1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.	(a)		$x = 3$ drawn	1	B1 for $x = 3$ drawn [Note: each line drawn must be a single line segment satisfying $x = 3$]
	(b)		$y = x$ drawn	1	B1 for $y = x$ drawn [Note: each line drawn must be a single line segment satisfying $y = x$]
	(c)	Gradient = $\frac{3-0}{0--2}$	1.5	2	M1 for a method to find the gradient of the given line A1 for 1.5 oe
2.			Points plotted at (5, 6), (15, 9), (25, 8), (35, 7), (45,5) and joined with line segments	2	B2 for correct plotting of 5 points and joining with line segments (B1 for points plotted correctly at midpoints of intervals OR joining points with line segments at the correct heights and consistent within the class interval (including end values) OR correct frequency polygon with one point incorrect OR correct frequency polygon with first and last point joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

<table>
<tr><th colspan="5">1MA1 Practice papers Set 5: 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>3.</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 (=5 993.....)

A1 for answer in range (£)87 – (£)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) oe

C1(dep on at least M1) for conclusion following from working seen</td></tr>
</table>

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
4.	(a)	15 ÷ 60	25p	2	M1 for 15 ÷ 60 oe or clear attempt to find gradient A1 for £0.25 or 25p
	(b)	0.2 × 90 (=18) From graph 90 units costs £19	Yes as cost will be lower	3	M1 for Tariff B price for 90 units 20 × 90 (=1800) **or** 0.2 × 90 (= 18) **OR** Tariff A price per unit $\frac{1900}{90}$ **or** $\frac{19}{90}$ B1 for reading from Tariff A graph at 90 units **or** £19 C1 for £18 and £19 with 'yes' or 21.(1…)p with 'yes' **OR** M1 for drawing the correct line (for Tariff B) through the origin with gradient 0.2 B1 for reading from Tariff A graph at 90 units **or** 19 seen C1 for £18 and £19 with 'yes'

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.		Some area examples: ½ × 12 × 25 = 150 8× 25 = 200 ½ × 11 × 25 = 137.5 5 × 25 = 125 ½ × 21 × 25 = 262.5 ½ × 44 × 25 = 550 ½ × 70 × 25 = 875 40 × 25 = 1000	550 ft^2	4	M1 Using the correct dimensions to calculate an area M1 Complete method to find the area of the grass A1 cao C1 (dep on a previous M mark) correct units communicated

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
6.	(a)	p^{5+4}		1	B1 (accept $^{p5+4}$)
	(b)	q^{5-2}		1	B1 (accept q^{5-2})
	(c)			2	B2 (accept $2t^0u$, $2t^0u^1$ oe) (B1 for 2 correct terms from 2, t^0 and u oe eg u^1)
	(d)			2	B2 cao (B1 for 2 correct terms from 3, w and y^3 oe) NB: accept w^1 for w.
	(e)		x^{-2} x^0 $x^{\frac{1}{2}}$ x x^2	2	B2 cao (B1 for any 4 in relative correct order, or all correct but in reverse order)
7.			64%	4	M1 for 0.8 × 8000 (= 6400) oe M1 for 0.8 × 0.8 × 8000 (=5120) oe M1 (dep on M2) for (= 64) C1 for 64% from correct working

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
8.		578 ÷ 0.85	680	3	M1 for 100% – 15% (=85%) or 1 – 0.15 (=0.85) oe M1 for 578 ÷ 0.85 A1 cao
9.	(a)		12, 6	2	M1 for frequency density calculation (implied by one answer), or 1 cm^2 = 2 (trains), or fd = 0.5 or 8 cm^2 = 16 A1 both 12 and 6
	(b)	Bar of height 5cm (5–10) Bar of height 1cm (30–50)	Height 5cm Height 1cm	2	M1 for frequency density calculation (implied by one correct bar) or 1 cm^2 = 2 (trains) or fd = 0.5 A1 for bar of height 5cm (5 to 10) AND for bar of height 1 cm (30 to 50) 8 cm^2 = 16
10.		$y^2 = \frac{2x+1}{x-1}$ $y^2(x-1) = 2x + 1$ $y^2x - y^2 = 2x + 1$ $y^2x - 2x = y^2 + 1$	$x = \frac{y^2+1}{y^2-2}$	4	M1 squaring both sides to get a correct equation M1 removing denominator to get a correct equation M1 correctly gathering *x*s on one side of a correct equation with non-*x* terms on the other side A1

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
11.			9.54	3	M1 for (BC^2=) 52 + 62 – 2 × 5 × 6 × cos 120° M1 for correct order of evaluation or 91 A1 for 9.53 – 9.54
12.			Rotation, 180°, centre (–1, 1)	3	B1 for rotation B1 for 180° (accept half turn) B1 for (–1, 1) (SC B1 for triangle with vertices (–3, 0) (–5, 0) (–3, –4) drawn) **OR** B1 for enlargement B1 for scale factor – 1 B1 for (– 1, 1) (NB: a combination of transformations scores no marks)

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
13.		$4(x + 4) = 4x + 16$ $4(3x + 4) = 12x + 16$ $4x + 16 = \frac{2}{3}(12x + 16)$ $12x + 48 = 24x + 32$ $12x = 16$	$5\frac{1}{3}$	5	M1 for a correct expression for at least one perimeter. M1 for "$4x + 16$" = $\frac{2}{3}$ "$(12x + 16)$" oe M1 for $12x + 48 = 24x + 32$ or $4x + 16 = 8x + \frac{32}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" + 4 **OR** M2 for $x + 4 = \frac{2}{3}(3x + 4)$ M1 for $3x + 12 = 6x + 8$ or $x + 4 = x + \frac{8}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" + 4

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
14.	(a)	$F = \frac{k}{x^2}$		3	M1 k must be a letter not a number
		$0.8 = \frac{k}{5^2}$ or $k = 20$			M1 for substitution (implies first M1)
		$x^2 = \frac{20}{320}$ or $x = \sqrt{\frac{20}{320}}$	$F = \frac{20}{x^2}$		A1 (Award 3 marks for $F = \frac{k}{x^2}$ and $k = 20$ stated anywhere (even in (b)) unless contradicted by later work)
	(b)			2	M1 ft if $k \neq 1$ for correct rearrangement NB. The only ft is for the value of k in $F = \frac{k}{x^2}$
			0.25 oe		A1 cao (ignore ±)

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
15.			22.5	3	M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$ M1 (dep M1) for doubling the area of the triangle A1 for 22.4 – 22.5 **OR** M1 for complete method to find height of parallelogram, e,g. 5 sin 40° M1 (dep M1) for complete method to find the area of the parallelogram, e.g. 7 × 5sin 40° A1 for 22.4 – 22.5
16.	(i)		250	4	M1 for 50/8 (=6.25) or 8/50 (= 0.16) or 40/8 (=5) or 8/40 (= 0.2) or $\frac{50}{n} = \frac{8}{40}$ oe M1 for 50 × 40 ÷ 8 or 50 × 5 or 6.25 × 40 or 50 ÷ 0.2 oe A1 cao
	(ii)		assumption		B1 for correct mathematical assumption, e.g. fixed population, takes random sample

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
17.		Growth factor = $\frac{100+n}{100}$ $500 \times \frac{100+n}{100} \times \frac{100+n}{100}$ $= 700$ $(100+n)^2 = 14000$ $100 + n = 118.32$ $n = 18.32$ After 5 years, 500×1.1832^5 OR $500 \times 1.1 \times 1.1 = 605$ too low $500 \times 1.2 \times 1.2 = 720$ too big $500 \times 1.18 \times 1.18 = 696.2$ too low $500 \times 1.19 \times 1.19 =$	1159 or 1160	5	M1 for introducing growth factor M1 for $500 \times \frac{100+n}{100} \times \frac{100+n}{100} = 700$ A1 for 18.32 or 118.32 M1 for 500×1.1832^5 A1 for 1158 or 1159 or 1160 (accept 1143 or 1144) OR M1 for any trial evaluated and compared with 700 M1 for trials above and below A1 for 1.1832 or better M1 for 500×1.1832^5 A1 for 1158 or 1159 or 1160 (accept 1143 or 1144)

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		708.05 too big $500 \times 1.183 \times 1.183 = 699.745$ too low $500 \times 1.184 \times 1.184 = 700.9$ too big $500 \times 1.1832 \times 1.1832 = 699.98$ After 5 years, 500×1.1832^5			OR M1 for introducing a growth factor M1 for $500r^2 = 700$ A1 for (r =) $\sqrt{\frac{700}{500}}$ oe or 1.18(3) M1 for $500 \times \left(\sqrt{\frac{700}{500}}\right)^5$ oe A1 for 1158 or 1159 or 1160 (accept 1143 or 1144)
18.	(c)	$\frac{2(x+3)-(x-4)}{(x-4)(x+3)}$ $= \frac{2x+6-x+4}{(x-4)(x+3)}$	$\frac{x+10}{(x-4)(x+3)}$	3	M1 for common denominator of $(x-4)(x+3)$ M1 for $\frac{2(x+3)}{(x-4)(x+3)} - \frac{(x-4)}{(x-4)(x+3)}$ $\frac{2(x+3)-(x-4)}{(x-4)(x+3)}$ oe condone missing brackets around $x-4$ A1 for $\frac{x+10}{(x-4)(x+3)}$ or $\frac{x+10}{x^2-x-12}$

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
19.		$\frac{18}{30}\times\frac{12}{29} + \frac{7}{30}\times\frac{23}{29} + \frac{5}{30}\times\frac{25}{29}$ or $1 - (\frac{18}{30}\times\frac{17}{29} + \frac{7}{30}\times\frac{6}{29} + \frac{5}{30}\times\frac{4}{29})$ or $\frac{18}{30}\times\frac{7}{29} + \frac{18}{30}\times\frac{5}{29} + \frac{7}{30}\times\frac{18}{29} + \frac{7}{30}\times\frac{5}{29} + \frac{5}{30}\times\frac{18}{29} + \frac{5}{30}\times\frac{7}{29}$	$\frac{502}{870}$	4	B1 for a second 'branch' probability seen (could be seen in a tree) M1 for a product of any first and second stage correct probabilities M1 for a complete method to find the required probability A1 for $\frac{502}{870}$ oe Note if decimals used they must be correct to 2 decimal places ***Special case with replacement:*** B2 for $\frac{502}{900}$ oe B0 M1 $\frac{18}{30}\times\frac{12}{30}$ or $\frac{7}{30}\times\frac{23}{30}$ or $\frac{5}{30}\times\frac{25}{30}$ M1 $\frac{18}{30}\times\frac{12}{30} + \frac{7}{30}\times\frac{23}{30} + \frac{5}{30}\times\frac{25}{30}$ A0

1MA1 Practice papers Set 5: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
20.			$x < -4, \quad x > 2.5$	4	M1 for rearranging to give $2x^2 + 3x - 20 > 0$ M1 for method to solve $2x^2 + 3x - 20 = 0$ M1 for establishing critical values 2.5 and –4 A1 $x < -4$, $x > 2.5$

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	1MA0	2F	1303	Q22	Graphs of linear equations	2	0.08				0.21	0.04	0.01
2	5MB1	1F	1306	Q16	Frequency polygon	2	0.63				1.27	0.92	0.64
3	1MA0	2F	1206	Q28	Compound measures	5	1.03				2.54	1.20	0.46
4	5AM1	1H	1306	Q09	Conversion graphs	5	3.43	4.72	4.21	3.59	2.75	1.79	0.38
5	5AM1	1H	1206	Q07	Area	4	2.07	3.57	2.94	2.09	1.12	0.58	0.00
6	1380	2H	1006	Q22	Index laws	8	4.70	7.21	5.74	4.64	3.72	2.60	1.68
7	5MM2	2H	1311	Q20	Ratio	4	2.45	3.77	3.48	2.98	1.89	0.55	0.04
8	5AM1	1H	1306	Q19	Reverse percentages	3	1.75	2.96	2.71	1.92	0.90	0.25	0.00
9	1380	2H	1006	Q25	Histograms and grouped frequency	4	1.97	3.71	2.94	1.86	1.08	0.63	0.34
10	4MA0	1H	1405	Q17	Rearranging equations	4	1.82	2.91	1.64	0.87	0.34	0.09	0.02
11	5MM2	2H	1311	Q23	Sine and cosine rule	3	1.27	2.97	2.55	1.52	0.32	0.02	0.00
12	1380	2H	1203	Q17	Transformations	3	0.97	2.62	1.96	1.20	0.53	0.22	0.15
13	5AM1	1H	1111	Q14	Solve linear equations	5	1.25	4.83	1.43	0.70	0.36	0.57	1.00
14	4MA0	2H	1405	Q17	Direct and inverse proportion	5	3.11	4.62	3.29	1.57	0.53	0.13	0.04
15	1MA0	2H	1506	Q23	Trigonometry	3	0.69	2.58	1.78	0.76	0.15	0.02	0.00
16	5MB1	1H	1311	Q17	Estimating populations	4	1.04	3.76	2.46	1.39	0.60	0.38	0.00
17	5AM2	2H	1111	Q25	Graphs of exponential functions	5	0.73	5.00	1.29	0.67	0.00	0.00	0.00
18	1380	2H	1111	Q23c	Algebraic fractions	3	0.28	2.04	1.03	0.30	0.04	0.01	0.00
19	1MA0	2H	1511	Q25	Probability	4	0.34	3.45	2.77	1.48	0.34	0.06	0.01
20	NEW				Inequalities	4							
						80							