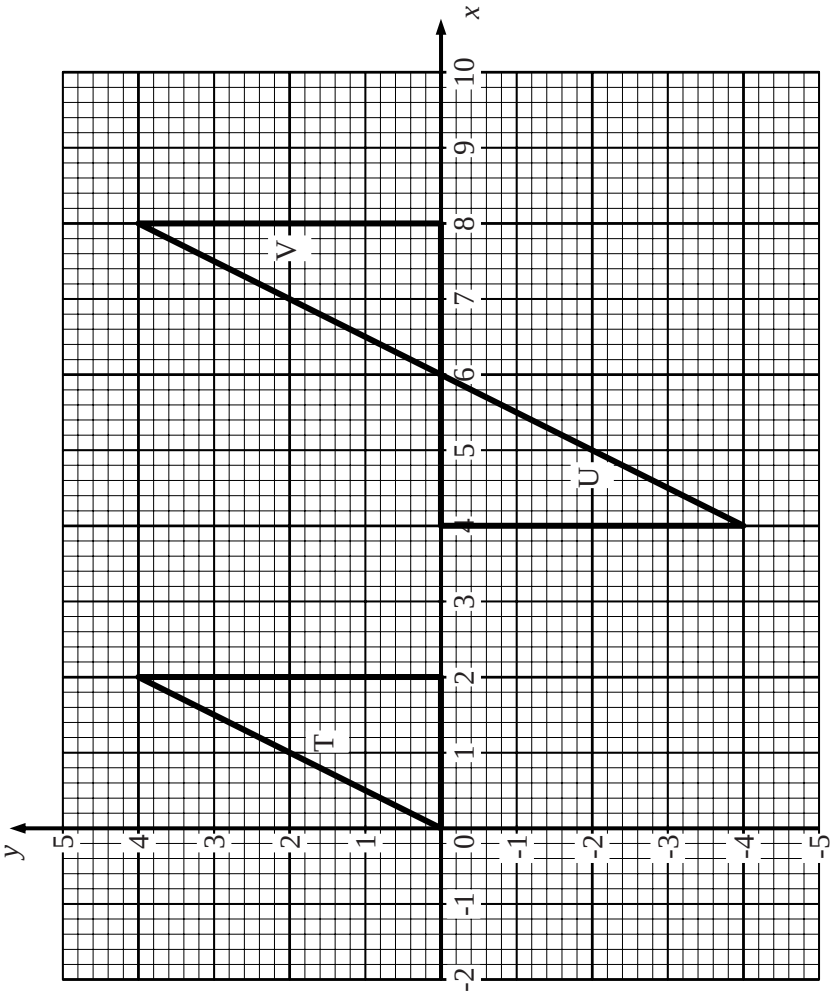






9 (c)

18.



Write your name here

Surname	Other names

Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 1 (Non-Calculator)

Higher Tier

Sample Assessment Material
Time: 1 hour 45 minutes

Paper Reference
1MA0/1H

You must have:
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. 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 must not be used**.

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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S 3 7 7 0 9 A 0 1 2 7

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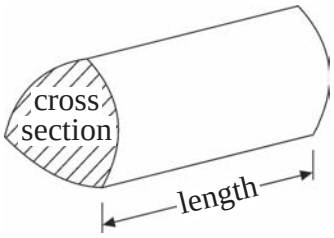
GCSE Mathematics 1MA0

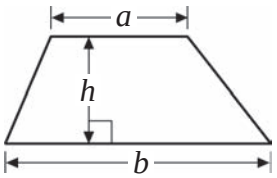
Formulae – Higher Tier

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

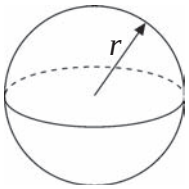


Area of trapezium = $\frac{1}{2}(a+b)h$



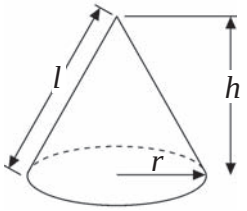
Volume of sphere = $\frac{4}{3}\pi r^3$

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

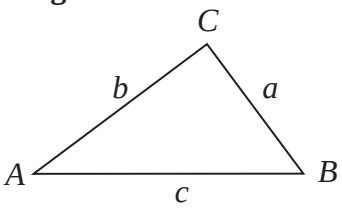


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (i) Simplify $13x - 24y + 17x + 14y$

.....

(ii) Solve $6(1 - 2x) - 3(x + 1) = 0$

.....

(Total for Question 1 = 5 marks)

***2** Jennie's council has a target of $\frac{1}{5}$ for households to recycle their waste.

In January, Jennie recycled $\frac{1}{10}$ of her household waste.

In February, she recycled 15 kg of her 120 kg of household waste.

Her result for March was 13 % recycled out of 112 kg of household waste.

Has Jennie met the council's target?
Which was her best month for recycling?
Show clearly how you got your answers.

(Total for Question 2 = 4 marks)

3

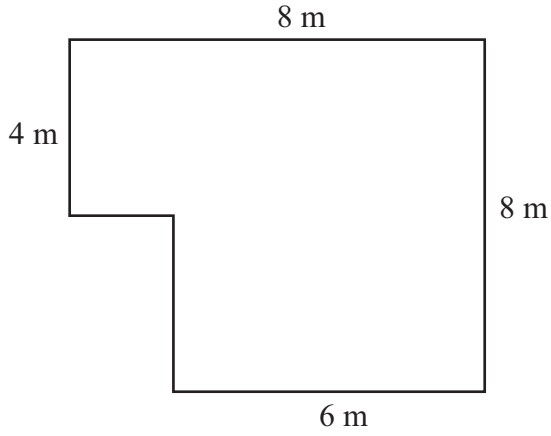


Diagram **NOT** accurately drawn

The diagram is a plan of the floor of Nikola's room.
All the angles are right angles.
Nikola is going to lay carpet tiles to cover all the floor.
Each tile is a square 50 cm by 50 cm.
Each tile costs £4

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

£ .....

(Total for Question 3 = 6 marks)

4 (a) Solve $5p - 16 = 4$

(2)

$p =$ .....

(b) Solve $2q - 4 = 5q + 5$

(2)

$q =$ .....

$y = 3(2x - 1) - 2(5 + 3x)$

(c) Show that y will always be the same value.

(2)

(Total for Question 4 = 6 marks)

5 The nth term of a sequence is $2n^2$

(i) Find the 4th term of the sequence.

.....

(ii) Is the number 400 a term of the sequence?

.....

Give reasons for your answer.

(Total for Question 5 = 3 marks)

6 Last year Sasha was paid £15400 after deductions from her gross salary.
She was paid 70% of her gross salary.
This year Sasha's gross salary increased by 2%.

Work out the increase in Sasha's gross salary. Give your answer in pounds.

£ .....

(Total for Question 6 = 4 marks)

7 (a) Express 66 as a product of its prime factors.

(2)

.....

(b) Express 132^2 as a product of its prime factors.

(2)

.....

(Total for Question 7 = 4 marks)

8 A bag contains only red, yellow and blue discs.

The probability of drawing a red disc at random is $\frac{1}{2}$

The probability of drawing a yellow disc at random is x
The probability of drawing a blue disc at random is $4x$

One disc is to be selected at random.

Work out the probability that it will be a blue disc.
Give your answer as a numerical value.

.....

(Total for Question 8 = 3 marks)

9 (a) Simplify

(i) $a^5 \div a^3$

(3)

.....

(ii) $2x^2 \times 3x^2y^2$

.....

(b) Expand and simplify $(x + 3)(x + 7)$

(2)

.....

(c) Factorise fully $3pq - 12p^2$

(2)

.....

(d) (i) Factorise $3y^2 - 10y + 3$

(4)

.....

Hence, or otherwise

(ii) Factorise $3(x+2)^2 - 10(x+2) + 3$

.....

(Total for Question 9 = 11 marks)

10

The diagram represents 100 cards. Each card has a whole number from 1 to 100 on it.
No cards have the same number.

Bill puts a red dot on every card which has a multiple of 6 on it.
Parul puts a green dot on every card which has a multiple of 9 on it.

All the cards are placed in a bag.
Vicki selects a card is selected at random.

What is the probability that the card has both a red and a green dot on it?

.....

(Total for Question 10 = 3 marks)

11

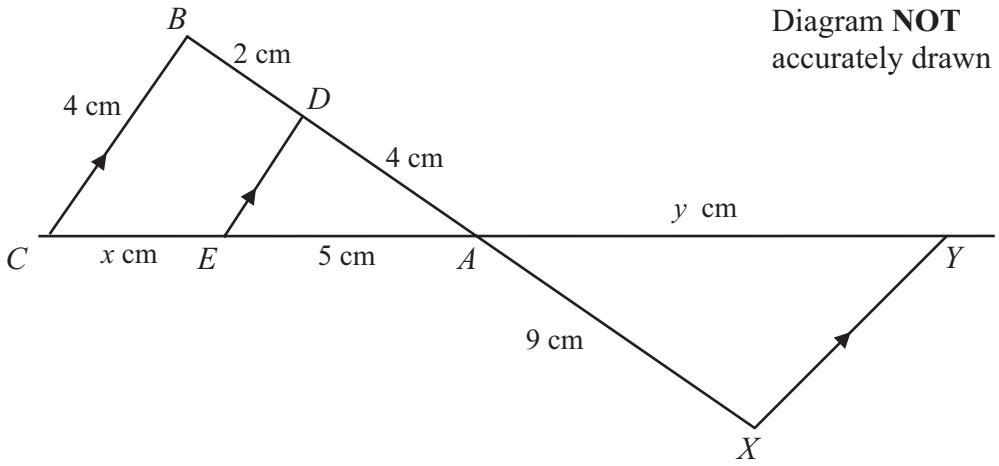


Diagram **NOT** accurately drawn

CEAY and *BDAX* are straight lines.
XY, *ED* and *CB* are parallel.
AE = 5 cm.
AX = 9 cm.
AD = 4 cm.
BC = 4 cm.
BD = 2 cm.

CE = *x* cm.
XY = *y* cm.

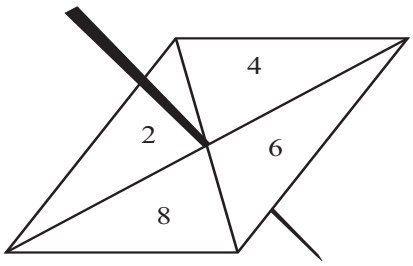
Find the value of *x* and the value of *y*.

x = ...

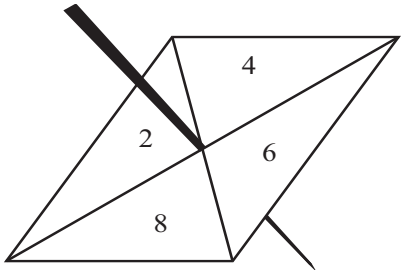
y = ...

(Total for Question 11 = 4 marks)

12 Here are two fair 4-sided spinners.
One is a Blue spinner and one is a Red spinner.



Blue spinner



Red spinner

Each spinner has four sections numbered 2, 4, 6 and 8

Each spinner is to be spun once.

Total score = Blue spinner score + Red spinner score

(a) Find the probability that the total score will be 10

(3)

.....

Ali and Shazia play a game.

In each round of the game, Ali spins the Blue spinner once and Shazia spins the Red spinner once.

Ali wins when the Blue spinner score is greater than the Red spinner score.

Ali and Shazia play 80 rounds.

(b) Work out an estimate of the number of rounds that Ali will win.

(3)

.....

(Total for Question 12 = 6 marks)

13 The population of Algeria is 34 million.

(a) Write 34 million in standard form.

(1)

.....

The total land area of Algeria is 2.4×10^{12} m^2.
5% of the total land area is used to grow crops.

(b) Work out the area of land in Algeria which is used to grow crops.
Write your answer in standard form, in km^2.

(2)

..... m^2

(Total for Question 13 = 3 marks)

14

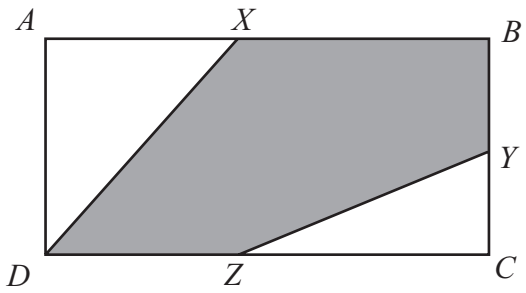


Diagram **NOT** accurately drawn

ABCD is a rectangle.
X is the midpoint of *AB*.
Y is the midpoint of *BC*.
Z is the midpoint of *CD*.

What fraction of the total area of *ABCD* is shaded?

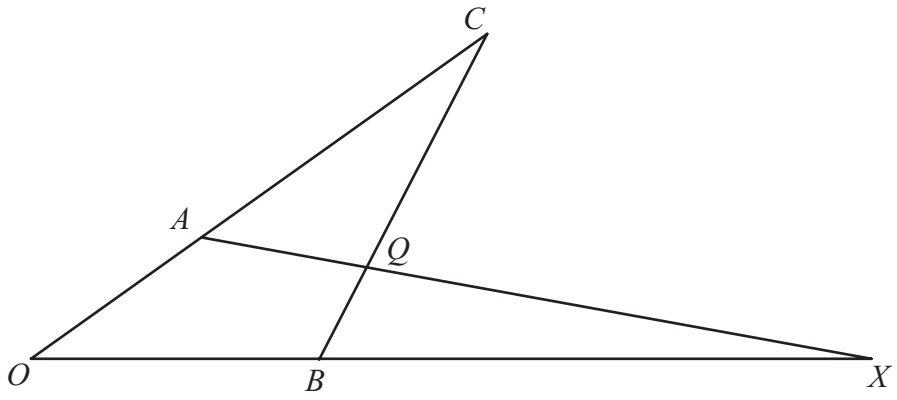
Show clearly how you get your answer.

.....

(Total for Question 14 = 4 marks)

15

Diagram **NOT** accurately drawn



In the diagram,

$\overrightarrow{OA} = 4\mathbf{a}$ and $\overrightarrow{OB} = 4\mathbf{b}$

OAC, OBX and BQC are all straight lines

$AC = 2OA$ and $BQ : QC = 1:3$

(a) Find, in terms of **a** and **b**, the vectors which represent

(4)

(i) $\overrightarrow{BC}$

.....

(ii) $\overrightarrow{AQ}$

.....

Given that $\overrightarrow{BX} = 8\mathbf{b}$

(b) Show that AQX is a straight line.

(3)

(Total for Question 15 = 7 marks)

16 There are 10 students in a class.
6 of the students are boys and 4 of the students are girls.

Three students are picked at random from the class to form a team.

Work out the probability that the team consists of 1 girl and 2 boys.

.....

(Total for Question 16 = 4 marks)

17 Simplify $\dfrac{3x^2 - 16x - 35}{9x^2 - 25}$

.....

(Total for Question 17 = 3 marks)

18 $\sqrt{3} = 3^k$

(a) Write down the value of k

(1)

.....

(b) Expand and simplify $(2 + \sqrt{3})(1 + \sqrt{3})$

Give your answer in the form $a + b\sqrt{3}$

where a and b are integers

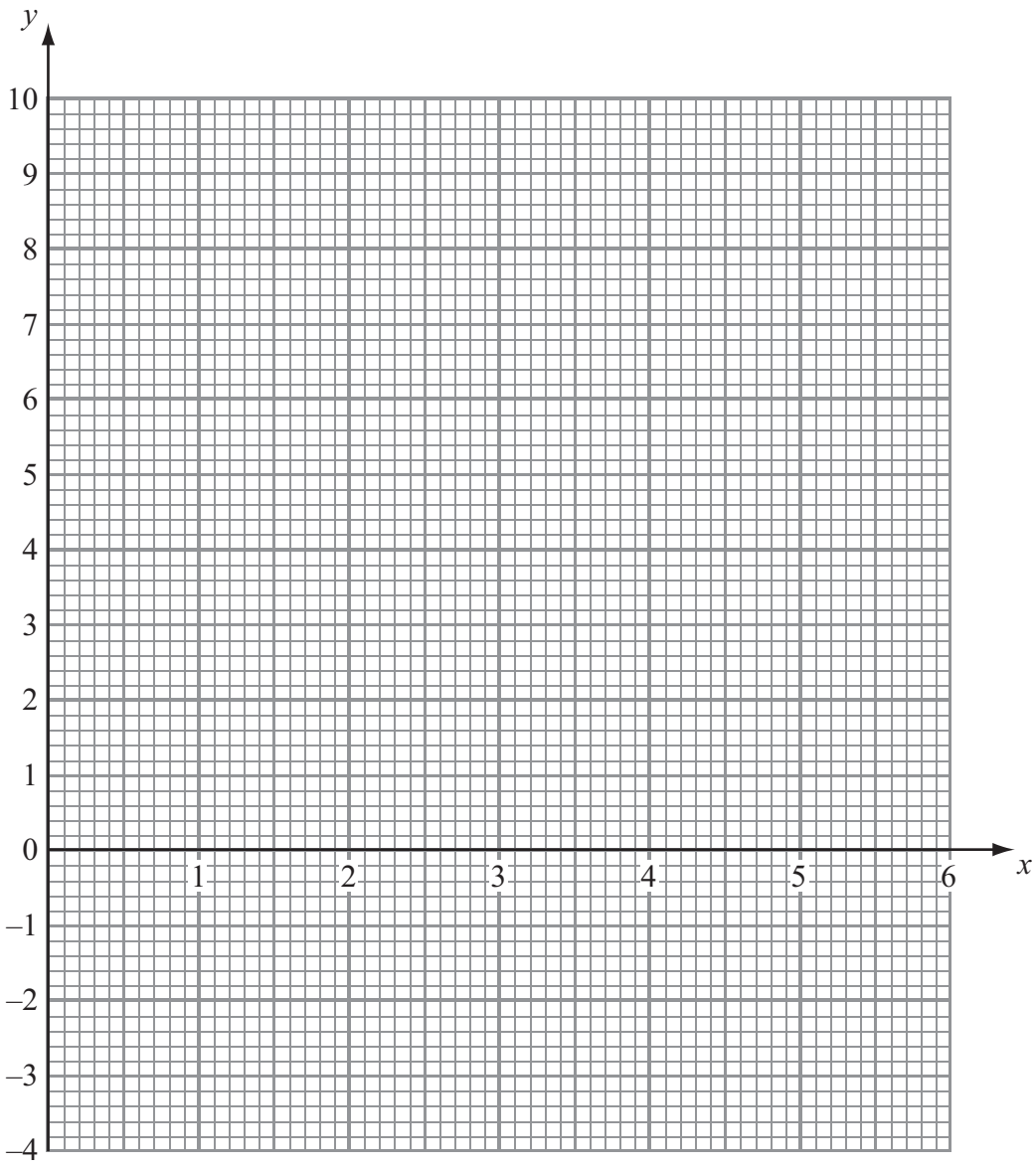
(2)

.....

(Total for Question 18 = 3 marks)

19 (a) On the grid draw the graph of $y = x(x - 3)$

(2)



(b) Using your result for (a), or otherwise, solve the simultaneous equations

$y = x(x - 3)$

$x^2 + y^2 = 9$

(3)

(Total for Question 19 = 5 marks)

***20** Prove that the difference between the squares of consecutive odd numbers is a multiple of 8

(Total for Question 20 = 6 marks)

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21 Mr Walton is responsible for maintaining fish stocks in a river. The table gives some information about the lengths, in centimetres, of a type of fish caught from the river.

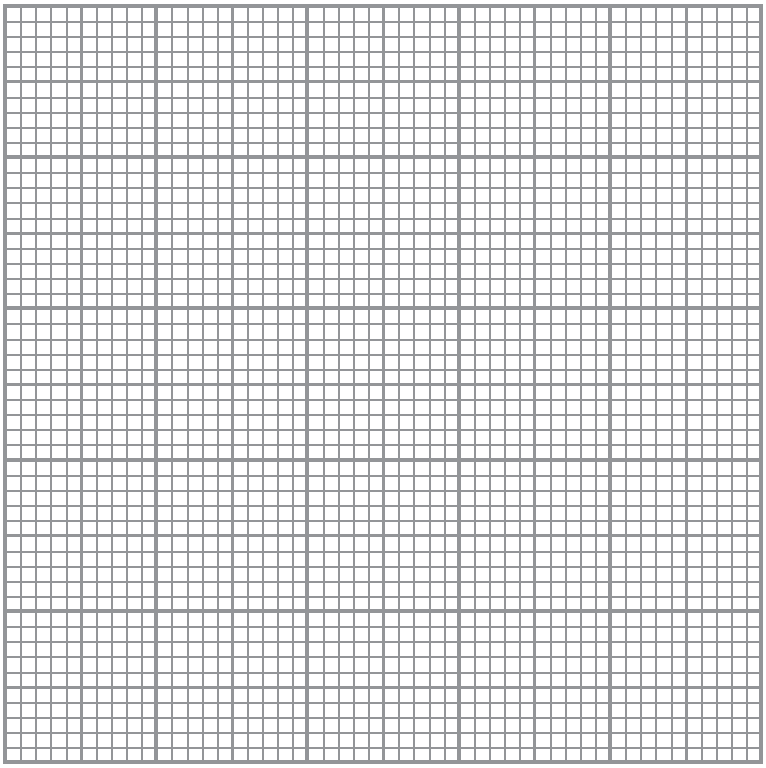
Length (L) cm	Frequency
$0 < L \leqslant 10$	40
$10 < L \leqslant 20$	60
$20 < L \leqslant 40$	90
$40 < L \leqslant 80$	60
$L > 80$	0

He wants to study the effect of returning to the river fish less than 50 cm in length that are caught.

Mr Walton suggests that fish which are less than 50 cm in length are returned to the river.

Draw a suitable statistical diagram for the information in the table.

Use it to find an estimate of the percentage of fish returned to the river.



..... %

(Total for Question 21 = 6 marks)

TOTAL FOR PAPER = 100 MARKS

1MA0/1H					
Question		Working	Answer	Mark	Additional Guidance
1.	(i)		$30x - 10y$	5	B2 cao (If no marks then B1 $30x$, B1 $10y$)
	(ii)	$6 - 12x - 3x - 3 = 0$ $3 - 15x = 0$ $15x = 3$	$\frac{1}{5}$		M1 for correct multiplication of brackets to get $6 - 12x - 3x - 3$ A1 $3 - 15x = 0$ B1 ft for "$\frac{1}{5}$"
					Total for Question: 5 marks
2. **QWC iii FE**		See table at end	Best month and supporting explanation	4	M1 Converts for at least 2 months to a common format (fractions, decimals or %age) A1 all correct C1 for Council target: No (yes) dep on M1 and consistent with the candidates calculations **QWC: Decisions should be stated, following through from working out** C1 March with all calculations correct for the 3 months **QWC: Decisions should be stated, following through from working out**
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3. **FE**		No of tiles around room = 2 × lengths of room = 8, 16, 16, 12 Total number of tiles = 8 × 16 + 8 × 12 = 224 Cost = 4 × 224 **OR** Area of the room =4 × 8 + 4 × 6 = 56 Area of a tile = 0.5 × 0.5 = 0.25 Number of tiles = 56 ÷ 0.25 = 224 Cost = 4 × 224	£ 896	6	M1 for doubling each length to show number of tiles for each side B1 for 8, 16, 16 and 12 M1 for a full method of finding the number of tiles (12 × 16 + 8 × 4) A1 for at least one 'section' correct M1 for 4 × '224' A1 cao **OR** M1 for full method for finding the area of the room A1 at least one area correct B1 for area of tile = 0.25m^2 or 2500 cm^2 or 4 tiles = 1 m^2 M1 for area of room ÷ area of a tile M1 for 4 × number of tiles A1 cao
					Total for Question: 6 marks
4.	(a)	$5p = 20$	$p = 4$	2	M1 add 16 to both sides A1 cao
	(b)	$-9 = 3q$	$q = -3$	2	M1 correct method to isolate $\pm 3q$ A1 cao
	(c)	$6x - 3 - 10 - 6x =$	-13	2	M1 at least one expansion correct A1 –13 or a statement that the answer is indep of x depending on correct working
					Total for Question: 6 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(i)		32	1	B1 cao
	(ii)	$2n^2 = 400$, $n^2 = 200$, n not a whole number	No + explanation	2	M1 sets $2n^2 = 400$ C1 and concludes correctly **OR** M1 14th term is (392), 15th term is (450) C1 and concludes correctly
					Total for Question: 3 marks
6. **FE**		15400 ÷ 70 × 100 = 22000 22000 × 2÷ 100	440	4	M1 15400 ÷ 70 × 100 oe A1 22000 M1 '22000' × 2 ÷ 100 oe A1 cao
					Total for Question: 4 marks
7.	(a)	66 = 2 ×33 = 2 × 3 × 11	2 × 3 × 11	2	M1 Successive division by 2 and 3 either by a factor tree or by repeated division A1 cao
	(b)	$132^2 = 4 \times 66^2$ $= 2^2 \times (2 \times 3 \times 11)^2$ **OR** $132^2 = 17424 = 2 \times 8712$ $= 2 \times 2 \times 4356 =$ $2^3 \times 2178 = 2^4 \times 1089$ $=2^4 \times 3 \times 363 =...$	$2^4 \times 3^2 \times 11^2$	2	M1 $(2 \times 3 \times 11)^2$ A1 $2^2 \times 3^2 \times 11^2$ oe **OR** M1 $132^2 = 17424$ and at least 3 correct steps in for example the factor tree
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8.		$x + 4x + \frac{1}{2} = 1$ $5x = \frac{1}{2}$, $x = \frac{1}{10}$ **OR** Chooses a suitable number of balls (say 10) 5 will be red The other 5 need to be shared out in the ratio 1:4, Hence 1 yellow and 4 blue	$\frac{4}{10}$	3	M1 $x + 4x + \frac{1}{2} = 1$ A1 $x = \frac{1}{10}$ A1 $\frac{4}{10}$ oe
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9.	(a) (i)		a^2	3	B1 cao
	(ii)		$6x^4y^3$		B2 $6x^4y^3$ (B1 for 2 out of 3 terms correct in a product)
	(b)	$x^2 + 3x + 7x + 21$	$x^2 + 10x + 21$	2	M1 3 or 4 terms out of 4 correct in a 4 term expansion A1 cao
	(c)		$3p(q - 4p)$	2	B2 cao (B1 $p(3q - 12p)$, $12p(\frac{1}{4}q - p)$, $p(aq + bp)$ where a and b are numbers)
	(d)(i)	$(3(x+2)-1)(x+2-3)$	$(3y-1)(y-3)$	4	B2 cao (B1 $(3y - m)(y - n)$ where $mn = \pm 3$ or $m + n = \pm 10$
	(ii)	**OR** $3x^2 + 12x + 12 - 10x - 20 + 3$ $= 3x^2 + 2x - 5$	$(3x+5)(x-1)$		M1 use of the factorised form with y replaced twice by $3x + 2$ A1 cao **OR** B1 $3x^2 + 2x - 5$ B1 cao
					Total for Question: 11 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
10.		Reds 6, 12, 18, 24, 30... Greens 9, 18, 27...	$\frac{1}{20}$	3	B1 list of red and green multiples (both to at least 18) or explicitly states 'LCM' B1 works out highest number (90 seen) B1 $\frac{1}{20}$ (accept $\frac{5}{100}$)
					Total for Question: 3 marks
11.		$\frac{x}{5} = \frac{2}{4}$ $\frac{y}{x+5} = \frac{9}{6}$ or $\frac{y}{9} = \frac{x+5}{6}$	$x = 2.5$ $y = 11.25$	4	M1 a correct expression for x involving ratios of sides, e.g. $\frac{x}{5} = \frac{2}{4}$ oe A1 cao M1 $\frac{y}{x+5} = \frac{9}{6}$ or $\frac{y}{9} = \frac{x+5}{6}$ oe A1 cao **OR** $\frac{y}{5} = \frac{9}{4}$ A1 cao
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.	(a)	4 6 8 10 6 8 10 12 8 10 12 14 10 12 14 16 **OR** $\frac{1}{4}\times\frac{1}{4}$ $\frac{1}{4}\times\frac{1}{4}\times 4$	$\frac{4}{16}$	3	M1 Attempts to list all outcome pairs A1 all 16 found A1 cao **OR** M2 $\frac{1}{4}\times\frac{1}{4}\times 4$ (M1 $\frac{1}{4}\times\frac{1}{4}\times 1,\ 2$ or 3) A1 $\frac{4}{16}$ oe
	(b)	Prob Ali wins = $\frac{6}{16}$ Number of wins = $\frac{6}{16}\times 80$	30	3	B1 Prob Ali wins = $\frac{6}{16}$ oe M1 $'\frac{6}{16}'\times 80$ A1 ft
					Total for Question: 6 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
13.	(a)		3.4×10^{7}	1	B1 cao
	(b)	$2.4\times10^{12}\times\frac{5}{100}(\div10^{6})$	1.2×10^{5}	2	M1 $2.4\times10^{12}\times\frac{5}{100}$ oe $(\div10^{6})$ A1 cao
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14.		Let $AB = x, AD = y$ Area of rectangle $= xy$ Area AXD = $\frac{xy}{4}$ Area CYZ = $\frac{xy}{8}$ Shaded area = $\frac{5xy}{8}$	$\frac{5}{8}$	4	M1 a full method to find the unshaded area and subtracting from 1 B1 area of AXD = area of $ABCD \div 4$ B1 area of CYZ = area of $ABCD \div 8$ A1 cao **OR** **Diagram** M1 for dividing left into 2 congruent triangles for dividing right into 4 congruent triangles B1 left = $2A$ and $2A$ or shaded = $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4} = \frac{2}{8}$ B1 right = $2A$ and A and A or shaded = $\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$ A1 cao **Substitution** M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes B1 for area of DZX B1 for area of $ZXBY$ A1 cao **OR** M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes B1 for area ADX B1 for area ZCY A1 cao
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
15.	(a) (i)	$\vec{BC} = \vec{CO} + \vec{OB}$	12**a** – 4**b**	4	M1 $\vec{BC} = \vec{CO} + \vec{OB}$ A1 cao
	(ii)	$\vec{AQ} = \vec{AO} + \vec{OB} + \vec{BQ}$ = –4**a** + 4**b** + $\frac{1}{4}$ (12**a** – 4**b**)	3**b** – **a**		M1 –4**a** + 4**b** + $\frac{1}{4}$ '(12**a** – 4**b**)' A1 cao
	(b)	$\vec{OX}$ = 12**b** , $\vec{AX}$ = –4**a** + 12**b** = 4(–**a** + 3**b**)	Correct reason, with correct working	3	B1 $\vec{OX}$ = 12**b** B1 $\vec{AX}$ = –4**a** + 12**b** C1 convincing explanation
					Total for Question: 7 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
16.		$\frac{4}{10}\times\frac{6}{9}\times\frac{5}{8} = \frac{120}{720}$ $\frac{120}{720} + \frac{6}{10}\times\frac{5}{9}\times\frac{4}{8} + \frac{6}{10}\times\frac{4}{9}\times\frac{5}{8}$	$\frac{360}{720}$	4	M1 for $\frac{4}{10}\times\frac{6}{9}\times\frac{5}{8}$ A1 for $\frac{120}{720}$ oe M1 $\frac{'120'}{720}$ + 2 correct cases (M1 any 2 correct cases) **or** $\frac{'120'}{720}$ X 3 A1 cao SC with replacement M1 $\frac{4}{10}\times\frac{6}{10}\times\frac{6}{10}$ M1 $\frac{4}{10}\times\frac{6}{10}\times\frac{6}{10}$ ×3
					Total for Question: 4 marks
17.		$\frac{(3x+5)(x-7)}{(3x-5)(3x+5)}$	$\frac{x-7}{3x-5}$	3	B1 $(3x+5)(x-7)$ B1 $(3x-5)(3x+5)$ B1 $\frac{x-7}{3x-5}$
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
18.	(a)		$\frac{1}{2}$	1	B1
	(b)	$(2+\sqrt{3})\times(1+\sqrt{3})$ $= 2+2\sqrt{3}+\sqrt{3}+\sqrt{9}$	$5+3\sqrt{3}$	2	M1 4 term expansion with 3, 4 terms correct and sight of 3 or $\sqrt{9}$ A1 cao
					Total for Question: 3 marks
19.	(a)		Smooth curve	2	B1 correct plot of their values B1 smooth curve through their points
	(b)		$x = 3$ $y = 0$	3	M1 attempts to draw circle at origin M1 uses radius 3 cm (using graph scale correctly) A1 cao **OR** B1 for substituting a value of x into $y = x(x-3)$ and $x^2 + y = r^2$ B1 for substituting y into $x = 3$ into $x(x-3)$ and $x^2 + y = r^2$ B1 cao
					Total for Question: 5 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
20. **QWC ii, iii**		$(2n+1)^2-(2n-1)^2$ **=** $4n^2+4n+1-(4n^2-4n+1)$ **=** $8n$ **OR** $(2n+1)^2-(2n-1)^2$ **=** $((2n+1)-(2n-1))(2n+1+2n-1))$ $= 2 \times 4n = 8n$	Fully algebraic argument, set out in a logical and coherent manner	6	B2 the nth term for consecutive odd numbers is $2n-1$ oe (B1 $2n+k$, $k \neq -1$ or $n = 2n-1$ or $2x-1$ B1 use of $2n+1$ and $2n-1$ oe M1 $(2n+1)^2-(2n-1)^2$ M1 $4n^2+4n+1-(4n^2-4n+1)$ C1 conclusion based on correct algebra **QWC: Conclusion should be stated, with correct supporting algebra.** **OR** B1 use of $2n+1$ and $2n-1$ oe M1 $(2n+1)^2-(2n-1)^2$ M1 $((2n+1)-(2n-1))(2n+1+2n-1))$ C1 conclusion based on correct algebra **QWC: Conclusion should be stated, with correct supporting algebra.**
					Total for Question: 6 marks

<table>
<tr><th colspan="6">1MA0/1H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Additional Guidance</th></tr>
<tr><td>21.</td><td></td><td>
<table>
<tr><th>L</th><th>F</th><th>FD</th><th>CF</th></tr>
<tr><td>0–10</td><td>40</td><td>4</td><td>40</td></tr>
<tr><td>10–20</td><td>60</td><td>6</td><td>100</td></tr>
<tr><td>20–40</td><td>90</td><td>4.5</td><td>190</td></tr>
<tr><td>40–80</td><td>60</td><td>1.5</td><td>250</td></tr>
<tr><td>>80</td><td>0</td><td>0</td><td>250</td></tr>
</table>
</td><td>Histogram
OR
Cumulative Frequency polygon

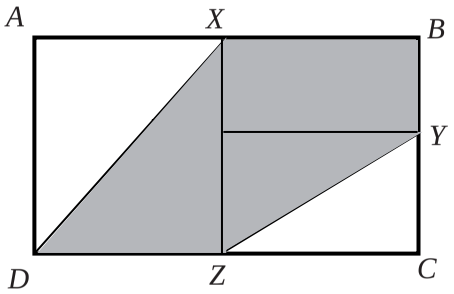
82%</td><td>6</td><td>B1 Scales labelled and also marked on the vertical axis with frequency density or with cumulative frequency
M1 frequency densities calculated, at least one non-trivial one correct.
A1 all correctly plotted
(M1 cumulative frequencies correct)

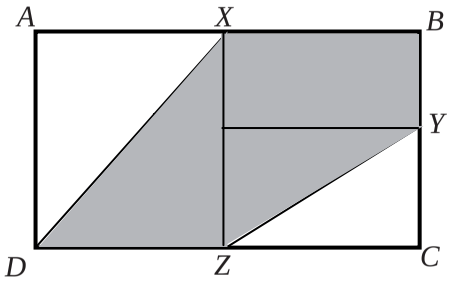
M1 Use 50 on the horizontal scale of CF diagram read off vertical axis (200-210)
or Use 50 on the horizontal scale of a histogram and covert area to the left to a frequency
M1 convert to a percentage
A1 80 – 85</td></tr>
<tr><td colspan="6">Total for Question: 6 marks</td></tr>
</table>

2.

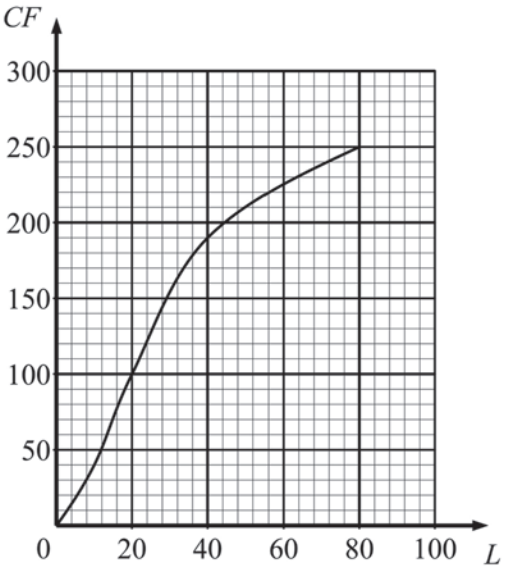
	Fraction	Decimal	%	kg
Jan	$\frac{1}{10}$	0.1	10%	Not known
Feb	$\frac{1}{8}$	0.125	12.5%	15 kg
Mar	$\frac{13}{100}$	0.13	13%	14.56 kg

14.

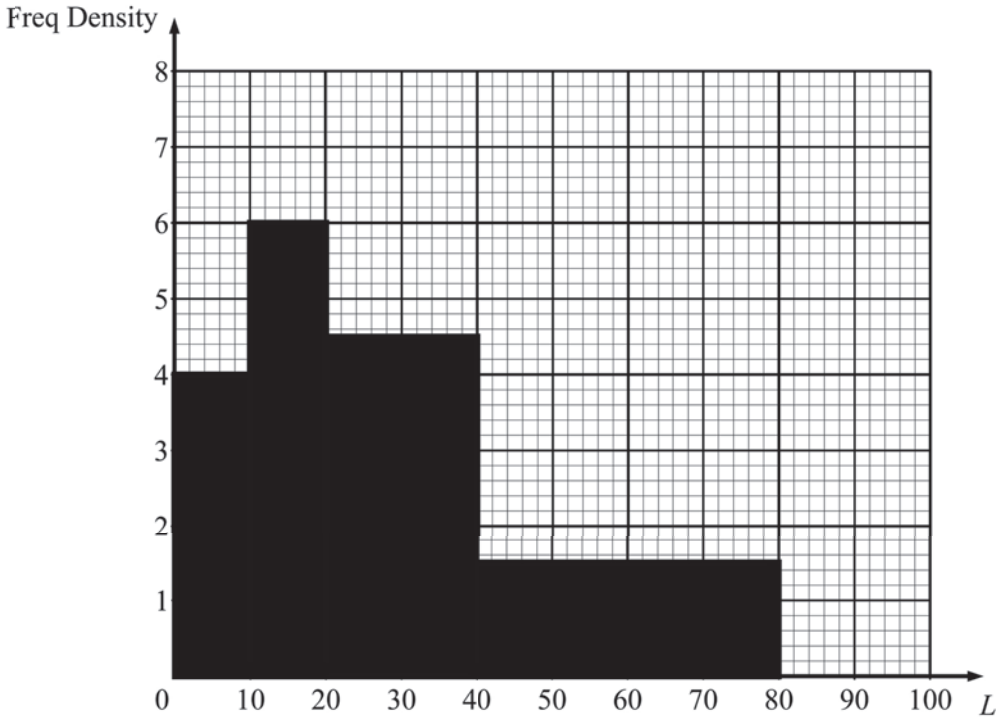




21.



OR



Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics A

Paper 2 (Calculator)

Foundation Tier

Sample Assessment Material **Time: 1 hour 45 minutes**	Paper Reference **1MA0/2F**

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

S37712A

2/2/2/3/2/2

S 3 7 7 1 2 A 0 1 2 9

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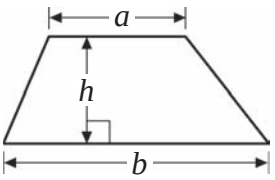
GCSE Mathematics 1MA0

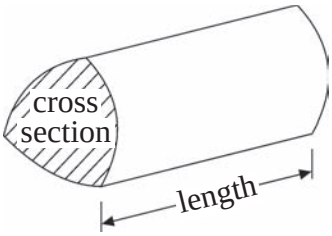
Formulae: Foundation Tier

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

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



Volume of prism = area of cross section × length



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Susie has one pound and sixty pence.

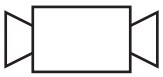
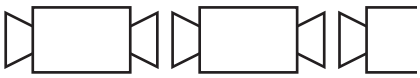
Her friend, Katie, has two pounds and five pence.

They want to buy a pizza between them.
The pizza costs £3.50
How much money will they have left?

Show your working here.

(Total for Question 1 = 2 marks)

2 The pictogram shows the number of packets of toffees sold by a shop some days in one week.

Monday		Key  represents 20 packets
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		

(a) Write down the number of packets of toffees that were sold on

(2)

(i) Tuesday,

..... packets

(ii) Thursday.

..... packets

40 packets were sold on Friday.

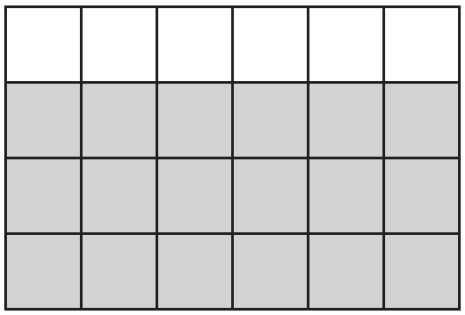
30 packets were sold on Saturday.

(b) Use this information to complete the pictogram.

(2)

(Total for Question 2 = 4 marks)

3



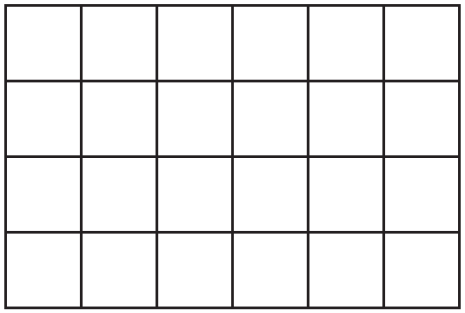
(a) Write down the fraction of this shape that is shaded.
Write your fraction in its simplest form.

(2)

.....

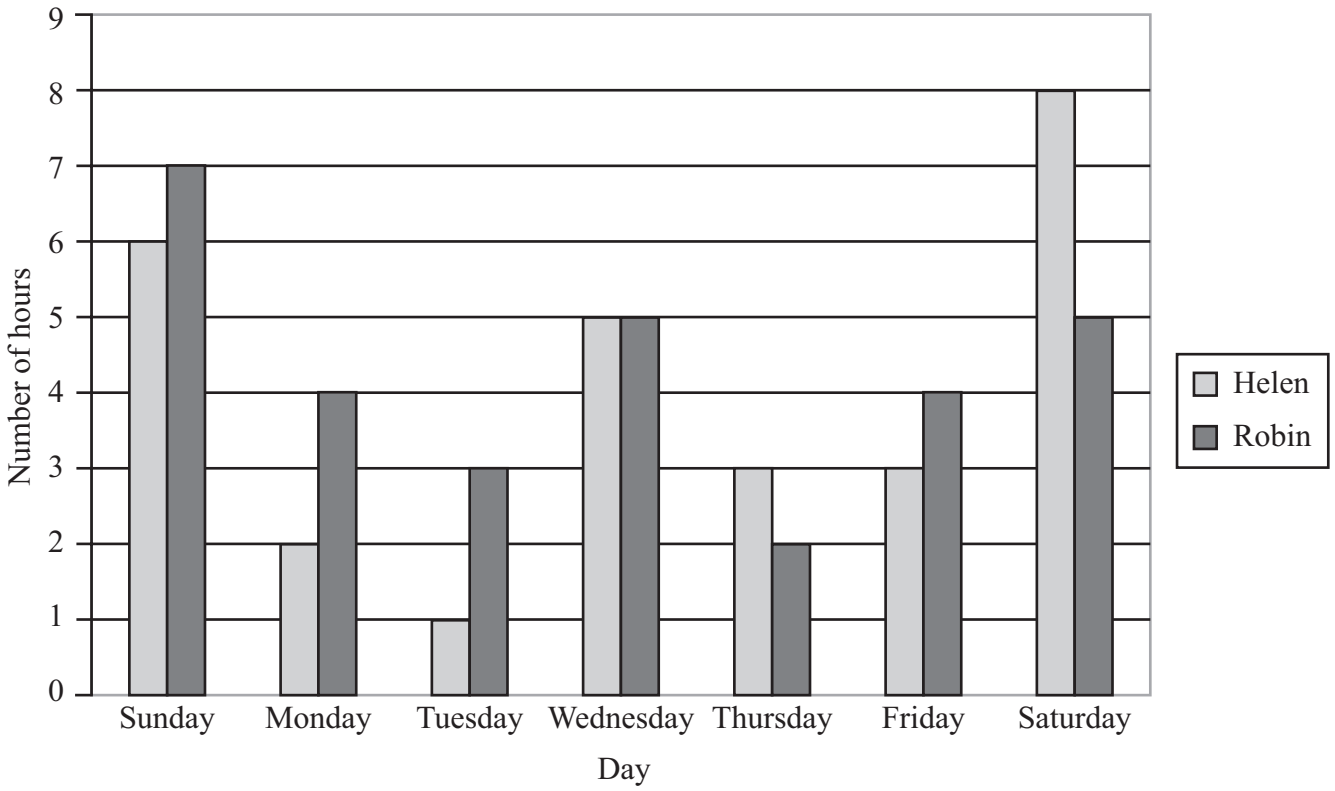
(b) Shade $\frac{2}{3}$ of this shape.

(1)



(Total for Question 3 = 3 marks)

4 Here is a dual bar chart showing the number of hours of TV that Helen and Robin watched each day last week.



(a) Write down the number of hours of TV that Helen watched on Monday.

(1)

..... hours

(b) How many more hours of TV did Robin watch than Helen watch last week?

(2)

.....

(c) Find the median of the number of hours Robin watched TV last week.

(2)

.....

(d) On Saturday and Sunday Helen watched 7 programmes altogether.

Work out the average length of the programmes that she watched.

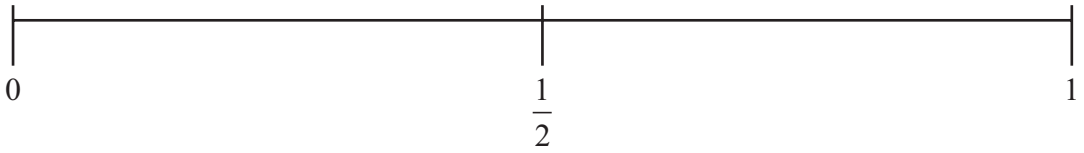
(2)

.....

(Total for Question 4 = 7 marks)

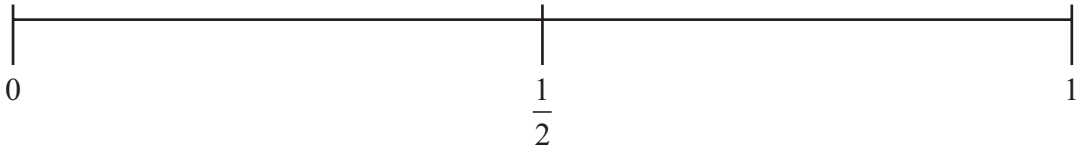
5 (a) On the probability scale below, mark with a cross (×) the probability that it will snow in London in June.

(1)



(b) On the probability scale below, mark with a cross (×) the probability that it will rain in Manchester next year.

(1)



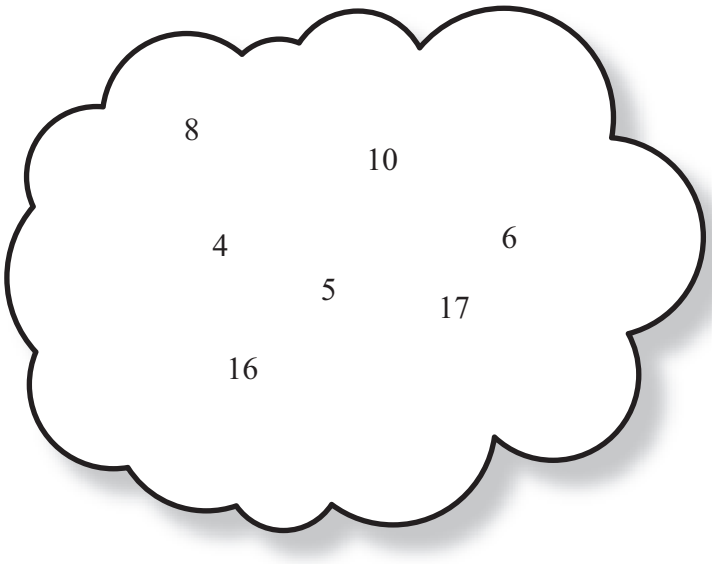
(c) What is the **probability** that you will get a head when you flip a fair coin?

(1)

.....

(Total for Question 5 = 3 marks)

6



Using only the numbers in the cloud, write down

(i) an odd number

.....

(ii) a multiple of 4

.....

(iii) two numbers which have a sum which is a prime number

.....

(iv) the value of 2^3

.....

(Total for Question 6 = 4 marks)

7 Here is a sketch of triangle *ABC*.

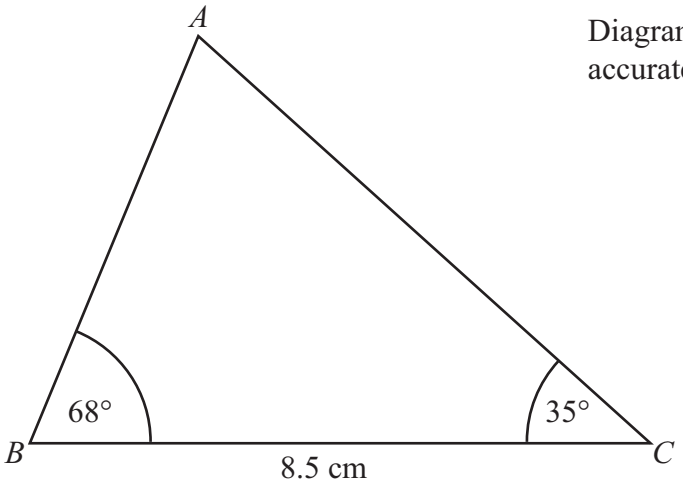


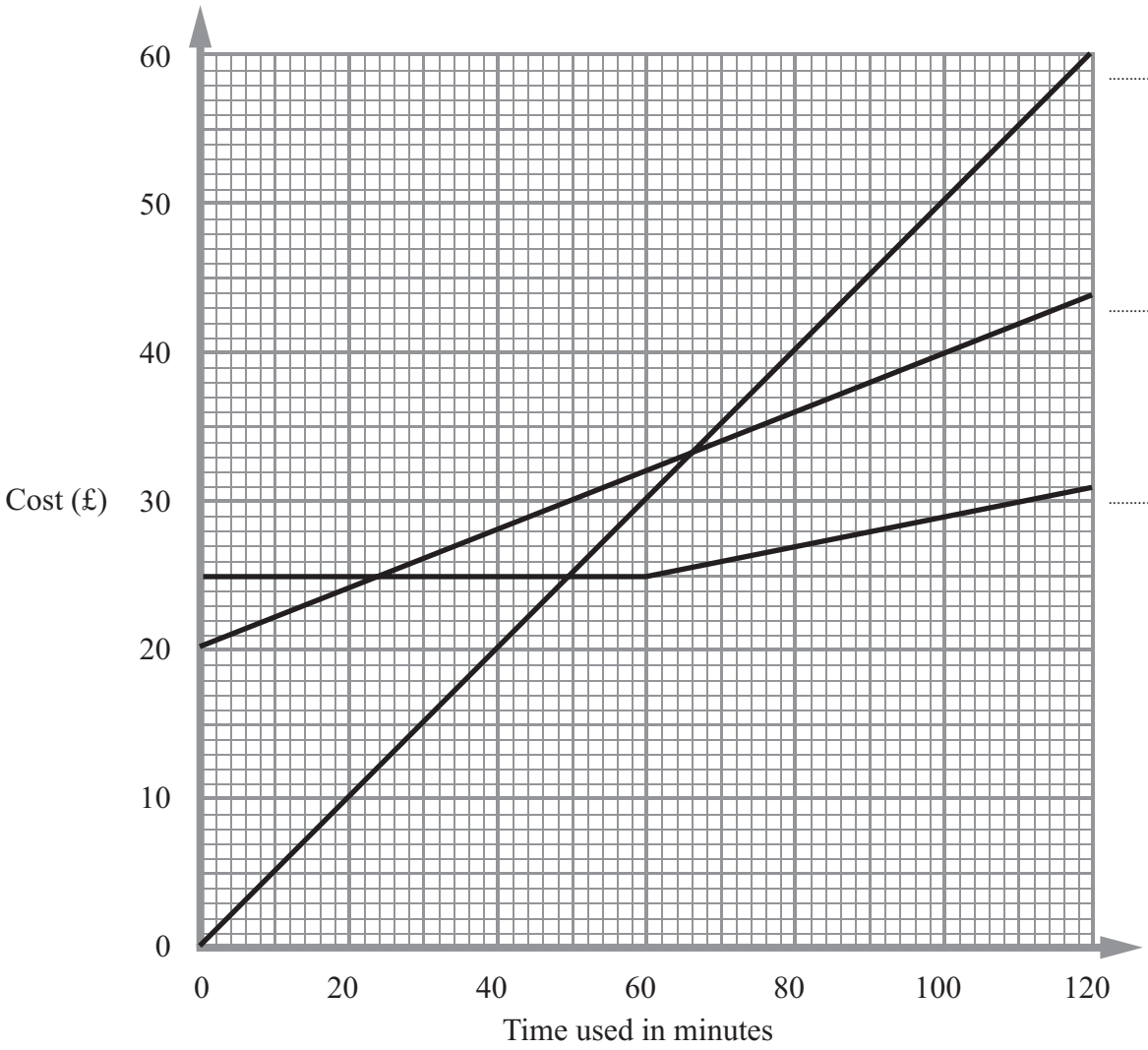
Diagram **NOT** accurately drawn

BC = 8.5 cm
Angle *B* = 68°
Angle *C* = 35°

Draw an accurate diagram of triangle *ABC* in the space below.

(Total for Question 7 = 3 marks)

8 The graph shows the cost of using a mobile phone for one month for three different tariffs.



The three tariffs are

Tariff A	Rental £20	every minute costs 20p
Tariff B	Pay as you go	every minute costs 50p
Tariff C	Rental £25	first 60 minutes free, then each minute costs 10p

(a) Label each line on the graph with the letter of the tariff it represents.

(1)

Jim uses tariff A for 100 minutes in one month.

(b) Find the total cost.

(1)

£ .....

Fiona uses her mobile phone for about 60 minutes each month.

(c) Explain which tariff would be the cheapest for her to use.
You **must** give the reasons for your answer.

(2)

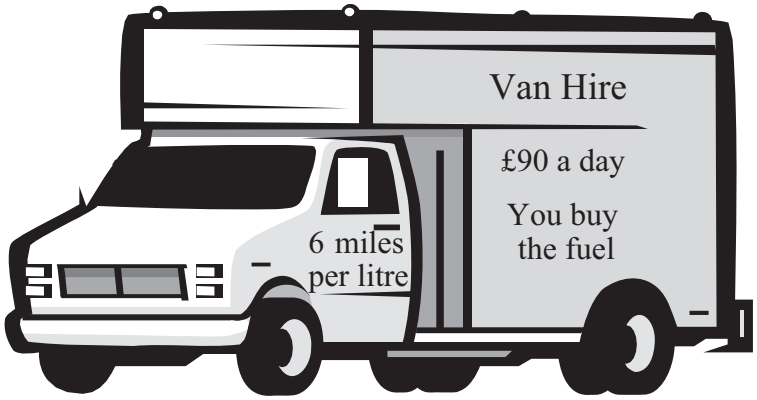
.....

.....

.....

(Total for Question 8 = 4 marks)

9 Jason hired a van.



Fuel

98.9p
per litre

The company charges £90 per day plus the cost of the fuel used.
The van can travel 6 miles for each litre of fuel used.
Fuel costs 98.9p for 1 litre.

On Monday Jason hired the van and drove from London to Cardiff.
On Tuesday Jason drove from Cardiff to Edinburgh.
On Wednesday, Jason drove from Edinburgh back to London and returned the van.

Jason thought the total cost would be about £400.

Jason uses this table for information about distances between cities.

London			
153	**Cardiff**		
212	245	**York**	
413	400	193	**Edinburgh**

Work out the total cost of hiring the van and the fuel used.

£ .....

(Total for Question 9 = 8 marks)

10 This formula is used to predict the adult height of a baby girl.

$$H = \frac{F + M - 12.5}{2}$$

H = adult height of girl (cm)
F = height of father (cm)
M = height of mother (cm)

Karen and Keith have a baby girl.

They are interested in finding out how tall their baby girl is likely to grow.

Karen has a height of 156 cm.
Keith has a height of 172 cm.

(a) Use the formula to predict the adult height of their baby girl.
Show clearly how you get your answer.

(2)

Height ..... cm

John and Jenny also have a baby girl.
John and Jenny are the same height.

When they use the formula to predict the adult height of their baby girl they get an answer of 162 cm.

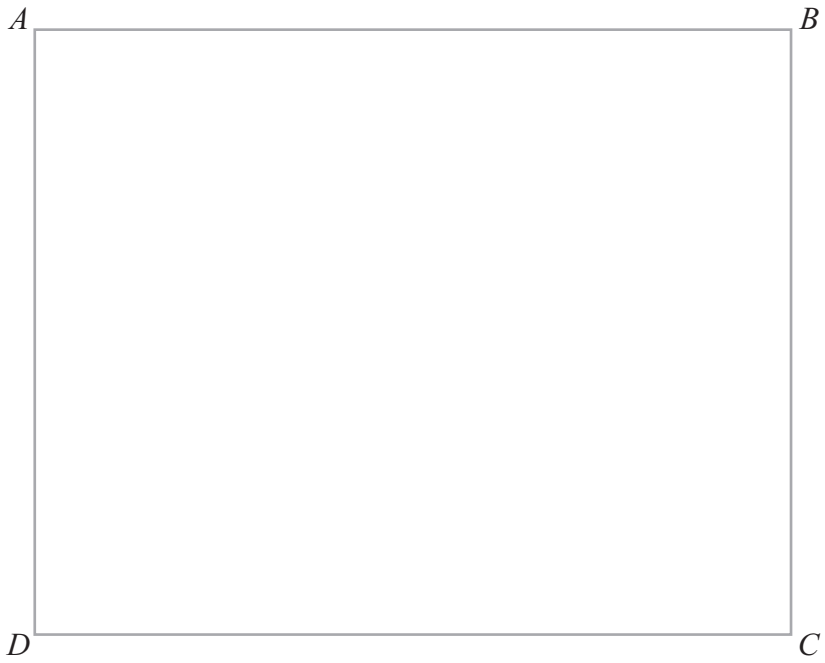
(b) Find an estimate of Jenny's height.
Give your answer to the nearest centimetre.

(3)

Height ..... cm

(Total for Question 10 = 5 marks)

11 Bill is planning the layout of a school playground.
For safety reasons he has to mark part of the playground where children cannot play games.
He makes a plan of the playground drawn to a scale of 1 cm to 1 m.



Scale 1 cm represents 1 m

For Health and Safety reasons, children cannot play games

within 4 m of the corner *D*
Or
within 3 m of the side *BC*.

(a) Complete the plan of the playground accurately to show where children cannot play games.

(4)

Children can play games on the rest of the playground.
There has to be at least 1 m^2 for each child.

*(b) Calculate the largest number of children that can play in the rest of the playground.

(6)

.....

(Total for Question 11 = 10 marks)

12

Item	Costs (£)
Motor oil 1*l*	2.50
Wiper blades 1	8.75
Brake Pads 1	14.85
Antifreeze 1*l*	3.99
Hydraulic Fluid 1*l*	5.99
Spark Plugs	1.75

Mr Smith had his car serviced.
He had to pay for a 15 000 mile service, 3 litres of oil and 4 spark plugs.
Complete his bill, and work out the total amount to pay.

Gary's Garage

Item	Number of items	Cost of one item	Total
15 000 mile Service (labour charge) Motor oil 1*l* Spark plugs	1	£75.50	£75.50
		Total	£ .....
		VAT at 17 $\frac{1}{2}$ % of Total	£ .....
		Total amount to pay	£ .....

(Total for Question 12 = 6 marks)

13

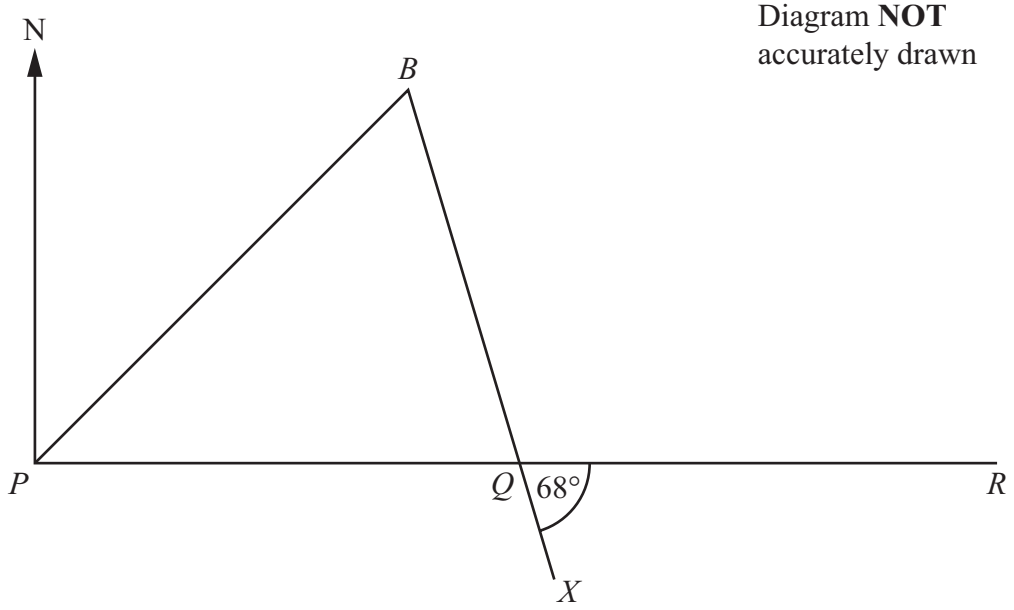


Diagram **NOT** accurately drawn

PQR is a straight line going East.
B is on a bearing, 052° from *P*.
B and *Q* are the same distance from *P*.

Find the bearing of *X* from *B*.
You must show your working out clearly.

.....°

(Total for Question 13 = 3 marks)

14 In the diagram all of the angles are in degrees.
Find the size of angle *CDE*.

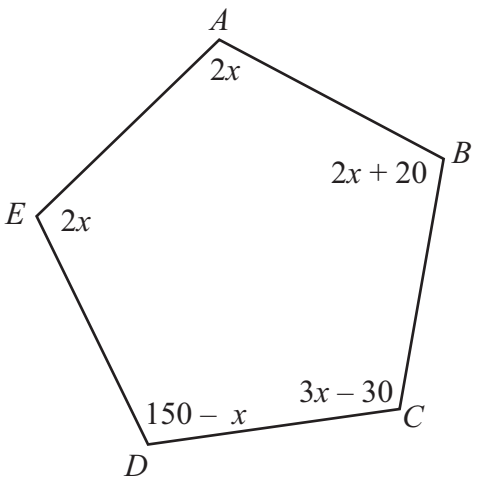
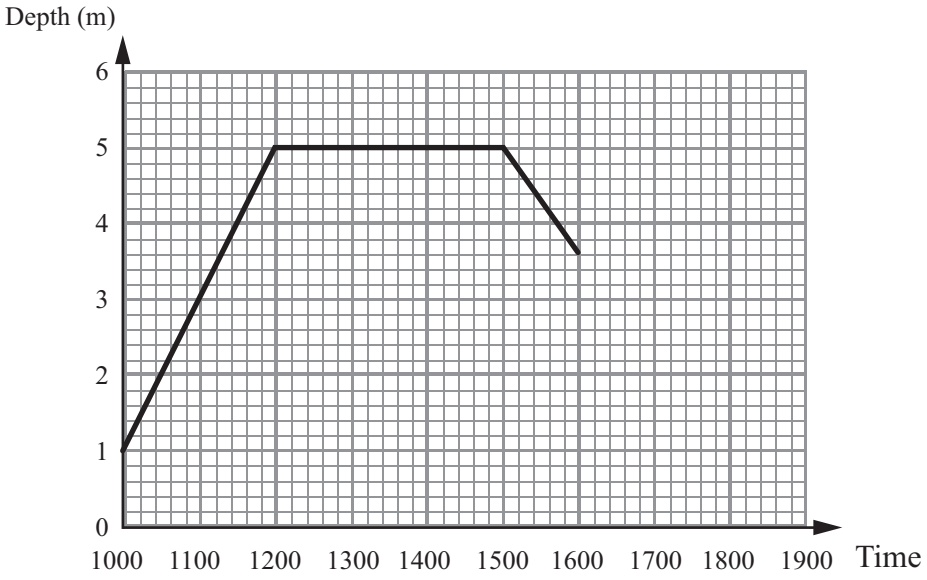


Diagram **NOT** accurately drawn

.....

(Total for Question 14 = 4 marks)

15 Rain water is collected in a tank.
The graph gives information about the depth of the water in the tank between 1000 and 1600.



(a) Write down the depth of water at 1300.

(1)

..... m

(b) Write down the time at which the depth was 2 metres.

(1)

.....

After 1600, the water is used for irrigating a field.
The depth of water continues to fall at the same rate as it fell between 1500 and 1600.

(c) Find the time at which the depth of the water is zero.

(1)

.....

(Total for Question 15 = 3 marks)

16 Use your calculator to work out $\dfrac{\sqrt{13.2-6.8}}{3.25+4.9}$

Give your answer as a decimal.
Write down all the figures on your calculator display.

.....

(Total for Question 16 = 2 marks)

17 The equation $x^3 - 5x = 60$ has a solution between 4 and 5

Find this solution and give your answer correct to 1 decimal place.
You must show **all** your working.

$x =$ .....

(Total for Question 17 = 4 marks)

***18** Alan and Bhavana are planning their fitness program.
They plan to run on parts of a field.
The diagram below shows a rectangular field 80 metres by 60 metres.

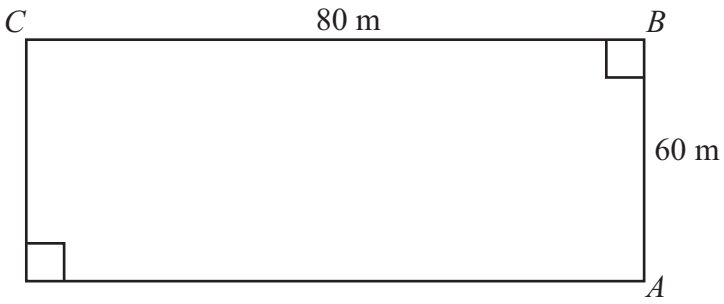


Diagram **NOT** accurately drawn

Alan runs **around** the field from *A* to *C* (via *B*) at 5m/s.

Bhavana runs directly across the diagonal of the field from *A* to *C* at 3m/s.

If they both started at the same time, who would reach point *C* first?

You must explain your answer.

.....

.....

(Total for Question 18 = 6 marks)

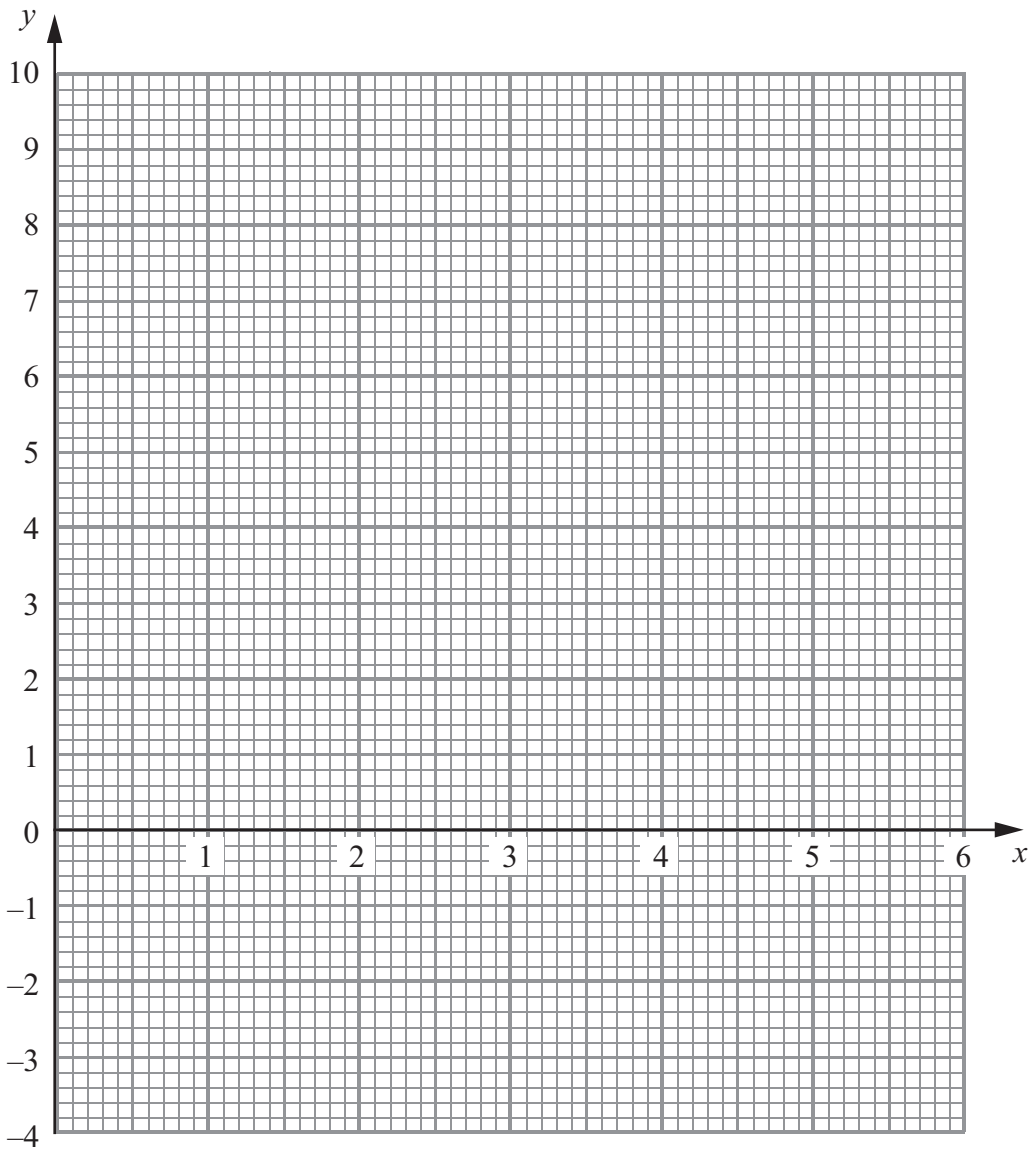
19 (a) Complete the table of values for y = $x(x - 3)$ for values of x from 0 to 5

(1)

x	0	1	2	3	4	5
y	0	−2		0	4	

(b) On the grid draw the graph of $y = x^2 - 3x$

(2)



The length of a rectangle is 3m less than the width. The area of the rectangle is 7 m^2

(c) Find an estimate for the width of the rectangle.

(2)

..... m

(Total for Question 19 = 5 marks)

20 Harry and Sally want to keep free range hens.

They have a rectangular piece of land that they intend to use for a chicken run.

The length of the land is 30 m and the width is 10 m.

Harry and Sally will need to put a fence, with a gate, around the chicken run.

They are advised that the least area a free range hen needs is 0.8 m^2.

They want to have as many hens as they can.

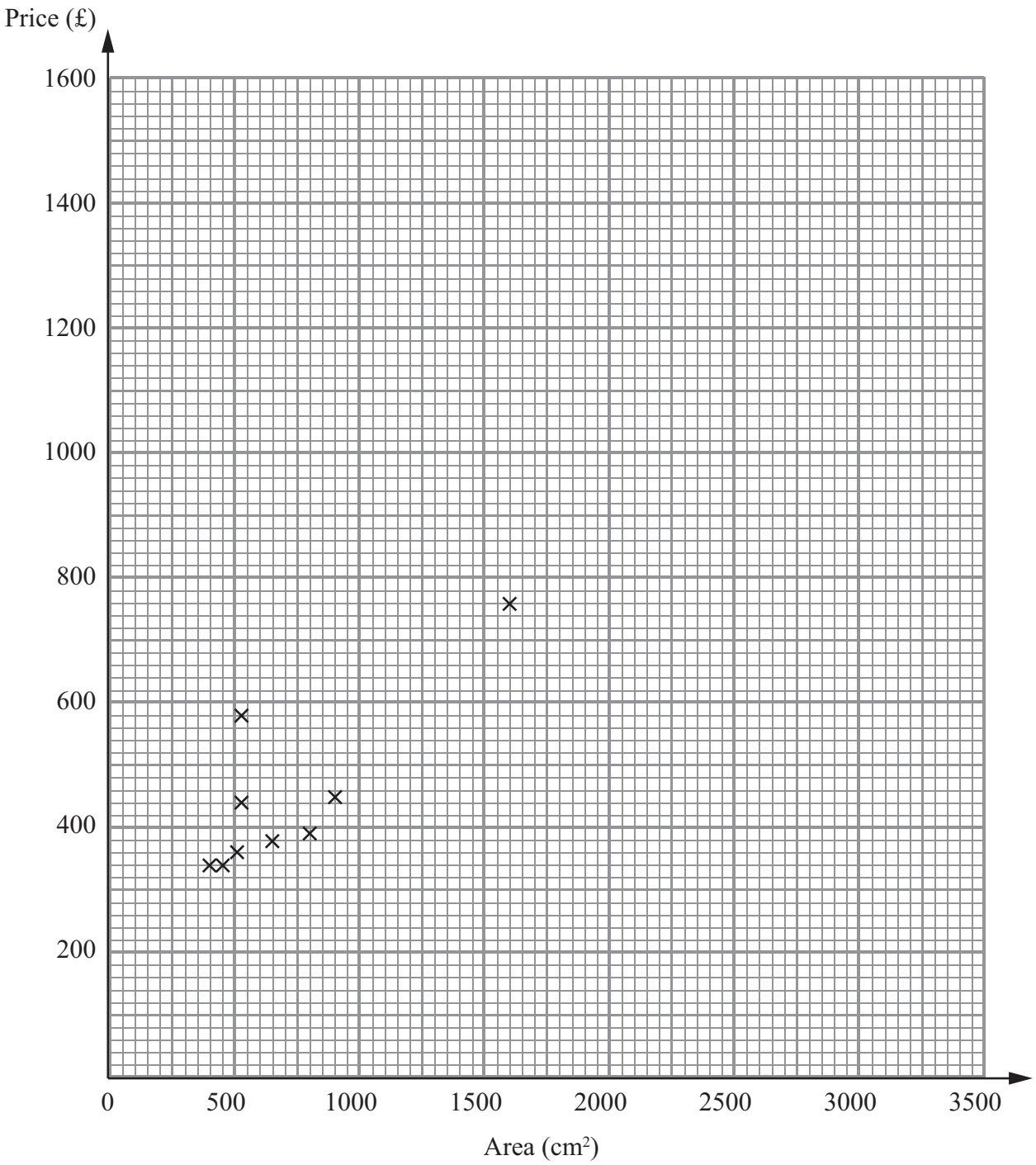
Hens cost £7.50 each.
Putting in the fence and gate will cost £9.85 per metre.

Work out the total cost of buying the hens and fencing the land.

£ .....

(Total for Question 20 = 9 marks)

21 Pablo is an artist. He wants to find estimates for the prices of some of the new pictures he has painted. The scatter graph, below, gives information about the area and the price of some of his old pictures.



The table shows the area and the price of another three of his old pictures.

Area (cm^2)	2000	2900	3260
Price (£)	1150	1250	1500

(a) Find an estimate of the price of a new picture with an area of 2500 cm^2.

(3)

£ .....

All Pablo's pictures are rectangles.
One of his pictures has a price of £1000
Its length is 48 cm.

(b) Find an estimate for the width of the picture.

(2)

..... cm

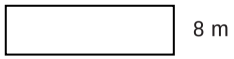
(Total for Question 21 = 5 marks)

TOTAL FOR PAPER = 100 MARKS

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.		1.60 + 2.05 = 3.65	15p	2	B1 £3.65 oe B1 15p
					Total for Question: 2 marks
2.	(a)(i)		60	2	B1 60 cao
	(ii)		50		B1 50 cao
	(b)		2 full packets 1.5 full packets	2	B1 2 full packets cao B1 1.5 full packets
					Total for Question: 4 marks
3.	(a)		$\frac{3}{4}$	2	B2 $\frac{3}{4}$ cao (B1 $\frac{18}{24}$, $\frac{12}{16}$, $\frac{9}{12}$, $\frac{6}{8}$)
	(b)		Any 16 squares shaded	1	B1 Any 16 squares shaded
					Total for Question: 3 marks

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
4.	(a)		2	1	B1 cao
	(b)	7 + 4 + 3 + 5 + 2 + 4 + 5 = 30 6 + 2 + 1 + 5 + 3 + 3 + 8 = 28 **OR** 1 + 2 + 2 + 0 – 1 + 1 – 3 = 2	2 hours	2	M1 finds the totals of Robin and Helen. A1 cao **OR** M1 find the differences of Robin and Helen A1 cao
	(c)	2 3 4 4 5 5 7	4 hours	2	M1 orders the values A1 cao
	(d)	(6 + 8)÷ 7	2	2	M1 attempts to find mean A1 2 cao
					Total for Question: 7 marks
5.	(a)		Correct plot	1	B1 Cross placed within 0.5 cm to right of 0 inclusive
	(b)		Correct plot	1	B1 Cross placed within 0.5 cm to left of 1 inclusive
	(c)		$\frac{1}{2}$	1	B1 0.5 oe
					Total for Question: 3 marks

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
6.	(i)		5 or 17	1	B1 5 or 17 or both
	(ii)		4, 8, or 16	1	B1 for one, two or three of 4, 8 or 16
	(iii)		5 and 6	1	B1 5 and 6 oe
	(iv)		8	1	B1 cao
					Total for Question: 4 marks
7.		8.5 cm line drawn angles at B and C drawn	Correct Construction of triangle	3	B1 8.5 cm line drawn tolerance ± 0.2cm B1 angles at B and C drawn tolerance ± 2° B1 fully correct within tolerance
					Total for Question: 3 marks
8.	(a)		B, A, C	1	B1 cao
	(b)		£40	1	B1 cao
	(c)		C + reason	2	C2 correct + comparison with the two other tariffs (C1 correct + comparison with one other tariff or line drawn at 60 up from the time axis to intersect at least one line)
					Total for Question: 4 marks
9.		153 + 400 + 413 = 966 Number of litres used = 966 ÷ 6 = 161 Cost of fuel 161 × 98.9p = £159.23 Day cost = 3 × 90 = 270 Total = £159.23 + £270	429.23	8	B1 any one correct distance identified M1 153 + 400 + 413 A1 966 M1 '966' ÷6 M1 '161' × 98.9 M1 3 × 90 M1 '159.23' + '270' A1 cao
					Total for Question: 8 marks

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
10.	(a)	$\frac{156+174-12.5}{2}$	157.75	2	M1 substitute correctly A1 157.75 or 158
	(b)	$\frac{j+j-12.5}{2}=162$ $2j-12.5=324$ $\frac{324+12.5}{2}$	168	3	M1 $\frac{j+j-12.5}{2}=162$ M1 correct method to isolate j A1 168 or better
					Total for Question: 5 marks
11.	(a)	complete diagram at end  		4	M1 quarter circle centre *D* radius 4 cm A1 clear indication of region by shading in or shading out M1 straight line parallel to *BC* 3 cm away A1 clear indication of the region by shading in or shading out.
	(b) **QWC** **i, ii**	Area = $\frac{\pi \times 4^2}{4}$ =12.56637... Area = 3 × 8 = 24	43	6	M1 $\pi \times 4^2$ M1 3 × 8 A1 sight of either correct area A1 36.56637... M1 8 × 10 – '36.56637..' = 43.4336... C1 43 **QWC: Decision should be stated, following on from working out**
					Total for Question: 10 marks
12. **FE**		3 × 2.5 = 7.50 4 × 1.75 = 7 75.50 + 7.50 + 7 = 90 9 + 4.5 + 2.25 = 15.75	105.75	6	B1 3 and 7.50 B1 4 and 7 B1 90 ft M1 9 + 4.5 + 2.25 seen A1 15.75 A1 cao
					Total for Question: 6 marks
13.			154°	3	B1 for 38° B1 for 64° B1 cao
					Total for Question: 3 marks

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14.		$2x + 2x + 40 + 3x - 30 + 150 - x + 2x = 540$ $8x + 140 = 540$ $x = 50$	100°	4	M1 $2x + 2x + 40 + 3x - 30 + 150 - x + 2x$ M1 collects terms correctly A1 $x = 50$ A1 cao
					Total for Question: 4 marks
15.	(a)		5 m	1	B1 cao
	(b)		10:30	1	B1 10:25 – 10:35
	(c)		18:10 – 18:30	1	B1 18:10 – 18:30
					Total for Question: 3 marks
16.		$\frac{\sqrt{6.4}}{8.15}$	0.31040762 ...	2	M1 correct order of evaluation as evidenced by sight of 6.4 or 8.15 A1 0.31040(762....)
					Total for Question:2 marks

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
17.		$f(x) = x^3 - 5x$ x | $x^3 - 5x$ 4.00 | 44.00 4.10 | 48.42 4.20 | 53.09 4.30 | 58.01 4.40 | 63.18 68.62 or 4.50 | 68.63 4.60 | 74.34 4.70 | 80.32 4.80 | 86.59 4.90 | 93.15 5.00 | 100.00 4.35 | 60.56	4.3	4	B2 for trial between 4.3 and 4.4 inclusive (B1 for trial between 4 and 5 inclusive) B1 for different trial between 4.33 and 4.37 inclusive B1 (dep on at least one previous B1) for 4.3 only NB trials where x has 1 d.p should be rounded or truncated to at least 2 SF; trials where x has 2 d.p. or more should be rounded or truncated to at least 3 SF
					Total for Question: 4 marks
18. **QWC ii**		Alan 60 + 80 = 140 140 ÷ 5 = 28 Bhavana $60^2 + 80^2 = 10000$ $\sqrt{10000} = 100$ 100 ÷ 3=33.33333….	Alan, with statement supporting explanation	6	B1 Alan runs 140 M1 '140'÷ 5 M1 $60^2 + 80^2$ A1 100 A1 28 or 33.33333… seen C1 Alan stated with comparison of times and times attributed to correct person **QWC: Decision stated with statement supporting explanation**
					Total for Question: 6 marks

<table>
<tr><th colspan="6">1MA0/2F</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Additional Guidance</th></tr>
<tr><td>19.</td><td>(a)</td><td>0, –2, –2, 0, 4, 10</td><td>–2, 10</td><td>1</td><td>B1, B1 for each cao</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Smooth curve</td><td>2</td><td>B1 correct plot of their values
B1 smooth curve through their points providing at least 1 mark earned in (a)</td></tr>
<tr><td></td><td>(c)</td><td>Draws $y = 7$

OR

T&I

<table><tr><th>Width</th><th>Area</th></tr><tr><td>4</td><td>4</td></tr><tr><td>4.1</td><td>4.51</td></tr><tr><td>4.2</td><td>5.04</td></tr><tr><td>4.3</td><td>5.59</td></tr><tr><td>4.4</td><td>6.16</td></tr><tr><td>4.5</td><td>6.75</td></tr><tr><td>4.6</td><td>7.36</td></tr><tr><td>4.7</td><td>7.99</td></tr><tr><td>4.8</td><td>8.64</td></tr><tr><td>4.9</td><td>9.31</td></tr><tr><td>5</td><td>10</td></tr><tr><td>4.55</td><td>7.0525</td></tr></table></td><td>4.5</td><td>2</td><td>M1 draw $y = 7$
A1 4.5 — 4.6 ft from graph
OR

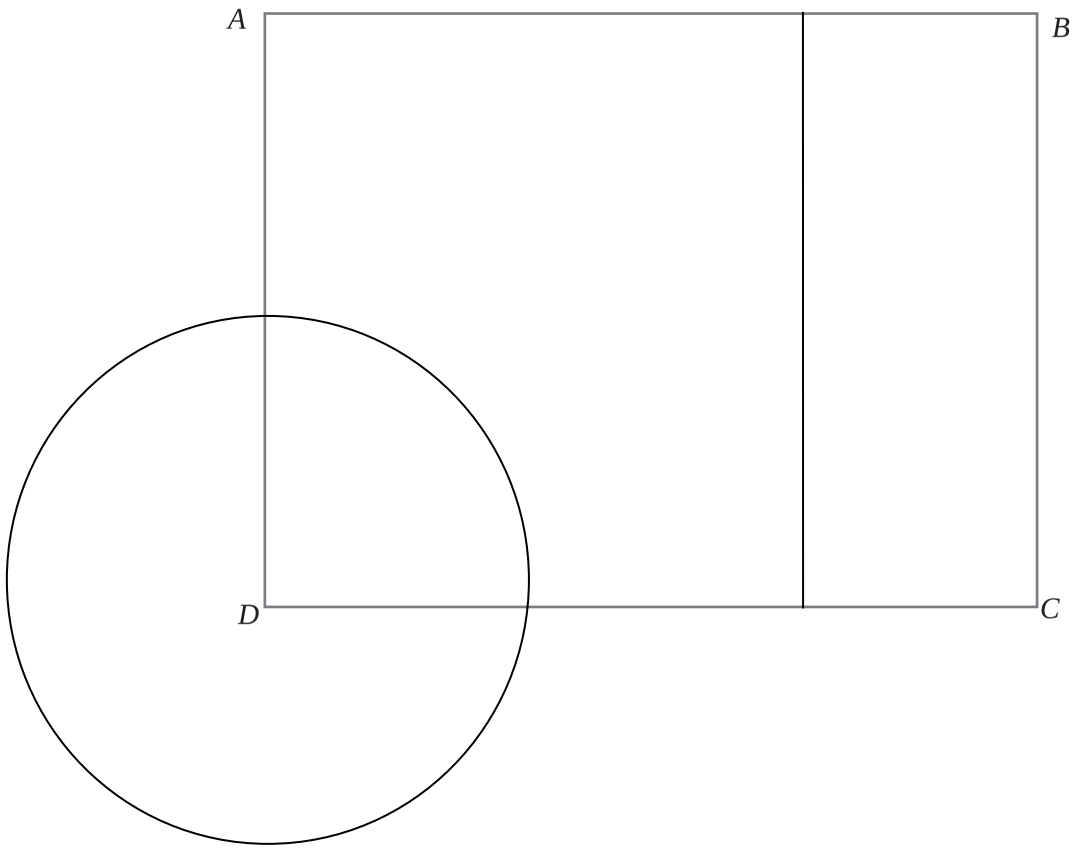
Uses T&I

B2 4.5 with $x^2 - 3x$ evaluated correctly at 4.5 and 4.6
(B1 Locates ‘root’ between 4 and 5 at least 2 evaluations or refers to table)</td></tr>
<tr><td colspan="6">Total for Question: 5 marks</td></tr>
</table>

1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
20. **FE**		Area of land = 30 × 10 = 300 m^2 Perimeter of land = 30 + 30 + 10 + 10 = 80 m No. of hens = 300 ÷ 0.8 = 375 Cost of hens = 375 × 7.5 = £2812.50 Cost of fencing = 80 × 9.85 = £788 Total cost = £2812.50 + £788 = £3600.50	£3600.50	9	M1 for area of land 30 × 10 = 300m^2 M1 for perimeter of land = 30 + 30 + 10 + 10 = 80m M1 for "300" ÷ 0.8 A1 (ft) for 375 hens M1 for "375" × 7.5 A1 (ft) for £2812.50 M1 for "80" × 9.85 A1 (ft) for £788 A1 cao for total cost
					Total for Question: 9 marks

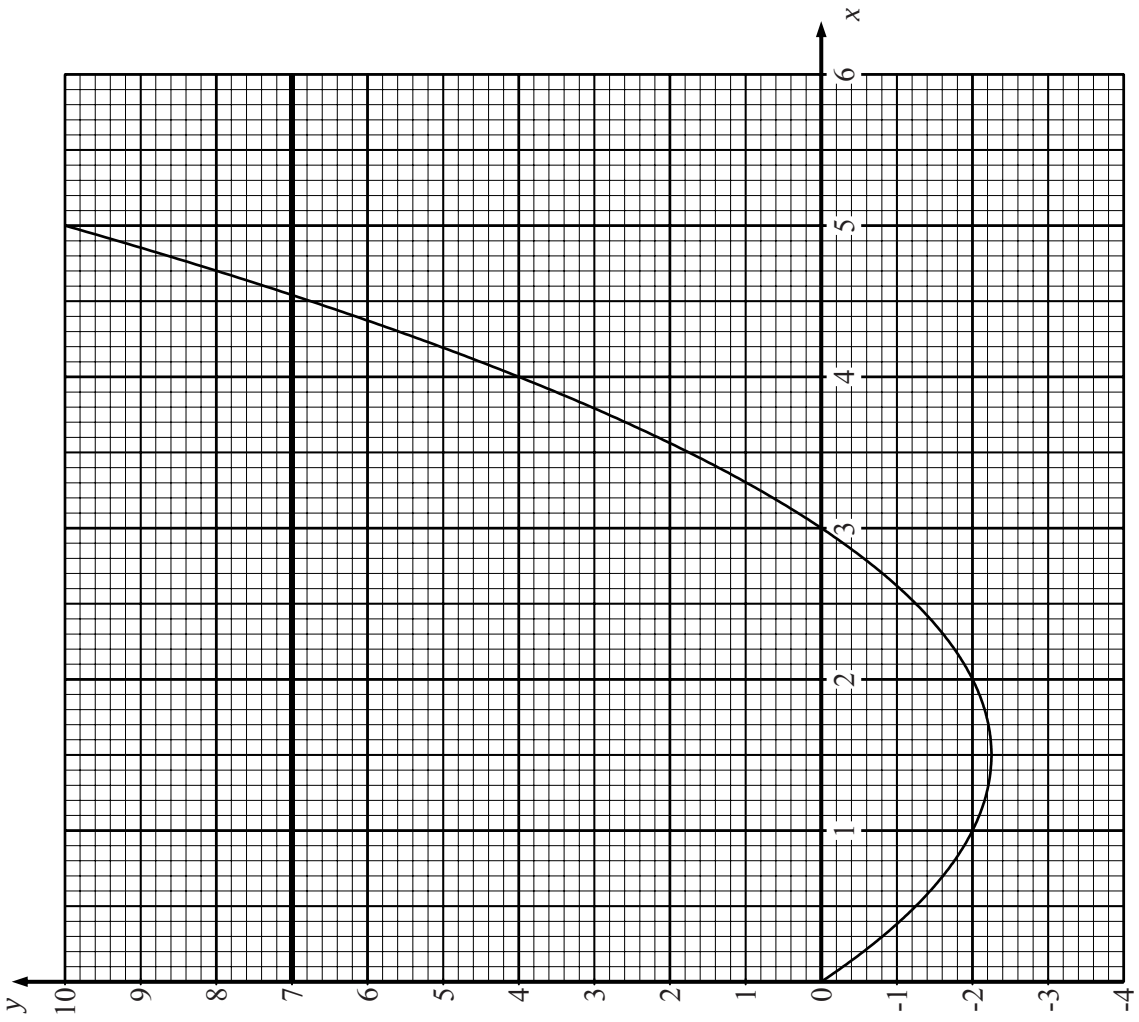
1MA0/2F					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
21. **FE**	(a)	Plots further data Draws line of best fit Reads off value from 2500	£ 1100— 1200	3	M1 plots further figures M1 draws line of best fit A1 1100 — 1200
	(b)	Draws $y = 1000$ '2000' ÷ 48	42	2	M1 draws $y = 1000$ and divides by 48 A1 40 — 44
					Total for Question: 5 marks

11.

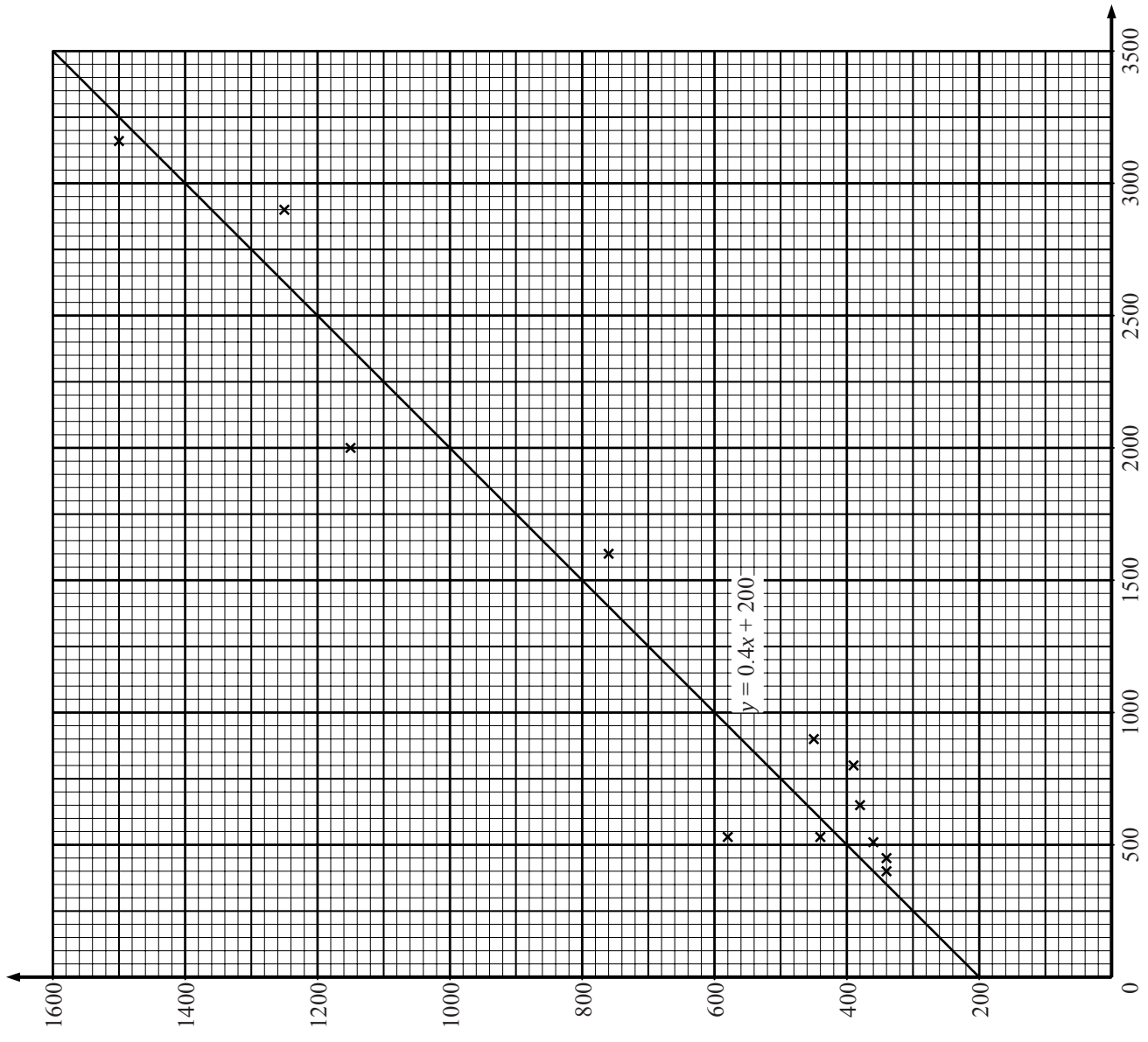


Scale 1 cm represents 1 m

19



21.



Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Mathematics A

Paper 2 (Calculator)

Higher Tier

Sample Assessment Material
Time: 1 hour 45 minutes

Paper Reference
1MA0/2H

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 ▶

S37713A

2/2/2/2/3/2

S 3 7 7 1 3 A 0 1 2 5

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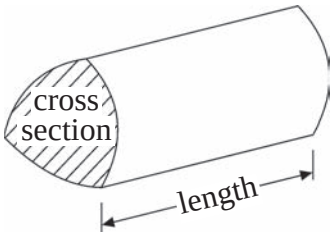
GCSE Mathamatics 1MA0

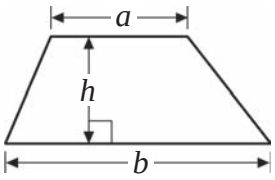
Formulae – Higher Tier

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

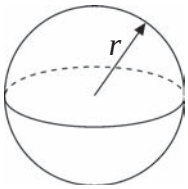


Area of trapezium = $\frac{1}{2}(a+b)h$



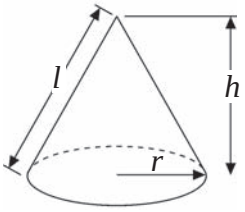
Volume of sphere = $\frac{4}{3}\pi r^3$

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

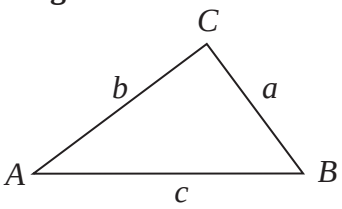


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Peter won £75 as a prize.

He gave $\frac{4}{5}$ of the prize money as a present to Roger and Bethan.

Roger and Bethan shared the present in the ratio 2:3

Work out how much they each got.

Roger .....

Bethan .....

(Total for Question 1 = 4 marks)

2 The equation $x^3 - 5x = 60$ has a solution between 4 and 5

Find this solution and give your answer correct to 1 decimal place.
You must show **all** your working.

$x =$ .....

(Total for Question 2 = 4 marks)

3

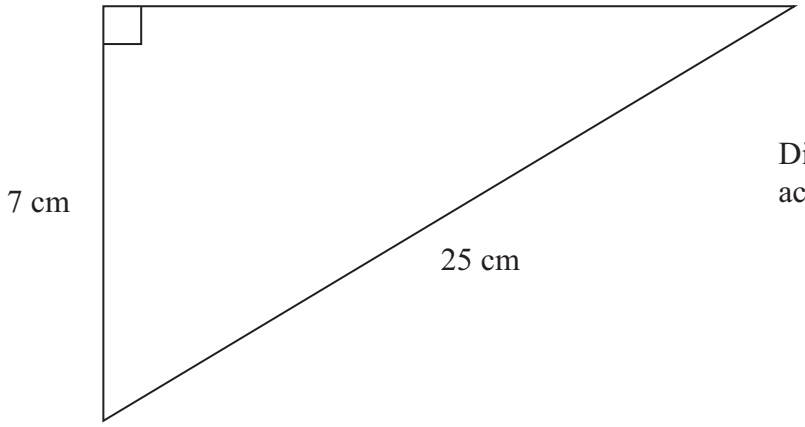


Diagram **NOT** accurately drawn

Calculate the area of this right-angled triangle.

.....

(Total for Question 3 = 4 marks)

4 Imran wants to work out how much tax he needs to pay.

Last year he earned £18 000

He does not pay Income tax on the first £6475 he earned.
He pays tax of 20 pence for each pound he earned above £6475

He pays the tax in two equal half-yearly instalments.

***(a)** How much Income tax does Imran have to pay in his first half-yearly instalment?

(4)

.....

Imran wants to know what percentage of his earnings he pays in tax.

(b) Calculate the Income tax Imran has to pay as a percentage of his earnings last year.

(2)

..... %

(Total for Question 4 = 6 marks)

5 Here is some information about the time, in minutes, it took the 21 teachers at a school to get to work on Monday.

13	18	20	35	45	34	44
23	33	12	46	21	22	17
22	31	23	8	15	22	10

(a) Draw an ordered stem and leaf diagram to show this information.

(3)

Roadworks near the school meant that the time to travel to school by every teacher on Tuesday was increased by 5 minutes.

(b) What was the median of the times on Tuesday?

(2)

..... minutes

(c) State whether the interquartile range of the times on Tuesday would be less, greater or the same as the interquartile range of the times on Monday.
Give a reason for your answer.

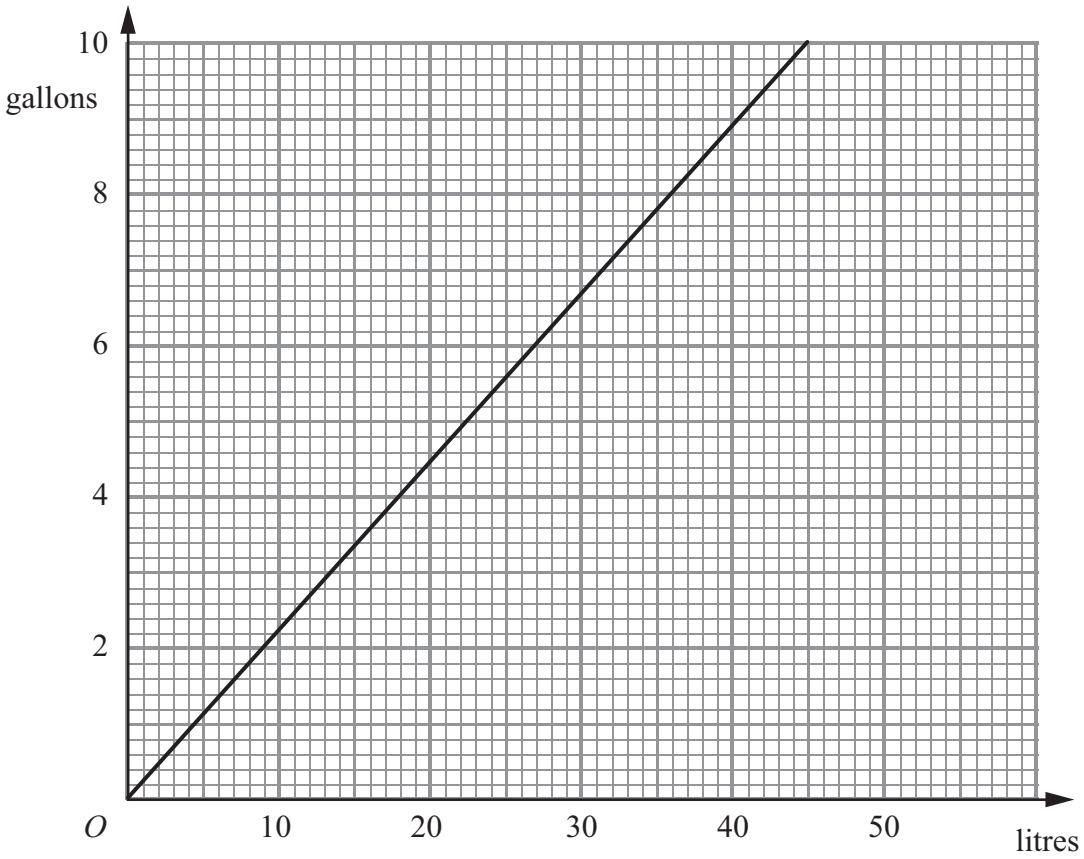
(1)

.....

.....

(Total for Question 5 = 6 marks)

6 The graph can be used to convert between gallons and litres.



The diagram shows a central heating oil tank.

The oil tank is in the shape of a cylinder of length 180 cm and radius 60 cm.

The oil tank contains 200 gallons of oil.

*(a) Is the oil tank more or less than $\frac{1}{2}$ full?

(5)

The oil has a density of 0.85 g/cm³.

(b) Work out, in kg, the mass of the oil in the tank.

(3)

..... kg

(Total for Question 6 = 8 marks)

7 The table shows information about the number of hours that 120 children used a computer last week.

Number of hours	Frequency
$0 < h \leqslant 2$	10
$2 < h \leqslant 4$	15
$4 < h \leqslant 6$	30
$6 < h \leqslant 8$	35
$8 < h \leqslant 10$	25
$10 < h \leqslant 12$	5

Work out an estimate for the mean number of hours that the children used a computer.
Give your answer to 2 decimal places.

(4)

..... cm

(Total for Question 7 = 4 marks)

8 Fred and Jim pay Malcolm to do some gardening.

Fred has £x
Jim has ten pounds less than Fred.

Fred pays one third of his money to Malcolm.

Jim pays half of his money to Malcolm.

(a) Show that the amount that Malcolm is paid is $\frac{x}{3}+\frac{x-10}{2}$.

(1)

Malcolm is paid a total of £170

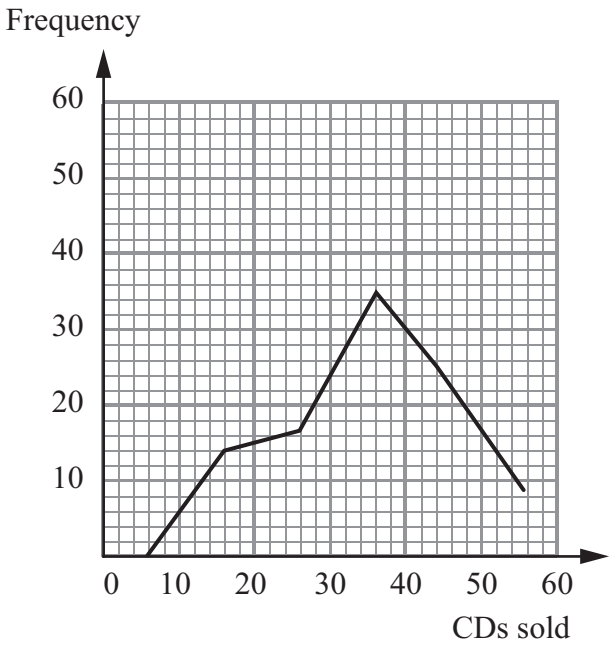
(b) Use algebra to show how much money Fred has left.

(4)

.....

(Total for Question 8 = 5 marks)

***9** Kevin and Joe each manage a shop that sells CDs. Kevin's shop is in the High Street and Joe's is in the Retail Park.
They want to compare the sales of CDs in each of their shops for the first 100 days of the year.



Kevin's information about the number of CDs sold each day in the High Street shop is shown on the grid. Each class interval is 10 CDs wide.

Joe's information about the number of CDs sold each day in the Retail Park shop is shown in the table.

Number of CDs sold each day	**Frequency**
0 – 10	10
11 – 20	34
21 – 30	24
31 – 40	13
41 – 50	7
51 – 60	12

Compare the sales of CDs in the two shops.

(Total for Question 9 = 4 marks)

10 (a) Simplify fully

$(x^3)^{\frac{1}{2}} \times (x^2)^{\frac{1}{4}}$

(3)

.....

(b) Solve

$(x - 1)(x + 2) = 18$

(4)

.....

(c) Solve the simultaneous equations

$y = x^2 - 1$

$y = 5 - x$

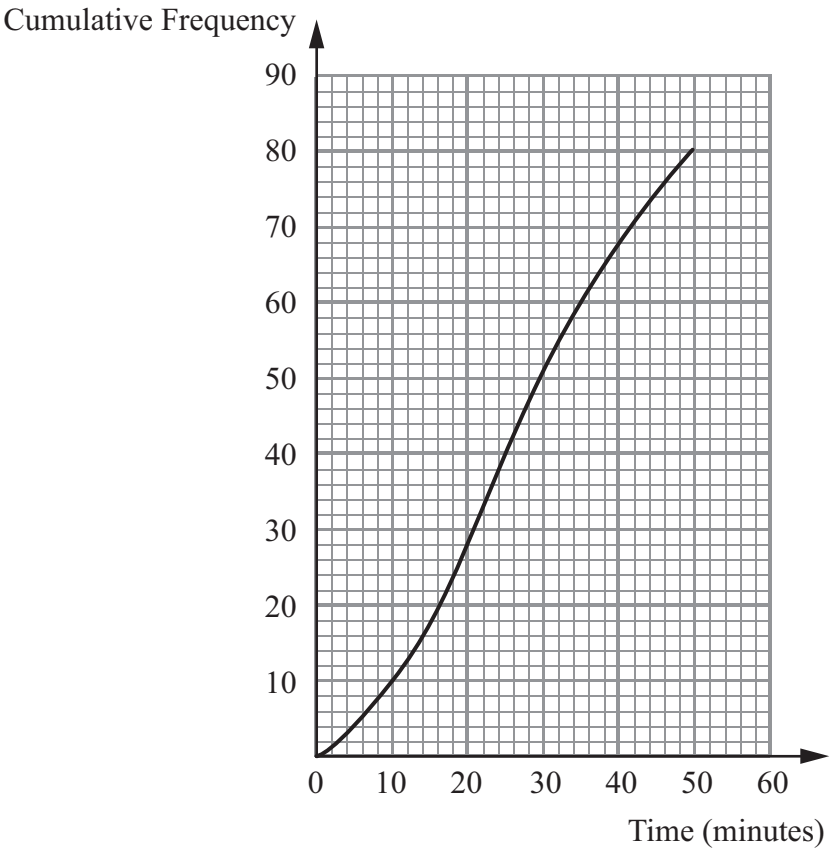
(5)

.....

.....

(Total for Question 10 = 12 marks)

11 The cumulative frequency diagram gives information about the time, in minutes, 80 people were kept waiting at a hospital casualty department.



(a) Write down the number of people who waited for 20 minutes or less.

(1)

.....

(b) Work out an estimate of the number of people who waited for between 26 minutes and 40 minutes.

(2)

.....

The hospital has a target that no more than 15% of people are kept waiting for 40 minutes or more in the casualty department each day.

(c) Has the hospital achieved its target for the day?
You must explain your answer.

(2)

.....

.....

(Total for Question 11 = 5 marks)

***12**

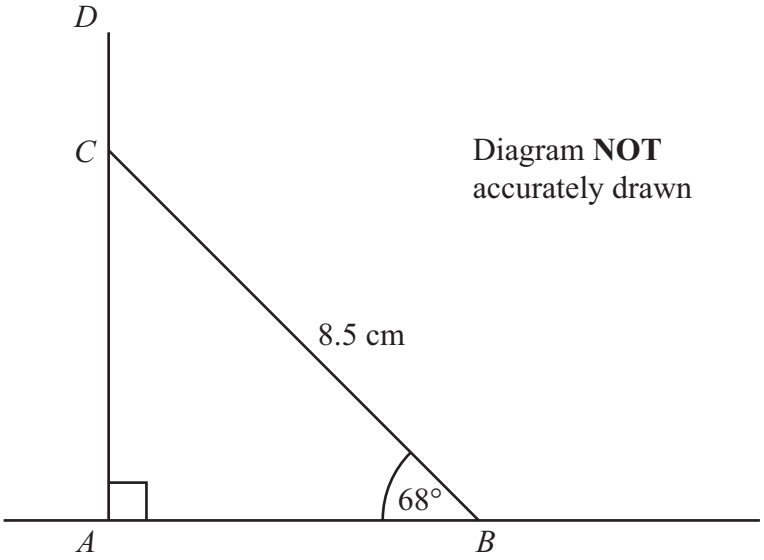


Diagram **NOT** accurately drawn

The diagram represents a vertical pole *ACD*.
AB is horizontal ground.
BC is a wire of length 8.5 metres.

The height of the pole *AD* is 9 metres.

For the pole to be correctly installed, the length *DC* has to be at least 1 metre.

Show that the pole has been correctly installed.

.....

(Total for Question 12 = 4 marks)

13 The time, T seconds, for a hot sphere to cool is proportional to the square root of the surface area, A m^2, of the sphere.

When $A = 100$, $T = 40$.

Find the value of T when $A = 60$.

Give your answer correct to 3 significant figures.

..... seconds

(Total for Question 13 = 4 marks)

14 The line $y = 2x + 3$ meets the line $y = 4x + 2$ at the point P.

Find an equation of the line which is perpendicular to the line $y = 2x + 3$ and which passes through the point P.

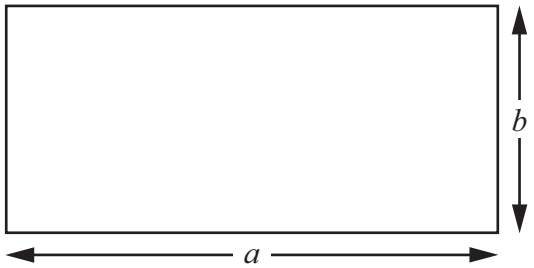
(5)

.....

(Total for Question 14 = 5 marks)

15 Here is a rectangle.

Diagram **NOT** accurately drawn



a = 8.3 cm correct to 1 decimal place.
b = 3.6 cm correct to 1 decimal place.

(a) Calculate the upper bound of the area of this rectangle.
Write down all the figures on your calculator.

(2)

..... cm^2

(b) Find the area of this rectangle correct to an appropriate number of significant figures.

(2)

..... cm^2

(Total for Question 15 = 4 marks)

16

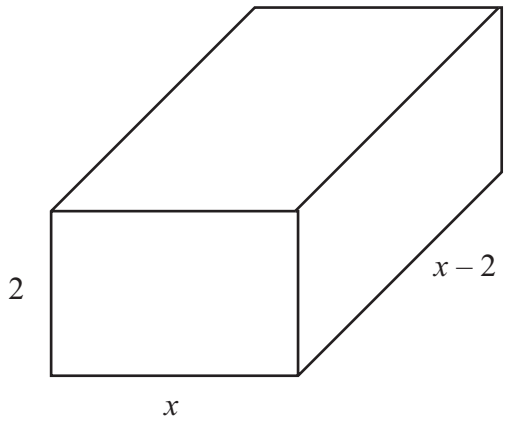


Diagram **NOT** accurately drawn

The diagram shows a cuboid.
All the measurements are in cm.

The volume of the cuboid is 51 cm^3.

(a) Show that $2x^2 - 4x - 51 = 0$ for $x > 2$

(4)

(b) Solve the quadratic equation

$$2x^2 - 4x - 51 = 0$$

Give your solutions correct to 3 significant figures.
You must show your working.

(3)

.....

.....

(Total for Question 16 = 7 marks)

17

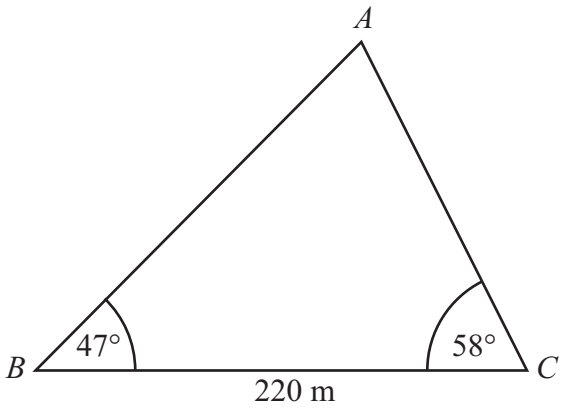


Diagram **NOT** accurately drawn

Angle *ABC* = 47°
Angle *ACB* = 58°
BC = 220 m

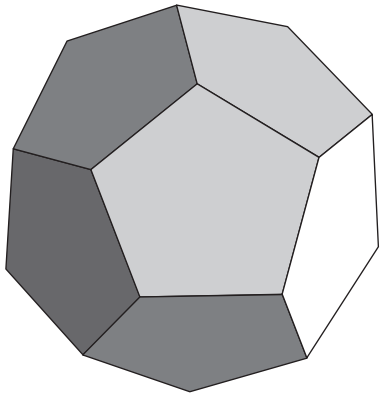
Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

.....

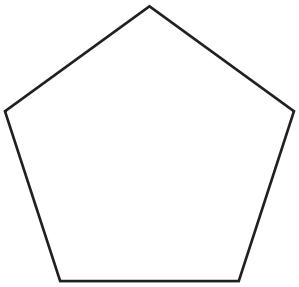
(Total for Question 17 = 5 marks)

18 Here is a regular dodecahedron.

A dodecahedron is a solid with 12 faces.



Each face is a regular pentagon.



Calculate the total surface area of a regular dodecahedron with edges of length 10 cm.

(Total for Question 18 = 9 marks)

TOTAL FOR PAPER = 100 MARKS

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
1.		$\frac{4}{5} \times 75 = 60$ 60 ÷ 5 = 12 3 × 12 = 36 2 × 12 = 24	Roger 24 Bethan 36	4	M1 $\frac{4}{5} \times 75$ M1 '60' ÷ (3+2) A1 Roger 24 A1 Bethan 36 (Allow 3 marks for the correct numbers the wrong way round)
					Total for Question: 4 marks
2.		x / $f(x) = x^3 - 5x$ 4.00 44.00 4.10 48.42 4.20 53.09 4.30 58.01 4.40 63.18 68.62 or 4.50 68.63 4.60 74.34 4.70 80.32 4.80 86.59 4.90 93.15 5.00 100.00 4.35 60.56	4.3	4	B2 for trial between 4.3 and 4.4 inclusive (B1 for trial between 4 and 5 inclusive) B1 for different trial between 4.33 and 4.37 inclusive B1 (dep on at least one previous B1) for 4.3 only NB trials where x has 1 d.p should be rounded or truncated to at least 2 SF; trials where x has 2 d.p. or more should be rounded or truncated to at least 3 SF
					Total for Question: 4 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3.		$25^2 - 7^2 = 576$ $\sqrt{576} = 24$ $\frac{1}{2} \times 24 \times 7$	84 cm^2	4	M1 $25^2 - 7^2$ M1 $\sqrt{25^2 - 7^2}$ M1 (dep) $\frac{1}{2} \times '24' \times 7$ A1 cao
					Total for Question: 4 marks
4. **FE**	(a)	$18000 - 6475 = 11525$ $11525 \times \frac{20}{100} = 2305$	£ 1152.50	4	M1 $18000 - 6475$ A1 11525 M1 '11525' $\times \frac{20}{100}$ A1 £1152.50
	(b)	$\frac{'2305'}{18000} \times 100$	12.8	2	M1 $\frac{'2305'}{18000} \times 100$ A1 ft on '2305'
					Total for Question: 6 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
5.	(a)	0: 8 1: 023578 2: 0122233 3: 1345 4: 456 Key 4 I 6 means 46 minutes	Correct stem and leaf	3	B3 Fully correct (B2 All entries correct, no key) (B1 correct entries unordered, key or no key) **OR** (B2 Three rows correct, key or no key) (B1 Two rows correct, key or no key)
	(b)	Old median = 22 New median = 22 + 5	27 minutes	2	M1 finds median correctly for original data and adds 5 A1 cao **OR** M1 Redoes table (ft) with each value increased by 5 and attempts to find median A1 cao
	(c)		The same + reason	1	C1 All the values have increased by 5 minutes so when you subtract the 5 minutes will cancel out.
					Total for Question: 6 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
6. **FE QWC ii, iii**	(a)	1 gallon = 4.54 litres, 200 gallons = 908 litres = 908000 cm^3 Vol of tank $60^2 \times x \pi \times 180$ = 2035752.04..cm^3 908000< 1017876.02 **OR** Vol of tank $60^2 \times \pi \times 180$ = 2035752.04..cm^3 Half vol of tank = 1017876.02 cm^3 = 1017.876...litres 1017.876 ÷ 4.54 = 224 gallons 224 > 200	No	5	Response may convert into gallons, litres, or cm^3 Calculations may be performed in different orders M1 Using formulae to find volume of tank B1 Converts between litres and cubic centimetres M1 reads off graph for 1l, 2l , 4l, 5l or 10 litres within tolerance (4.4 — 4.6) A1 Answer in cm^3, litres or gallons C1 Decision and reason **QWC: Decision should be stated, with appropriate supporting statement**
	(b)	"908000" cm^3 × 0.85 g/cm^3 = 771800 g	771.8	3	M1 "908000" × 0.85 M1(dep) 771800÷1000 A1 770 — 772
					Total for Question: 8 marks
7.		$\frac{10 + 45 + 150 + 245 + 225 + 55}{120}$	6.08 hours	4	M1 for mid interval values M1 for multiplying frequencies by mid-interval values M1 for adding (freq × mid-interval values) ÷ 120 A1 cao
					Total for Question: 4 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8.	(a)	Fred pays $\frac{x}{3}$ and Jim pays $\frac{x-10}{2}$ Malcolm gets £170 for Fred and Jim, so Malcolm gets $\frac{x}{3}+\frac{x-10}{2}=170$	Clear and coherent explanation	1	C1 a clear and coherent explanation
	(b)	Fred has $\frac{2x}{3}$ left, so solving for x using $\frac{x}{3}+\frac{x-10}{2}=170$ $2x+3(x-10)=170\times6$ $5x=1050$ $x=210$ **OR** $\frac{x}{3}+\frac{x-10}{2}=\frac{2x+3(x-10)}{6}$ $\frac{5x-30}{6}=170$ $5x=1050$ $x=210$	£140	4	M1 multiply through by 6 and cancels fractions M1 (dep)expand $3(x-10)$ M1 (dep)collect terms on each side correctly A1 cao **OR** M1 collects terms over 6 M1(dep) expand $3(x-10)$ M1(dep) multiply through by 6 and collect terms A1 cao
					Total for Question: 5 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9. **QWC i, iii** **FE**		Makes a comparison of the shape of the distribution by drawing Makes a comparison of the modal classes(31—40, 11—20) Makes a comparison of the class intervals that contain the medians.(31—40, 21—30) Works out an estimate of the total sales of each shop(2635, 3530)	Correct comparisons	4	B1, B1, B1 for any 4 of the following done correctly Plots frequency polygon or produces table compares modes compares medians compares total sales C1 for comments on shape of the distributions **QWC: Decisions should be stated, and all comments should be clear and follow through from any working or diagrams**
					Total for Question: 4 marks

1MA0/2H					
Question		Working	Answer	Mark	Additional Guidance
10.	(a)	$x^{3/2} \times x^{1/2}$	x^2	3	B1 $x^{3/2}$ seen B1 $x^{2/4}$ oe seen A1 cao
	(b)	$x^2 - 1x + 2x - 2 = 18$ $x^2 + x - 20 = 0$ $(x + 5)(x - 4)$	$4, -5$	4	M1 Correct expansion B1 $x^2 + x - 20 = 0$ B1 $(x + 5)(x - 4)$ A1 cao
	(c)	$x^2 + x - 6 = 0$ $(x + 3)(x - 2)$ $x = -3, x = 2$	$x = -3, y = 8$ $x = 2, y = 3$	5	M1 Sets equations equal and rearranges B1 $x^2 + x - 6 = 0$ oe B1 $(x - 3)(x + 2)$ A2 Two correct pair of solutions A1 correct set of x values
					Total for Question: 12 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
11.	(a)		28	1	B1 27 — 29
	(b)	68 – 42	26	2	M1 68 — 42 A1 26 — 30 (need $\frac{1}{2}$ sq tolerance on each)
FE	(c)	15% of 80 = 12	Yes, with correct conclusion	2	M1 looks up 68 or 40 min on cumulative frequency A1 correct conclusion
					Total for Question: 5 marks
12. **QWC ii, iii** **FE**		$\sin 68^o = \frac{AC}{8.5}$ AC = 8.5 × sin 68° = 7.881 7.881 + 1 < 9	Reason supported by calculation	4	M1 $\sin 68^o = \frac{AC}{8.5}$ M1 AC = 8.5 × sin 68° A1 7.88(1... C1 8.88(1... + conclusion **QWC: Decision should be stated, supported by clearly laid out working** Note $\frac{AC}{\sin 68} = \frac{8.5}{\sin 90}$ does not get marks until in the form $AC = \frac{8.5}{\sin 90} \times \sin 68$
					Total for Question: 4 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
13.		$T = k\sqrt{A}$; 40 = $k\sqrt{100}$ $k = 4$ $T = 4\sqrt{A}$ $T = 4\sqrt{60}$	31.0	4	M1 $T = k\sqrt{A}$ M1 40 = $k\sqrt{100}$ A1 $T = 4\sqrt{A}$ A1 for 30.98... or 31(.0) **OR** M2 for $\frac{T}{40} = \sqrt{\frac{60}{100}}$ oe M1 for $T = 40 \times \sqrt{\frac{60}{100}}$ oe A1 for 30.98... or 31.0
					Total for Question: 4 marks

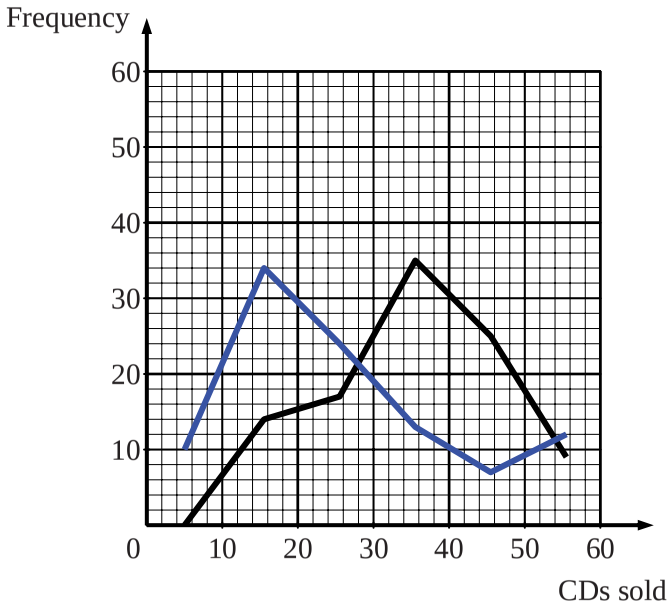
1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14.	(b)	Eliminate y to get $2x + 3 = 4x + 2, x = 0.5$ $y = 4$ **OR** $y = 2x + 3$ and $y = 4x + 2$ drawn correctly on graph paper Perpendicular drawn correctly through (0.5, 4) Intercept found Gradient found	$y = -0.5x + 4.25$	5	M1 eliminate y M1 substitute the found value of x in one equation A1 both answers M1 an equation of the form $y = mx + c$ with either c correct or m correct or the correct gradient stated A1 cao **OR** B1 $y = 2x + 3$ drawn B1 $y = 4x + 2$ drawn M1 draws perpendicular though point of intersection M1 an equation of the form $y = mx + c$ with either c correct or m correct or the correct gradient stated A1 cao
					Total for Question: 5 marks
15.	(a)	UB 8.35 × 3.65 = 30.4775	30.4775	2	M1 sight of 8.35 or 3.65 A1 30.4775
	(b)	LB 8.25 × 3.55 = 29.2875	30	2	M1 8.25 × 3.55 A1 30 (dep on 8.25 X 3.55 seen)
					Total for Question: 4 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
16.	(a)	Vol = $x \times (x-2) \times 2 = 51$ Vol = $2x^2 - 4x - 51 = 0$	Derives given answer and condition	4	M1 Vol = $x \times (x-2) \times 2$ M1 expands bracket correctly A1 (E1) sets equal to 51 B1 $x > 2$ as the lengths of the cuboid have to be positive.
	(b)	$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 2 \times (-51)}}{2 \times 2}$ $x = \frac{4 \pm \sqrt{424}}{4}$	6.15, -4.15 both to 3sf	3	M1 correct substitution (allow sign errors in *a*, *b* and *c*) into quadratic formula M1 $x = \frac{4 \pm \sqrt{424}}{4}$ A1 6.14(7..., – 4.14(7...)
					Total for Question: 7 marks
17.		Angle *BAC* = 180º — 47º — 58º = 75º $\frac{AC}{\sin 47} = \frac{220}{\sin 75} (= \frac{AB}{\sin 58})$ *AC* = $\frac{220 \sin 47}{\sin 75}$ = 166.57.. Area= $\frac{1}{2} \times 220 \times '166.57' \times \sin 58$ = 15538	15500 m^2	5	B1 for 75º M1 $\frac{AC}{\sin 47} = \frac{220}{\sin 75} (= \frac{AB}{\sin 58})$ M1 *AC* = $\frac{220 \sin 47}{\sin 75}$ M1 $\frac{1}{2}$ × 220 × "166.57" × sin58 A1 15500 m^2
					Total for Question: 5 marks

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
18.		Pentagon = 5 equal isos triangles $\frac{360}{5}$ =72º Base angles = (180 – 72) ÷ 2 = 54º for finding equal sides of isosceles triangle; $\frac{x}{\sin 54} = \frac{10}{\sin 72}$ = 8.506508084... area of isosceles triangle = $\frac{1}{2}x^2 \sin 72$ = 34.40954801.. area of pentagon = 5 × 34.40954801 = 172.0477401 area of dodecahedron = 12 ×172.0477401 **OR** Using right-angled trigonometry; h = 5tan54º = 6.8819... Area of isosceles triangle = $\frac{1}{2} \times 10 \times h$ = 34.40954801... area of pentagon = 5 × 34.40954801 = 172.0477401 area of dodecahedron = 12 ×172.0477401	2065 cm^2	9	B1 for $\frac{360}{5}$ = 72º B1 (180 – 72) ÷ 2 = 54º M1 for finding equal sides of isosceles triangle; $x = \frac{x}{\sin 54} = \frac{10}{\sin 72}$ A1 for x = 8.506508084... M1 for finding area of isosceles triangle = $\frac{1}{2}x^2 \sin 72$ A1 for 34.40954801...(ft) B1 for area of pentagon = 5 × (ft) = 172.0477401...(ft) B1 for area of dodecahedron = 12 × (ft)= 2064.572881... cm^2 A1 for 2065 cm^2 (oe) **OR** B1 for $\frac{360}{5}$ = 72º B1 (180 – 72) ÷ 2 = 54 º M1 for using right-angled trigonometry; h = 5 tan54º A1 for 6.8819... M1 for finding area of isosceles triangle = $\frac{1}{2} \times 10 \times h$ A1 for 34.40954801...(ft) B1 for area of pentagon = 5 × (ft) = 172.0477401...(ft) B1 for area of dodecahedron = 12 × (ft) = 2064.572881... cm^2 A1 for 2065 cm^2 (oe)

1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
18. (Cont)		**OR** Pentagon split into 3 isos triangles, where 2 are equal. Area of 2 isos triangles $= 2(\frac{1}{2}10^2 \sin 108)$ = 95.10565163... $\frac{x}{\sin 72} = \frac{10}{\sin 36}$ x = 16.18033989... x^2 = 261.803399.. Area of 3rd isos triangle $= \frac{1}{2}$ (261.803399..)sin36 = 76.94208845..	2065 cm^2	9	**OR** B1 for 108° (and base angles 36°) B1 for base angles 72° (and 36°) M1 for finding equal sides of 3rd isos triangle: $\frac{x}{\sin 72} = \frac{10}{\sin 36}$ A1 for x = 16.18033989... M1 for area = $\frac{1}{2}x^2 \sin 36$ M1 for area = $2(\frac{1}{2}10^2 \sin 108)$ A1 for one of (76.94208845.. and 95.10565163...) B1 for area of dodecahedron A1 for 2065 cm^2 (oe)
					Total for Question: 9 marks

9.



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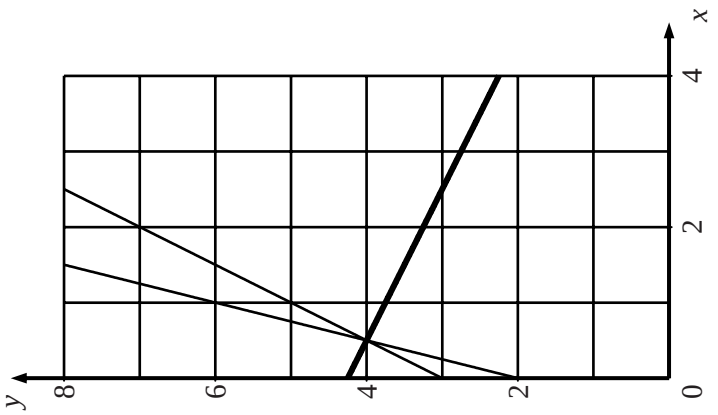

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