

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

Question		Working	Answer	Mark	Notes
1.	(a)		4	1	B1 cao
	(b)		7 or (0,7)	1	B1 cao
2.		$\frac{25}{8} - \frac{5}{3} = \frac{75-40}{24} = \frac{35}{24}$ <p>OR</p> $2\frac{1}{8} - \frac{2}{3} = 2\frac{3-16}{24}$ $= 1\frac{27-16}{24}$ <p>OR</p> $2\frac{1}{8} - \frac{2}{3} = 2\frac{3-16}{24}$ $= 2\frac{-13}{24}$	$1\frac{11}{24}$	3	M1 for converting to improper fractions, at least one correct or $3 - 1 = 2$ and ‘borrowing’ or negative fraction answer M1 for putting fractions over a common denominator, at least one correct A1 for $\frac{35}{24}$ or $1\frac{11}{24}$

1MA1 Practice Papers: Set 3 Regular (1H) mark scheme – Version 1.1

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

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3.		20	3	<p>M1 for $330 \div 120 (= 2.75)$ or $200 \div 60 (= 3 \frac{1}{3})$ or $450 \div 180 (= 2.5)$ M1 for $450 \div 180 (= 2.5)$ AND $8 \times "2.5" (= 20)$ A1 cao OR M1 for $120 \div 8 (= 15)$ or $60 \div 8 (= 7.5)$ or $180 \div 8 (= 22.5)$ M1 for $330 \div (120 \div 8) (= 22)$ or $200 \div (60 \div 8) (= 26.6\dots)$ or $450 \div (180 \div 8) (= 20)$ A1 cao OR M1 for multiples of 120:60:180, e.g. 240:120:360 M1 for multiples linked to 450 and $8+8+4$ or scaling 2.5 oe A1 cao</p>
4.	$2.25 \times 60 \div 100 = 1.35$ $1.35 + 0.80 = 2.15$ $1.5 \times 60 \div 100 = 0.90$ $0.90 + 1.90 = 2.80$	Railtickets with correct calculations	4	<p>NB. All work may be done in pence throughout</p> <p>M1 for correct method to find credit card charge for one company e.g. $0.0225 \times 60 (= 1.35)$ oe or $0.015 \times 60 (= 0.9)$ oe M1 (dep) for correct method to find total additional charge or total price for one company e.g. $0.0225 \times 60 + 0.80$ or $0.015 \times 60 + 1.90$ or 2.15 or 2.8(0) or 62.15 or 62.8(0) A1 for 2.15 and 2.8(0) or 62.15 and 62.8(0) C1 (dep on M1) for a statement deducing the cheapest company, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each company</p>

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

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		<p>OR</p> $2.25 - 1.5 = 0.75$ $0.075 \times 60 \div 100 = 0.45$ $0.80 + 0.45 = 1.25$ $1.25 < 1.90$			<p>OR</p> <p>M1 for correct method to find percentage of (60 + booking fee) e.g. $0.0225 \times 60.8 (= 1.368)$ oe or $0.015 \times 61.9 (= 0.9285)$</p> <p>M1 (dep) for correct method to find total cost or total additional cost e.g. '1.368' + 60.8 (= 62.168) or '1.368' + 0.8 (= 2.168) or '0.9285' + 61.9 (= 62.8285) or '0.9285' + 1.9 (= 2.8285)</p> <p>A1 for 62.168 or 62.17 AND 62.8285 or 62.83 OR 2.168 or 2.17 AND 2.8285 or 2.83</p> <p>C1 (dep on M1) for a statement deducing the cheapest company, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each company</p> <p>OR</p> <p>M1 for correct method to find difference in cost of credit card charge e.g. $(2.25 - 1.5) \times 60 \div 100$ oe or 0.45 seen</p> <p>M1 (dep) for using difference with booking fee or finding difference between booking fees e.g. $0.80 + "0.45" (= 1.25)$ or $1.90 - "0.45" (= 1.45)$ or $1.90 - 0.8 (= 1.1(0))$</p> <p>A1 1.25 and 1.9(0) or 0.45 and 1.1(0)</p> <p>C1 (dep on M1) for a statement deducing the cheapest company, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each company</p> <p>QWC: Decision and justification should be clear with working clearly presented and attributable</p>

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

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5.	(a)		Correct frequency polygon	2	B2 for fully correct polygon. Points plotted at the midpoints $\pm \frac{1}{2}$ square (B1 for all points plotted accurately not joined or one error or one omission in plotting but joined) or all points plotted accurately and joined with first joined to last or all points at the correct heights and consistently within or at the ends of the intervals and joined (can include joining last to first to make a polygon)
	(b)	$20 + 12 + 10 + 8 + 6$	56	2	M1 for $20 + 12 + 10 + 8 + 6$ A1 cao
	(c)		$0 \leq L < 10$	1	B1 for $0 \leq L < 10$ oe

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

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6.	<p>Area of circle B is 110% of the area of circle A</p> <p>Area of circle C is 110% of 110% = 121% of the area of circle A.</p> <p>OR</p> <p>Area of circle B is 220 cm²</p> <p>Area of circle C is 242 cm²</p> <p>Area of circle B is 1.1 times bigger</p> <p>Area of circle C is 1.1 × 1.1 = 1.21 times bigger</p>	21% or 42 cm ²	4	<p>B1 110% seen</p> <p>M1 $\frac{110}{100} \times 110$ oe</p> <p>A1 121%</p> <p>C1 dep on M1 for 21% bigger oe</p> <p>OR</p> <p>B1 220 shown</p> <p>M1 $\frac{110}{100} \times 220$</p> <p>A1 242</p> <p>C1 dep on M1 for area is 42 cm²bigger oe</p> <p>OR</p> <p>B1 for 1.1 seen</p> <p>M1 for 1.1 × 1.1</p> <p>A1 for 1.21</p> <p>C1 dep on M1 for 21% larger or 1.21 times larger o.e.</p>
7.	<p>(a) $2x + 6y + 4x - 4y$</p> <p>(b) $2 \times 4 \times p - 3 \times 4 \times p \times q$</p>	<p>$6x + 2y$</p> <p>$4p(2 - 3q)$</p>	<p>2</p> <p>2</p>	<p>M1 for $2x + 6y$ or $4x - 4y$ or $6x$ or $2y$</p> <p>A1 for $6x + 2y$ [accept $2(3x + y)$]</p> <p>B2 cao</p> <p>[B1 for $2p(4 - 6q)$ or $p(8 - 12q)$ or $4(2p - 3pq)$ or $2(4p - 6pq)$ or $4p(a + bq)$ where $a \neq 0$ and $b \neq 0$]</p>

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

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8.		“two angles are equal so the triangle is isosceles”	5	<p>M1 for $6x - 10 + 4x + 8 + 5x + 2$ or $15x$ M1 for $6x - 10 + 4x + 8 + 5x + 2 = 180$ or $15x = 180$ or $(x =) 180 \div 15$ A1 $x = 12$ M1 (ft from '12' if M2 scored) for $5 \times '12' + 2$ or $6 \times '12' - 10$ or $62(^{\circ})$ or $4 \times '12' + 8$ or $56(^{\circ})$ C1 both base angles as 62 and two angles are equal so the triangle is isosceles NB. $x = 12$ with no working scores M0M0A0 ; correct value of x from clear trial and improvement could gain M1M1A1 OR M1 $5x + 2 = 6x - 10$ or $2 + 10 = 6x - 5x$ A1 $x = 12$ M1 $5 \times 12 + 2$ or $6 \times 12 - 10$ or $62(^{\circ})$ or $4 \times 12 + 8$ or $56(^{\circ})$ M1 checking their angles add to 180°, “62”+”62”+”56”= 180 C1 both base angles as 62 and two angles are equal so the triangle is isosceles OR M1 $4x + 8 = 5x + 2$ oe or $4x + 8 = 6x - 10$ A1 $x = 6$ or $x = 9$ M1 (dep) for substituting ‘x’ into one of the angles oe M1 for showing their angles do not sum to 180° C0</p>

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

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9.	(a)	$30 = 2 \times 3 \times 5$ $42 = 2 \times 3 \times 7$ HCF = 2×3	6	2	M1 for 30 or 42 written correctly as a product of prime factors or attempt to list the factors of 30 and 42 (at least 4 for each including 6) A1 for HCF = 6
	(b)	30, 60, 90, ... 45, 90, 135, ...	90	2	M1 for listing multiples of 30 and 45 (at least 60 and 90) or $2 \times 3 \times 5 \times 3$ A1 for LCM = 90 SC B1 for 210
10.		$\frac{1}{2} (12 + 8) \times 6 = 60$ '60' $\times 20 = 1200$ $1200 \times 5 = 6000$ $6000 \div 1000 = 6$	6	5	M1 $\frac{1}{2} (12 + 8) \times 6$ oe or 60 seen M1 (dep) '60' $\times 20$ M1 (indep) '1200' $\times 5$ A1 6000 cao A1 ft (dep on 1 st or 3 rd M1 scored) for 6

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

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11.	(a)	1	1	B1 cao
	(b)	$\frac{1}{7}$	1	B1 for $\frac{1}{7}$ (condone $\pm \frac{1}{7}$)
	(c)	$\frac{2^3 \div 2^3}{2^{4^3}} = \frac{2^5}{2^{12}}$	2^{-7}	3
	<p>OR</p> $\frac{2 \times 16}{16 \times 16 \times 16} =$ $\frac{2}{16 \times 16} = \frac{2}{2^4 \times 2^4} = \frac{2}{2^8}$			

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

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12.	$yy + yy' + y'y$ $\frac{3}{9} \times \frac{2}{8} + \frac{3}{9} \times \frac{6}{8} + \frac{6}{9} \times \frac{3}{8}$ OR $yy + yr + yb + ry + by$ $\frac{3}{9} \times \frac{2}{8} + \frac{3}{9} \times \frac{4}{8} + \frac{3}{9} \times \frac{2}{8} +$ $\frac{4}{9} \times \frac{3}{8} + \frac{2}{9} \times \frac{3}{8}$ OR $1 - y'y'$ $1 - \frac{6}{9} \times \frac{5}{8}$	$\frac{42}{72}$	4	B1 for $\frac{2}{8}$ or $\frac{3}{8}$ or $\frac{4}{8}$ or $\frac{6}{8}$ or $\frac{5}{8}$ seen as 2nd probability M1 for any one appropriate product (see working column) M1 for a complete method A1 for $\frac{42}{72}$ oe, eg $\frac{7}{12}$ With replacement B0 M1 for any one appropriate product M1 for a complete method A0
13.	$\frac{(2x-1)(x-3)}{(x+3)(x-3)}$	$\frac{(2x-1)}{(x+3)}$	3	M1 for $(2x-1)(x-3)$ M1 for $(x+3)(x-3)$ A1 cao
14.	$(2 + \sqrt{3})(2 - \sqrt{3})$ $= 4 - 2\sqrt{3} + 2\sqrt{3} - \sqrt{3}\sqrt{3}$ $= 4 - 3$	1	2	M1 for all 4 terms correct ignoring signs or 3 out of 4 terms with correct signs or correct use of difference of 2 squares A1 cao (SC M1 for $4 - 2\sqrt{3} + 2\sqrt{3}$)

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

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15.		Proof	3	M1 for $\overrightarrow{MN} = \overrightarrow{MO} + \overrightarrow{ON} (= \mathbf{n} - \mathbf{m})$ or $\overrightarrow{NM} = \overrightarrow{OM} + \overrightarrow{NO} (= \mathbf{m} - \mathbf{n})$ or $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB} (= 2\mathbf{n} - 2\mathbf{m})$ or $\overrightarrow{BA} = \overrightarrow{OA} + \overrightarrow{BO}$ ($= 2\mathbf{m} - 2\mathbf{n}$) M1 for $\overrightarrow{MN} = \mathbf{n} - \mathbf{m}$ and $\overrightarrow{AB} = 2\mathbf{n} - 2\mathbf{m}$ oe C1 (dep on M1, M1) for fully correct proof, with $\overrightarrow{AB} = 2\overrightarrow{MN}$ or \overrightarrow{AB} is a multiple of \overrightarrow{MN} [SC M1 for $\overrightarrow{MN} = 0.5\mathbf{n} - 0.5\mathbf{m}$ and $\overrightarrow{AB} = \mathbf{n} - \mathbf{m}$] C1 (dep on M1) for fully correct proof, with $\overrightarrow{AB} = 2\overrightarrow{MN}$ or \overrightarrow{AB} is a multiple of \overrightarrow{MN}

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

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16.	$360 - y$	$180 - \frac{y}{2}$	4	<p>M1 $ADC = \frac{y}{2}$</p> <p>A1 $180 - \frac{y}{2}$</p> <p>C2 (dep on M1) for both reasons <u>Angle at centre is twice the angle at the circumference</u> <u>Opposite angles in cyclic quadrilateral add to 180°</u> (C1 (dep on M1) for one appropriate circle theorem reason) OR M1 reflex $AOC = 360 - y$ A1 $\frac{360 - y}{2}$ oe C2 (dep on M1) for both reasons <u>Angles around a point add up to 360°</u> <u>Angle at centre is twice the angle at the circumference</u> (C1 (dep on M1) for one appropriate circle theorem reason)</p>
17.	(a)	(5,-4)	2	B2 for (5,-4) (B1 for (a,-4) or (5,b) where $a \neq 5$ or 3 and $b \neq -4$).
	(b)	(-2,2)	2	B2 for (-2,2) (B1 for (a,2) or (-2,b) where $a \neq -2$ and $b \neq 2$).

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

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18.	<p>$ABE = \text{angle } CBD$ (vertically opposite angles)</p> <p>$\text{angle } EAB = \text{angle } CDB$ (alternate angles)</p> <p>$\text{angle } AEB = \text{angle } BCD$ (alternate angles)</p> <p>OR</p> <p>$\text{angle } EAB = \text{angle } CDB$ (alternate angles)</p> <p>$\text{angle } AEB = \text{angle } BCD$ (alternate angles)</p> <p>$ABE = \text{angle } CBD$ (angles in a triangle sum to 180°)</p>	proof	4	<p>M1 for any 2 pairs of angles correctly matched</p> <p>A1 for all 3 pairs correctly matched</p> <p>C2 (dep on M1) for full reasons and concluding statement</p> <p>(C1(dep on M1) for at least one reason)</p>
19.	<p>(a)(i)</p> <p>(ii)</p> <p>(b)</p>	$\frac{\sqrt{3}}{2}$ $-\frac{\sqrt{3}}{2}$	<p>2</p> <p>2</p>	<p>B1 cao</p> <p>B1 cao</p> <p>B2 cao</p> <p>[B1 for sine curve starting from the origin with amplitude 4, OR</p> <p>B1 cuts x axis at 90, 180, 270, 360 and starts from 0]</p>

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

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20.	$(n + 1)^2 - n^2$ $= n^2 + 2n + 1 - n^2$ $= 2n + 1$ $(n + 1) + n = 2n + 1$ <p>OR</p> $(n + 1)^2 - n^2$ $= (n + 1 + n)(n + 1 - n)$ $= (2n + 1)(1) = 2n + 1$ $(n + 1) + n = 2n + 1$ <p>OR</p> $n^2 - (n + 1)^2 =$ $n^2 - (n^2 + 2n + 1) =$ $- 2n - 1 = -(2n + 1)$ <p>Difference is $2n + 1$</p> $(n + 1) + n = 2n + 1$	proof	4	<p>M1 for any two consecutive integers expressed algebraically e.g. n and $n + 1$</p> <p>M1 (dep on M1) for the difference between the squares of ‘two consecutive integers’ expressed algebraically e.g. $(n + 1)^2 - n^2$</p> <p>A1 for correct expansion and simplification of difference of squares, e.g. $2n + 1$</p> <p>C1 (dep on M2A1) for showing statement is correct, e.g. $n + n + 1 = 2n + 1$ and $(n + 1)^2 - n^2 = 2n + 1$ from correct supporting algebra</p>

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

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21.				4	<p>M1 for $-((x + 1.5)^2 - (1.5)^2 - 5)$ or attempt to find points to plot - must have at least 3 correct points evaluated or correct method to find x axis intercepts</p> <p>A1 for $-((x + 1.5)^2 - 7.25)$ or parabola with maximum marked at $(-1.5, 7.25)$ or $\frac{3 \pm \sqrt{29}}{2}$</p> <p>C1 for parabola drawn with maximum in 2nd quadrant or y intercept $(0, 5)$ or with x axis intercepts at $\left(\frac{3 \pm \sqrt{29}}{2}, 0\right)$</p> <p>C1 for parabola drawn with maximum $(-1.5, 7.25)$ and y intercept $(0, 5)$ and x axis intercepts at $\left(\frac{3 \pm \sqrt{29}}{2}, 0\right)$</p>

National performance data taken from Results Plus

Qu No	Spec	Paper	Session	Qu	Topic	Max score	Mean % all	ALL	A*	A	B	C	D	E
1	5MM1	1H	1111	Q10	Gradients	2	66	1.32	1.88	1.87	1.44	0.83	0.36	0.00
2	5MM1	1H	1206	Q16	Fractions	3	65	1.94	2.90	2.67	2.31	1.32	0.45	0.07
3	1MA0	1F	1511	Q19	Ratio	3	39	1.17				1.55	1.25	0.95
4	1MA0	1H	1206	Q10	Percentages	4	55	2.19	3.64	3.20	2.70	1.78	0.54	0.16
5	1380	1F	1203	Q21	Frequency diagrams	5	40	2.02	5.00	4.50	4.00	3.03	2.38	1.74
6	5MM2	2H	1206	Q14	Percentages	4	85	3.41	3.89	3.72	3.57	3.15	2.12	0.44
7	5MM1	1H	1106	Q08	Simplify expressions	4	68	2.71	3.82	3.64	3.23	2.44	1.45	1.00
8	5MM1	1H	1306	Q11	Solve linear equations	5	53	2.65	4.73	4.35	3.18	1.44	0.45	0.00
9	5MM1	1H	1206	Q12	HCF and LCM	4	70	2.79	3.67	3.37	2.85	2.29	1.72	1.27
10	1380	1H	1111	Q16	Compound measures	5	18	0.91	4.14	2.74	1.30	0.36	0.09	0.05
11	5MM1	1H	1106	Q12	Index laws	5	29	1.43	4.63	2.86	1.28	0.65	0.32	0.14
12	5MM1	1H	1406	Q24	Selection with or without replacement	4	45	1.81	3.50	2.86	1.92	0.78	0.18	0.11
13	5MM1	1H	1211	Q25	Simplify algebraic fractions	3	25	0.74	2.69	1.88	0.84	0.07	0.00	0.00
14	1380	1H	911	Q21	Surds	2	24	0.47	1.83	1.23	0.46	0.09	0.02	0.01
15	1MA0	1H	1406	Q24	Vectors	3	20	0.59	2.58	1.74	0.52	0.05	0.00	0.00
16	1MA0	1H	1311	Q22	Circle theorems	4	16	0.65	3.19	1.98	0.65	0.09	0.01	0.00
17	1380	1H	911	Q24	Transformation of functions	4	21	0.83	3.56	1.87	0.64	0.24	0.15	0.13
18	5MM1	1H	1311	Q21	Congruence and similarity	4	20	0.80	2.52	1.38	0.82	0.34	0.09	0.00
19	2540	1H	811	Q27	Graphs of trigonometric functions	4	13	0.52	2.69	1.31	0.52	0.18	0.08	0.07
20	1MA0	1H	1303	Q21	Algebraic proof	4	3	0.11	2.09	0.38	0.03	0.00	0.00	0.00
21	NEW QUESTION				Turning point of quadratic function	4	No data available							
						80								