1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0				
Question	Working	Answer	Mark	Notes
1		$\dfrac{39}{80}$	4	M1 for a correct method to find $\frac{2}{5}$ of 40; eg. $40 \div 5 \times 2 \ (= 16)$ **or** for a correct method to find $\frac{5}{8}$ of 40; eg. $40 \div 8 \times 5 \ (= 25)$ M1 for a correct method to find $\frac{2}{5}$ of 40 **and** $\frac{5}{8}$ of 40 M1 (dep on M1) for $80 - "16" - "25" \ (= 39)$ or $\dfrac{"16" + "25"}{80} \ (= \frac{41}{80})$ A1 $\dfrac{39}{80}$ oe **OR** M1 for $1 - \dfrac{2}{5} \ (= \frac{3}{5})$ **and** $1 - \dfrac{5}{8} \ (= \frac{3}{8})$ M1 for a correct method to find $\frac{3}{5}$ of 40; eg. $40 \div 5 \times 3 \ (= 24)$ **or** for a correct method to find $\frac{3}{8}$ of 40; eg. $40 \div 8 \times 3 \ (= 15)$ M1 (dep on M1) for $"24" + "15" \ (= 39)$ A1 $\dfrac{39}{80}$ oe
2		$w = 2P + 3$	2	M1 for a clear intention to multiply **both** sides by 2 or add $\frac{3}{2}$ to both sides as a first step A1 for $w = 2P + 3$ oe

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Question	**Working**	**Answer**	**Mark**	**Notes**
3	$25 \div 50 = 0.5$ h = 30 min $\newline$ $25 \div 60 = 0.416$h = 25 min	5	3	M1 for $25 \div 50$ **or** $\dfrac{60}{50} \times 25$ **or** 30 (min) **or** 0.5(h) $\newline$ **or** $25 \div 60$ **or** $\dfrac{60}{60} \times 25$ **or** 25 (min) **or** 0.41(6)(h) $\newline$ M1(dep) '0.5' – '0.41(6)' **or** '30' – '25' $\newline$ A1 cao $\newline$ $\newline$ **OR** $\newline$ $\newline$ M1 for $60 \div 25$ (= 2.4) and $60 \div$ "2.4" **or** $\newline$ $50 \div 25$ (= 2) and $60 \div$ "2" $\newline$ M1(dep) for '30' – '25' $\newline$ A1 cao

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Question	**Working**	**Answer**	**Mark**	**Notes**
4	$12x + 9y = -21$ $\underline{12x - 16y = 104}$ $25y = -125$ $y = -5$ $4x + 3 \times -5 = -7$ **OR** $16x + 12y = -28$ $\underline{9x - 12y = 78}$ $25x = 50$ $x = 2$ $4 \times 2 + 3y = -7$	$x = 2$ $y = -5$	4	M1 for correct process to eliminate either x or y (condone one arithmetic error) A1 for either $x = 2$ or $y = -5$ M1 (dep on 1st M1) for correct substitution of their found value or (indep) for correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both $x = 2$ and $y = -5$ **SC**: B1 for $x = 2$ or $y = -5$ if M0 scored

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Question	**Working**	**Answer**	**Mark**	**Notes**
5 (a)	4500×1.04^2	4867.20	3	M1 for 4500×1.04 or for $4500 + 0.04 \times 4500$ or for 4680 or 180 or 360 or 4860 M1 (dep) '4680' $\times$ 1.04 or for '4680' + 0.04 $\times$ '4680' A1 for 4867.2(0) cao (If correct answer seen then ignore any extra years) **Alternative method** M2 for 4500×1.04^2 or 4500×1.04^3 A1 for 4867.2(0) cao [SC: 367.2(0) seen B2]
(b)	2400×1.075^n 2580 2773.5 2981.5125 3205.12… 3445.51…	5	2	M1 for an attempt to evaluate 2400×1.075^n for at least one value of n (not equal to 1) or $3445.51 \div 1.075^n$ $(n \geq 2)$ or $\dfrac{3445.51}{2400}$ (=1.4356...) and 1.075^n evaluated, $n \geq 2$ A1 for 5 cao

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Question	**Working**	**Answer**	**Mark**	**Notes**
6	$2 \times 10 \cos 70$ OR $BC^2 = 10^2 + 10^2 - 2 \times 10 \times 10 \times \cos 40$ $BC = \sqrt{46.79(1....)}$	6.84	4	M1 for $180 - 2 \times 70$ M1 for $\dfrac{10}{\sin 70} = \dfrac{BC}{\sin(180 - 2 \times 70)}$ M1 for $BC = \dfrac{\sin(180 - 2 \times 70) \times 10}{\sin 70}$ A1 for 6.84(0…) **OR** M1 for $180 - 2 \times 70$ M1 for $10^2 + 10^2 - 2 \times 10 \times 10 \times \cos(180 - 2 \times 70)$ M1 for $\sqrt{'46.79(1....)'}$ A1 for 6.84(0…) M1 for perpendicular from A to BC, may be implied by correct working M1 for $10 \times \cos 70$ or $10 \times \sin 20$ or correct attempt to use sin or cos M1 for $2 \times$ '$10 \times \cos 70$' A1 for 6.84(0...)

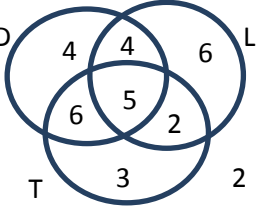|	1MA1 Practice papers Set 6: Paper 3H (Regular) mark scheme – Version 1.0				
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(i)	$\dfrac{1}{2} \times (x + 6 + 3x - 4) \times (x - 1)$ **or** $(x + 6)(x - 1)$ **or** $(x - 1)(3x - 4)$ **or** $\dfrac{1}{2} \times (x - 1)(3x - 4 - (x + 6))$ $\dfrac{1}{2} \times (4x^2 - 2x - 2) = 119$		3	M1 correct algebraic expression for any relevant area M1 for correct equation with at least one pair of brackets expanded correctly
			shown		A1 for completion to given equation
	(ii)	$(2x \pm 15)(x \pm 8) \ (= 0)$ **or** $\dfrac{--1 \pm \sqrt{(-1)^2 - 4 \times 2 \times -120}}{2 \times 2}$ **or** $\left(x - \dfrac{1}{4}\right)^2 - \left(\dfrac{1}{4}\right)^2 - 60 = 0$ $(2x + 15)(x - 8) \ (=0)$ **or** $\dfrac{1 \pm \sqrt{1 + 960}}{4}$ **or** $x = \dfrac{1}{4} \pm \sqrt{\left(\dfrac{1}{4}\right)^2 + 60}$ **or** -7.5 **and** 8 given as solutions	8	3	M1 Start to solve quadratic condone one sign error in substitution if quadratic formula used; allow -1^2 or 1^2 or 1 in place of $(-1)^2$ M1 ft from an incorrect 3 term quadratic equation A1 dep ft method from an incorrect 3 term quadratic equation Award all 3 marks if first M1 awarded **and** 8 alone given as final answer

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Question	**Working**	**Answer**	**Mark**	**Notes**
8 (a)		$x \geq -1$	1	B1 cao
(b)		$-4,-3,-2$	2	B2 for all 3 values and no extras (ignore repeats) (B1 for 2 correct values and no extras or all 3 correct values and −5)
(c)		$y < 4$	2	M1 for clear intention to add 2 onto each side of an inequality (or equation) or clear intention to divide all terms by 5 as a first step or $(y =)$ 4 A1 cao

Question	Working	Answer	Mark	Notes
9	eg. $\dfrac{3}{9} \times \dfrac{2}{8} \times \dfrac{1}{7} \left(= \dfrac{6}{504} = \dfrac{1}{84} \right)$ eg. $\dfrac{2}{9} \times \dfrac{3}{8} \times \dfrac{4}{7} \left(= \dfrac{24}{504} = \dfrac{1}{21} \right)$ $6 \times "\dfrac{24}{504}" \left(= \dfrac{144}{504} = \dfrac{6}{21} = \dfrac{2}{7} \right)$ $6 \times \dfrac{2}{9} \times \dfrac{3}{8} \times \dfrac{4}{7} \ + \ \dfrac{3}{9} \times \dfrac{2}{8} \times \dfrac{1}{7} \ \left(= \dfrac{6}{21} + \dfrac{1}{84} \right)$	$\dfrac{150}{504}$	5	M1 (probabilities from selecting 2, 2, 2) allow $\dfrac{3}{9} \times \dfrac{2}{9} \times \dfrac{1}{9} \left(= \dfrac{6}{729} \right)$ **or** $\dfrac{3}{9} \times \dfrac{3}{9} \times \dfrac{3}{9} \left(= \dfrac{27}{729} \right)$ M1 (probabilities from selecting 1, 2, 3) allow $\dfrac{2}{9} \times \dfrac{3}{9} \times \dfrac{4}{9} \left(= \dfrac{24}{729} \right)$ M1 (probabilities for all combinations of 1, 2, 3) allow $6 \times "\dfrac{24}{729}" \left(= \dfrac{144}{729} \right)$ M1 complete correct method A1 oe eg. $\dfrac{25}{84}$, 0.298, 0.297619…

Question	Working	Answer	Mark	Notes
10	$20 = 2, 2, 5$ $140 = 2, 2, 5, 7$ $420 = 2, 2, 3, 5, 7$	60	2	M1 for identifying the prime factors for 2 of the 3 numbers 20,140,420 (can be implied by a factor tree, repeated division or Venn diagram) or For a complete Venn diagram for x and 140 with 20 in the intersection or $x = 20 \times 3$ or $20 \times 7 \times y = 420$ or $\dfrac{420}{20 \times 7}$ or At least the 1st 3 multiples of 20 or $140x = 420 \times 20$ oe A1 (Allow 2×2×3×5)
11		380	3	M1 for $1 - 0.15$ ($= 0.85$) or $100 - 15$ ($= 85$) M1 for $323 \div 0.85$ oe or $323 \div 85 \times 100$ oe A1 cao
12		 5/9		M1 for 5 in the middle and 1 from 4(D ∩ L ∩ T′) or 2(L ∩ T ∩ D') or 6(D ∩ T ∩ L') M1 for any 4 correct entries A1 for all correct including 2 outside the circles inside the rectangle B1 ft from incorrect diagram

Question		Working	Answer	Mark	Notes
13	(a)		1	1	B1
	(b)	$y = (x - 6) / 2$			M1 or for a correct flowchart including inverse
		$2y = x - 6$			
		$2y + 6 = x$	$2x + 6$	2	A1

Question	Working	Answer	Mark	Notes
14	$PQ(ML) = 20\sin 30^o$ $(=10)$ or $MR = \sqrt{12^2 + 20^2} = \sqrt{544}$ $= 4\sqrt{34} = 23.32..)$ $LR = \sqrt{12^2 + (RQ)^2} =$ $\sqrt{12^2 + (10\sqrt{3})^2} = \sqrt{444} = 2\sqrt{111} = 21.07..$ $\sin MRL = \dfrac{10}{4\sqrt{34}}\ \left(\dfrac{ML}{MR}\right)$ or $\quad \cos MRL = \dfrac{2\sqrt{111}}{4\sqrt{34}}$ $\left(\dfrac{LR}{MR}\right)$ or $\tan MRL = \dfrac{10}{2\sqrt{111}}\ \left(\dfrac{ML}{LR}\right)$		5	B1 Recognition of angle *LRM* as required angle either drawn on diagram or from working M2 for a correct method to calculate *PQ(ML)* & *MR* or *MR* & *LR* or *PQ(ML)* & *LR* (NB: *LR* requires use of *RQ* = $\sqrt{20^2 - 10^2}\, or\, 20\cos 30 = \sqrt{300} = 10\sqrt{3} = 17.32..)$ Or M1 for a correct method to calculate one of the sides *PQ* or *MR* or *LR* M1 (Dep on M2) Use of a correct trig ratio to find angle *MRL*
		25.4		A1 25.38 – 25.5

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Question	**Working**	**Answer**	**Mark**	**Notes**
15		21 or 22	5	M1 for $160r^2 = 90$ or $\dfrac{90}{160}$ M1 for $(r=)\sqrt{\dfrac{90}{160}}$ oe M1 (dep M2) for $160 \times \left(\sqrt{\dfrac{90}{160}}\right)^7$ oe A1 for 21.3… A1 for 21 or 22 **or** M1 for $160 \times r^2 = 90$ or $\dfrac{90}{160}$ M1 for $160 \times \dfrac{100-n}{100} \times \dfrac{100-n}{100} = 90$ M1 (dep M2) for 160×0.75^7 A1 for 21.3… A1 for 21 or 22

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Question	**Working**	**Answer**	**Mark**	**Notes**
16	$AC^2 = 11.8^2 + 7.4^2$ $- 2 \times 11.8 \times 7.4 \times \cos132$ $AC = 17.63\ldots$ $\frac{1}{2} \times 8.2 \times \text{“}17.63\ldots$ $(= 72.28..)$ $+ \frac{1}{2} \times 11.8 \times 7.4 \times \sin132$ $(= 32.445..)$	105	6	M1 for $AC^2 = 11.8^2 + 7.4^2 – 2 \times 11.8 \times 7.4 \times \cos132$ M1 for correct order of operations or 310.85… A1 for $AC = 17.63\ldots$ M1 for Area of $ABC = \frac{1}{2} \times 8.2 \times \text{“}17.63\ldots\text{”}$ **or** Area of $ADC = \frac{1}{2} \times 11.8 \times 7.4 \times \sin132$ M1 for “$\frac{1}{2} \times 8.2 \times \text{“}17.63\ldots\text{””}$ + “$\frac{1}{2} \times 11.8 \times 7.4 \times \sin132$” A1 for an answer in the range 104.7 – 105

Question	Working	Answer	Mark	Notes
17	$\sqrt{t} = \dfrac{x}{2a}$ or $x^2 = (2a\sqrt{t})^2$ or $x^4 = (2a\sqrt{t})^4$ oe $t = \left(\dfrac{x}{2a}\right)^2$ oe or $t^2 = \dfrac{x^4}{16a^4}$ oe $y = a\left[\left(\dfrac{x}{2a}\right)^2\right]^2 - 2a\left(\dfrac{x}{2a}\right)^2$ oe	$y = \dfrac{x^4}{16a^3} - \dfrac{x^2}{2a}$	4	M1 Correct rearrangement for $\sqrt{t}$ or correct expression for x^2 or x^4 M1 Correct expressions for t or t^2 or for at^2 or $2at$ in terms of x and a M1 for correct substitution of t and t^2 into expression for y A1 Fully correct answer in required form

Question	Working	Answer	Mark	Notes
18	Area $(1 < 1 < 6)$ $= (0.12 \times 1) +$ $(0.32 \times 1) + (0.38 \times 1) +$ $(0.52 \times 1) + (0.16 \times 1)$ $= 1.50$ Total Area$= (0.12 \times 2) +$ $(0.32 \times 1) + (0.38 \times 1) +$ $(0.52 \times 1) + (0.16 \times 2)$ $= 1.78$ Proportion $= \dfrac{1.50}{1.78}$	0.84 or $\dfrac{75}{89}$	4	M1 for attempt to use frequency density $\times$ width e.g. 0.12×2 or 0.24 M1 for $(0.12 \times 2) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 2)$ or 1.78 seen M1 for $((0.12 \times 1) + (0.32 \times 1) + (0.38 \times 1) + (0.52 \times 1) + (0.16 \times 1))/"1.78"$ A1 for answer which rounds to 0.84 or 84% or $\dfrac{75}{89}$ or equivalent vulgar fraction **OR** M1 for attempt to use area e.g. sight of any one of 4.8, 6.4, 7.6, 10.4 or 6.4 (cm²) oe M1 for $4.8 + 6.4 + 7.6 + 10.4 + 6.4$ or 35.6 (cm^2) oe seen M1 for $(2.4 + 6.4 + 7.6 + 10.4 + 3.2)$ "35.6" oe A1 for answer which rounds to 0.843 or $84.3\%\%$ or $\dfrac{75}{89}$ or equivalent vulgar fraction

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Question	Working	Answer	Mark	Notes
19		congruency proved	3	M1 for correct statement with correct reason
				M1 for a second correct statement with correct reason
				C1 for complete proof justifying congruency, eg SAS or AAS
				Eg
				DAE = *BCF* (opposite angles of parallelogram are equal)
				AE = *FC* (*E* and *F* are midpoints of lines of equal length)
				AD = *BC* (opposite sides of parallelogram are equal)
				AED ≡ *CFB* (SAS)
		explains why DE = FB	1	C1 for relevant statement using congruency
				Eg
				DE and *FB* are corresponding sides of congruent triangles

National performance data from Results Plus

Qn	Original source of questions					Max score	Mean score of students achieving grade:						
	Spec	Paper	Session YYMM	Qn	Topic		ALL	A*	A	B	C	D	E
1	5MM2	2H	1411	Q07	Fractions	4	1.98	3.50	2.97	2.44	1.18	0.76	0.10
2	5MM2	2F	1506	Q20	Rearranging equations	2	0.14				0.51	0.15	0.03
3	1MA0	2F	1211	Q23	Compound measures	3	0.59				1.35	0.70	0.35
4	5MM2	2H	1211	Q18	Simultaneous equations	4	2.07	4.00	3.41	2.37	1.38	0.17	0.00
5	1380	2H	0906	Q19	Compound interest	5	3.41	4.93	4.59	3.68	2.25	0.94	0.35
6	5MM2	2H	1111	Q17	Trigonometry	4	1.62	3.93	3.28	1.63	0.55	0.45	0.00
7	4MA0	3H	1606	Q17	Solving quadratic equations	6	3.21	5.22	3.03	1.13	0.32	0.13	0.02
8	5MM2	2H	1406	Q10	Solve inequalities	5	3.77	4.81	4.52	3.98	3.18	2.25	0.82
9	4MA0	3H	1606	Q21	Probability	5	1.70	2.88	1.45	0.57	0.14	0.04	0.02
10	4MA0	4H	1606	Q10	LCM and HCF	2	1.26	1.78	1.20	0.76	0.40	0.23	0.16
11	5MM2	2H	1306	Q12	Reverse percentages	3	1.90	2.98	2.76	2.18	1.06	0.35	0.14
12	4MA0	4H	1606	Q21	Venn diagrams	4	2.04	3.15	1.80	0.94	0.4	0.15	0.05
13	4MA0	2H	1305	Q17	Functions	5	3.03	4.26	3.09	1.78	0.95	0.45	0.18
14	4MA0(R)	4H	1606	Q17	Trigonometry	5	2.33	4.36	2.96	1.36	0.47	0.14	0.02
15	5AM2	2H	1311	Q25	Proportional change	5	1.33	4.58	2.62	1.07	0.28	0.00	0.00
16	5MM2	2H	1106	Q24	Sine and cosine rule	6	1.30	5.46	3.05	0.73	0.23	0.02	0.00
17	4MA0(R)	4H	1606	Q21	Rearranging equations	4	1.00	2.72	0.66	0.11	0.01	0.01	0.00
18	5AM1	1H	1111	Q22	Histograms and grouped data	4	0.72	1.67	0.86	0.50	0.09	0.14	0.00
19	5MM2	2H	1311	Q26	Geometric proof	4	0.26	1.41	0.42	0.11	0.03	0.00	0.00
						80							