1MA1 Practice papers Set 5: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.		4.5 × 1000 × 1000	4 500 000	2	M1 for complete method equivalent to 4.5 × 1000 × 1000 A1 for 4 500 000 oe
2.			195	2	M1 for 325 ÷ (8 – 3) (= 65) A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
3.		$30x + 4y = 46$ (×2) $24x + 8y = 45.20$ (×0.5) Eg $60x + 8y = 92$ $24x + 8y = 45.20$ $36x = 46.8$ $x = \frac{46.8}{36}$ Eg $30x + 4y = 46$ $12x + 4y = 22.60$ $18x = 23.4$ $x = \frac{23.4}{18}$ **OR** Eliminates x first **Or** substitution back into any correct equation	Petrol £1.30 Oil £1.75	5	B1 for correct equations expressed in terms of two variables (oe) M1 for correct process to eliminate either variable (condone one arithmetic error) A1 for either x = £1.30 or £1.75 oe M1 (dep on 1st M1) for correct substitution of their found variable **OR** M1 (indep of 1st M1 for a correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both x =£1.30 and £1.75 oe (SC B1 for x = £1.30 , B1 for y= £1.75 oe if M0 scored)

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Question		**Working**	**Answer**	**Mark**	**Notes**
4.		180 – 150 (=30) 360 ÷ "30" **OR** $\frac{N-2}{N} \times 180 = 150$ $(N-2)180 = 150N$ $30N = 360$	12	3	M1 for 180 – 150 (= 30) M1 for 360 ÷ "30" A1 cao **OR** M1 for $\frac{N-2}{N} \times 180 = 150$ M1 for 360 ÷ "30" A1 cao

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5.			The Friendly Bank	4	M1 for a correct method to find interest for the first year for either bank **OR** correct method to find the value of investment after one year for either bank **OR** use of the multiplier 1.04 or 1.05 M1 for a correct full method to find the value of the investment (or the value of the total interest) at the end of 2 years in either bank A1 for 2100.8(0) and 2110.5(0) (accept 100.8(0) and 110.5(0)) C1 (dep on M1) ft for a correct comparison of *their* total amounts, identifying the bank from their calculations **OR** M1 for either 1.04 × 1.01 or 1.05 × 1.005 M1 for 1.04 × 1.01 and 1.05 × 1.005 A1 for 1.0504 and 1.05525 C1 (dep on M1) ft for a correct comparison of *their* total multiplying factors identifying the bank from their calculations

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Question		**Working**	**Answer**	**Mark**	**Notes**
6.			12	4	M1 x, $\frac{x}{2}$, $\frac{x}{2} - 5$, 9 M1 $x + \frac{x}{2} + \frac{x}{2} - 5 + 9 < 30$ M1 correct method to isolate x A1 cao
7.		(100% – 10%) × Normal Price = £4.86 Normal Price = £4.86 ÷ 0.9	£5.40	3	M1for '4.86 is 90%' or (100% – 10%) × Normal Price = 4.86 or 4.86 ÷ 90 M1 for 4.86 ÷ 0.9 or 4.86 × 10 ÷ 9 oe A1 £5.40 (accept 5.4) **OR** M1 10% = £0.54 or £4.86 ÷ 9 M1 (dep) £4.86 + '£0.54' A1 £5.40 (accept 5.4)

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Question		**Working**	**Answer**	**Mark**	**Notes**
8.	(a)		graph	2	B2 for fully correct cf graph (accept ogive) condone graph starting at (30, 0) [B1 for 4 or 5 points plotted consistently or for cf graph drawn through points other than end points of intervals]
	(b(i)		53 – 57	3	B1 for 53 – 57 or ft their cf graph (tolerance ±2mm square) M1 for 'upper quartile (from cf = 60)' – 'lower quartile (from cf = 20)' (tolerance ±2mm square)
	(ii)	63 – 43	20		A1 for 17 – 23 or ft their cf graph
	(c)	80 – 60 **OR** 80 – (52 + [80 – 52] $\times \frac{3}{10}$) 80 – 60.4 = 19.6	19 – 23	2	M1 for 80 – '60 (from $A = 63$)' for their cf graph (tolerance ±2mm square) or 80 – (52 + [80 – 52] $\times \frac{3}{10}$) oe A1 for 19 – 23 [SC B1 for 90 – '60 (from $A = 63$)' (tolerance ±2mm square)]

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Question		**Working**	**Answer**	**Mark**	**Notes**
9.	(a)	$(3x + 2)(2x + 1) = 100$		2	M1 or $(2x \times 3x) + 2(2x + 1) + 3x = 100$ oe or $(2x \times 3x) + (2 \times 2x\ (\times 1)) + 1) + 3x + 1 + 1 = 100$ oe other partitions are acceptable but partitioning must go on to form a correct equation.
		$6x^2 + 4x + 3x + 2 = 100$	$6x^2 + 7x - 98 = 0$ *		A1 Accept $6x^2 + 7x + 2 = 100$ if M1 awarded
	(b)	$(3x + 14)(2x - 7)\ (= 0)$	73.5	5	M2 or $(x =)\dfrac{-7 \pm \sqrt{49 + 2352}}{12}$ or $(x =)\dfrac{-7 \pm \sqrt{2401}}{12}$ If not M2 then M1 for $(3x \pm 14)(2x \pm 7)$ or $(x =)\dfrac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6}$ condone + in place of ± and 1 sign error.
		$x = 3.5$			A1 Dependent on at least M1 Ignore negative root.
		(Area =) 6 x "3.5"^{2} or $(3 \times$ "3.5") $\times$ $(2 \times$ "3.5")			M1ft Dependent on at least M1 and x > 0 A1 cao Dependent on first M1

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Question		**Working**	**Answer**	**Mark**	**Notes**
10.			23.8	5	M1 for $8^2 - 5^2$ or $AC^2 + 5^2 = 8^2$ M1 for $\sqrt{(8^2 - 5^2)}$ (=6.24(4..)) with least one of 8^2 or 5^2 correctly evaluated. M1 for 8π (=25.13 to 25.13(2…)) or $8\pi \div 2$ or 4π (=12.56(6…)) using $\pi = 3.14$ or better M1 for 5 + their *AC* + their arc *PBC* A1 for 23.7 – 23.9
11.			20 shown	5	B1 for 3 combinations (1 + 8, 5 + 4, 7 + 2) M1 for partial working $\frac{3}{20} \times 80$ or $\frac{3}{20} \times 3$ oe or 80 × 3 (= 240) M1 for complete working $\frac{3}{20} \times 80 \times 3$ oe M1 (income) 80 × 70 (= 5600) or 80 × 0.7 (= 56) C1 for "56 – 36=20" clearly stated

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Question		**Working**	**Answer**	**Mark**	**Notes**
12.	(a)		3×10^{m}	2	B2 (B1 for $3\times\sqrt{10^{2m}}$ **or** 3×10^{km} where $k \neq 1$ **or** a $\times 10^{m}$ where $a \neq 3$)
	(b)	$\left((9)^{\frac{3}{2}} = \right)27$ **or** 2.7		3	B1
		27×10^{3n} oe			M1
			$2.7 \times 10^{3n+1}$		A1
13.		$3.5^2 + 10^2$ (=112.25) **or** $6^2 + 3.5^2 + 10^2$ (=148.25)	29.5	4	M1
		$\sqrt{"112.25"}$ (=10.59..) **or** $\sqrt{"148.25"}$ (=12.17..)			M1 awrt 10.6 or 12.17
		tan ("x")= 6 / "10.59.." or sin("x") = 6/"12.17.."			M1(dep on M1M1)
					A1 awrt 29.5

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Question		**Working**	**Answer**	**Mark**	**Notes**
14.		35.5×26.5	940.75	3	B1 for sight of 35.5 or 26.5 or 35.4999(…) or 26.4999(…) M1 for UB length × UB width where $35.49 \leq$ UB length ≤ 35.5 $26.49 \leq$ UB width ≤ 26.5 A1 for 940.74 - 940.75 (or $\frac{3763}{4}$)
15.	(a)		$\frac{4}{5}$ oe	1	B1
	(b)		$\frac{1}{x}$	2	M1 $\frac{1}{(\sqrt{x-1})^2+1}$ or $\frac{1}{x-1+1}$ A1 (Also accept x^{-1})

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Question		**Working**	**Answer**	**Mark**	**Notes**
16.	(a)		1.6 − 2.4	3	M1 for tangent drawn at time = 3 M1 (dep) for 'diff *y*' ÷ 'diff *x*' A1 for 1.6 − 2.4
	(b)	Example: 2(0 + 7) ÷ 2 = 7 2(7 + 11) ÷ 2 = 18 2(11 + 12) ÷ 2 = 23 2(12 + 12) ÷ 2 = 24 2(12 + 12) ÷ 2 = 24 Total = 96 **OR** Area ≈ 50 squares 1 square = 2 × 1 = 2 m 50 × 2 = 100	96 – 102 plus comparison	3	M1 for division of area into trapezia or counting squares M1 for use of at least one trapezium (oe) to calculate area or totalling all squares and part squares C1 (dep on M1) for answer in range 96 − 102 and positive comment to compare 'area' with 100 (SC B1 for area of 84 if M1 not scored)

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Question		**Working**	**Answer**	**Mark**	**Notes**
17.			565or 566	5	M1 for using other than a linear relationship attempt to establish Month 1 population as $100 \times x$ oe. eg $100\left(1+\frac{r}{100}\right)$ M1 for forming equation $100x^2 = 200$ oe. eg. $100\left(1+\frac{r}{100}\right)^2 = 200$ M1 for method to solve equation to establish $x = \sqrt{2}$ M1 for attempting to find Month 5 population e.g. $100 \times \sqrt{2}^5$ oe A1 for 565 or 566 given as answer dependent on working seen **Or** M1 for realising that population doubles in 2 months in a non-linear relationship, e.g. month 4 = 400, month 6 = 800, etc. M1 for forming the equation $2 = x^2$ or $x = \sqrt{2}$ M1 for method to solve equation to establish $x = \sqrt{2}$ M1 for attempting to find Month 5 population is $100 \times \sqrt{2}^5$ A1 for 565 or 566 given as answer dependent on working seen **Or** M1 for establishing population is of form $N = Ab^t$ oe M1 for substituting $t = 0$, $N = 100$ gives $100 = Ax^0$ or $A = 100$

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Question		**Working**	**Answer**	**Mark**	**Notes**
					M1 for substituting $t = 2$, $n = 200$ gives $200 = 100x^2$ and $x^2 = 2$ so $x = \sqrt{2}$ M1 for attempting to find Month 5 population is $100 \times \sqrt{2}^5$ A1 for 565 or 566 given as answer dependent on working seen
18.	(a)		$\mathbf{b} - \mathbf{a}$		B1 for $\mathbf{b} - \mathbf{a}$ or $-\mathbf{a} + \mathbf{b}$ oe
	(b)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $\overrightarrow{OP} = \mathbf{a} + \frac{3}{5}(\mathbf{b} - \mathbf{a})$ $\overrightarrow{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$	proof		M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ oe or $\overrightarrow{OP} = \overrightarrow{OB} + \overrightarrow{BP}$ oe M1 for $\overrightarrow{AP} = \frac{3}{5}(\mathbf{b} - \mathbf{a})$ oe or $\overrightarrow{BP} = \frac{2}{5}(\mathbf{a} - \mathbf{b})$ oe A1 for $\mathbf{a} + \frac{3}{5}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{2}{5}(\mathbf{a} - \mathbf{b})$ oe leading to given answer with correct expansion of brackets seen
19.		$(4n^2 + 2n + 2n + 1)$ $-(2n + 1)$ $= 4n^2 + 4n + 1 - 2n - 1$ $= 4n^2 + 2n$	Proof	3	M1 for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$ or $(2n + 1)\{(2n + 1) - 1\}$ A1 for $4n^2 + 2n$ or equivalent expression in factorised form C1 for convincing statement using $2n(2n + 1)$ or $2(2n^2 + n)$ or $4n^2 + 2n$ to prove the result

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Question		**Working**	**Answer**	**Mark**	**Notes**
		$= 2n(2n + 1)$			

National performance data from Results Plus

	Original source of questions						Mean score of students achieving grade:					
Qn	Spec	Paper	Session YYMM	Qn	Topic	Max score	ALL	A*	A	B	C	D	E
1	5MB3	3H	1303	Q09b	Conversions	2	0.26	1.40	0.54	0.14	0.03	0.02	0.05
2	NEW				Ratio	2							
3	5AM1	1H	1206	Q15	Simultaneous equations	5	3.05	4.91	4.66	3.60	1.43	0.36	0.00
4	5MM2	2H	1106	Q08	Interior and exterior angles	3	1.08	2.81	2.13	0.95	0.41	0.09	0.00
5	1MA0	2H	1306	Q14	Compound interest	4	2.22	3.69	3.34	2.79	1.94	0.97	0.23
6	5AM2	2H	1311	Q15	Solve inequalities	4	2.71	3.68	3.10	2.94	2.13	1.96	3.00
7	1380	2H	1106	Q16	Reverse percentages	3	1.41	2.91	2.29	1.41	0.65	0.21	0.05
8	5AM1	1H	1211	Q12	Cumulative frequency diagrams	7	3.79	6.00	4.40	2.89	1.66	0.73	
9	4MA0	2H	1401	Q18	Solve quadratic equations	7	3.46	6.31	4.20	2.00	0.45	0.14	0.00
10	5MM2	2H	1111	Q14	Pythagoras in 2D	5	2.47	4.74	4.14	2.83	1.48	0.42	0.00
11	5MB1	1H	1511	Q11	Probability	5	1.89	5.00	3.75	3.36	2.30	1.54	1.00
12	4MA0	1H	1401	Q18	Standard form	5	1.58	3.26	1.56	0.61	0.14	0.01	0.02
13	4MA0	2H	1305	Q22	Trigonometry	4	1.76	2.87	1.61	0.65	0.16	0.02	0.00
14	1380	2H	1011	Q24	Bounds	3	0.92	2.85	2.25	1.15	0.29	0.04	0.01
15	4MA0	4H	1301	Q23	Functions	3	1.65	2.63	1.96	1.04	0.47	0.14	0.03
16	5AM2	2H	1206	Q20	Distance-time / speed graphs	6	1.77	4.88	2.94	1.02	0.19	0.03	0.00
17	5AM2	2H	1406	Q21	Proportional change	5	1.34	4.47	2.43	0.58	0.18	0.04	0.00
18	1380	2H	906	Q23	Vectors	4	0.81	3.13	1.43	0.47	0.12	0.02	0.00
19	1MA0	2H	1406	Q21b	Algebraic proof	3	0.38	1.88	0.95	0.29	0.07	0.02	0.00
						80							