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.		$\frac{25}{8}-\frac{5}{3}=\frac{75-40}{24}=\frac{35}{24}$ **OR** $2\frac{1}{8}-\frac{2}{3}=2\frac{3-16}{24}$ $=1\frac{27-1}{24}$ **OR** $2\frac{1}{8}-\frac{2}{3}=2\frac{3-16}{24}$ $=2\frac{-13}{24}$	$1\frac{11}{24}$	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: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
3.			20	3	M1 for 330 ÷ 120 (= 2.75) or 200 ÷ 60 (= $3\ ^{1}/_{3}$) or 450 ÷ 180 (= 2.5) M1 for 450 ÷ 180 (= 2.5) AND 8 ×"2.5"(= 20) A1 cao **OR** M1 for 120 ÷ 8 (= 15) or 60 ÷ 8 (= 7.5) or 180 ÷ 8 (= 22.5) M1 for 330 ÷ (120 ÷ 8) (= 22) or 200 ÷ (60 ÷ 8) (= 26.6...) or 450 ÷ (180 ÷ 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
4.		2.25 × 60 ÷ 100 = 1.35 1.35 + 0.80 = 2.15 1.5 × 60 ÷ 100 = 0.90 0.90 + 1.90 = 2.80	Railtickets with correct calculations	4	NB. All work may be done in pence throughout M1 for correct method to find credit card charge for one company e.g. 0.0225 × 60(= 1.35) oe or 0.015 × 60 (= 0.9) oe M1 (dep) for correct method to find total additional charge or total price for one company e.g. 0.0225 × 60 + 0.80 or 0.015 × 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

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
		OR 2.25 – 1.5 = 0.75 0.075 × 60 ÷ 100 = 0.45 0.80 + 0.45 = 1.25 1.25 < 1.90			**OR** M1 for correct method to find percentage of (60 + booking fee) e.g. 0.0225 × 60.8 (= 1.368) oe or 0.015 × 61.9 (= 0.9285) 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) 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 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 **OR** M1 for correct method to find difference in cost of credit card charge e.g. (2.25 – 1.5) × 60 ÷ 100 oe or 0.45 seen 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)) A1 1.25 and 1.9(0) or 0.45 and 1.1(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 QWC: Decision and justification should be clear with working clearly presented and attributable

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.	(*a*)		Correct frequency polygon	2	B2 for fully correct polygon. Points plotted at the midpoints ± ½ 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					
Question		**Working**	**Answer**	**Mark**	**Notes**
6.		Area of circle B is 110% of the area of circle A Area of circle C is 110% of 110% = 121% of the area of circle A. **OR** Area of circle B is 220 cm^2 Area of circle C is 242 cm^2 Area of circle B is 1.1 times bigger Area of circle C is 1.1 × 1.1 = 1.21 times bigger	21% or 42 cm^2	4	B1 110% seen M1 $\frac{110}{100} \times 110$ oe A1 121% C1 dep on M1 for 21% bigger oe **OR** B1 220 shown M1 $\frac{110}{100} \times 220$ A1 242 C1 dep on M1 for area is 42 cm^2bigger oe **OR** B1 for 1.1 seen M1 for 1.1 × 1.1 A1 for 1.21 C1 dep on M1 for 21% larger or 1.21 times larger o.e.
7.	(*a*)	$2x + 6y + 4x - 4y$	$6x + 2y$	2	M1 for $2x + 6y$ or $4x - 4y$ or $6x$ or $2y$ A1 for $6x + 2y$ [accept $2(3x + y)$]
	(*b*)	$2 \times 4 \times p - 3 \times 4 \times p \times q$	$4p(2 - 3q)$	2	B2 cao [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 $b \neq 0$]

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
8.			"two angles are equal so the triangle is isosceles"	5	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 $62(^o)$ or $4 \times$ '12' $+ 8$ or $56(^o)$ 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 $62(^o)$ or $4 \times 12 + 8$ or $56(^o)$ M1 checking their angles add to 180^o, "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^o C0

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
9.	(*a*)	30 = 2 × 3 × 5 42 = 2 × 3 × 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 × 3 × 5 × 3 A1 for LCM = 90 SC B1 for 210
10.		½ (12 + 8) × 6 = 60 '60' × 20 = 1200 1200 × 5 = 6000 6000 ÷ 1000 = 6	6	5	M1 ½ (12 + 8) × 6 oe or 60 seen M1 (dep) '60' × 20 M1 (indep) '1200' × 5 A1 6000 cao A1 ft (dep on 1st or 3rd M1 scored) for 6

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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	M1 for writing one of the numbers correctly as a power of 2 M1 for $2^{'2'} \times 2^{'3'} = 2^{'2'+'3'}\left(= 2^5\right)$ or $\left(2^{'4'}\right)^3 = 2^{'4'\times 3}\left(= 2^{12}\right)$ or $\frac{2^{'5'}}{2^{'12'}} = 2^{'5'-'12'}$ A1 for 2^{-7} or $\frac{1}{2^{-7}}$
		OR $\frac{2\times 16}{16\times 16\times 16} =$ $\frac{2}{16\times 16} = \frac{2}{2^4\times 2^4} = \frac{2}{2^8}$			**OR** B1 for $\frac{1}{16^2}$ or an equivalent fraction with a numerator of 2 M1 for $2^{'4'} \times 2^{'4'} = 2^{'4'+'4'}\left(= 2^8\right)$ or $\frac{2^{'1'}}{2^{'8'}} = 2^{'1'-'8'}$ A1 for 2^{-7} or $\frac{1}{2^7}$ [SC: B1 for an answer of $\frac{1}{128}$ if M0 scored]

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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					
Question		**Working**	**Answer**	**Mark**	**Notes**
15.			Proof	3	M1 for $\overrightarrow{MN} = \overrightarrow{MO} + \overrightarrow{ON}$ (= **n** – **m**) or $\overrightarrow{NM} = \overrightarrow{OM} + \overrightarrow{NO}$ (= **m** – **n**) or $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ (= 2**n** – 2**m**) or $\overrightarrow{BA} = \overrightarrow{OA} + \overrightarrow{BO}$ (= 2**m** – 2**n**) M1 for $\overrightarrow{MN}$= **n** – **m** and $\overrightarrow{AB}$= 2**n** – 2**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**n** – 0.5**m** and $\overrightarrow{AB}$ = **n** – **m**] C1 (dep on M1) for fully correct proof, with $\overrightarrow{AB}$= $2\overrightarrow{MN}$ or $\overrightarrow{AB}$ is a multiple of of $\overrightarrow{MN}$]

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
16.		$360 - y$	$180 - \frac{y}{2}$	4	M1 $ADC = \frac{y}{2}$ A1 $180 - \frac{y}{2}$ C2 (dep on M1) for both reasons Angle at centre is twice the angle at the circumference Opposite angles in cyclic quadrilateral add to 180° (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 Angles around a point add up to 360° Angle at centre is twice the angle at the circumference (C1 (dep on M1) for one appropriate circle theorem reason)
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					
Question		**Working**	**Answer**	**Mark**	**Notes**
18.		*ABE* = angle *CBD* (vertically opposite angles) angle *EAB* = angle *CDB* (alternate angles) angle *AEB* = angle *BCD* (alternate angles) **OR** angle *EAB* = angle *CDB* (alternate angles) angle *AEB* = angle *BCD* (alternate angles) *ABE* = angle *CBD* (angles in a triangle sum to 180˚)	proof	4	M1 for any 2 pairs of angles correctly matched A1 for all 3 pairs correctly matched C2 (dep on M1)for full reasons and concluding statement (C1(dep on M1) for at least one reason)
19.	(*a*)(i)		$\frac{\sqrt{3}}{2}$	2	B1 cao
	(ii)		$-\frac{\sqrt{3}}{2}$		B1 cao
	(*b*)			2	B2 cao [B1 for sine curve starting from the origin with amplitude 4, OR B1 cuts *x* axis at 90, 180, 270, 360 and starts from 0]

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
20.		$(n + 1)^2 - n^2$ $= n^2 + 2n + 1 - n^2$ $= 2n + 1$ $(n + 1) + n = 2n + 1$ **OR** $(n + 1)^2 - n^2$ $= (n + 1 + n)(n + 1 - n)$ $= (2n + 1)(1) = 2n + 1$ $(n + 1) + n = 2n + 1$ **OR** $n^2 - (n + 1)^2 =$ $n^2 - (n^2 + 2n + 1) =$ $-2n - 1 = -(2n + 1)$ Difference is $2n + 1$ $(n + 1) + n = 2n + 1$	proof	4	M1 for any two consecutive integers expressed algebraically e.g. n and $n + 1$ M1 (dep on M1) for the difference between the squares of 'two consecutive integers' expressed algebraically e.g. $(n + 1)^2 - n^2$ A1 for correct expansion and simplification of difference of squares, e.g. $2n + 1$ 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

1MA1 Practice papers Set 3: Paper 1H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
21.				4	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 A1 for $-((x + 1.5)^2 - 7.25)$ or parabola with marxiumum marked at $(-1.5, 7.25)$ or $\frac{3 \pm \sqrt{29}}{2}$ C1 for parabola drawn with maxiumum in 2nd quadrant or y intercept (0, 5) or with x axis intercepts at $\left(\frac{3 \pm \sqrt{29}}{2}, 0\right)$ C1 for parabola drawn with maxiumum (-1.5, 7.25) and y intercept (0, 5) and x axis intercepts at $\left(\frac{3 \pm \sqrt{29}}{2}, 0\right)$

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.			29.1	3	M1 use of cos M1 cos ("x") = (= 0.87…) or ("x" =) cos – 1 ( ) **OR** or M2 for sin and following correct Pythagoras or M2 for tan and following correct Pythagoras or correct Pythagoras and then correct use of sine or cosine rule with "21.36" A1 for ans rounding to 29.1 (29.1103…)
2.		$2000 \times 1.05^2 =$ 2000×1.1025 **OR** $2000 \times 1.05 = 2100$ $2100 \times 1.05 = 2205$	£2205	3	M2 2000×1.05^2 (M1 2000×1.05^n, $n \neq 2$) A1 cao **OR** M1 $\frac{5}{100} \times 2000$ (oe) or 100 or 200 or 2100 or 2200 seen M1 (dep) $\frac{5}{100} \times (2000 +$ "100") A1 cao SC B2 for £2315.25 seen (3 yrs)

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
3.		Angle *ACB* = 67º *x* = 180 – (67 + 67)	46° with reasons	4	B1 for angle *ACB* = 67º, could be marked on the diagram M1 for 180 – (‘67’ + ‘67’) A1 for *x* = 46° C1 for vertically opposite angles (or vertically opposite angles) **and** base angles of an isosceles triangle are equal **OR** B1 for angle *ACB* = 67º, could be marked on the diagram M1 for 180 – (‘67’ + ‘67’) A1 for *x* = 46° C1 for “angles on a straight line add up to 180^{o} **and** base angles of an isosceles triangle are equal

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
4.		$\frac{1}{6}\times\frac{1}{6}=\frac{1}{36}$ $1-\frac{1}{36}$ **OR** $\frac{1}{6}\times\frac{5}{6}+\frac{5}{6}\times\frac{1}{6}+\frac{5}{6}\times\frac{5}{6}$ $=\frac{5+5+25}{36}$ **OR** (see table below)	$\frac{35}{36}$	3	M1 for $\frac{1}{6}\times\frac{1}{6}$ oe M1 for $1-$, $\frac{1}{6}\times\frac{1}{6}$, oe A1 for $\frac{35}{36}$ or 0.97(2222...) oe **OR** M1 for $\frac{1}{6}\times\frac{5}{6}$ or $\frac{5}{6}\times\frac{1}{6}$ or $\frac{5}{6}\times\frac{5}{6}$ oe M1 for $'\frac{1}{6}\times\frac{5}{6}'+'\frac{5}{6}\times\frac{1}{6}'+'\frac{5}{6}\times\frac{5}{6}'$ oe A1 for $\frac{35}{36}$ or 0.97(2222...) oe **OR** M1 for probability space oe that can lead to the answer M1 for $1-\frac{'\text{number of 6,6}'}{36}$ or $\frac{'\text{number of non 6,6}'}{36}$ A1 for $\frac{35}{36}$ or 0.97(2222...) oe

	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.		$P = kr^2$ $36 = k \times 20^2$ $P = 0.09\ r^2$ **OR** $\frac{20^2}{r^2} = \frac{36}{p}$ $P = \frac{36}{20^2} r^2$	$P = 0.09\ r^2$	3	M1 for $P = kr^2$ (accept any $k \neq 0$ or 1) M1 (dep) for $36 = k \times 20^2$ A1 for $P = 0.09\ r^2$ oe **OR** M2 for $\frac{20^2}{r^2} = \frac{36}{p}$ oe, e.g. $20^2 : r^2 = 36 : P$ A1 for $P = \frac{36}{20^2} r^2$ oe

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
6.		$2x + 2(x \pm 9) < 200$ $2x + 2x \pm 18 < 200$ $4x \pm 18 < 200$ $4x < 182$ (or 218) $x < 45.5$ ($x < 54.5$, so width < 45.5) **OR** $200 \div 4 = 50$ $9 + 9 \div 4 = 4.5$ $50 – 4.5 = 45.5$ **OR** $200 – 18 = 182$ $182 \div 4 = 45.5$	45	4	B1 for $x \pm 9$ oe seen (it could just be on a diagram) or a rectangle with length 9 cm greater than the width M1 for $2x + 2(x \pm 9)$ oe A1 for 45.5 B1 for answer of 45 **OR** M1 for $200 \div 4$ (= 50) M1 for $(9 + 9) \div 4$ (= 4.5) A1 for 45.5 B1 for answer of 45 **OR** M1 for $200 – 18$ (= 182) M1 for $182 \div 4$ A1 for 45.5 B1 for answer of 45 [SC: B3 for 45.5 seen from any method]

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
7.		$\sqrt{45^2 + 20^2}$ = $\sqrt{2425}$ = 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 oe **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 oe
8.				2	B2 for correct locus within guidelines (overlay) (B1 for a line drawn parallel to either given line OR a line passing through the angle outside of the guidelines OR a line drawn within the guidelines but not passing through angle)

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
9.			116	3	M1 for 80% or 0.8 seen oe or $\frac{464}{0.8}$ (= 580) M1 for $\frac{464}{0.8} - 464$ A1 cao **OR** M1 for 80% or 0.8 seen oe M1 for 464 ÷ 4 or 464 ÷ (80÷20) A1 cao
10.		(6.21795×10^{10}) ÷ 510 072 000 = 121.9(03378…)	1.22×10^{2}	3	M1 for SA Jupiter ÷ SA Earth e.g. (6.21795×10^{10}) ÷ 510 072 000 oe, e.g. 62000 ÷ 51 or digits 121 …. or digits 122 A1 for 121 – 122 A1 for $1.21 \times 10^{2} – 1.22 \times 10^{2}$
11.			75.5	3	M1 for 25 × 67.8 (= 1695) or 55 × 72.0 (= 3960) M1 (dep) for (“3960” − “1695”) ÷ 30 A1 cao
12.			Rotation, 90° clockwise centre (1,4)	3	B1 for rotation B1 for 90° clockwise or 270° anticlockwise B1 for (1,4) NB Award B0 if more than one transformation given

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
13.	(*a*)		25.5	2	M1 for 3000 × 8.5 A1 cao
	(*b*)		2.187×10^6	3	M1 for $\left(\frac{225}{0.25}\right)^3$ or 900^3 oe or $\left(\frac{225}{25}\right)^3$ or 9^3 M1 for correct conversion of units (cm^3 to m^3) A1 cao
14.			12	5	M1 for writing a correct expression for the perimeter of the square or the rectangle e.g. $4(x + 6)$ or $10x + 20$ or for the semi-perimeter M1 for equating the two (semi) perimeters correctly M1 for resolving the fraction e.g. $20x + 120 = 30x + 60$ or for rearranging the equation to the form. $a = bx + c$ M1 for $10x + 60 = 120$ or $24 = 2x + 12$ or $x = 6$ A1 cao
15.	(*a*)		$2x^3 + 3x^2 - 28x - 15$	3	M1 Correct expansion of any 2 brackets (condone 1 error) M1 Correct expansion of previos product by remaining bracket (condone 1 error) A1
	(*b*)		$r = \frac{am-1}{5-a}$	3	M1 for $5r - ar = am - 1$ oe (terms in r isolated) M1 for $r(5 - a) = am - 1$ A1

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
16.			49	3	M1 for 180 – 56 – 75 A1 for 49 C1 for alternate segment theorem and angles on a straight line add up to 180^o OR alternate segment theorem and angles in a triangle add up to 180^o Appropriate to methods shown
17.			6.2	5	M1 for a method to find an angle *RAB* = 70, *ABR* = 50, *BRA* = 60 or *TAR* = 20 M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$ M1 for use of sine rule to find *AR*, $AR = \frac{12}{\sin"60"} \times \sin"50"$ (= 10.61) M1 for substitution into cosine formula $TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (= 37.92) A1 for 6.15 – 6.2
18.	(*a*) (i)(ii) (*b*)		(2, 0) and (6, 0) (0, 4) Drawn curve	2 2	B1 for (2, 0) and (6, 0) B1 for (0, 4) M1 for a translation in the positive *y*-direction A1 for curve passing through (2, 0), (0, 2) and (4, 2)

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
19.	(*a*)		11	3	M1 for tangent drawn at $t = 2$ M1 (dep) for $\frac{diff.\ y}{diff.\ x}$ ft from tangent A1 for 9 – 14
	(*b*)		66.5	3	M1 for splitting the area into 4 strips and a method of finding the area of one shape under the graph, e.g. ½ × 1 × (26 + 62) (= 44) M1 for complete process to find the area under the graph, e.g. '44' + ½ × 1 × (8 + 26) (= 17) + ½ × 1 × (1.5 + 8) (= 4.75) + + ½ × 1 × (0 + 1.5) (= 0.75) [= 66.5] A1 NB Allow for ± 1 when reading the values of the diagram
20.			1847 – 1848	5	M1 for correct method to establish week 6 population as $1200 \times x$ oe M1 for forming equation $1200\ x^2 = 900$ M1 for method to solve equation to establish $x = \frac{\sqrt{3}}{2}$ M1 for correct method for week 2 population e.g. $1200 \div \left(\frac{\sqrt{3}}{2}\right)^3$ oe A1 for 1847 – 1848 given as answer dependent on working seen

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
					OR M1 for realising that population is $\frac{3}{4}$ in 2 weeks M1 for forming the equation $\frac{3}{4} = x^2$ M1 for method to solve equation to establish $x = \frac{\sqrt{3}}{2}$ M1 for correct method for week 2 population e.g. $1200 \div \left(\frac{\sqrt{3}}{2}\right)^3$ oe A1 for 1847 – 1848 given as answer dependent on working seen **OR** M1 for establishing population is of form $N = Ab^t$ oe M1 for substituting $t = 5$, $N = 1200$ gives $1200 = Ax^5$ M1 for substituting $t = 7$, $N = 900$ gives $900 = Ax^7$ or $900 = 1200x^2$ and $x^2 = \frac{3}{4}$ so $x = \frac{\sqrt{3}}{2}$ M1 for correct method for week 2 population e.g. $1200 \div \left(\frac{\sqrt{3}}{2}\right)^3$ oe A1 for 1847 – 1848 given as answer dependent on working seen

1MA1 Practice papers Set 3: Paper 2H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
21.		$(A =)$ $0.5\times(4+k)\times\sqrt{3}\left(=5\sqrt{6}\right)$ $k+4=\dfrac{10\sqrt{6}}{\sqrt{3}}$ $(k =)\ 2\times\dfrac{5\sqrt{6}}{\sqrt{3}-4}$ or $(k =)\ \dfrac{5\sqrt{6}-2\sqrt{3}}{0.5\sqrt{3}}$ oe	$(k =)\ 10\sqrt{2}-4$	3	M1 $4\sqrt{3}+0.5(k-4)\times\sqrt{3}$ oe M1 correctly isolating k A1 Accept $2\left(5\sqrt{2}-2\right)$ but don't accept $10\sqrt{2}-4$ followed by $5\sqrt{2}-2$

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

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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".

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

1MA1 Practice papers Set 3: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
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

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

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

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

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

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