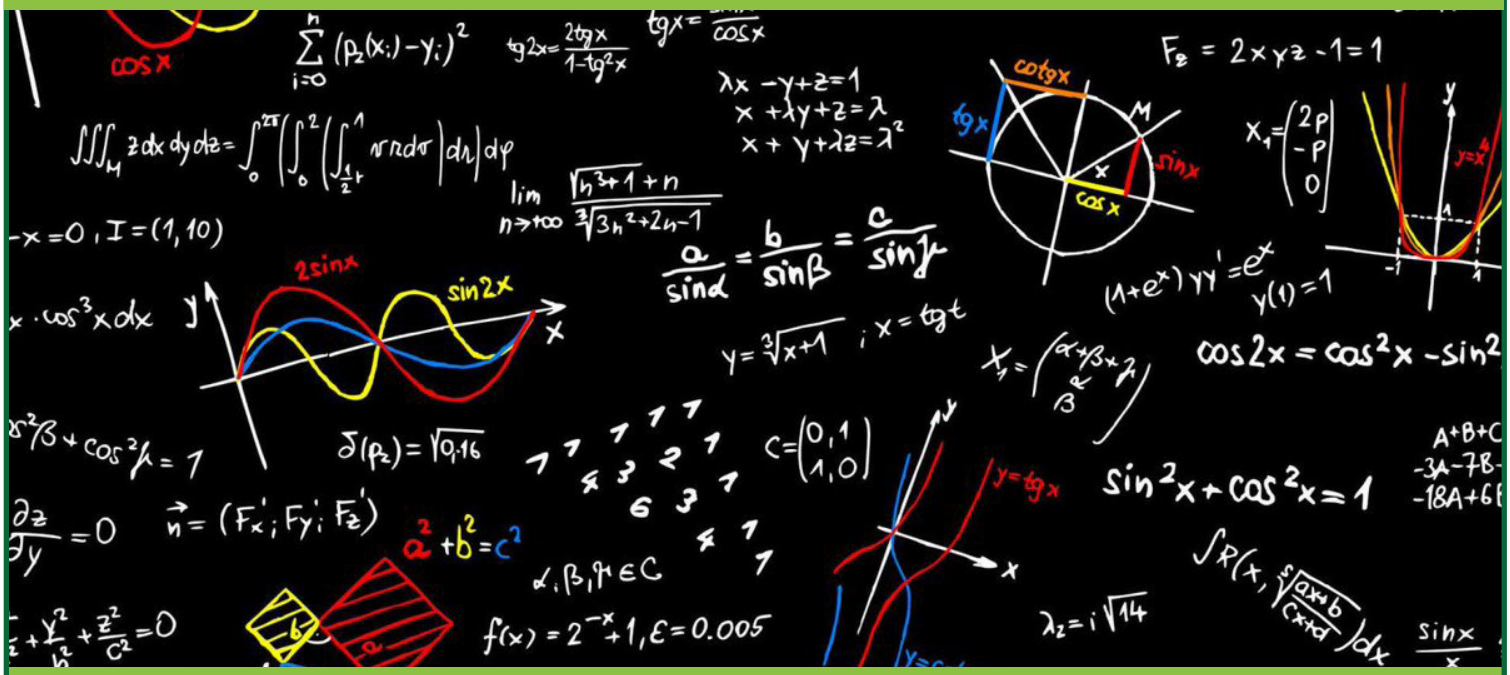
Bentley Wood

High School for Girls

Mathematics Bridging Work

Pack B

Year 10 into 11 for 2023/24



Name: _____

Tutor Group: _____

Teacher: _____

Year 10
Summer Revision Work

Pack B Higher for set 3

This pack contains:

- **List of all crossover topics and Sparx video/task number (grades 3 to 6)**
- **A complete set of higher practice papers, followed by the mark scheme.**
- **Focus on the first half of the paper.**

How to use this pack:

1- Identify the topics you need to revise first from the list (you do not need to do all of them)
2- Watch the video & try the task
3- Little and often – 2 to 3 videos and tasks per revision session
4- Complete the practice paper 1 odd questions
5- Mark and purple pen your answers
6- How did you do? Are there any topics you need to revisit? Mark them on the revision list and go to step 2
7- Complete practice paper 2 odd questions
8- Mark and purple pen your answers
9- How did you do? Are there any topics you need to revisit? Mark them on the revision list and go to step 2
10- Complete the practice paper 3 odd questions
11- Mark and purple pen your answers
12- Repeat the process for each of the 3 papers but this time you complete the even questions.

Number

Topic	Topic code	R	A	G
Fractions	U224, U538, U793			
Factors, multiples and primes	U739, U250			
Percentage change	U671, U332, U988			
Standard form	U330, U534, U264, U290			
Error intervals	U657			

Algebra

Topic	Topic code	R	A	G
Linear equations	U325, U870, U599			
Linear inequalities	U759, U738, U145, U337			
Index laws	U662			
Linear simultaneous equations	U760, U757, U836, U137			
Linear graphs and coordinates	U315, U669, U477, U848, U377			
Quadratic graphs and equations	U989, U667, U228, U601			

Ratio and proportion

Topic	Topic code	R	A	G
Ratio	U687, U753, U176, U577, U921, U865			
Speed	U151			
Density and pressure	U910, U527			
Proportion	U721, U357, U610			

Geometry

Topic	Topic code	R	A	G
Area	U226, U343, U950			
Volume	U786, U174, U915			
Angles	U655, U826, U329, U427			
Pythagoras' theorem	U385			
Trigonometry	U605, U283, U545			
Transformations	U196, U799, U696, U519, U766			

Probability

Topic	Topic code	R	A	G
Calculating probabilities	U408, U510, U683, U580			
Expected outcomes	U166			
Tree diagrams	U558, U729			
Set notation	U748, U296			

Statistics

Topic	Topic code	R	A	G
Averages	U717, U569			
Averages with grouped data	U877			
Sampling	U162			
Scatter graphs	U199, U277, U128			
Frequency polygons	U840			

edexcel

GCSE Mathematics Practice Tests: Set 6

Paper 1H (Non-calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

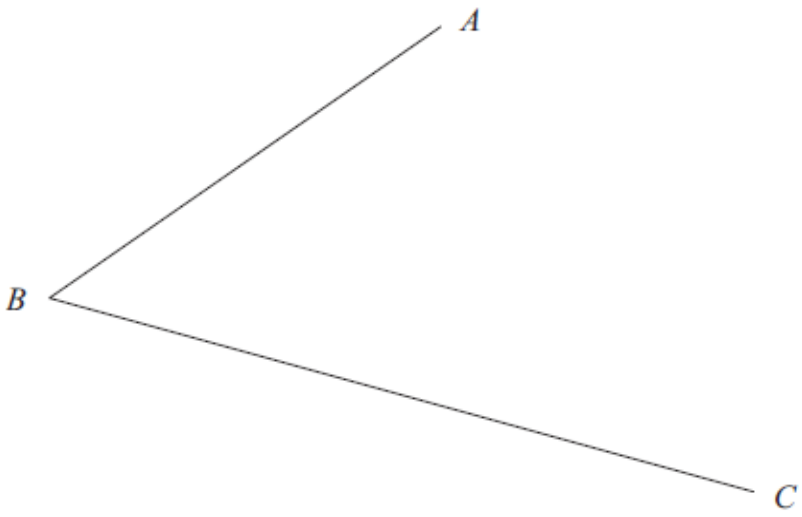
- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

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.

Answer ALL questions.
Write your answers in the spaces provided.
You must write down all the stages in your working.

1. Use ruler and compasses to construct the bisector of angle *ABC*.
You must show all your construction lines.



(Total 2 marks)

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2. Peter, Tarish and Ben share £54.

Tarish gets three times as much money as Peter.
Ben gets twice as much money as Tarish.

How much money does Ben get?

£ .....

(Total 3 marks)

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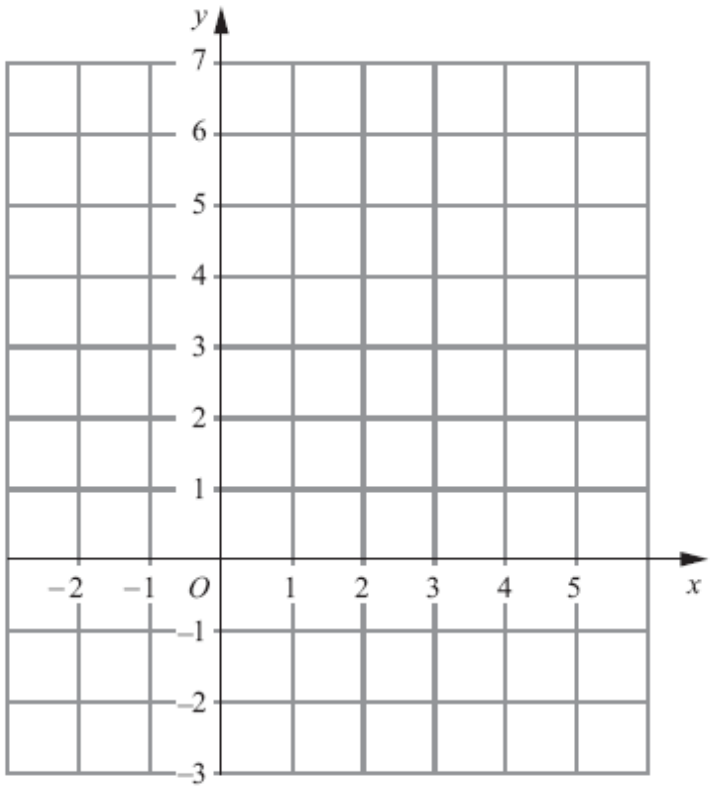
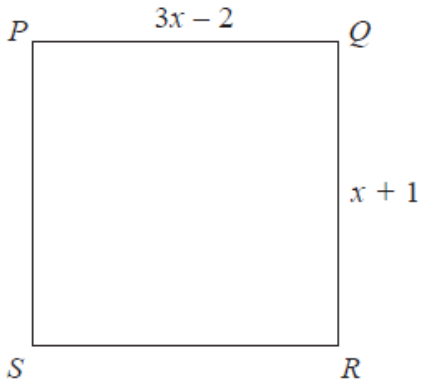
3. On the grid draw the graph of $x + y = 4$ for values of x from -2 to 5



(Total 3 marks)

4. *PQRS* is a square.



All measurements are in centimetres.

Show that the perimeter of the square is 10 cm.

(Total 4 marks)

5. The diagram shows the plan of a floor.

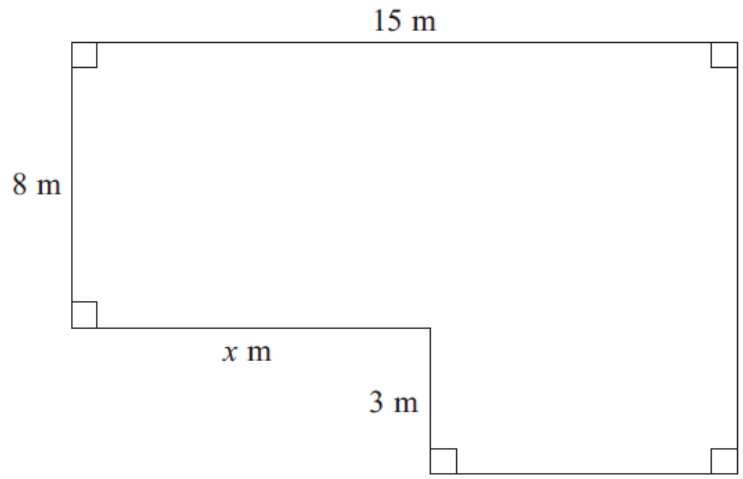


Diagram **NOT** accurately drawn

The area of the floor is 138 m^2.

Work out the value of x.

(Total 4 marks)

6. There are 40 litres of water in a barrel.

The water flows out of the barrel at a rate of 125 millilitres per second.

1 litre = 1000 millilitres.

Work out the time it takes for the barrel to empty completely.

..... seconds

(Total 3 marks)

---

7. (a) Work out $\frac{2}{5} + \frac{1}{4}$

.....

(2)

(b) Work out $3\frac{1}{8} \times \frac{2}{5}$

Give your answer as a fraction in its simplest form.

.....

(3)

(Total 5 marks)

---

8. Lillian, Max and Nazia share a sum of money in the ratio 2 : 3 : 5

(a) What fraction of the money does Max receive?

.....

(2)

Nazia receives £60

(b) Work out how much money Lillian receives.

£ .....

(3)

(Total 5 marks)

---

9. (a) Solve $11 - 4y = 6y - 3$

$y =$ .....

(2)

(b) Solve $x^2 - 3x - 40 = 0$

$x =$ ....., $x =$ .....

(3)

(Total 5 marks)

---

10. There are 11 pens in a box.

6 of the pens are black.
3 of the pens are red.
2 of the pens are green.

Henry takes at random two pens from the box.

Work out the probability that he takes one black pen and one green pen.

.....

(Total 4 marks)

---

11. The size of the obtuse angle in an isosceles triangle is $x°$.

Write an expression, in terms of x, for the size, in degrees, of one of the other two angles.

.....

(Total 2 marks)

---

12. (a) Write down the value of $9^{\frac{1}{2}}$

.....

(1)

(b) Write down the value of $8^{-\frac{1}{3}}$

.....

(1)

$2^k = 16$

(c) Write down the value of k.

.....

(1)

(d) Solve $8^5 = 2^{2m+3}$

.....

(3)

(Total 6 marks)

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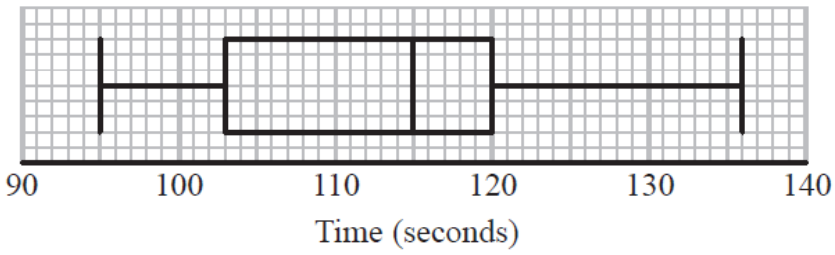
13. Tom recorded the times, in seconds, some boys took to complete an obstacle course.

He drew this box plot for his results.



Tom also recorded the times some girls took to complete the obstacle course.

Here are the times, in seconds, for the girls.

99	101	103	106	108	109	110	110	111	112
113	114	115	115	117	120	124	125	132	

Compare the distribution of the times for the boys with the distribution of the times for the girls.

(Total for 4 marks)

14. (a) Write 8.2×10^5 as an ordinary number.

.....

(1)

(b) Write 0.000 376 in standard form.

.....

(1)

(c) Work out the value of $(2.3 \times 10^{12}) \div (4.6 \times 10^3)$
Give your answer in standard form.

.....

(2)

(Total 4 marks)

15.

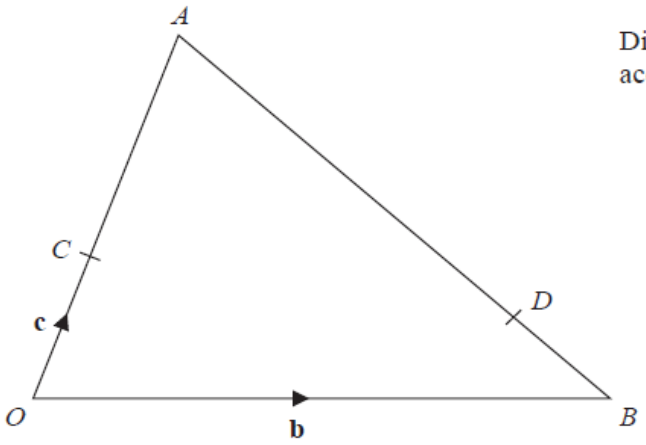


Diagram **NOT** accurately drawn

In the diagram,

$\overrightarrow{OB} = \mathbf{b}$

$\overrightarrow{OC} = \mathbf{c}$

$\overrightarrow{OC} = \frac{1}{3}\overrightarrow{OA}$

$\overrightarrow{BD} = \frac{1}{4}\overrightarrow{BA}$

Find CD in terms of **b** and **c**.

Give your answer in its simplest form.
You must show all your working.

.....

(Total 4 marks)

16. Two events, A and B, are mutually exclusive.

$P(A) = 0.3$

$P(B) = 0.5$

(a) Work out $P(A')$

.....

(1)

(b) Work out $P(A \cup B)$

.....

(1)

$P(C) = 0.4$
$P(D) = 0.2$
$P(C \cap D) = 0.06$

(c) Are C and D independent events?
Explain your answer.

.....

.....

.....

(2)

(Total 4 marks)

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17. Simplify fully $\dfrac{2x^2+9x-5}{6x^2-5x+1}$

.....

(Total 3 marks)

18.

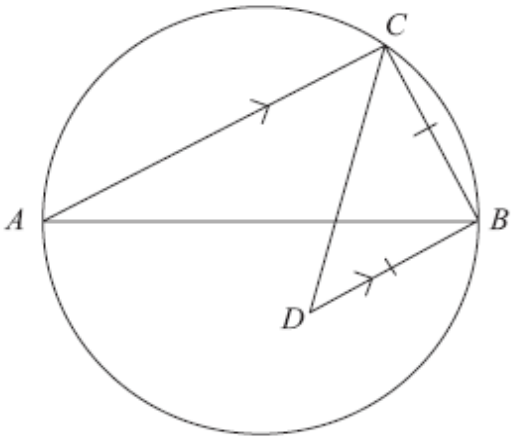


Diagram **NOT** accurately drawn

AB is a diameter of a circle.
C is a point on the circle.
D is the point inside the circle such that *BD* = *BC* and *BD* is parallel to *CA*.

Find the size of angle *CDB*.

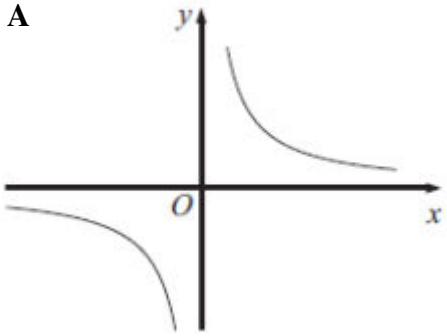
You must give reasons for your answer.

..... °

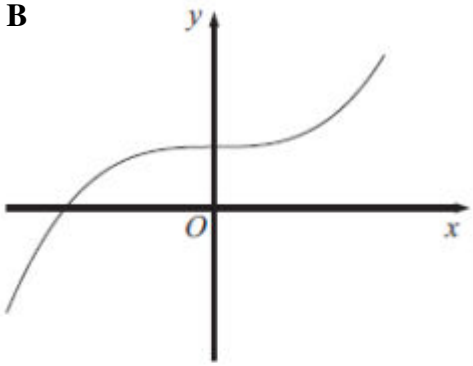
(Total 4 marks)

19.

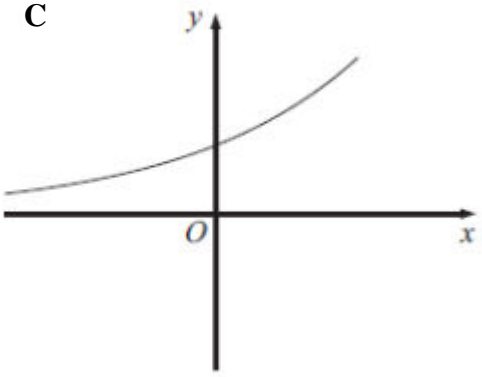
A



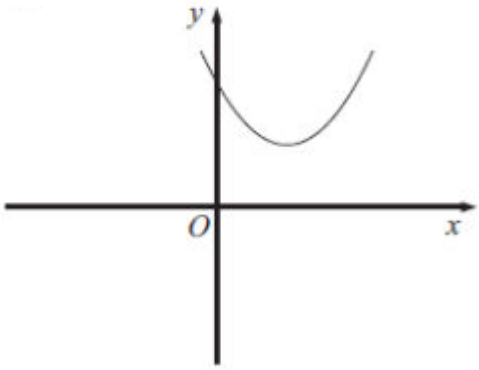
B



C



D



Each equation in the table represents one of the graphs **A** to **D**.
Write the letter of each graph in the correct place in the table.

Equation	Graph
$y = x^2 - 4x + 5$	
$y = 4^{2x}$	
$y = x^3 + 4$	
$y = \frac{4}{x}$	

(Total 3 marks)

20. Expand $(1 + \sqrt{2})(3 - \sqrt{2})$

Give your answer in the form $a + b\sqrt{2}$ where a and b are integers.

.....

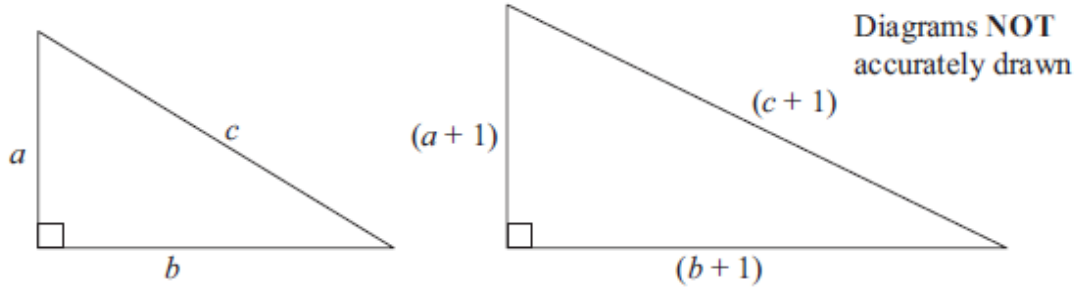
(Total 2 marks)

21. Umar thinks $(a+1)^2 = a^2 + 1$ for all values of a.

(a) Show that Umar is wrong.

(2)

Here are two right-angled triangles.
All the measurements are in centimetres.



(b) Show that $2a + 2b + 1 = 2c$

(3)

a, b and c cannot all be integers.

(c) Explain why.

(1)

(Total 6 marks)

TOTAL FOR PAPER IS 80 MARKS

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1				2	M1 for correct intersecting arcs A1 for correct angle bisector
2		P: T: B = 1: 3: 6 54÷10 × 6 **OR** e.g. T = 3P B = 2T So, B = 2(3P) = 6P P+T+B=P+3P+6P =10P P = 54÷10 = £5.40 B = 6 × £5.40	32.40	3	M1 for 1 : 3 : 6 or any three numbers in the ratio 1:3:6 in any order M1 for 54 ÷ (1 + 3 + 6) × 6 A1 for 32.4(0) **Alternative:** M1 for 1: 3: 6 oe or P + 3P + 6P (=10P) oe, e.g. T/3 + T + 2T (=10T/3) or e.g. B/6 + B/2 + B (=10B/6) or 5.4(0) or 16.2(0) seen M1 for 54 ÷ 10 × 6 or [54 $\frac{\div' 10}{3'}$] × 2 or 54 $\frac{\div' 10}{6'}$ oe A1 for 32.4(0) OR M1 for a partial decomposition of £54 in ratio 1:3:6, e.g. (£)5 +(£)15 + (£)30 (=(£)50) M1 for a decomposition of the remaining amount in ratio 1:3:6, e.g. 40(p) + 120(p) + 240 (=400(p)) A1 for 32.4(0)
3		<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td></tr></table>	graph	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct) A1 for correct line between $x = –2$ and $x = 5$ **or** **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted **or** line segment of $x + y = 4$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points plotted with no more than 2 incorrect)

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					A1 for correct line between $x = -2$ and $x = 5$ **or** **(Use of $y = mx + c$)** M2 for at least 2 correct points (and no incorrect points) plotted (M1 for $y = 4 - x$ or line drawn with gradient of -1 or line drawn with a y intercept of 4 and a negative gradient) A1 for correct line between $x = -2$ and $x = 5$
4			Proof	4	M1 for setting up a correct equation in x, eg. $3x - 2 = x + 1$ M1 (dep) for a fully correct method to solve their equation or for $x = 1.5$ M1 (dep) for ("1.5" + 1) × 4 or (3 × "1.5" – 2) × 4 or (3 × "1.5" – 2) × 2 + ("1.5"+ 1) × 2 C1 (dep on M3) for completing the proof resulting in a perimeter of 10 **OR** M1 for setting up a correct equation in x, eg. $2(3x - 2) + 2(x + 1) = 10$ M1 (dep) for a fully correct method to solve their equation or for $x = 1.5$ M1 (dep) for "1.5" + 1 and 3 × "1.5" – 2 C1 (dep on M3) for completing the proof resulting in a justification that the shape is a square
5			9	4	M1 for method to find area of one rectangle, eg 15 × 8 (=120) or 15 × 11 (=165) M1 (dep) for subtracting from/by given area, eg (138 – "120") (=18) or "165" – 138 (=27) M1 for final step from complete method shown, eg 15 − "18"÷ 3 or "27" ÷ 3 A1 cao **OR**

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					M1 for a correct expression for the area of one rectangle, eg $(8 + 3) \times (15 - x)$ or $8 \times x$ M1 (dep) for a correct equation eg $(8 + 3) \times (15 - x) + 8 \times x = 138$ M1 for correct method to isolate x, eg $3x = 27$ A1 cao
6		$\frac{40000}{125} = \frac{8000}{25}$ =320 seconds	320	3	M1 for 40×1000 or $125 \div 1000$ or 40000 or 0.125 M1 for $\frac{'40000'}{125}$ or $\frac{40}{'0.125'}$, A1 cao **OR** M1 for $1000 \div 125$ M1 for '8' × 40 A1 cao
7	(a)	$\frac{8}{20} + \frac{5}{20}$	$\frac{13}{20}$		M1 for both fractions expressed with a suitable common denominator (multiple of 20) and at least one of the two fractions

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					correct A1 for $\frac{13}{20}$ oe or M1 for 0.4 + 0.25 A1 for 0.65 or M1 for table structure, all cells correct A1 for 13/20 oe
	(b)	$\frac{25}{8} \times \frac{12}{5}$	$\frac{15}{2}$		M1 for a correct method to convert to improper fractions or $\frac{(3\times 8+1)}{8}$ M1 (dep) for A1 for or $\frac{15}{2}$ or 7.5 (SC: B2 for 7.5)
8	(a)	$\frac{3}{2+3+5}$	$\frac{3}{10}$	2	M1 for $\frac{3}{2+3+5}$ A1 for $\frac{3}{10}$ oe
	(b)	60 ÷ 5 = 12 12 × 2 = **Alternative:** Total sum = 60 × 2 = 120 Lillian = $\frac{2}{10}$ of 120 = 120 × 2 ÷ 10	24	3	M1 for 60 ÷ 5 M1 for "12" × 2 A1 for 24 cao **Alternative:** M1 for 60 × 2 = 120 seen M1 for 120 × 2 ÷ 10 A1 cao SC: B2 for 24, 36 and 60 SC: B1 for 36 on answer line

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	$11 + 3 = 6y + 4y$ $14 = 10y$	1.4	2	M1 for collecting the y terms or the numbers on one side of equation, eg $11 = 6y – 3 + 4y$ or $11 – 4y + 3 = 6y$ A1 for 1.4 or $\frac{14}{10}$ oe
	(b)	$(x – 8)(x + 5)$ **OR** $\frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 1 \times -40}}{2 \times 1}$ $\frac{3 \pm \sqrt{169}}{2} = \frac{3 \pm 13}{2}$	8, –5	3	M2 for $(x – 8)(x + 5)$ (M1 for $(x \pm 8)(x \pm 5)$ A1 cao 8 and –5 **OR** M1 for correct substitution in formula of $a = 1$, $b = \pm 3$ and $c = \pm 40$ M1 for reduction to $\frac{3 \pm \sqrt{169}}{2}$ A1 cao 8 and –5
10		$(\frac{6}{11} \times \frac{2}{10}) + (\frac{2}{11} \times \frac{6}{10})$ $= \frac{12}{110} + \frac{12}{110}$	$\frac{24}{110}$	4	B1 for $\frac{2}{10}$ or $\frac{6}{10}$ oe seen as the 2nd probability M1 for $(\frac{6}{11} \times \frac{2}{10})$ or $(\frac{2}{11} \times \frac{6}{10})$ oe M1 for $(\frac{6}{11} \times \frac{2}{10}) + (\frac{2}{11} \times \frac{6}{10})$ o.e. A1 for $\frac{24}{110}$ oe **Tree diagram method** B1 for $\frac{2}{10}$ or $\frac{6}{10}$ oe seen as the 2nd probability M1 for (‘$\frac{6}{11}$’ × ‘$\frac{2}{10}$’) or (‘$\frac{2}{11}$’ × ‘$\frac{6}{10}$’) oe

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					M1 for $(\text{'}\frac{6}{11}\text{'} \times \text{'}\frac{2}{10}\text{'}) + (\text{'}\frac{2}{11}\text{'} \times \text{'}\frac{6}{10}\text{'})$ oe A1 for $\frac{24}{110}$ oe **Alternative scheme for replacement** B0 for $\frac{6}{11}$ or $\frac{2}{11}$ seen as the 2nd probability M1 for $(\frac{6}{11} \times \frac{2}{11})$ or $(\frac{2}{11} \times \frac{6}{11})$ oe M1 for $(\frac{6}{11} \times \frac{2}{11}) + (\frac{2}{11} \times \frac{6}{11})$ oe A0 for $\frac{24}{121}$ **Special Cases** SC: Award B2 for $\frac{24}{121}$ or $\frac{10}{110}$ oe or $\frac{20}{110}$ oe SC: Award B1 for $\frac{10}{121}$ or $\frac{20}{121}$
11		$180 - x$	$\frac{180-x}{2}$ Or $90 - \frac{x}{2}$	2	M1 for $180 - x$ seen (eg $180 - x \div 2$) A1 correct expression
12	(a)		3	1	B1 for 3 (accept ±3, but not –3 alone)
	(b)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ (= 0.5)
	(c)		4	1	B1 cao
	(d)		6	3	M1 for using $8 = 2^3$ M1 for deriving a correct equation in m A1 cao

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		Boys Girls Median: 115 112 Range: 41 33 IQR: 17 9	Comparison of data	4	B1 for correct median for girls or boys B1 for any correct range or IQR C1 for a correct comparison of the medians C1 ft for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question and all figures used for comparisons correct. **OR** B2 for an accurately drawn boxplot (superimposed) C1 for a correct comparison of the medians C1 for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question
14	(a)		820 000	1	B1 cao
	(b)		3.76×10^{-4}	1	B1 cao
	(c)		5×10^{8}	2	M1 for $2.3 \div 4.6 \times 10^{12-3}$ oe or 500 000 000 or 0.5×10^{9} A1 cao (accept 5.0×10^{8}
15			$\frac{3\mathbf{b}-\mathbf{c}}{4}$	4	M1 for $\overrightarrow{CD} = \overrightarrow{CO} + \overrightarrow{OB} + \overrightarrow{BD}$ M1 (indep) for $\overrightarrow{CO} + \overrightarrow{OB} = -\mathbf{c} + \mathbf{b}$ or $\overrightarrow{BA} = -\mathbf{b} + 3\mathbf{c}$ M1 for $-\mathbf{c} + \mathbf{b} + \frac{1}{4}(-\mathbf{b} + 3\mathbf{c})$ A1 for $\frac{3\mathbf{b}-\mathbf{c}}{4}$ **OR** M1 for $\overrightarrow{CD} = \overrightarrow{CA} + \overrightarrow{AD}$ M1 (indep) for $\overrightarrow{CA} = 2\mathbf{c}$ or $\overrightarrow{AB} = -3\mathbf{c} + \mathbf{b}$ M1 for $2\mathbf{c} + \frac{3}{4}(-3\mathbf{c} + \mathbf{b})$ A1 for $\frac{3\mathbf{b}-\mathbf{c}}{4}$
16	(a)	1 – 0.3	0.7	1	B1 0.7 oe
	(b)	0.3 + 0.5	0.8	1	B1 0.8 oe

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
	(c)	$0.2 \times 0.4 = 0.08$ $0.08 \neq 0.06$	Not independent with reason	2	M1 for 0.2×0.4 (= 0.08) C1 for 0.08 and stating events not independent
17		$\frac{(2x-1)(x+5)}{(2x-1)(3x-1)}$	$\frac{x+5}{3x-1}$	3	M1 for factorizing the numerator correctly M1 for factorizing the denominator correctly A1 for $\frac{x+5}{3x-1}$
18		$ACB = 90^o$ angle in a semi circle $CBD = 180 - ACB$ co-interior angles add to 180° $CBD = 90°$ $DCB = CDB =$ $(180^o - 90^o) \div 2$ base angles of an isosceles triangles	45	4	B1 $ACB = 90$ (could be on the diagram) or 45 seen in a correct position on the diagram B1 answer of 45 B1 angle in a <u>semicircle</u> = 90 B1 base angles <u>isosceles</u> triangle are equal or <u>alternate angles</u> are equal
19			D, C, B, A	3	B3 all correct (B2 2 or 3 correct) (B1 1 correct)
20		$3 - \sqrt{2} + 3\sqrt{2} - \sqrt{2}\sqrt{2}$	$1 + 2\sqrt{2}$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao
21	(a)	$(a+1)^2 = a^2 + 2a + 1$ $\neq a^2 + 1$ **OR** Pick any non-zero value of a and show that LHS ≠ RHS **OR** $(a+1)^2 = a^2 + 2a + 1$ Solves $a^2 + 2a + 1$ $= a^2 + 1$ to get $a =$	Correctly shown	2	M1 for $(a+1)^2 = a^2 + 2a + 1$ **or** $a^2 + a + a + 1$ (Expansion must be correct but may not be simplified) A1 for statement that $a^2 + 2a + 1 \neq a^2 + 1$ (eg. they are different) **OR** M1 for correct substitution of any integer into both expressions eg. $(2 + 1)^2$ **and** $2^2 + 1$ A1 for correct evaluation of both expressions and statement that they are not equal (eg. they are different) **OR**

1MA1 Practice papers Set 6: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		0 and indicates a contradiction			M1 $(a+1)^2 = a^2 + 2a + 1$ **or** $a^2 + a + a + 1$ A1 Solves $a^2 + 2a + 1 = a^2 + 1$ to get $a = 0$ and indicates a contradiction
	(b)	$a^2 + 2a + 1 + b^2 + 2b + 1 = c^2 + 2c + 1$ But $a^2 + b^2 = c^2$ So $2a + 2b + 1 = 2c$	AG	3	M1 use of Pythagoras in either triangle – **one** of $a^2 + b^2 = c^2$ **or** $(a + 1)^2 + (b + 1)^2 = (c + 1)^2$ A1 $a^2 + 2a + 1 + b^2 + 2b + 1 = c^2 + 2c + 1$ **and** $a^2 + b^2 = c^2$ A1 $2a + 2b + 1 = 2c$
	(c)	LHS is odd, RHS is even	Explanation	1	B1 eg. LHS is odd, RHS is even **or** one side is odd and the other side is even oe

GCSE Mathematics Practice Tests: Set 6

Paper 2H (Calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. The width of a rectangle is a whole number of centimetres.

The length of the rectangle is 9 cm longer than its width.
The perimeter of the rectangle is less than 200 cm.

Find the greatest possible width of the rectangle.

…….. cm

(Total 4 marks)

---

2. A rugby team played six games.
The mean score for the six games is 14.5

The rugby team played one more game.
The mean score for all seven games is 16

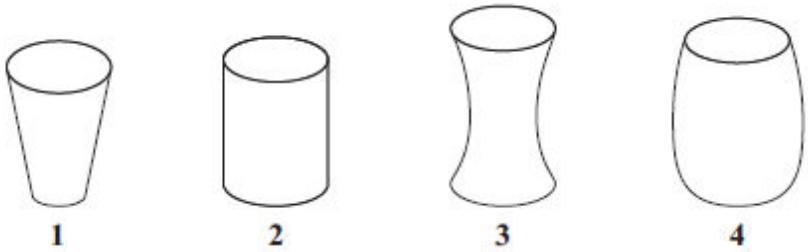
Work out the number of points the team scored in the seventh game.

..... points

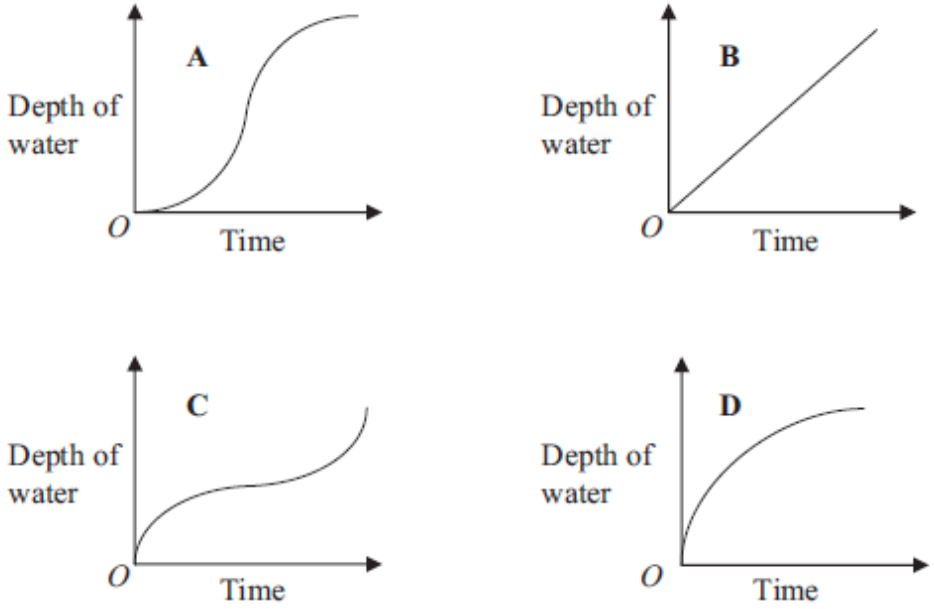
(Total 2 marks)

---

3. Here are four containers.
Water is poured into each container at a constant rate.



Here are four graphs.
The graphs show how the depth of the water in each container changes with time.



Match each graph with the correct container.

A and .....

B and .....

C and .....

D and .....

(Total 2 marks)

4. The diagram shows the positions of three turbines A, B and C.

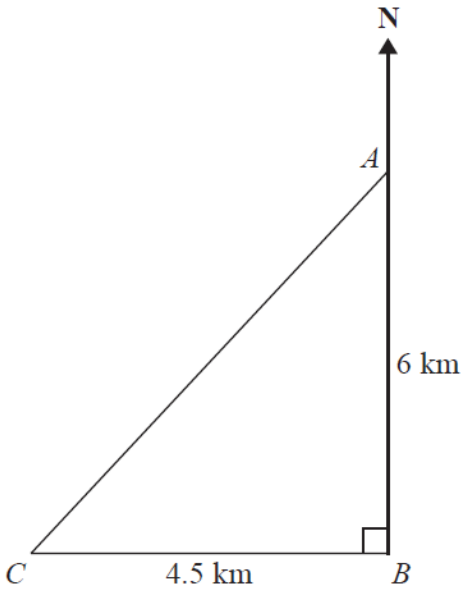


Diagram **NOT** accurately drawn

A is 6 km due north of turbine B.
C is 4.5 km due west of turbine B.

(a) Calculate the distance AC.

..... km
(3)

(b) Calculate the bearing of C from A.
Give your answer correct to the nearest degree.

..... °
(4)

(Total 7 marks)

5. The diagram shows a prism.

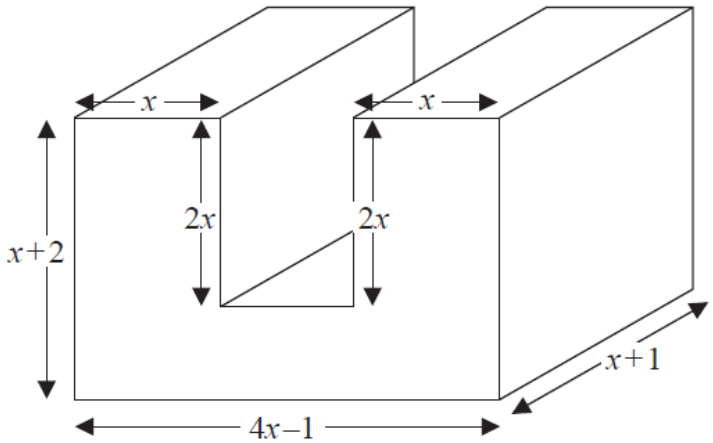


Diagram **NOT** accurately drawn

All measurements are in centimetres.
All corners are right angles.

Find an expression, in terms of x, for the volume, in cm^3, of the prism.
You must show your working.
Give your answer in its simplest form.

.....

(Total 4 marks)

6. The diagram shows a triangle *DEF* inside a rectangle *ABCD*.

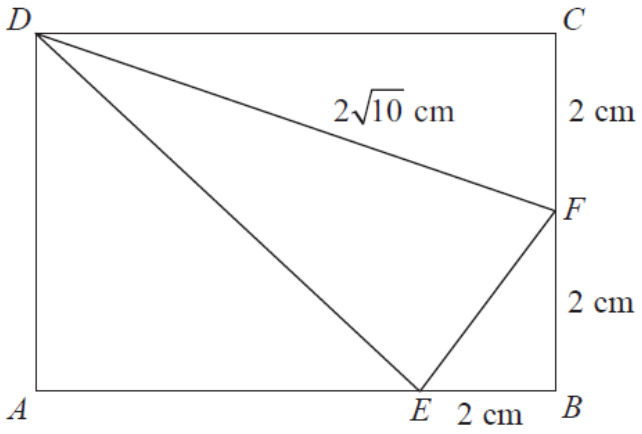


Diagram **NOT** accurately drawn

Show that the area of triangle *DEF* is 8 cm^2.
You must show all your working.

(Total 4 marks)

7. Jarek uses the formula

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

to work out the area of a triangle.

For this triangle,

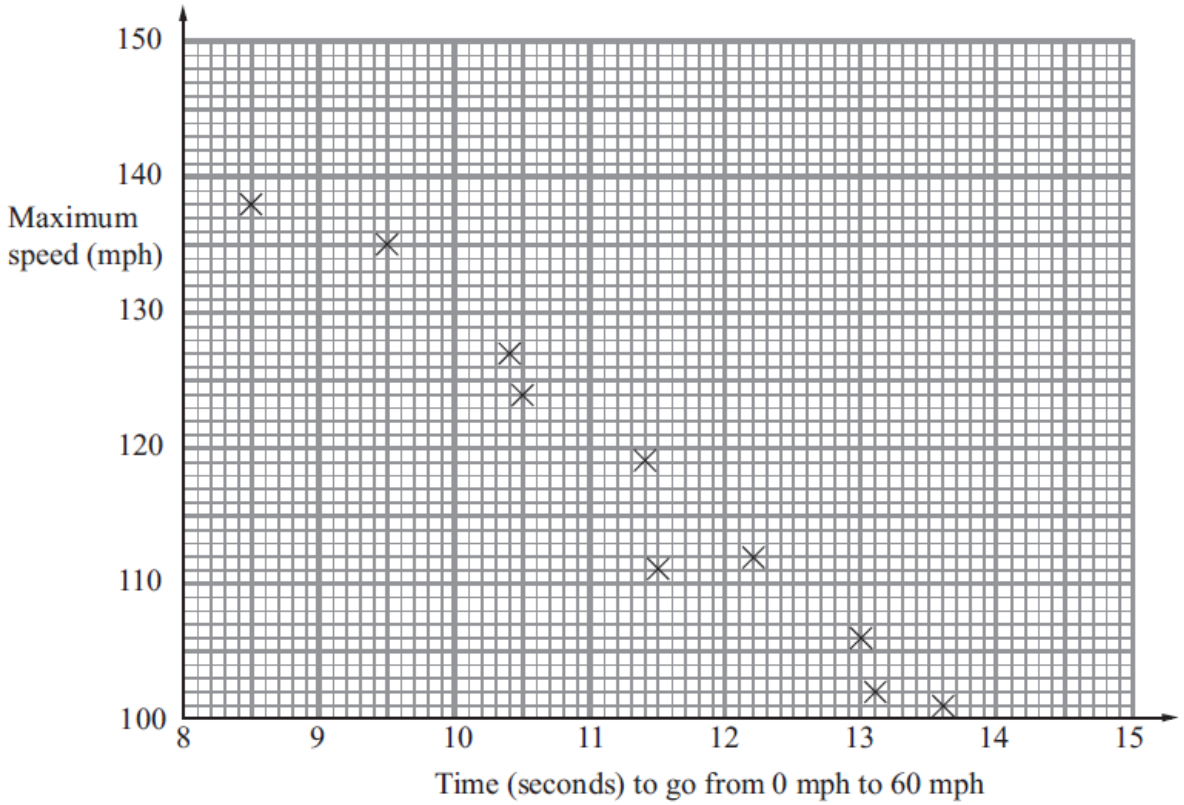
$a = 7.8$ cm correct to the nearest mm.
$b = 5.2$ cm correct to the nearest mm.
$C = 63°$ correct to the nearest degree.

Calculate the lower bound for the area of the triangle.

..... cm^2

(Total 3 marks)

8. The scatter graph shows some information about 10 cars.
It shows the time, in seconds, it takes each car to go from 0 mph to 60 mph.
For each car, it also shows the maximum speed, in mph.



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

.....

(1)

The time a car takes to go from 0 mph to 60 mph is 11 seconds.

(b) Estimate the maximum speed for this car.

..... mph

(2)

(Total 3 marks)

---

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

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

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

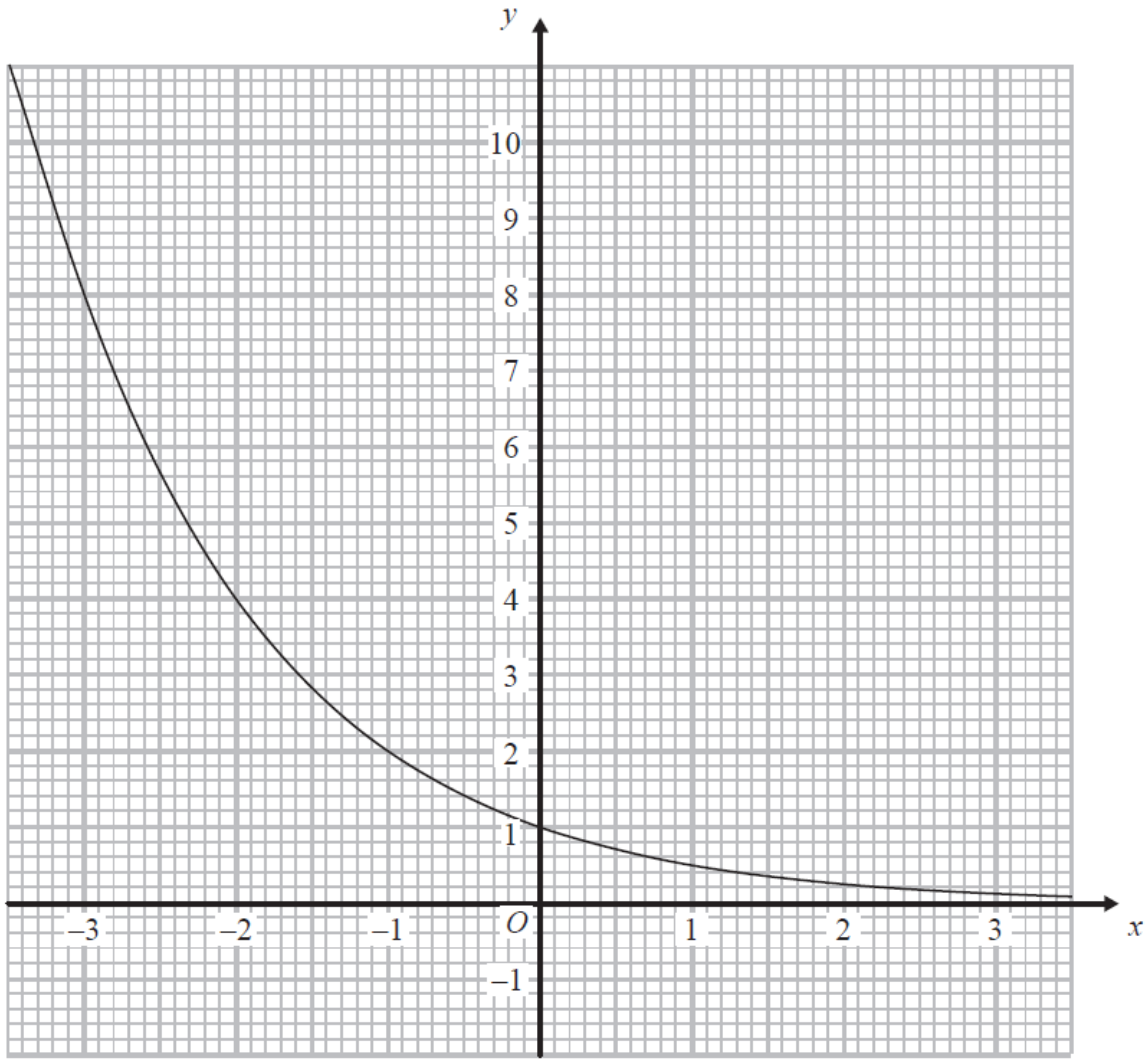
Work out the cost of each cup of coffee and the cost of each cup of tea.

Cup of coffee.....

Cup of tea.....

(Total 5 marks)

10.



The graph of $y = k^x$, where k is a positive constant, is shown above.

Find the value of k.

k = ...

(Total 2 marks)

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

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

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

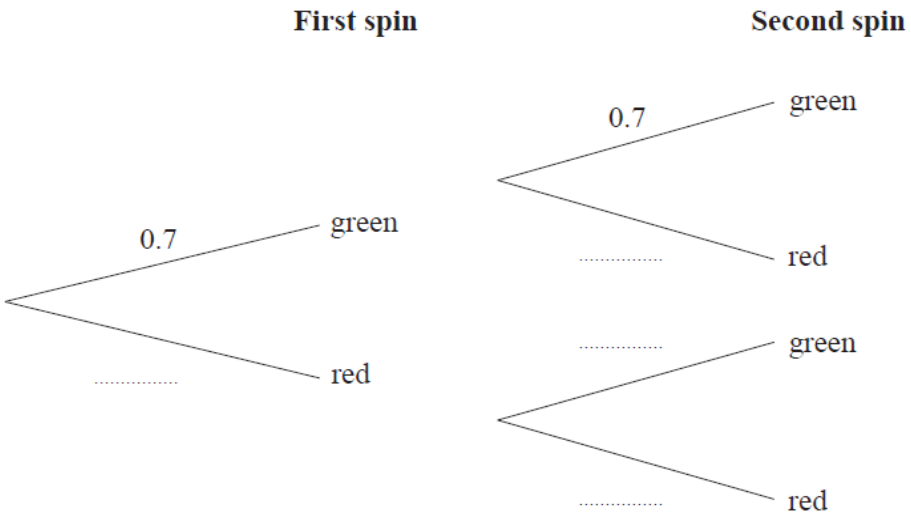
(Total 5 marks)

12. Louise makes a spinner.

The spinner can land on green or on red.
The probability that the spinner will land on green is 0.7

Louise spins the spinner twice.

(*a*) Complete the probability tree diagram.



(2)

(*b*) Work out the probability that the spinner lands on two different colours.

.....

(3)

(Total 5 marks)

13. A trapezium $ABCD$ has an area of $5\sqrt{6}$ cm^2.

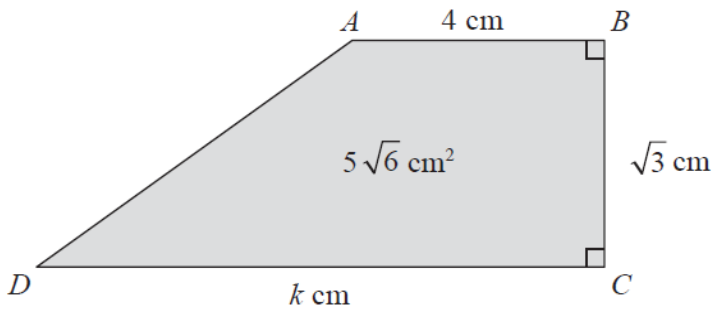


Diagram **NOT** accurately drawn

$AB = 4$ cm.
$BC = \sqrt{3}$ cm.
$DC = k$ cm.

Calculate the value of k, giving your answer in the form $a\sqrt{b} - c$, where a, b and c are positive integers. Show each step in your working.

$k =$ .....

(Total 3 marks)

14. The diagram shows a large tin of pet food in the shape of a cylinder.

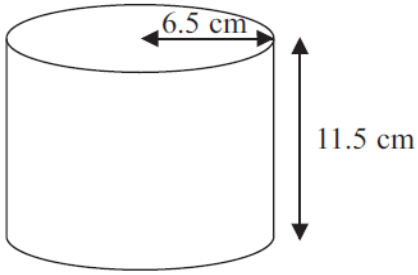


Diagram **NOT** accurately drawn

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

Calculate the height of the new tin.
Give your answer correct to one decimal place.

..... cm

(Total 3 marks)

15. Prove that, for all positive values of n,

$$\frac{(n+2)^2-(n+1)^2}{2n^2+3n}=\frac{1}{n}$$

(Total 4 marks)

---

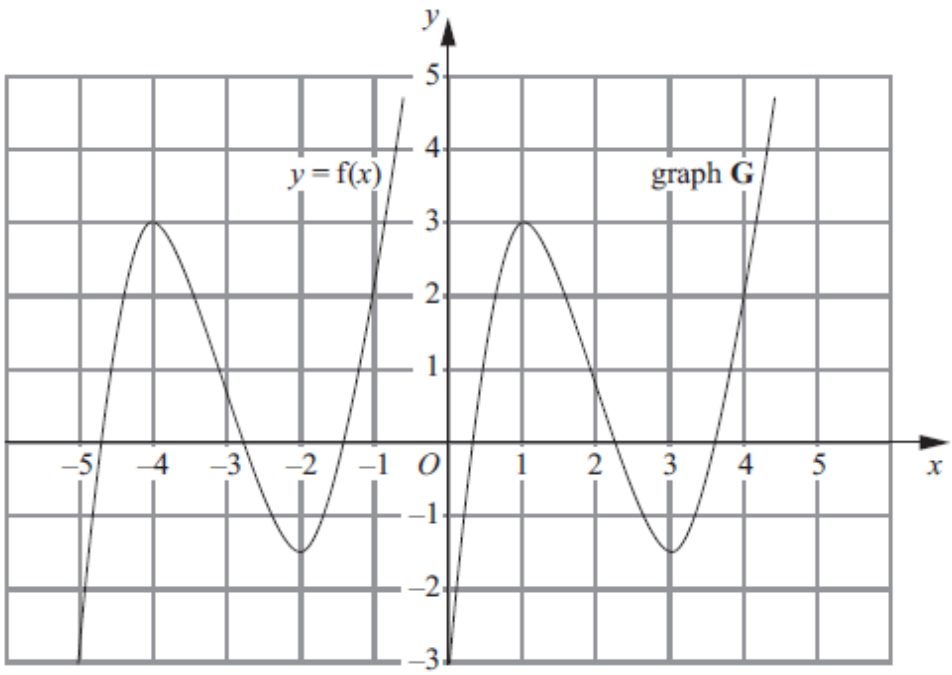
16. Make r the subject of the formula $p = \dfrac{2r+5}{r-3}$

r = ...

(Total 4 marks)

---

17. The graph of $y = f(x)$ is shown on the grid.



The graph **G** is a translation of the graph of $y = f(x)$.

(a) Write down, in terms of f, the equation of graph **G**.

$y =$ .....

(1)

The graph of $y = f(x)$ has a maximum point at $(-4, 3)$.

(b) Write down the coordinates of the maximum point of the graph of $y = f(-x)$.

(..... , ...)

(2)

(Total 3 marks)

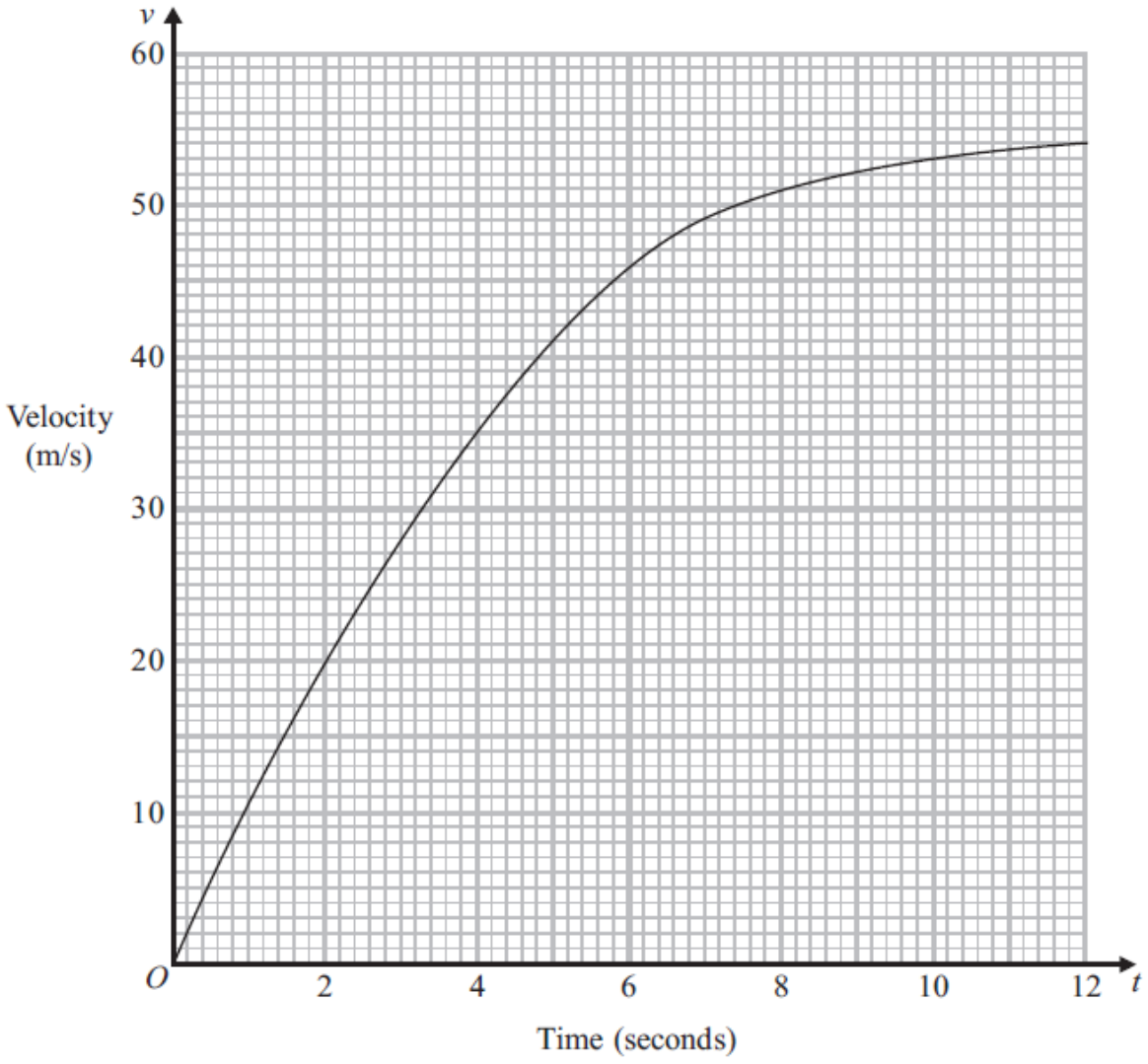
---

18. A parachutist jumps out of a plane.

This graph shows information about the velocity, v m/s, of the parachutist t seconds after he jumped.

(a) Work out an estimate for the acceleration of the parachutist when $t = 8$

..... m/s^2
(3)



(b) Work out an estimate for the distance the parachutist falls in the first 6 seconds.

..... m

(3)

(Total 6 marks)

---

19. S is inversely proportional to the cube of t.

When $t = 4$, $S = \frac{1}{2}$

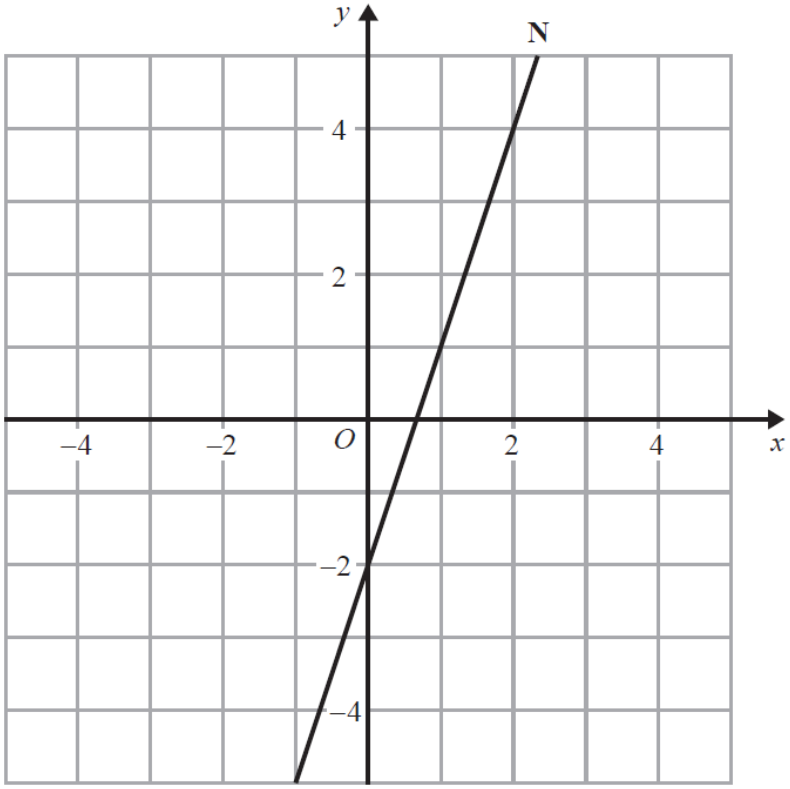
Find the value of S when $t = 8$

.....

(Total 4 marks)

---

20. The line **N** is drawn below.



Find an equation of the line perpendicular to line **N** that passes through the point (0, 1).

.....

(Total 3 marks)

21. The points A, B and C lie in order on a straight line.

The coordinates of A are (2, 5)
The coordinates of B are (4, p)
The coordinates of C are (q, 17)

Given that $AC = 4AB$, find the values of p and q.

p = ...

q = ...

(Total 3 marks)

TOTAL FOR PAPER IS 80 MARKS

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$2x + 2(x + 9) < 200$ $2x + 2x + 18 < 200$ $4x + 18 < 200$ $4x < 182$ $x < 45.5$ **OR** $200 \div 4 = 50$ $9 + 9 \div 4 = 4.5$ $50 - 4.5 = 45.5$ OR $200 - 18 = 182$ $182 \div 4 = 45.5$	45	4	B1 for $x + 9$ oe seen (it could just be on a diagram) **or** any rectangle with length 9 cm greater than width M1 for $2x + 2(x + 9)$ oe A1 for 45.5 B1 for answer of 45 **OR** M1 for $200 \div 4$ (=50) M1 for $(9 + 9) \div 4$ (=4.5) A1 for 45.5 B1 for answer of 45
2		$16 \times 7 = 112$ $112 - 87$	25	2	M1 for 6×14.5 (= 87) or 7×16 (=112) or 6×1.5 (= 9) or 7×1.5 (= 10.5) A1 for 25
3			A and 3 B and 2 C and 4 D and 1	2	B2 for all 4 correct (B1 for 2 correct)
4	(a)		7.5	3	M1 for $4.5^2 + 6^2$ (=5 6.25) M1 for $\sqrt{56.25}$ or $\sqrt{(4.5^2 + 6^2)}$ A1 for 7.5
	(b)		217	4	M1 for use of appropriate trig ratio eg tan $CAB = \frac{4.5}{6}$ (= 0.75), sin $CAB = \frac{4.5}{"7.5"}$ (= 0.6), cos $CAB = \frac{6}{"7.5"}$ (= 0.8) M1 for inverse trig shown correctly e.g. $CAB = \tan^{-1} \frac{4.5}{6}$ (= 0.75), $CAB = \sin^{-1} \frac{4.5}{"7.5"}$ (= 0.6), $CAB = \cos^{-1} \frac{6}{"7.5"}$ (= 0.8) A1 for 36.8 to 37 (or 53 to 53.2 if identified as ACB)

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					B1ft for bearing 180 + "36.8" if "36.8" is not 40–50
5			$9x^2 + 7x - 2$	4	M1 for finding an expression for a missing length eg $4x - 1 - x - x$ ($=2x - 1$) or $x + 2 - 2x$ ($= 2 - x$) M1 for a correct expression for one area from the cross-section, eg. $x \times 2x$ or $(4x - 1)(x + 2 - 2x)$ or for one volume of cuboid(s), eg. $x \times 2x \times (x + 1)$ M1 for a complete method to find the volume A1 for $9x^2 + 7x - 2$ or $(9x - 2)(x + 1)$ oe
6			8	4	M1 for $(2\sqrt{10})^2 - 2^2$ ($= 36$) A1 for ($CD =$) 6 M1 (dep on M1) for '6' × 4 – $\frac{1}{2}$ × '6' × 2 – $\frac{1}{2} \times 2 \times 2 - \frac{1}{2}$ × ('6' – 2) × 4 C1 for area of 8 from fully correct working
7			17.7(014…)	3	B1 for 7.75 or7.85 or 5.15 or 5.25 or 62.5 or 63.5 M1 for $\frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$ A1 for 17.7(0140994…)
8	(a) (b)		Negative 117–123	1 2	B1 cao M1 for a line of best fit drawn between (9, 130) & (9, 140) and between (13, 100) & (13,110) inc.. A1 for 117 − 123 inclusive
9		$4x + 3y = 695$ $5x + 2y = 720$ $8x + 6y = 1390$ $15x + 6y = 2160$ $7x = 770$	Coffee £1.1(0) Tea 85p	5	M1 for attempt to use variables for cost of cup of tea and cost of a cup of coffee. A1 for correct equations : $4x + 3y = 695$ and $5x + 2y = 720$ oe M1 for correct process to eliminate either x or y (condone one arithmetic error) could be by multiplication of both equations and then

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		$x = 110$ $y = 85$			addition/subtraction **or** by manipulation of one equation and then substitution into second equation M1 (dep) for substituting found value into either equation A1 for correct answers with units
10		$2 = k^{-1}$	½	2	M1 for reading off and substituting a pair of values from the graph (excluding 0, 1) into the equation, eg $x = -1$, $y = 2$ A1 for ½ oe
11		US 1 gal costs 20.88÷6=$3.48 1 litre costs $3.48÷3.79 = $0.918... I litre costs 0.918..× 0.77 Euros = 0.707..Euros Russia 1 litre costs 800 ÷25.58 = 31.27... Roubles 1 litre costs 31.27÷40.63 Euros = 0.769... Euros Or 25.58 litres = 25.58 ÷ 3.79 = 6.749.. US gallons	Correct conclusion based on correct calculations	5	M1 for a conversion, gallons to litres or litres to gallons M1 for a conversion, roubles to US Dollars or US Dollars to roubles or convert both to Euros M1 for a conversion to common units and common currency A1 for two correct answers in the same currency and for the same unit C1 (dep on at least M1) for correct conclusion ft candidate's figures. eg M1 1 US gal costs 20.88÷6 (=3.48) M1 1 litre costs 3.48 ÷3.79 ..× 0.77 (=0.707..) M1 1 litre in Russia costs 800 ÷25.58 ÷40.63 (=0.769) A1 for 0.707 and 0.769 C1 (dep on at least M1) for correct conclusion ft candidate's figures.

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		800 roubles = (800÷40.63)÷0.77 = \$25.571.. Cost in \$ of 1 US gallon in Russia is 25.571..÷6.749... = \$3.788.. Cost in \$ of 1 US gallon in US = 20.88÷6 = \$3.48 <u>Cost per litre for US petrol</u> \$0.918 or €0.707 or 28.7 rub <u>Cost per gallon for US petrol</u> \$3.48 or €2.68 or 109 rub <u>Cost per litre for Russian petrol</u> 31.27 rub or €0.770 or \$1 <u>Cost per gallon for Russian petrol</u> 118 rub or €2.92 or \$3.79			
12	(a)		0.3 0.3, 0.7, 0.3	2	B1 for 0.3 as first spin oe B1 for 0.3, 0.7, 0.3 in correct positions for second spin oe
	(b)		0.42	3	M1 for '0.3' × '0.7' or 0.7 × '0.3' (=0.21) M1 for '0.3' × '0.7 + 0.7 × '0.3 (OR M2 for $1 - 0.7^2 - 0.3^2$) A1 for 0.42 oe
13		(A =) 0.5 × (4 + k) × √3 (= 5√6) oe	(k =) 10√2 – 4	3	M1 $4\sqrt{3} + 0.5(k - 4) \times \sqrt{3}$ oe M1 correctly isolating k A1 Accept $2(5\sqrt{2} - 2)$ but don't accept $10\sqrt{2} - 4$

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		$k + 4 = (10\sqrt{6})/\sqrt{3}$ $(k =)\ 2 \times (5\sqrt{6})/\sqrt{3} - 4$ or $(k =)\ (5\sqrt{6} - \sqrt{3})/(0.5\sqrt{3})$ oe			followed by $5\sqrt{2} - 2$
14			14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (= 1526.42...) M1 (dep) for $\frac{\text{'1526.42...'}}{\pi \times 5.8^2}$ A1 for 14.4 - 14.5 **OR** M1 for $\frac{5.8}{6.5}$ or $\frac{6.5}{5.8}$ or 0.89(23…) or 1.12(06896…) M1 for $11.5 \div \left(\frac{5.8}{6.5}\right)^2$ or $11.5 \div \left(\frac{6.5}{5.8}\right)^2$ A1 for 14.4 – 14.5
15		$(n^2 + 4n + 4) - (n^2 + 2n + 1)$ $\frac{2n+3}{2n^2+3n}$ $\frac{2n+3}{n(2n+3)}$	Proof	4	M1 for correct method to expand $(n + 2)^2$ or $(n + 1)^2$ M1 for correct simplification of numerator M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof **OR** M1 for $\{(n+2) - (n+1)\}\{(n+2) + (n+1)\}$ M1 for $1 \times (2n+3)$ M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof **OR** M1 for $n\{(n+2)^2 - (n+1)^2\} = (2n^2 + 3n) \times 1$ M1 for $n(n+2)^2 - n(n+1)^2$ or for correct expansion of $(n+2)^2 - (n+1)^2$

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					M1 for correct expansion of $n\{(n+2)^2-(n+1)^2\}$ C1 for complete and correct proof (must include statement recognising the equality of LHS and RHS)
16		$p(r-3) = 2r+5$ $pr-3p = 2r+5$ $pr-2r = 3p+5$ $r(p-2) = 3p+5$	$\frac{3p+5}{p-2}$	4	M1 for multiplying both sides by $r-3$ eg $p(r-3)$ or $pr-3p$ or $pr-3$ or $p \times r-3$ M1 for isolating their two terms in r on one side of an equation to get $pr-2r$ or $2r-pr$ M1 (dep on M1) for correctly factorising r from '$pr-2r$' A1 for $\frac{3p+5}{p-2}$ or $\frac{-3p-5}{2-p}$ oe
17	(a)		$y-f(x-5)$	1	B1 cao
	(b)		(4, 3)	2	B2 cao (B1 for one coord. correct (in correct position) or (3,4).)
18	(a)		1.5	3	B1 for tangent drawn at $t = 8$ M1 for height ÷ base for a triangle with the tangent as hypotenuse A1 for 1.25 to 1.75
	(b)		156	3	M1 for attempting to find area under curve M1 for correct method to find the area under the curve between $t = 0$ and $t = 6$ (at least 3 areas) A1 for 150 – 160
19			$\frac{1}{16}$	4	M1 for $S \propto \frac{1}{t^3}$ or $S = \frac{k}{t^3}$ M1 for $\frac{1}{2} = \frac{k}{4^3}$ oe or $S = \frac{32}{t^3}$ M1 $S = \frac{32}{8^3}$ oe

1MA1 Practice papers Set 6: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					A1 for $\frac{1}{16}$ oe
20		Gradient of N = 3 Gradient of perpendicular to line N = $-\frac{1}{3}$	$y = -\frac{1}{3}x + 1$	3	M1 for complete method to find gradient of line N or for drawing a perpendicular line M1 for method to find the gradient of a perpendicular line A1 $y = -\frac{1}{3}x + 1$ oe
21			$p = 8$, $q = 10$	3	M1 for finding the difference between the x or y coordinates eg $4 - 2$ (= 2) or $17 - 5$ (= 12) M1 for a complete method to find the values of p or q A1 cao

GCSE Mathematics Practice Tests: Set 6

Paper 3H (Calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

Advice

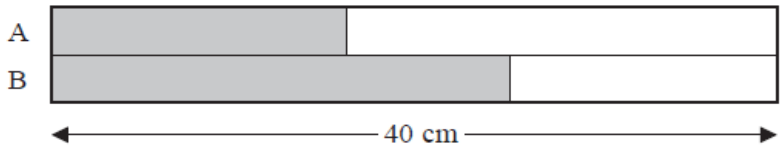
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Here is a rectangle.



The rectangle has been divided into two strips, A and B.
The strips have the same width.

$\frac{2}{5}$ of strip A is shaded.

$\frac{5}{8}$ of strip B is shaded.

The length of the rectangle is 40 cm.

What fraction of the rectangle is **not** shaded?

.....

(Total 4 marks)

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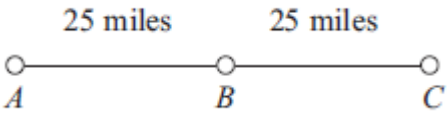
2. Make w the subject of the formula $P = \frac{w-3}{2}$

.....

(Total 2 marks)

3.



A, *B* and *C* are 3 service stations on a motorway.

AB = 25 miles
BC = 25 miles

Aysha drives along the motorway from *A* to *C*.

Aysha drives at an average speed of 50 mph from *A* to *B*.
She drives at an average speed of 60 mph from *B* to *C*.

Work out the difference in the time Aysha takes to drive from *A* to *B* and the time Aysha takes to drive from *B* to *C*.

Give your answer in minutes.

..... minutes

(Total 3 marks)

4. Solve the simultaneous equations

$$4x + 3y = -7$$

$$3x - 4y = 26$$

x =.....

y =.....

(Total 4 marks)

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5. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

(a) How much did Toby have in his savings account after 2 years?

£ .....

(3)

Jaspir invested £2400 for n years in a savings account.
He was paid 7.5% per annum compound interest.

At the end of the n years he had £3445.51 in the savings account.

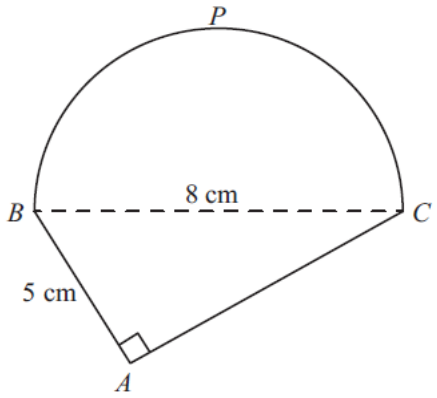
(b) Work out the value of n.

.....

(2)

(Total 5 marks)

6. Here is a shape.



BPC is a semicircle.
BAC is a right-angled triangle.

BC = 8 cm.
AB = 5 cm.

Work out the perimeter of the shape.
Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

7. The diagram shows a trapezium.

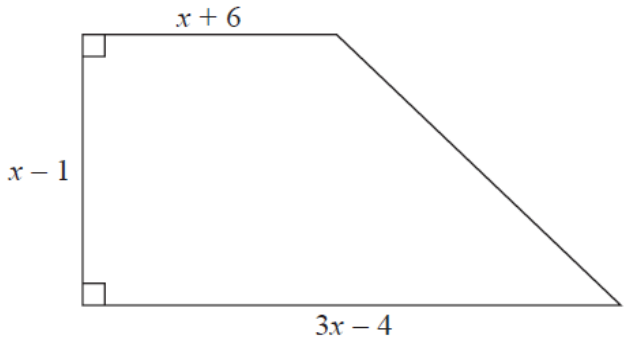


Diagram **NOT** accurately drawn

All measurements on the diagram are in centimetres.

The area of the trapezium is 119 cm^2

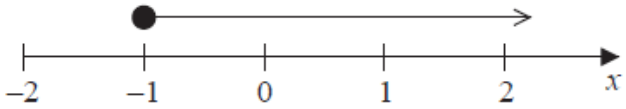
(i) Show that $2x^2 - x - 120 = 0$

(ii) Find the value of x.
Show your working clearly.

x = ...

(Total 6 marks)

8. Here is a number line.



(a) Write down the inequality shown on the number line.

.....

(1)

p is an integer.

$-5 < p \leq -2$

(b) Write down all the possible values of p.

.....

(2)

(c) Solve $5y - 2 < 18$

.....

(2)

(Total 5 marks)

9. There are 9 counters in a bag.
There is a number on each counter.

Kal takes at random 3 counters from the bag.

He adds together the numbers on the 3 counters to get his Total.

Work out the probability that his Total is 6.

.....

(Total 5 marks)

10. The highest common factor (HCF) of 140 and x is 20.

The lowest common multiple (LCM) of 140 and x is 420.

Find the value of x.

x = ...

(Total 2 marks)

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11. A number is decreased by 15%.
The result is 323

What was the original number?

.....

(Total 3 marks)

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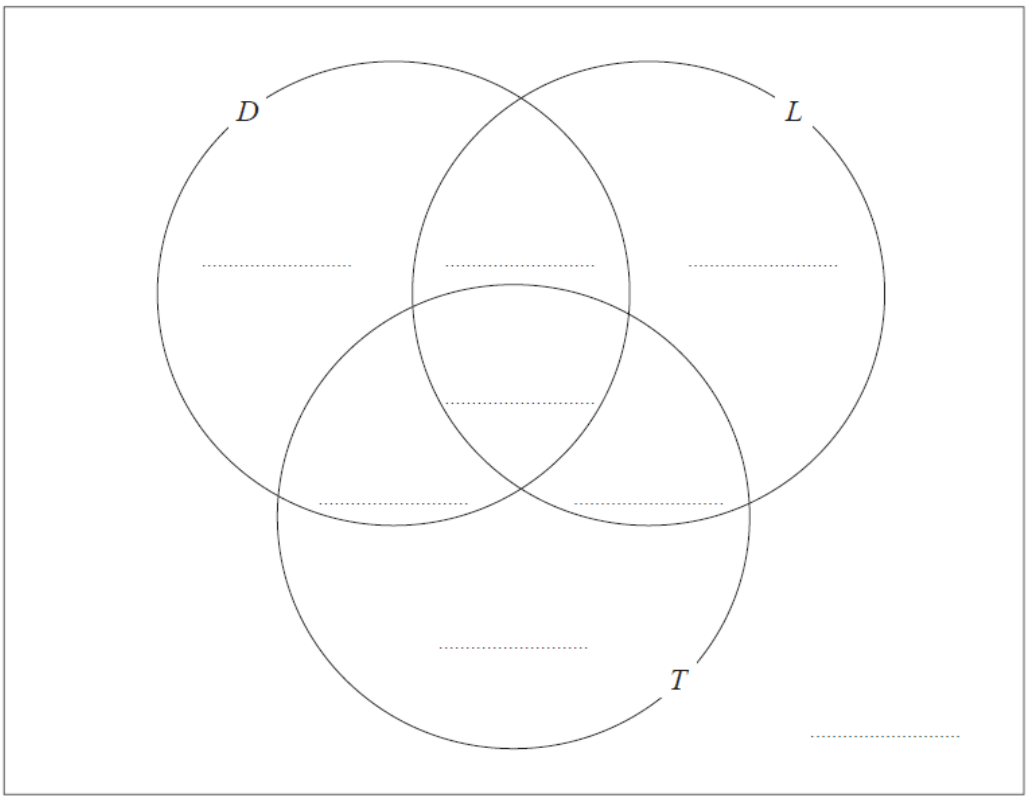
12. Each student in a group of 32 students was asked the following question.

"Do you have a desktop computer (D), a laptop (L) or a tablet (T)?"

Their answers showed that

19 students have a desktop computer
17 students have a laptop
16 students have a tablet
9 students have both a desktop computer and a laptop
11 students have both a desktop computer and a tablet
7 students have both a laptop and a tablet
5 students have all three.

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.



(3)

One of the students with both a desktop computer and a laptop is chosen at random.

(b) Find the probability that this student also has a tablet.

.....

(1)

(Total 4 marks)

13. The function f is defined as

$$f(x) = \frac{x-6}{2}$$

(*a*) Find f(8).

.....

(1)

(*b*) Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

$f^{-1}(x)$ = ...

(2)

The function g is defined as

$$g(x) = \sqrt{x-4}$$

(*c*) Express the function gf in the form $gf(x) = \ldots$
Give your answer as simply as possible.

$gf(x)$ = ...

(2)

(Total 5 marks)

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14. The diagram shows a prism.

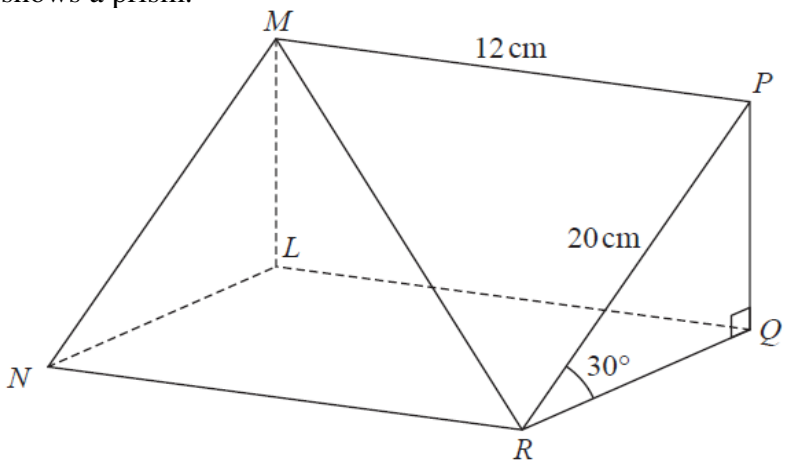


Diagram **NOT** accurately drawn

Triangle *PQR* is a cross section of the prism.

PR = 20 cm
MP = 12 cm
Angle *PRQ* = 30º
Angle *PQR* = 90º

Calculate the size of the angle that the line *MR* makes with the plane *RQLN*.
Give your answer correct to 1 decimal place.

.....°

(Total 5 marks)

15. A scientist is studying some rabbits.
The rabbits have a disease that kills the rabbits.

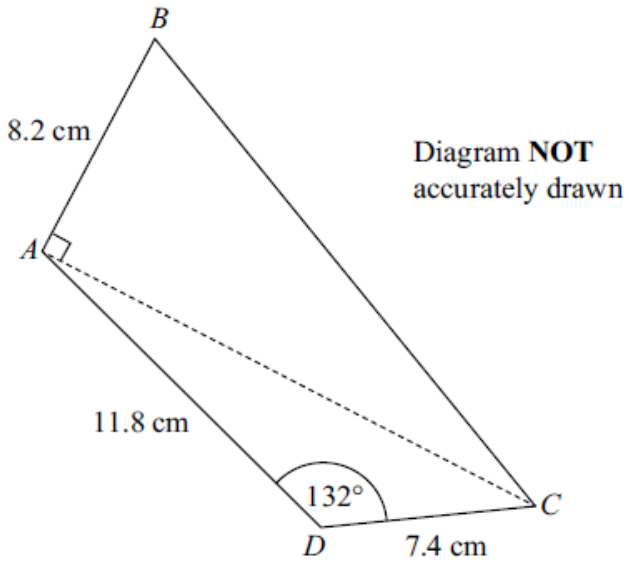
A population of 160 of these rabbits was reduced to 90 rabbits in two days.
The rabbit population is decreasing exponentially.

Work out how many of the 160 rabbits will still be alive at the end of 7 days.

.....

(Total 5 marks)

16.



Work out the area of the quadrilateral *ABCD*.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 6 marks)

17. $y = at^2 - 2at$

$x = 2a\sqrt{t}$

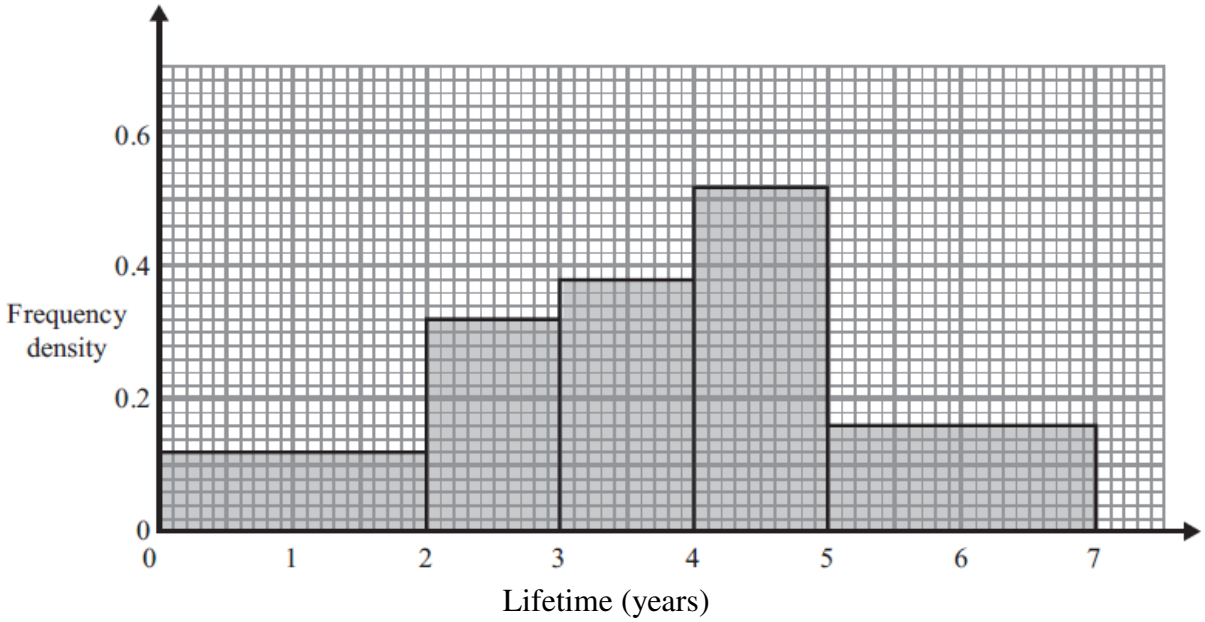
Express y in terms of x and a.

Give your answer in the form $y = \frac{x^p}{ma^3} - \frac{x^q}{na}$, where p, q, m and n are integers.

.....

(Total 4 marks)

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

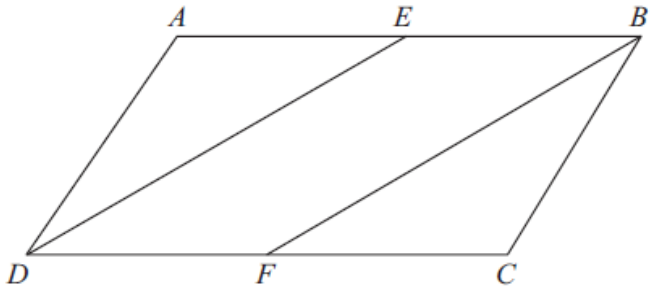


Work out the proportion of the components with a lifetime of between 1 and 6 years.

.....

(Total 4 marks)

19.



ABCD is a parallelogram.
E is the midpoint of *AB*.
F is the midpoint of *DC*.

(a) Prove that triangle *AED* is congruent to triangle *CFB*.

(3)

(b) Hence, prove that *DE* = *FB*

(1)

(Total 4 marks)

TOTAL FOR PAPER IS 80 MARKS

1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			$\frac{39}{80}$	4	M1 for a correct method to find $\frac{2}{5}$ of 40; eg. $40 \div 5 \times 2$ (= 16) **or** for a correct method to find $\frac{5}{8}$ of 40; eg. $40 \div 8 \times 5$ (= 25) M1 for a correct method to find $\frac{2}{5}$ of 40 **and** $\frac{5}{8}$ of 40 M1 (dep on M1) for 80 – "16" – "25" (= 39) or $\frac{\text{"16"} + \text{"25"}}{80}$ $(= \frac{41}{80})$ A1 $\frac{39}{80}$ oe **OR** M1 for $1 - \frac{2}{5}$ $(= \frac{3}{5})$ **and** $1 - \frac{5}{8}$ $(= \frac{3}{8})$ M1 for a correct method to find $\frac{3}{5}$ of 40; eg. $40 \div 5 \times 3$ (= 24) **or** for a correct method to find $\frac{3}{8}$ of 40; eg. $40 \div 8 \times 3$ (= 15) M1 (dep on M1) for "24" + "15" (= 39) A1 $\frac{39}{80}$ oe
2			$w = 2P + 3$	2	M1 for a clear intention to multiply **both** sides by 2 or add $\frac{3}{2}$ to both sides as a first step A1 for $w = 2P + 3$ oe
3		25 ÷ 50 = 0.5 h = 30 min 25 ÷ 60 = 0.416h = 25 min	5	3	M1 for 25 ÷ 50 **or** $\frac{60}{50} \times 25$ **or** 30 (min) **or** 0.5(h) **or** 25 ÷ 60 **or** $\frac{60}{60} \times 25$ **or** 25 (min) **or** 0.41(6)(h) M1(dep) '0.5' –'0.41(6)'**or** '30' – '25' A1 cao **OR** M1 for 60 ÷ 25 (= 2.4) and 60 ÷ "2.4" **or** 50 ÷ 25 (= 2) and 60 ÷ "2" M1(dep) for '30' – '25' A1 cao
4		$12x + 9y = -21$ $12x - 16y = 104$ $25y = -125$	$x = 2$ $y = -5$	4	M1 for correct process to eliminate either x or y (condone one arithmetic error)

1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		$y = -5$ $4x + 3 \times -5 = -7$ **OR** $16x + 12y = -28$ $9x - 12y = 78$ $25x = 50$ $x = 2$ $4 \times 2 + 3y = -7$			A1 for either $x = 2$ or $y = -5$ M1 (dep on 1st M1) for correct substitution of their found value or (indep) for correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both $x = 2$ and $y = -5$ **SC**: B1 for $x = 2$ or $y = -5$ if M0 scored
5	(a)	4500×1.04^2	4867.20	3	M1 for 4500×1.04 or for $4500 + 0.04 \times 4500$ or for 4680 or 180 or 360 or 4860 M1 (dep) '4680' × 1.04 or for '4680' + 0.04 × '4680' A1 for 4867.2(0) cao (If correct answer seen then ignore any extra years) **Alternative method** M2 for 4500×1.04^2 or 4500×1.04^3 A1 for 4867.2(0) cao [SC: 367.2(0) seen B2]
	(b)	2400×1.075^n 2580 2773.5 2981.5125 3205.12… 3445.51…	5	2	M1 for an attempt to evaluate 2400×1.075^n for at least one value of n (not equal to 1) or $3445.51 \div 1.075^n$ ($n \geq 2$) or $\frac{3445.51}{2400}$ (=1.4356...) and 1.075^n evaluated, $n \geq 2$ A1 for 5 cao
6		$2 \times 10 \cos 70$ OR $BC^2 = 10^2 + 10^2 -$ $2 \times 10 \times 10 \times \cos 40$ $BC = \sqrt{46.79(1....)}$	6.84	4	M1 for $180 - 2 \times 70$ M1 for $\frac{10}{\sin 70} = \frac{BC}{\sin(180 - 2 \times 70)}$ M1 for $BC = \frac{\sin(180 - 2 \times 70) \times 10}{\sin 70}$ A1 for 6.84(0…) **OR** M1 for $180 - 2 \times 70$ M1 for $10^2 + 10^2 - 2 \times 10 \times 10 \times \cos(180 - 2 \times 70)$ M1 for $\sqrt{'46.79(1....)'}$

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Question		**Working**	**Answer**	**Mark**	**Notes**
					A1 for 6.84(0…) M1 for perpendicular from A to BC, may be implied by correct working M1 for 10×cos70 or 10×sin20 or correct attempt to use sin or cos M1 for 2× '10×cos70' A1 for 6.84(0...)
7	(i)	$\frac{1}{2}\times(x+6+3x-4)\times(x-1)$ **or** $(x+6)(x-1)$ **or** $(x-1)(3x-4)$ **or** $\frac{1}{2}\times(x-1)(3x-4-(x+6))$ $\frac{1}{2}\times(4x^2-2x-2)=119$	shown	3	M1 correct algebraic expression for any relevant area M1 for correct equation with at least one pair of brackets expanded correctly A1 for completion to given equation
	(ii)	$(2x\pm15)(x\pm8)$ (= 0) **or** $\frac{--1\pm\sqrt{(-1)^2-4\times2\times-120}}{2\times2}$ **or** $\left(x-\frac{1}{4}\right)^2-\left(\frac{1}{4}\right)^2-60=0$ $(2x+15)(x-8)$ (=0) **or** $\frac{1\pm\sqrt{1+960}}{4}$ **or** $x=\frac{1}{4}\pm\sqrt{\left(\frac{1}{4}\right)^2+60}$ **or** −7.5 **and** 8 given as solutions	8	3	M1 Start to solve quadratic condone one sign error in substitution if quadratic formula used; allow -1^2 or 1^2 or 1 in place of $(-1)^2$ M1 ft from an incorrect 3 term quadratic equation A1 dep ft method from an incorrect 3 term quadratic equation Award all 3 marks if first M1 awarded **and** 8 alone given as final answer
8	(a)		$x \geq -1$	1	B1 cao
	(b)		−4,−3,−2	2	B2 for all 3 values and no extras (ignore repeats) (B1 for 2 correct values and no extras or all 3 correct values and −5)
	(c)		$y < 4$	2	M1 for clear intention to add 2 onto each side of an inequality (or equation) or clear intention to divide all terms by 5 as a first step or (y =) 4 A1 cao

1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		eg. $\frac{3}{9}\times\frac{2}{8}\times\frac{1}{7}\left(=\frac{6}{504}=\frac{1}{84}\right)$ eg. $\frac{2}{9}\times\frac{3}{8}\times\frac{4}{7}\left(=\frac{24}{504}=\frac{1}{21}\right)$ $6\times"\frac{24}{504}"\left(=\frac{144}{504}=\frac{6}{21}=\frac{2}{7}\right)$ $6\times\frac{2}{9}\times\frac{3}{8}\times\frac{4}{7}\ +\ \frac{3}{9}\times\frac{2}{8}\times\frac{1}{7}\ \left(=\frac{6}{21}+\frac{1}{84}\right)$	$\frac{150}{504}$	5	M1 (probabilities from selecting 2, 2, 2) allow $\frac{3}{9}\times\frac{2}{9}\times\frac{1}{9}\left(=\frac{6}{729}\right)$ **or** $\frac{3}{9}\times\frac{3}{9}\times\frac{3}{9}\left(=\frac{27}{729}\right)$ M1 (probabilities from selecting 1, 2, 3) allow $\frac{2}{9}\times\frac{3}{9}\times\frac{4}{9}\left(=\frac{24}{729}\right)$ M1 (probabilities for all combinations of 1, 2, 3) allow $6\times"\frac{24}{729}"\left(=\frac{144}{729}\right)$ M1 complete correct method A1 oe eg. $\frac{25}{84}$, 0.298, 0.297619…
10		20 = 2, 2, 5 140 = 2, 2, 5, 7 420 = 2, 2, 3, 5, 7	60	2	M1 for identifying the prime factors for 2 of the 3 numbers 20,140,420 (can be implied by a factor tree, repeated division or Venn diagram) or For a complete Venn diagram for x and 140 with 20 in the intersection or $x = 20 \times 3$ or $20 \times 7 \times y = 420$ or $\frac{420}{20\times 7}$ or

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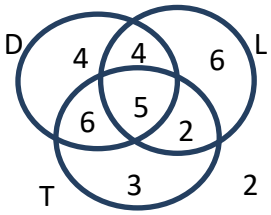
Question		**Working**	**Answer**	**Mark**	**Notes**
					At least the 1st 3 multiples of 20 or $140x = 420 \times 20$ oe A1 (Allow $2\times2\times3\times5$)
11			380	3	M1 for $1 - 0.15$ ($= 0.85$) or $100 - 15$ ($= 85$) M1 for $323 \div 0.85$ oe or $323 \div 85 \times 100$ oe A1 cao

12			5/9		M1 for 5 in the middle and 1 from 4(D ∩ L ∩ T′) or 2(L ∩ T ∩ D') or 6(D ∩ T ∩ L') M1 for any 4 correct entries A1 for all correct including 2 outside the circles inside the rectangle B1 ft from incorrect diagram
13	(a)		1	1	B1
	(b)	$y = (x - 6) / 2$ $2y = x - 6$ $2y + 6 = x$	$2x + 6$	2	M1 or for a correct flowchart including inverse A1

14		$PQ(ML) = 20\sin 30^o$ (=10) or $MR = \sqrt{12^2 + 20^2} = \sqrt{544} = 4\sqrt{34}$ =23.32..) $LR = \sqrt{12^2 + (RQ)^2}$ = $\sqrt{12^2 + (10\sqrt{3})^2} = \sqrt{444} = 2\sqrt{111} = 21.07..$ $\sin MRL = \frac{10}{4\sqrt{34}}$ $\left(\frac{ML}{MR}\right)$ or $\cos MRL = \frac{2\sqrt{111}}{4\sqrt{34}}$ $\left(\frac{LR}{MR}\right)$ or $\tan MRL = \frac{10}{2\sqrt{111}}$ $\left(\frac{ML}{LR}\right)$	25.4	5	B1 Recognition of angle *LRM* as required angle either drawn on diagram or from working M2 for a correct method to calculate *PQ*(*ML*) & *MR* or *MR* & *LR* or *PQ*(*ML*) & *LR* (NB: *LR* requires use of *RQ* = $\sqrt{20^2 - 10^2}$ *or* $20\cos 30 = \sqrt{300} = 10$) Or M1 for a correct method to calculate one of the sides *PQ* or *MR* or *LR* M1 (Dep on M2) Use of a correct trig ratio to find angle *MRL* A1 25.38 – 25.5

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Question		**Working**	**Answer**	**Mark**	**Notes**
15			21 or 22	5	M1 for $160r^2 = 90$ or $\frac{90}{160}$ M1 for $(r=)\ \sqrt{\frac{90}{160}}$ oe M1 (dep M2) for $160 \times \left(\sqrt{\frac{90}{160}}\right)^7$ oe A1 for 21.3… A1 for 21 or 22 **or** M1 for $160 \times r^2 = 90$ or $\frac{90}{160}$ M1 for $160 \times \frac{100-n}{100} \times \frac{100-n}{100} = 90$ M1 (dep M2) for 160×0.75^7 A1 for 21.3… A1 for 21 or 22
16		$AC^2 = 11.8^2 + 7.4^2 - 2 \times 11.8 \times 7.4 \times \cos 132$ $AC = 17.63…$ ½ ×8.2 × "17.63… (= 72.28..) + ½ × 11.8 × 7.4 × sin132 (= 32.445..)	105	6	M1 for $AC^2 = 11.8^2 + 7.4^2 - 2 \times 11.8 \times 7.4 \times \cos 132$ M1 for correct order of operations or 310.85… A1 for $AC = 17.63…$ M1 for Area of ABC = ½ ×8.2 × "17.63…" **or** Area of ADC = ½ × 11.8 × 7.4 × sin132 M1 for "½ ×8.2 × "17.63…"" + "½ × 11.8 × 7.4 × sin132" A1 for an answer in the range 104.7 – 105

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Question		**Working**	**Answer**	**Mark**	**Notes**
17		$\sqrt{t} = \frac{x}{2a}$ or $x^2 = (2a\sqrt{t})^2$ or $x^4 = (2a\sqrt{t})^4$ oe $t = \left(\frac{x}{2a}\right)^2$ oe or $t^2 = \frac{x^4}{16a^4}$ oe $y = a\left[\left(\frac{x}{2a}\right)^2\right]^2 - 2a\left(\frac{x}{2a}\right)^2$ oe	$y = \frac{x^4}{16a^3} - \frac{x^2}{2a}$	4	M1 Correct rearrangement for $\sqrt{t}$ or correct expression for x^2 or x^4 M1 Correct expressions for t or t^2 or for at^2 or $2at$ in terms of x and a M1 for correct substitution of t and t^2 into expression for y A1 Fully correct answer in required form

1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		Area $(1 < l < 6)$ $= (0.12 \times 1) +$ $(0.32 \times 1) + (0.38 \times 1) +$ $(0.52 \times 1) + (0.16 \times 1)$ $= 1.50$ Total Area$= (0.12 \times 2) +$ $(0.32 \times 1) + (0.38 \times 1) +$ $(0.52 \times 1) + (0.16 \times 2)$ $= 1.78$ Proportion $= \frac{1.50}{1.78}$	0.84 or $\frac{75}{89}$	4	M1 for attempt to use frequency density × width e.g. 0.12×2 or 0.24 M1 for $(0.12 \times 2) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 2)$ or 1.78 seen M1 for $((0.12 \times 1) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 1))$/"1.78" A1 for answer which rounds to 0.84 or 84% or $\frac{75}{89}$ or equivalent vulgar fraction **OR** M1 for attempt to use area e.g. sight of any one of 4.8, 6.4, 7.6, 10.4 or 6.4 (cm^2) oe M1 for $4.8 + 6.4 + 7.6 + 10.4 + 6.4$ or 35.6 (cm^2) oe seen M1 for $(2.4 + 6.4 + 7.6 + 10.4 + 3.2)$ "35.6" oe A1 for answer which rounds to 0.843 or 84.3%% or $\frac{75}{89}$ or equivalent vulgar fraction
19			congruency proved	3	M1 for correct statement with correct reason M1 for a second correct statement with correct reason C1 for complete proof justifying congruency, eg SAS or AAS Eg $DAE = BCF$ (opposite angles of parallelogram are equal) $AE = FC$ (E and F are midpoints of lines of equal length) $AD = BC$ (opposite sides of parallelogram are equal) $AED \equiv CFB$ (SAS)
			explains why DE = FB	1	C1 for relevant statement using congruency Eg DE and FB are corresponding sides of congruent triangles