

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 $54 \div 10 \times 6$ OR e.g. $T = 3P$ $B = 2T$ So, $B = 2(3P) = 6P$ $P+T+B=P+3P+6P=10P$ $P = 54 \div 10 = \text{£}5.40$ $B = 6 \times \text{£}5.40$	32.40	3	M1 for 1 : 3 : 6 or any three numbers in the ratio 1:3:6 in any order M1 for $54 \div (1 + 3 + 6) \times 6$ 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 $54 \div 10 \times 6$ or $[54 \frac{\div' 10}{3'}] \times 2$ 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)

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3		<table border="1"><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>-1</td></tr></table>								x	-2	-1	0	1	2	3	4	5	y	6	5	4	3	2	1	0	-1	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) 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
x	-2	-1	0	1	2	3	4	5																						
y	6	5	4	3	2	1	0	-1																						

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					(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 $(\text{"1.5"} + 1) \times 4$ or $(3 \times \text{"1.5"} - 2) \times 4$ or $(3 \times \text{"1.5"} - 2) \times 2 + (\text{"1.5"} + 1) \times 2$ 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 $\text{"1.5"} + 1$ and $3 \times \text{"1.5"} - 2$ C1 (dep on M3) for completing the proof resulting in a justification that the shape is a square

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Question		Working	Answer	Mark	Notes
5			9	4	M1 for method to find area of one rectangle, eg $15 \times 8 (=120)$ or $15 \times 11 (=165)$ 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 $15 - "18" \div 3$ or $"27" \div 3$ A1 cao OR 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

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Question	Working	Answer	Mark	Notes
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' $\times 40$ A1 cao

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Question		Working	Answer	Mark	Notes
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 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)

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Question	Working	Answer	Mark	Notes	
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)	$60 \div 5 = 12$ $12 \times 2 =$ Alternative: Total sum = $60 \cdot 2 = 120$ Lillian = $\frac{2}{10}$ of 120 = $120 \cdot 2 \div 10$	24	3	M1 for $60 \div 5$ M1 for “12” $\times 2$ A1 for 24 cao Alternative: M1 for $60 \cdot 2 = 120$ seen M1 for $120 \cdot 2 \div 10$ A1 cao SC: B2 for 24, 36 and 60 SC: B1 for 36 on answer line

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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

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Question	Working	Answer	Mark	Notes	
10	$\left(\frac{6}{11} \times \frac{2}{10}\right) + \left(\frac{2}{11} \times \frac{6}{10}\right)$ $= \frac{12}{110} + \frac{12}{110}$	$\frac{24}{110}$	4	B1 for $\frac{2}{10}$ or $\frac{6}{10}$ oe seen as the 2nd probability M1 for $\left(\frac{6}{11} \times \frac{2}{10}\right)$ or $\left(\frac{2}{11} \times \frac{6}{10}\right)$ oe M1 for $\left(\frac{6}{11} \times \frac{2}{10}\right) + \left(\frac{2}{11} \times \frac{6}{10}\right)$ 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 $\left(\frac{6}{11} \times \frac{2}{10}\right)$ or $\left(\frac{2}{11} \times \frac{6}{10}\right)$ oe M1 for $\left(\frac{6}{11} \times \frac{2}{10}\right) + \left(\frac{2}{11} \times \frac{6}{10}\right)$ oe A1 for $\frac{24}{110}$ oe	

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Question		Working	Answer	Mark	Notes
					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

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Question		Working		Answer	Mark	Notes
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
13		Boys	Girls	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
		Median:	115 112			
		Range:	41 33			
		IQR:	17 9			

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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
	(c)	$0.2 \times 0.4 = 0.08$	Not independent	2	M1 for $0.2 \times 0.4 (= 0.08)$

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	$0.08 \neq 0.06$	with reason		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 $\frac{x+5}{3x-1}$ A1 for $\frac{x+5}{3x-1}$	
18	$ACB = 90^\circ$ angle in a semi circle $CBD = 180 - ACB$ co-interior angles add to 180° $CBD = 90^\circ$ $DCB = CDB =$ $(180^\circ - 90^\circ) \div 2$ 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		E, B, F, C, D, A	3	B3 all correct (B2 4,5 correct) (B1 2 or 3 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	

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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 $\neq$ RHS OR $(a+1)^2 = a^2 + 2a + 1$ Solves $a^2 + 2a + 1 = a^2 + 1$ to get $a = 0$ and indicates a contradiction	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 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)	$a^2 + 2a + 1 + b^2 + 2b + 1 = c^2$ 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

National performance data from Results Plus

Original source of questions					Max score	Mean score of students achieving grade:						
Qn	Spec	Paper	Session YYMM	Qn		ALL	A*	A	B	C	D	E
1	2540	1F	0811	Q25	Constructions	2	0.15			0.36	0.12	0.05
2	1380	1F	1106	Q27	Ratio	3	0.27			0.75	0.29	0.10
3	1380	1F	1011	Q21	Graphs of linear equations	3	0.59			1.45	0.48	0.12
4	5MM1	1H	1411	Q09	Solve linear equations	4	2.07	3.57	2.93	2.47	1.52	0.77
5	1MA0	1H	1411	Q07	Perimeter and area	4	1.38	3.85	3.56	2.93	1.51	0.68
6	1380	1H	906	Q10	Compound measures	3	2.20	2.86	2.57	2.20	1.88	1.49
7	5MM1	1H	1311	Q13	Fractions	5	2.87	4.72	4.20	3.32	2.20	0.93
8	1387	3I	0711	Q13	Ratio	5	2.48			4.30	3.07	1.65
9	5MM1	1H	1211	Q15	Solve quadratic equations	5	2.32	4.94	4.63	3.62	1.47	0.47
10	5MM1	1H	1206	Q20	Selection with or without replacement	4	1.68	3.65	2.88	1.74	0.51	0.17
11	5MM1	1H	1111	Q11	Angles	2	0.80	1.50	1.73	0.98	0.18	0.00
12	5MM1	1H	1411	Q17	Index laws	6	2.32	5.70	3.87	2.33	1.30	0.52
13	1MA0	1H	1611	Q18	Box plots	4	Data to be added January 2017					
14	1MA0	1H	1303	Q16	Standard form	4	1.18	3.27	2.48	1.68	0.91	0.35
15	5MM1	1H	1411	Q23	Vectors	4	1.10	3.85	2.12	1.03	0.17	0.03
16	5MM1	1H	1211	Q23	Venn diagrams	4	1.03	1.82	1.33	0.87	0.57	0.40
17	5MM1	1H	1411	Q22	Simplify algebraic fractions	3	0.70	2.96	1.68	0.37	0.02	0.00
18	1380	1H	1111	Q19	Circle theorems	4	0.93	3.21	2.33	1.39	0.55	0.18
19	1380	1H	1203	Q20	Graphs of trigonometric functions	3	0.67	2.14	1.26	0.70	0.38	0.23
20	1MA0	1H	1411	Q21	Surds	2	0.28	1.85	1.58	0.83	0.16	0.03
21	1380	1H	1203	Q24	Algebraic proof	6	0.54	2.55	1.27	0.56	0.16	0.03
					TOTAL	80						