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 ÷ 2 (=30) and 9 ÷ 2 (=4.5) A2 cao (A1 for 25.5) **OR** M1 for 60 – 9 (=51) and "51" ÷ 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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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

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4.			30	4	M1 for Y: 600 ÷ 5 × 3 oe (= 360) M1 for R: 600 × 25 ÷ 100 oe (= 150) M1 (dep on M2) for (600 – '360' – '150') × 2 – '150' oe A1 cao **OR** M1 for Y: 3 ÷ 5 × 100 (= 60%) M1 for G: 100 – '60' – 25 (= 15) and '15' ÷ 100 × 600 (= 90) M1 (dep on M2) for '90' × 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' × 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

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6.			5.32	3	M1 $\sin 43°$ used M1 $7.8\sin 43°$ **OR** M1 for $7.8\cos 43°$ (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 $\frac{7.8}{\sin 90°} = \frac{x}{\sin 43°}$ M1 for correct expression for x e.g. $x = \frac{7.8\sin 43°}{\sin 90°}$ A1 for awrt 5.32 (5.319587...)
7.	(*a*) (i)		{p,r,a}	1	B1 Withhold marks for repeats
	(ii)		{p,a,r,i,s,b,u,d,e,t}	1	B1 Withhold marks for repeats
	(*b*)		E No letters common to Prague and Lisbon	1	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".

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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

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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 $\frac{7}{25}\times £1 = 28p$ 40p > 28p **OR** e.g. 200 games 200 × 40p = £80 "$\frac{7}{25}$" × 200 × £1 = £56 £80 > £56	Yes, with justification	5	M1 or $\frac{3}{5}\times\frac{1}{5}$ or $\frac{1}{5}\times\frac{2}{5}$ or $\frac{1}{5}\times\frac{2}{5}$ M1(dep) for $\frac{3}{5}\times\frac{1}{5}+\frac{1}{5}\times\frac{2}{5}+\frac{1}{5}\times\frac{2}{5}$ A1 for $\frac{7}{25}$ oe M1 for "$\frac{7}{25}$" × £1 OR "$\frac{7}{25}$" × n × £1 **and** n × 40p 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

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Question		**Working**	**Answer**	**Mark**	**Notes**
11.			36% depreciation	3	M1 for 0.8×0.8 (= 0.64) M1 for 1 – "0.64" (= 0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction **OR** (uses a trial value, e.g. 1000) M1 for $1000 \times (0.8)^2$ (= 640) M1 for (1000 – 640) ÷ 1000 (= 0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction **OR** M1 for 0.2×0.2 (= 0.04) M1 for 0.2 + 0.2 – "0.04" (= 0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction **OR** C1 only for identifying the 2nd 20% reduction is off the reduced amount at the end of the first year

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Question		**Working**	**Answer**	**Mark**	**Notes**
12.			85.6	4	M1 for 360 ÷ 5 (= 72) M1 (dep) for $\frac{1}{2} \times 6^2 \times \sin"72"$ (= 17.12) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6 OR M1 for 360 ÷ 10 (= 36) or $\frac{1}{2}(180 - 360 \div 5)$ (= 54) M1(dep) for e.g. $6 \times \sin"36" \times 6 \times \cos"36"$ (= 17.12) or $\frac{1}{2}$ $6 \times \sin"54" \times 6 \times \cos"54"$ (= 8.55) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6

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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)

<table>
<tr><th colspan="5">1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>16.</td><td></td><td><table><tr><td></td><td>With</td><td>Without</td></tr><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></table></td><td>Comparison of data</td><td>2</td><td>C1 for comparison of medians or stating the range or interquartile range are the same. Values stated must be correct.
C1 for comparison relating the results in a context i.e. including the median and a measure of spread</td></tr>
<tr><td>17.</td><td>(a)</td><td></td><td>28.5</td><td>1</td><td>B1 for 28.5 or 2850 cm or 28.499 or 28.49…
or 28.49 recurring oe</td></tr>
<tr><td></td><td>(b)</td><td>2 × (147.5 + 28.5)</td><td>352</td><td>3</td><td>B1 for upper bound of length = 147.5 or 14750 cm
or 147.49 recurring oe
M1 for 2 × (“upper bound width” + “upper bound length”) where these are not the given values.
A1 cao 351.999 − 352</td></tr>
<tr><td>18.</td><td></td><td>$\frac{84}{100} \times 61$
383 × 130281
51 240 000 − 49 897 623
= 1342377</td><td>1 300 000</td><td>5</td><td>M1 for correct method to work out 84% of 61 million e.g.
$\frac{84}{100} \times 61$ or digits 5124 seen
A1 for 51.2(4) million oe
M1 for 383 × 130281 or digits 4989....seen
M1 (dep on at least 1 previous M1) for “51.24” − “49.89…”
A1 1 300 000 – 1 350 000 oe</td></tr>
</table>

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Question		**Working**	**Answer**	**Mark**	**Notes**
19.		$c^2 = 60^2 + 90^2 –$ $2 \times 60 \times 90 \times \cos 130^o$ $c^2 = 3600 + 8100 –$ $10\ 800 \times – 0.6427876$ $c^2 = 11\ 700 + 6942.106$ $c^2 = 18642.106$ $c = \sqrt{18642.106} =$ 136.536 Perimeter $= 60 + 90 + 136.536$	286.5	4	M1 for substituting values correctly into cosine rule formula e.g. $60^2 + 90^2 – 2 \times 60 \times 90 \times \cos 130^o$ 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 × 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 $\frac{1}{2} \times 114\quad (= 57)$ A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
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								