

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

Question		Working	Answer	Mark	Notes
1.	(a)		-1, 0, 1, 2, 3	2	B2 for all 5 values and no extras (ignore repeats) (B1 for 4 correct values and no extras or all 5 correct values and one incorrect value)
	(b)	$x + x + 9 < 60$ $2x < 51$ $x < 25.5$	25	3	M1 for $x + x + 9$ oe A2 cao (A1 for 25.5) OR M1 for $60 \div 2 (=30)$ and $9 \div 2 (=4.5)$ A2 cao (A1 for 25.5) OR M1 for $60 - 9 (=51)$ and " 51 " $\div 2 (=25.5)$ A2 cao (A1 for 25.5) OR M1 for at least 2 trials with correct totals A2 cao (A1 for correct trial of 25 and 26)
2.			bisector	2	M1 for an appropriate pair of arcs or correct line drawn without construction arcs A1 for perpendicular bisector of AB drawn with a pair of construction arcs

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Question	Working	Answer	Mark	Notes
3.	$4x + 3y = 695$ $5x + 2y = 720$ $8x + 6y = 1390$ $15x + 6y = 2160$ $7x = 770$ $x = 110$ $y = 85$	Coffee £1.1(0) Tea 85p	5	M1 for attempt to use variables for cost of cup of tea and cost of a cup of coffee. A1 for correct equations : $4x + 3y = 695$ and $5x + 2y = 720$ oe M1 for correct process to eliminate either x or y (condone one arithmetic error) could be by multiplication of both equations and then addition/subtraction or by manipulation of one equation and then substitution into second equation M1 (dep) for substituting found value into either equation A1 for correct answers with units

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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4.		30	4	M1 for Y: $600 \div 5 \times 3$ oe (= 360) M1 for R: $600 \times 25 \div 100$ oe (= 150) M1 (dep on M2) for $(600 - '360' - '150') \times 2 - '150'$ oe A1 cao OR M1 for Y: $3 \div 5 \times 100$ (= 60%) M1 for G: $100 - '60' - 25$ (= 15) and $'15' \div 100 \times 600$ (= 90) M1 (dep on M2) for $'90' \times 2 - 150$ A1 cao OR M1 for $\frac{12}{20} + \frac{5}{20} \left(= \frac{17}{20} \right)$ oe M1 for $\left(1 - \frac{17}{20} \right) \times 600$ (= 900) M1 (dep on M2) for $'90' \times 2 - 150$ A1 cao
5.		2.5×10^6	2	M1 for 2 500 000 oe e.g. 25×10^5 e.g. 0.25×10^7 or 2.5×10^n or $A \times 10^6$ where $1 \leq A < 10$ A1 cao

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

Question		Working	Answer	Mark	Notes
6.			5.32	3	M1 $\sin 43^\circ$ used M1 $7.8 \sin 43^\circ$ OR M1 for $7.8 \cos 43^\circ$ (5.704...) and $7.8^2 - 5.704^2$ (28.298) M1 for $\sqrt{28.298}$ OR M1 for correct statement of Sine Rule eg $\frac{7.8}{\sin 90^\circ} = \frac{x}{\sin 43^\circ}$ M1 for correct expression for x e.g. $x = \frac{7.8 \sin 43^\circ}{\sin 90^\circ}$ A1 for awrt 5.32 (5.319587...)
7.	(a) (i) (ii) (b)		{p,r,a} {p,a,r,i,s,b,u,d,e,t} E No letters common to Prague and Lisbon	1 1 1	B1 Withhold marks for repeats B1 Withhold marks for repeats B1 dep on E in a box Accept general reasons e.g. “no letters common to sets A and E” or “they share no common letters” or “no intersection (between A and E)” or “no letters the same” or “no letters in A are in E”.

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

Question		Working	Answer	Mark	Notes
8.	(a)	$21 \times 90 = 1890$ $\sqrt{1890}$	43	2	M1 for $\sqrt{21 \times 90}$ or 1890 seen A1 for an answer in the range 43 – 43.5
	(b)	$50 = \sqrt{21 \times d}$ $2500 = 21d$ $d = 2500 \div 21$	119	3	M1 for $50 = \sqrt{21 \times d}$ oe or 50^2 M1 for $21d = 50^2$ oe A1 for an answer in the range 119 – 119.05
9.			14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (= 1526.42...) M1 (dep) for $\frac{1526.42...}{\pi \times 5.8^2}$ 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

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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10.	$\frac{3}{5} \times \frac{1}{5} + \frac{1}{5} \times \frac{2}{5} + \frac{1}{5} \times \frac{2}{5} = \frac{7}{25}$ oe $\frac{7}{25} \times \text{£}1 = 28\text{p}$ $40\text{p} > 28\text{p}$ <p>OR</p> <p>e.g. 200 games $200 \times 40\text{p} = \text{£}80$ $\frac{7}{25} \times 200 \times \text{£}1 = \text{£}56$ $\text{£}80 > \text{£}56$</p>	Yes, with justification	5	<p>M1 or $\frac{3}{5} \times \frac{1}{5}$ or $\frac{1}{5} \times \frac{2}{5}$ or $\frac{1}{5} \times \frac{2}{5}$</p> <p>M1(dep) for $\frac{3}{5} \times \frac{1}{5} + \frac{1}{5} \times \frac{2}{5} + \frac{1}{5} \times \frac{2}{5}$</p> <p>A1 for $\frac{7}{25}$ oe</p> <p>M1 for “$\frac{7}{25}$” \times £1</p> <p>OR “$\frac{7}{25}$” $\times n \times$ £1 and $n \times 40\text{p}$</p> <p>C1 f.t. (dep on M3) for correct conclusion with fully correct justification based on expected profit per game or expected profit for a particular number of games</p>

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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11.		36% depreciation	3	<p>M1 for $0.8 \times 0.8 (= 0.64)$ M1 for $1 - "0.64" (= 0.36)$ C1 for 36% (depreciation) oe or compares cost with 40% reduction</p> <p>OR</p> <p>(uses a trial value, e.g. 1000) M1 for $1000 \times (0.8)^2 (= 640)$ M1 for $(1000 - 640) \div 1000 (= 0.36)$ C1 for 36% (depreciation) oe or compares cost with 40% reduction</p> <p>OR</p> <p>M1 for $0.2 \times 0.2 (= 0.04)$ M1 for $0.2 + 0.2 - "0.04" (= 0.36)$ C1 for 36% (depreciation) oe or compares cost with 40% reduction</p> <p>OR</p> <p>C1 only for identifying the 2nd 20% reduction is off the reduced amount at the end of the first year</p>

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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12.		85.6	4	<p>M1 for $360 \div 5 (= 72)$</p> <p>M1 (dep) for $\frac{1}{2} \times 6^2 \times \sin 72^\circ (= 17.12)$</p> <p>M1 for completing full method to find total area of pentagon</p> <p>A1 for 85.5 – 85.6</p> <p>OR</p> <p>M1 for $360 \div 10 (= 36)$ or $\frac{1}{2}(180 - 360 \div 5) (= 54)$</p> <p>M1(dep) for e.g. $6 \times \sin 36^\circ \times 6 \times \cos 36^\circ (= 17.12)$</p> <p>or $\frac{1}{2} 6 \times \sin 54^\circ \times 6 \times \cos 54^\circ (= 8.55)$</p> <p>M1 for completing full method to find total area of pentagon</p> <p>A1 for 85.5 – 85.6</p>

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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Question	Working	Answer	Mark	Notes
13.		$y = 2x - 1$	4	M1 for $\left(\frac{6 + -2}{2}, \frac{1 + 5}{2}\right)$ oe M1 for $\frac{-1}{0.5}$ oe (= 2) M1(dep on previous M1) for using $y = '2'x + c$ with their coordinates for the midpoint used correctly to find c A1 for $y = 2x - 1$ oe
14.	(a)	$d = \frac{7000}{c}$	2	M1 $d = k \div c$ or $25 = k \div 280$ A1 oe
	(b)	20	2	M1 $d = \frac{7000}{350}$ A1 cao OR M1 $25 \times 280 \div 350$ oe A1 cao
15.		0.7 to 0.9	3	M1 for drawing a tangent to the curve at 20 minutes M1 (dep) for $\frac{\text{correct vertical distance}}{\text{correct horizontal distance}}$ e.g. $\frac{30}{37}$ A1 (dep on M1M1) for answer in range 0.7 to 0.9 (condone a negative answer)

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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Question	Working	Answer	Mark	Notes												
16.	<table border="1"> <thead> <tr> <th></th> <th>With</th> <th>Without</th> </tr> </thead> <tbody> <tr> <td>Median</td> <td>1.8 kg</td> <td>1.4 kg</td> </tr> <tr> <td>Range</td> <td>1.1 kg</td> <td>1.1 kg</td> </tr> <tr> <td>IQR</td> <td>0.4 kg</td> <td>0.4 kg</td> </tr> </tbody> </table>		With	Without	Median	1.8 kg	1.4 kg	Range	1.1 kg	1.1 kg	IQR	0.4 kg	0.4 kg	Comparison of data	2	<p>C1 for comparison of medians or stating the range or interquartile range are the same. Values stated must be correct.</p> <p>C1 for comparison relating the results in a context i.e. including the median and a measure of spread</p>
	With	Without														
Median	1.8 kg	1.4 kg														
Range	1.1 kg	1.1 kg														
IQR	0.4 kg	0.4 kg														
17.	<p>(a)</p> <p>(b) $2 \times (147.5 + 28.5)$</p>	<p>28.5</p> <p>352</p>	<p>1</p> <p>3</p>	<p>B1 for 28.5 or 2850 cm or 28.499 or 28.49... or 28.49 recurring oe</p> <p>B1 for upper bound of length = 147.5 or 14750 cm or 147.49 recurring oe</p> <p>M1 for $2 \times$ (“upper bound width” + “upper bound length”) where these are not the given values.</p> <p>A1 cao 351.999 – 352</p>												
18.	$\frac{84}{100} \times 61$ 383×130281 $51\,240\,000 - 49\,897\,623$ $= 1342377$	1 300 000	5	<p>M1 for correct method to work out 84% of 61 million e.g.</p> $\frac{84}{100} \times 61$ <p>or digits 5124 seen</p> <p>A1 for 51.2(4) million oe</p> <p>M1 for 383×130281 or digits 4989....seen</p> <p>M1 (dep on at least 1 previous M1) for “51.24” – “49.89...”</p> <p>A1 1 300 000 – 1 350 000 oe</p>												

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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19.	$c^2 = 60^2 + 90^2 -$ $2 \times 60 \times 90 \times \cos 130^\circ$ $c^2 = 3600 + 8100 -$ $10\,800 \times -0.6427876$ $c^2 = 11\,700 + 6942.106$ $c^2 = 18642.106$ $c = \sqrt{18642.106} =$ 136.536 Perimeter $= 60 + 90 + 136.536$	286.5	4	M1 for substituting values correctly into cosine rule formula e.g. $60^2 + 90^2 - 2 \times 60 \times 90 \times \cos 130^\circ$ M1 for correct order of evaluation A1 for finding value of missing side in range 136 to 137 A1 for answer in range 286 to 287
20.	F 90 126 144 120 60 54	345	5	M1 for use of $F = FD \times \text{Int width}$ A1 for any 3 Fs correct M1 for $\frac{60}{100} \times (90 + 126 + 144 + 120) (= 288)$ or $\frac{60}{100} \times 480 (= 288)$ M1 $\frac{1}{2} \times (60 + 54) (= 57)$ or $\frac{1}{2} \times 114 (= 57)$ A1 cao

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0

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21.		$5(2x+1)^2 =$ $(4x+5)(5x-1)$ $5(4x^2+4x+1) =$ $20x^2+21x-5$ $20x^2+20x+5 =$ $20x^2+21x-5$ $20x+5 = 21x-5$ $x = 10$	$x = 10$	5	M1 for intention to multiply each side by $4x+5$ M1 for attempt to expand $(2x+1)^2$ or $5(2x+1)^2$ or $(4x+5)(5x-1)$, at least 3 out of 4 terms correct A1 for $20x^2+20x+5$ or $20x^2+21x-5$ oe A1 for $20x^2+20x+5 = 20x^2+21x-5$ oe A1 for 10

National performance data from Results Plus

Qu No	Spec	Paper	Session	Qu	Topic	Max score	Mean % all	ALL	A*	A	B	C	D	E
1	5MM2	2F	1211	Q24	Solve inequalities	5	33	1.63				2.97	2.30	1.80
2	2MB0	3H	1511	Q6	Construction	2	52	1.03	2.00	1.25	1.55	1.31	0.79	0.70
3	5AM1	1H	1306	Q21	Simultaneous equations	5	69	3.47	4.98	4.90	4.24	2.15	0.50	0.31
4	5MM2	2F	1406	Q27	Ratio	4	32	1.28				2.58	1.90	1.08
5	5MM2	2H	1211	Q14	Standard form	2	80	1.60	2.00	1.95	1.85	1.39	0.86	0.56
6	4MA0	1F	1401	Q15	Trigonometry	3	45	1.34				2.22	1.15	0.42
7	4MA0	1F	1405	Q19	Sets	3	46	1.39				1.98	1.36	0.97
8	5AM2	2H	1306	Q07	Compound measures	5	76	3.78	4.94	4.65	4.00	2.90	1.74	0.44
9	1MA0	2H	1311	Q24	Volume	3	39	1.17	2.88	2.56	1.81	0.68	0.09	0.02
10	5AM2	2H	1306	Q20	Probability	5	46	2.28	4.10	3.45	2.31	0.98	0.26	0.00
11	2MB0	3H	1511	Q13	Percentages	3	55	1.66	0.00	2.50	2.55	1.77	1.68	0.80
12	2MB0	3H	1506	Q17	Area of pentagon	4	42	1.67	3.60	3.01	1.83	0.67	0.19	0.05
13	2MB0	2H	1506	Q16	Graph of straight line	4	40	1.60	3.87	3.35	2.06	0.72	0.18	0.06
14	5AM2	2H	1311	Q22	Derive expressions	4	32	1.28	3.42	2.56	1.17	0.33	0.11	0.25
15	5AM2	2H	1406	Q15	Gradient of a curve	3	31	0.93	2.66	1.64	0.65	0.14	0.02	0.00
16	5AM1	1H	1411	Q19	Box plots	2	19	0.38	1.22	1.00	0.46	0.17	0.05	0.00
17	1380	2H	1006	Q21	Bounds	4	29	1.14	3.03	1.96	0.93	0.32	0.08	0.02
18	5AM1	1H	1111	Q13	Percentages	5	40	2.00	1.33	2.43	2.87	1.14	0.43	0.00
19	1380	2H	1203	Q20	Sine and cosine rule	4	14	0.55	3.30	1.70	0.36	0.04	0.00	0.00
20	2MB0	1H	1506	Q13	Histogram	5	36	1.79	4.64	4.07	2.44	0.92	0.16	0.03
21	1380	2H	1203	Q24	Solve algebraic fraction equations	5	11	0.54	3.61	1.44	0.35	0.06	0.01	0.01
						80								