1MA1 Practice papers Set 2: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.	(a)		76	3	M1 for 89% = 68 M1 for 68 ÷ 0.89 (or equivalent) A1 for 76 – 76.41
	(b)		11.8	2	M1 for (68 − 60) ÷ 68 × 100 (or equivalent) A1for 11.7 – 12
2.		12 are red. $\frac{1}{3}$ are red 12 × 3 = 2 blue for 1 red 24 blue for 12 red 24 + 12 =	36	3	M1 for P(red) = $\frac{1}{3}$ M1 for $\frac{1}{3} \times 36 = 12$ red or 12 × 3 A1 for 36 cao OR M1 for 2 blue for 1 red M1 for 24 blue for 12 red or 24 + 12 A1 for 36 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
3.			No with reason	1	C1 No and e.g, the area of B will be $2^2 = 4$ times greater than the area of A **or** may use values to give a counter example
4.		$\frac{15}{2} - \frac{14}{3} = \frac{45a}{6a} - \frac{28a}{6a}$	shown	3	M1 Complete improper fractions M1 Correct fractions with common denominator a multiple of 6 A1 dep on M2. Improper fraction required, e.g. $\frac{17}{6}$, $\frac{34}{12}$
5.			$t = \frac{7+5g}{3}$	3	M1 expands bracket, e.g.. $5t - 5g = 2t + 7$ **or** divides all terms by 5 as a first step M1 isolates terms in t, e.g.. $5t - 2t = 7 + 5g$ A1

<table>
<tr><th colspan="5">1MA1 Practice papers Set 2: 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>6.</td><td></td><td>180 × 365 = 65700

65700 ÷1000 = 65.7

65.7 × 91.22 = 5993.154

5993.154÷100 + 28.20 = 88.13...

<table><tr><td>D</td><td>U</td><td>C</td><td>T</td></tr><tr><td>366</td><td>65880</td><td>6010</td><td>88.30</td></tr><tr><td>365</td><td>65700</td><td>5993</td><td>88.13</td></tr><tr><td></td><td>65000</td><td>5929</td><td>87.49</td></tr><tr><td></td><td>66000</td><td>6020</td><td>88.40</td></tr><tr><td>364</td><td>65520</td><td>5976</td><td>87.96</td></tr><tr><td>360</td><td>64800</td><td>5911</td><td>87.31</td></tr><tr><td><s>336</s></td><td><s>60480</s></td><td>5517</td><td>83.37</td></tr></table></td><td>Decision

(should have a water meter installed)</td><td>5</td><td>Per year

M1 for 180 × ‘365’ (= 65700)
M1 for ‘65700’ ÷ 1000 (= 65.7 or 65 or 66)
M1 for ‘65.7’ × 91.22 (= 5993...)
A1 for answer in range (£)87 to (£)89
C1 (dep on at least M1) for conclusion following from working seen

OR (per day)

M1 for 107 ÷ ‘365’ (= 0.293…)
M1 for 180 ÷ 1000 × 91.22 (= 16.4196)
M1 for 28.2 ÷ ‘365’ + ‘0.164196’ (units must be consistent)
A1 for 29 – 30(p) and 24 – 24.3(p) (or equivalent)
C1 (dep on at least M1) for conclusion following from working seen

OR

M1 for (107 – 28.20) ÷ 0.9122 (= 86.384..)
M1 for ‘86.384..’× 1000 (= 86384.5…)
M1 for ‘365’ × 180 (= 65700)
A1 for 65700 and 86384.5...
C1 (dep on at least M1) for conclusion following from working seen

NB : Allow 365 or 366 or 52×7 (=364) or 12 × 30 (=360) or 365¼ for number of days</td></tr>
</table>

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Question		**Working**	**Answer**	**Mark**	**Notes**
7.		36 × 4 (=144) 176 + 103 + '144' (= 423) 15 × 28 = 420 Or '423' ÷ 28 = 15.107….	No with correct working	4	M1 for 36 × 4 (= 144) M1 for 176 + 103 + '144' (= 423) M1 for 28 × 15 C1 (dep on at least M2 awarded) for 420 **and** 423 and 'No she won't have enough' **Or** M1 for 36 × 4 (=144) M1 for 176 + 103 + '144' (=423) M1 for 423 ÷ 28 C1 (dep on at least M2 awarded) for 15.10 **or** 15.11 **or** 15.107… and 'No she won't have enough'
8.	(a)		$7n - 4$	2	B2 for $7n - 4$ (B1 for $7n + d$ where d is an integer)
	(b)		explanation	2	M1 for '$7n - 4$' = 150 **or** any other valid method, e.g. counting on 7s (to get 150) A1 for a complete explanation eg. the 22nd term is 150 or $n = 22$ from solution of equation or a clear demonstration based on 22 or complete sequence

1MA1 Practice papers Set 2: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
9.	(a)		6	3	M1 13 or 12.75 (LQ) 19 or 18.25 (UQ) identified from ordered list **OR** attempt to find IQR eg. 3(rd) and 9(th) seen or 2.75(th) and 8.25(th) seen M1 Identify 13 or 12.75 (LQ), **AND** 19 or 18.25 (UQ) A1 (accept 5.5)
	(b)		James **and** reason using IQR	1	B1 ft from (a) James: he has a lower IQR (or equivalent) (IQR must be part of the statement)
	(c)		no change with reason	1	B1 no change box ticked with reason, e.g. 2 new scores above median and 2 new scores below median **or** median of 4 numbers is 17

1MA1 Practice papers Set 2: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
10.	(a)	½(3x + 1 + 5x + 3)(2x + 3) = ½ (8x + 4)(2x + 3) So, (4x + 2)(2x + 3) – 46 = 0 $8x^2 + 16x + 6 - 46 = 0$ $8x^2 + 16x - 40 = 0$ $x^2 + 2x - 5 = 0$	Proof	3	M1for correct method to find area of trapezium M1 (dep) for expanding all brackets to get a correct expression for the area C1 for complete correct proof
	(b)	$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-5)}}{2 \times 1}$ $= \frac{-2 \pm \sqrt{24}}{2}$ **OR** $(x + 1)^2 - 1^2 - 5$ $= (x + 1)^2 - 6$ $x + 1 = \pm \sqrt{6}$	1.45, –3.45	3	M1 for $\frac{-2 \pm \sqrt{2^2 - 4(1)(-5)}}{2 \times 1}$ condone one sign error in substitution M1for $\frac{-2 \pm \sqrt{24}}{2}$ A1for 1.44 to 1.45 (and –3.44 to –3.45) **OR** M1 for $(x + 1)^2 - 1^2 - 5$ (or equivalent) M1 for $x + 1 = (\pm)\sqrt{6}$ A1 for 1.44 to 1.45 (and –3.44 to –3.45)

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Question		**Working**	**Answer**	**Mark**	**Notes**
11.		$\sqrt{45^2+20^2} = \sqrt{2425} = 49.24...$ $\sqrt{30^2+20^2} = \sqrt{1300} = 36.05...$ $\sqrt{45^2+30^2} = \sqrt{2925} = 54.08...$ $\sqrt{45^2+20^2+30^2} = \sqrt{3325}$ = 57.66281297 **OR** $30^2 + 20^2 + 45^2$ $= 900 + 400 + 2025 = 3325$ $\sqrt{'3325'} = 57.66281297$	No with working	4	M1 for $45^2 + 20^2$ or $20^2 + 30^2$ or $45^2 + 30^2$ M1 for $\sqrt{'45^2+20^2'}$ or $\sqrt{'20^2+30^2'}$ or $\sqrt{'45^2+30^2'}$ M1 for $\sqrt{'45^2+20^2+30^2'}$ ($= \sqrt{3325}$) C1 for No AND $57.6 – 57.7 < 60$ (or equivalent) **OR** M2 for $30^2 + 20^2 + 45^2$ (= 900 + 400 + 2025 =3325) M1 for $\sqrt{'3325'}$ C1 for No AND $57.6 – 57.7 < 60$ (or equivalent)
12		$(6.21795 \cdot 10^{10}) \div$ 510 072 000 = 121.9(03378…)	$1.22 \cdot 10^2$	3	M1 for SA Jupiter ÷ SA Earth e.g. $(6.21795 \cdot 10^{10}) \div 510\,072\,000$ (or equivalent), e.g. 62000 ÷ 51 or digits 121 …. or digits 122 A1 for 121 – 122 A1 for $1.21 \cdot 10^2 – 1.22 \cdot 10^2$

1MA1 Practice papers Set 2: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
13.			Yes with appropriate reason	4	M1 for writing $l \propto \frac{1}{d^2}$ or $l = \frac{k}{d^2}$ M1 for substituting to find value of k ($k = 2500$) M1 for substituting 5.4 to get $l = \frac{2500}{5.4^2}$ **or** substituting 85 to get $85 = \frac{2500}{d^2}$ C1 (Dep on M1 for yes and the number of decibels is 85.7(3…) which is more than 85 **or** distance is 5.42 m which is more than 5.4 m
14.		73 – 26	47	3	M1 for a complete method A1 B1 Alternate segment theorem
15.		12 × 20 + 10.8 × 10 + 7 × 15 + 5 × 15 + 1.8 × 30 + 0.6 × 30 = 240 + 108 + 105 + 75 + 54 + 18 =528 + 72 = 600	12%	3	M1 for attempt to work out total area (e.g. = 600) or area greater than 60 (e.g. =72) by using fd or counting squares M1 (dep) for $\frac{'72'}{'600'} \times 100$ (or equivalent) (= 12) A1 cao (must have % otherwise 2 marks)

1MA1 Practice papers Set 2: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
16.		$2^{\frac{n}{2}} = \frac{2^x}{(2^3)^y}$ $2^{\frac{n}{2}} = 2^{x-3y}$	$n = 2x - 6y$	3	M1 for writing 8 as 2^3 or $2^{\frac{n}{2}}$ M1 for 2^{x-3y} or $\frac{1}{2}n = x - 3y$ A1 for $n = 2(x - 3y)$ or $n = (x - 3y)$ |0.5
17.	(a)		$\mathbf{b} - \mathbf{a}$	1	B1 for $\mathbf{b} - \mathbf{a}$ or $-\mathbf{a} + \mathbf{b}$
	(b)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $\overrightarrow{AP} = \frac{3}{4} \times (\mathbf{b} - \mathbf{a})$ $\overrightarrow{OP} = \mathbf{a} + \frac{3}{4} \times (\mathbf{b} - \mathbf{a})$ OR $\overrightarrow{OP} = \overrightarrow{OB} + \overrightarrow{BP}$ $\overrightarrow{BP} = \frac{1}{4} \times (\mathbf{a} - \mathbf{b})$ $\overrightarrow{OP} = \mathbf{b} + \frac{1}{4} \times (\mathbf{a} - \mathbf{b})$	$\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$	3	B1 for $\frac{3}{4} \times$ '$(\mathbf{b} - \mathbf{a})$' M1 for $(\overrightarrow{OP} =) \overrightarrow{OA} + \overrightarrow{AP}$ or $(\overrightarrow{OP} =) \overrightarrow{OA} + \frac{3}{4}\overrightarrow{AB}$ or $\mathbf{a} \pm \frac{3}{4} \times$ '$(\mathbf{b} - \mathbf{a})$' A1 for $\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$ or $\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ **OR** B1 for $\frac{1}{4} \times$ '$(\mathbf{a} - \mathbf{b})$' M1 for $(\overrightarrow{OP} =) \overrightarrow{OB} + \overrightarrow{BP}$ or $(\overrightarrow{OP} =) \overrightarrow{OB} + \frac{1}{4}\overrightarrow{BA}$ or $\mathbf{b} \pm \frac{1}{4} \times$ '$(\mathbf{a} - \mathbf{b})$' A1 for $\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$ or $\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$

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Question		**Working**	**Answer**	**Mark**	**Notes**
18.		$7 = ka^1$; $175 = ka^3$ $k = \frac{7}{a}$, $175 = \frac{7a^3}{a}$, $175 = 7a^2$ $a^2 = 25$, so $a = 5, k = 1.4$ Or $7^3 = k^3 a^3$, $175 = ka^3$ $k^2 = \frac{7^3}{175}$, $k = 1.4$, $a = 5$	$k = 1.4$ $a = 5$	3	M1 either $a^2 = 25$ or $7 = ka$ (or $7 = ka^1$) and $175 = ka^3$ A1 $k = 1.4$ (or equivalent) A1 $a = 5$ SC Either $a = 5$ or $k = 1.4$ (or equivalent) gets B2

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Question		**Working**	**Answer**	**Mark**	**Notes**
19.			Yes with explanation	3	M1 For **Line A**: writes equation as $y = 1.5x + 4$ or gives the gradient as 1.5 or constant term of 4 OR for **Line B**: shows a method which could lead to finding the gradient or gives the gradient as 2 or constant term of 4 or calculates a sequence of points including (0,4) or writes equation of line as $y = 2x + 4$ M1 Shows correct aspects relating to an aspect of Line A and an aspect of Line B that enables some comparison to be made e.g. gradients, equations or points. C1 for gradients 1.5 **and** 2 **and** Yes **with** explanation that the gradients are different or states the lines intersect at (0,4) or explanation that interprets common constant term (4) from equations OR M1 for a diagram that shows both lines drawn and intersecting at (0,4) M1 for a diagram that shows both lines and their intersection point identified as (0,4) C1 for Yes and states the intersection point as (0,4)

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Question		**Working**	**Answer**	**Mark**	**Notes**
20.		$\frac{\sin A}{36} = \frac{\sin 48}{57}$ $A = \sin^{-1}\left(\frac{\sin 48}{57} \times 36\right)$ or A in range 27.9 – 28 $\frac{1}{2} \cdot 57 \cdot$ 36 sin (180 – 48 – "28") (= 995.49...)		4	M1 or $\frac{36}{\sin A} = \frac{57}{\sin 48}$ M1 dep M1 dep on the first M1 A1 **or** $\frac{1}{2} \cdot 57 \cdot 36 \sin (48)$ with AC in range 74 – 74.5 or AC from a correct method

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Question		**Working**	**Answer**	**Mark**	**Notes**
21.	(a)	$l^2 = 12^2 + 4^2$	159	3	M1 for $l^2 = 12^2 + 4^2$
		$\pi \cdot 4 \cdot \sqrt{(12^2 - 4^2)}$ or			M1 for a correct expression of the curved surface area
		$\pi \cdot 4 \cdot \sqrt{160}$			
		$\pi \cdot 4 \cdot 12.6(4911\ldots)$ or			A1 (accept in range 158 – 159)
		50.56π or			
		$\frac{1264}{25}\pi$			
	(b)	$\frac{12-h}{r} = \frac{12}{4}$ or $4(12-h) = 12r$	$V = 12\pi r^2 - 3\pi r^3$	3	M1
		or $\frac{h}{12} = \frac{4-r}{4}$ or $4:12 = r:12-h$			M1 $h = 3r$
				A1	cso

National performance data from Results Plus

	Source of questions								Mean score of students achieving grade:					
Qu No	Spec	Paper	Session	Qu	Topic	Max score	Mean % all	ALL	A*	A	B	C	D	E
1	1MA0	2H	1511	Q14	Percentages	5	14	0.69	3.66	2.79	1.91	0.84	0.38	0.13
2	5AM2	2F	1211	Q22	Probability	3	28	0.83				1.66	0.78	0.36
3				NEW	Algebraic proof	1		No data available						
4	4MA0(R)	1F	1501	Q19	Fractions	3	53	1.59				2.09	1.46	0.00
5				NEW	Rearranging equations	3		No data available						
6	5AM2	2H	1411	Q12	Solve inequalities	5	66	3.30	5.00	4.50	4.25	2.71	1.79	0.00
7	5AM1	1H	1506	Q12	Compound interest	5	59	2.96	4.60	3.72	3.04	1.99	0.85	0.43
8	1MA0	2H	1311	Q08	Number sequences	4	58	2.30	3.84	3.46	2.87	2.03	1.28	0.82
9	4MA0	1H	1601	Q13	Mean, median, mode	5	39	1.94	3.47	2.03	1.21	0.74	0.41	0.24
10	5MM2	2H	1406	Q26	Solve quadratic equations	6	42	2.54	5.73	4.65	2.27	0.63	0.12	0.03
11	5AM2	2H	1211	Q20	Pythagoras in 3D	4	36	1.42	3.80	2.89	1.68	0.61	0.02	0.00
12	1380	2H	1106	Q19	Standard form	3	31	0.94	2.66	1.72	0.75	0.23	0.06	0.03
13	5AM2	2H	1506	Q19	Direct and indirect proportion	4	31	1.25	3.19	2.13	0.82	0.11	0.02	0.00
14	4MA0	1H	1601	Q17b	Circle theorems	3	37	1.12	2.22	1.21	0.57	0.17	0.04	0.03
15	1MA0	2H	1311	Q27	Histograms and grouped frequency	3	23	0.68	2.42	1.75	0.90	0.21	0.06	0.05
16	4MA0	2H	1405	Q24	Solve linear equations	3	18	0.55	1.08	0.30	0.13	0.05	0.02	0.01
17	1MA0	2H	1206	Q26	Vectors	4	18	0.73	3.16	1.62	0.57	0.12	0.02	0.01
18	2540	2H	806	Q25	Graphs of exponential functions	3	12	0.36	1.81	0.57	0.10	0.03	0.01	0.02
19	1MA0	2H	1311	Q25	Gradients	3	10	0.29	1.86	0.83	0.21	0.02	0.00	0.00
20	4MA0	1H	1601	Q20	Sine and cosine rule	4	43	1.73	3.42	2.20	0.70	0.10	0.01	0.00
21	4MA0(R)	1H	1601	Q15ab	Volume and surface area	6	64	2.90	3.81	2.43	1.75	1.17	0.14	0.60
						80								