

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	1080	M1	for method to write one number as a product of prime factors (condone one division error in method chosen), eg. one complete factor tree or 2, 2, 3, 3, 3 or 2, 2, 2, 3, 5 or for listing at least 5 multiples of either number (condone one error) or for any common multiple ($\neq 1080$), eg. 12960 ($= 108 \times 120$)	Accept first 5 multiples if all correct or one error in the first 6 multiples
		M1	for method to write both numbers as a product of prime factors (condone a total of one division error) eg. two complete factor trees or 2, 2, 3, 3, 3 and 2, 2, 2, 3, 5 or lists of multiples of the two numbers, at least 5 of each, one of which includes 1080	For the list not containing 1080, accept first 5 correct multiples or one error in the first 6 multiples
		A1	cao SC: B2 for any product that would lead to 1080, eg. $2^3 \times 3^3 \times 5$ or $12 \times 9 \times 10$	

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5	93	M1 M1 M1 A1	for method to find angle ACB , eg. $180 - 75 - 51 (= 54)$ (dep M1) for method to use the ratio, eg. $"54" \div (2 + 1) (= 18)$ for complete method, eg. $180 - 51 - "18" \times 2$ or $75 + "18"$ oe cao	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
6	No (supported)	P1 P1 C1	for process to find total weight of the 4 red bricks, eg. $5 \times 4 (= 20)$ or for process to find total weight of the 5 blue bricks eg. $9 \times 5 (= 45)$ for process to find total weight of all 10 bricks, eg. $"20" + "45" + 6 (= 71)$ No with correct supporting evidence Acceptable examples No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 Not acceptable examples Yes No, it is 71	May be seen next to statements 20 must be clearly referenced to the red bricks. $5 + 9 + 6 = 20$ gets no marks Candidates working in grams will need to give 7100 and 7000 for example as comparable figures

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7	(a)	p^{10}	B1	cao	
	(b)	$2x^4y^2$	M1	for any two of $12 \div 6 (= 2)$, $x^{7-3} (= x^4)$, $y^{3-1} (= y^2)$ in a single product or written as a fraction with complete and correct cancelling of at least two terms	
			A1	cao	
8	(i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070° , eg. a line drawn 70° from the North line at P	Accept a line of any length as long as the intention is clear.
	(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance PQ , eg. $12 \times 1.5 (= 18)$	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to $12 \times 1.5 (= 18)$ Award no marks if no supportive processes Award no marks if no supportive processes Award A0A0 if Q is not in the correct place
			P1	(dep previous P1) for the process to use the given scale, eg. “18” $\div 4 (= 4.5 \text{ cm})$	
			A1	(dep P3) for distance in the range 20 to 23	
			A1	(dep P3) for bearing in the range 317 to 330	

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9 (a)	21.6	M1	for a method using distance = speed $\times$ time, eg. $72 \times \frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2×3 oe partitioning method	Accept 72×18
		A1	for 21.6 oe	
		M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. $20 \times \frac{3600}{1000}$ (= 72) or $72 \times \frac{1000}{3600}$ (= 20)	
(b)	No (supported)	C1	for No since 72 km/h = 20 m/s oe	Accept methods to convert both speeds to km/s or m/h
10 (a)	cf graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)	C2	for a complete and accurate cf graph	May be a cumulative frequency curve or a cumulative frequency polygon Ignore any graph drawn to the left of the first point If histograms drawn, plots must be identified
		(C1	for at least 4 or 5 cf values plotted correctly)	
			SC: B1 for 4 or 5 points plotted not at end but consistently within each interval and joined provided no gradient is negative	
		M1	for UQ in the range 66 to 70 or LQ in the range 42 to 46 or ft their cf graph	
		A1	for answer in range 21 to 28 or ft their cf graph	
(c)	answer in the range $\frac{19}{40}$ to $\frac{24}{40}$	M1	for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 or ft their graph (if possible)	Their graph must be a cf graph
		A1	for an answer in the range $\frac{19}{40}$ to $\frac{24}{40}$ or ft their cf graph	
				Accept any equivalent fraction, decimal from 0.475 to 0.6 or percentage from 47.5% – 60%

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11	72	M1 A1	for $\frac{5}{30} = \frac{12}{p}$ oe, eg $\frac{12}{p} \times 30 = 5$ or $12 \div \frac{5}{30}$ or $5 : 30 = 12 : p$ or 1 in 6 ($30 \div 5$) counters are yellow, so $12 \times "6"$ or using equivalent ratios to $5 : 30$, eg. $2 : 12$ and $10 : 60$ and adding to give $2 + 10 : 12 + 60$ cao	
12	Mistake identified	C1	for a correct mistake identified Acceptable examples all three terms should be multiplied by 2 and not just two of them the 5 should be multiplied by 2 it should be $2 \times T = q + 2 \times 5$ should subtract 5 first (before multiplying by 2) Not acceptable examples Should remove the 5 first $2 \times T$ should be $2T$ should have got rid of the denominator	Accept answers showing a correct first step
13 (a)	$\frac{17x + 2}{3x(x + 1)}$	M1 A1	for a correct common denominator with at least one correct numerator eg. $\frac{5 \times 3x}{3x(x+1)} + \frac{2(x+1)}{3x(x+1)}$ for a single simplified fraction, eg. $\frac{17x+2}{3x(x+1)}$ or equivalent eg. $\frac{17x+2}{3x^2+3x}$	$\frac{15x+2(x+1)}{3x(x+1)}$ gets M1 only
(b)	$(x + y)(x + y + 3)$	B1	cao	

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14	5	P1	for process to find the area of the triangle, eg. $0.5 \times (x + 4)(x - 2)$ oe OR for process to find the area of rectangle and 27.5×2 , eg. $(x + 4)(x - 2)$ and 55	Trial and improvement methods must be fully correct identifying the value of x as 7 (3 marks) or the shortest side as 5 (4 marks)
		P1	(dep P1) for process to expand the brackets and derive a quadratic equation, eg. $x^2 + 4x - 2x - 8 = 55$ or $0.5(x^2 + 4x - 2x - 8) = 27.5$ oe	
		P1	(dep P2) for complete process to solve the quadratic equation $x^2 + 2x - 63 = 0$ eg $(x - 7)(x + 9) (= 0)$ or $\frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -63}}{2 \times 1}$ or $(x + 1)^2 - 1 - 63 (= 0)$	
		A1	cao SC: B1 for $x^2 + 4x - 2x - 8 = 27.5$	

An answer of 5 with no supportive working gets no marks

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15	$\frac{414}{990}$	M1 M1 A1	for $(x =) 0.41818\ldots$ or $(10x =) 4.\dot{1}\dot{8}$ or $4.1818\ldots$ or $(100x =) 41.\dot{8}\dot{1}$ or $41.818\ldots$ or $(1000x =) 418.\dot{1}\dot{8}$ or $418.18\ldots$ for using two recurring decimals with a terminating decimal difference, eg. $(1000x - 10x =) 418.\dot{1}\dot{8} - 4.\dot{1}\dot{8}$ or $418.18\ldots - 4.1818\ldots (= 414)$ for $\frac{414}{990}$ oe, eg $\frac{23}{55}$	Accept $(100x - x =) 41.\dot{8}\dot{1} - 0.\dot{4}\dot{1}\dot{8}$ or $41.818\ldots - 0.41818\ldots (= 41.4)$ $\frac{41.4}{99}$ must be simplified to gain the accuracy mark
16 (a)	$2\sqrt{11}$	M1 A1	for method to multiply numerator and denominator by $\sqrt{11}$ or a multiple of $\sqrt{11}$, eg $\frac{22}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}}$ for $2\sqrt{11}$	
(b)	$\frac{6 + \sqrt{3}}{11}$	M1 M1 A1	for method to multiply numerator and denominator by $2\sqrt{3} + 1$ or a multiple of $2\sqrt{3} + 1$, eg $\frac{\sqrt{3}}{2\sqrt{3} - 1} \times \frac{2\sqrt{3} + 1}{2\sqrt{3} + 1}$ (dep) for $\sqrt{3} \times 2\sqrt{3} = 6$ or $2\sqrt{3} \times 2\sqrt{3} = 12$ for $\frac{6 + \sqrt{3}}{11}$ (accept $a = 6$ and $b = 11$)	

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17	4	P1	for process to find ratio of corresponding lengths, eg. $\sqrt{4}:\sqrt{9}$ (= 2 : 3)	This may be seen by checking their volume, eg. "8" $\times$ 4 (= 32) and "8" $\times$ 3 (= 24) An answer of 4 with no supportive working gets no marks
		P1	for process to find ratio of volumes, eg "2" ³ : "3" ³ (= 8 : 27)	
		P1	for "27" $\div$ "8" (= 3.375)	
		A1	for rounding to give an answer of 4 from correct working	

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18 (a)	Shown	C1	for $f^{-1}(x) = \sqrt[3]{\frac{x+4}{2}}$ OR for $2x^3 - 4 = 50$ OR for substituting $x = 3$ to find $f(3)$	
		C1	for substituting $x = 50$ to show the result giving $f^{-1}(50) = 3$ OR solving for x to give $x = 3$ OR for showing that $f(3) = 50$	
(b)	$x = -1$ and $x = 2.5$	P1	for $hg(x) = (x + 2)^2$	
		P1	(dep) for start to a process to derive a quadratic equation eg. $x^2 + 4x + 4 = 3x^2 + x - 1$	$(x + 2)^2$ must be correctly expanded
		P1	for a process to solve the quadratic equation $2x^2 - 3x - 5 = 0$ eg $(2x - 5)(x + 1) (= 0)$ or $\frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 2 \times -5}}{2 \times 2}$ or $2\left[\left(x - \frac{3}{4}\right)^2 - \frac{9}{16} - \frac{5}{2}\right] (= 0)$	
		A1	for $x = -1$ and $x = 2.5$	2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$ acceptable
19	$\frac{3}{4}$ oe	P1	for a first step to converting to a common base with one correct conversion, eg. $9^{-\frac{1}{2}} = 3^{-1}$ or $\frac{1}{3}$ or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe	$9^{-\frac{1}{2}} = 3^{-1}$ (or $\frac{1}{3}$) oe or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe seen alone gets the P1
		P1	(dep) for $3^{-1} = 3^{\frac{3}{4}} \div 3^{x+1}$ oe	
		A1	cao	

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20 (a)	graph	C2	for a translation of the graph by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$	Condone graph of $y = f(-x)$ also being drawn on the grid
		(C1	for a translation of the graph by the vector $\begin{pmatrix} -1 \\ b \end{pmatrix}$ where $b \neq -3$ or $\begin{pmatrix} a \\ -3 \end{pmatrix}$ where $a \neq -1$ or for a translation by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$ of 3 or 4 critical points)	Correct vector gets 1 mark
(b)	2, 1	B1	cao	
21	Sketch graph with TP at (2, -13) and intercepts at (0, -5), $(2 + \sqrt{\frac{13}{2}}, 0)$ and $(2 - \sqrt{\frac{13}{2}}, 0)$	B1	for a parabola drawn with intercept at the point (0, -5)	Turning point may be just seen and labelled on the sketch
		M1	for the start of a method to find the roots of $y = 0$, eg. $2(x - 2)^2 - 13 (= 0)$ oe or $(x =) \frac{- -8 \pm \sqrt{(-8)^2 - 4 \times 2 \times -5}}{2 \times 2}$	
		M1	(dep) for method to find the roots, eg. $2 \pm \sqrt{\frac{13}{2}}$ oe	
		B1	for turning point at (2, -13)	
		C1	for a fully correct parabola drawn with turning point at (2, -13) and intercepts at (0, -5), $(2 + \sqrt{\frac{13}{2}}, 0)$ oe and $(2 - \sqrt{\frac{13}{2}}, 0)$ oe clearly shown	

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22	Proof	C1	for one correct pair of equal angles with correct reason from: angle $ACB = \text{angle } ADB$, (<u>angles</u> in the <u>same segment</u> are equal) angle $DBC = \text{angle } DAC$, (<u>angles</u> in the <u>same segment</u> are equal) angle $ABD = \text{angle } ACD$, (<u>angles</u> in the <u>same segment</u> are equal) or for recognising all angles of 60 in triangle AED and in triangle CEB)	Underlined words need to be shown; reasons need to be linked to their statement(s)
		C1	for one identity, with reason(s), from the following list of alternatives: Alternatives: a complete method to show that angle $ACB = \text{angle } DBC (= 60)$, or BC being common to both triangles or $DB = DE + EB = AE + EC = AC$ (sides of an <u>equilateral triangle</u> are equal) or angle $ABC = 60 + \text{angle } ABD = 60 + \text{angle } ACD = \text{angle } DCB$ (<u>angles</u> in the <u>same segment</u> are equal) or angle $BDC = \text{angle } CAB$ (<u>angles</u> in the <u>same segment</u> are equal)	Pairs of equal angles may be just shown on the diagram
		C1	for a second identity, with reason(s), from the alternatives above	
		C1	for concluding the proof with a third identity, with reason(s), from the alternatives above, together with the condition for congruency, ASA or SAS or AAS	