1MA1 Practice papers Set 4: Paper 3H (Regular) mark scheme – Version 1.0					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.			50	3	M1 for 625 ÷ 250 (= 2.5) or 360 ÷ 120 (= 3) or 1000 ÷ 300 (= 3⅓) M1 for correct method to calculate the number of cookies for one ingredient, e.g. 625 ÷ 250 or 2.5 oe **and** 20 × "2.5" A1 cao
2.		0.65×80 = 52 $\frac{5}{8} \times 80 = 50$ 52 – 50	2	4	M1 for method to calculate the time Celina sings M1 for method to calculate the time Zoe sings M1(dep on at least M1) for finding the difference between two times A1 cao
3.			80	4	B1 for *EBF* = 50 or *ABE* = 50 M1 for angles given that can lead to *x* = 80 as the next step e.g. *EBF* = 50 and *ABE* = 50 e.g. *EBF* = 50 and *BFG* = 100 e.g. *EBF* = 50 and *BFE* = 80 e.g. *EBF* = 50 and *DEB* = 130 and *ABE* = 50 A1 cao C1 for stating correct reasons appropriate to their method shown

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4.	(a)		$c^8 k^{20}$	1	B1
	(b)	$12x^2 - 3x + 20x - 5$	$12x^2 + 17x - 5$	2	B2 for fully correct (B1 for 3 out of 4 terms correct in working including signs OR 4 terms correct, ignore signs. In a grid the $20x$ need not be signed)
	(c)	$(x - 5)(x + 2) = 0$	5 and -2	3	M1 for $(x \pm 5)(x \pm 2)$ A1 for $(x - 5)(x + 2) (= 0)$ B1 ft (dep on M1) for $x = 5$ and -2
5.			508	5	M1 for correct use of Pythagoras theorem, e.g. $12^2 + x^2 = 16^2$ or $16^2 - 12^2$ M1 for $\sqrt{16^2 - 12^2}$ (= 10.583…) M1 for area = ½ × 12 × $\sqrt{16^2 - 12^2}$ (= 63.498…) M1 for volume = 8 × $\frac{1}{2}$ × 12 × $\sqrt{16^2 - 12^2}$ or 8 × "63.498" A1 for answer in range 507.8 to 508

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6.		$3p^2 = y + 4$ $p^2 = \frac{y+4}{3}$	$p = \sqrt{\frac{y+4}{3}}$	3	M1 for clear intention to add 4 to both sides or divide all terms by 3(with at least 3 terms) M1 for clear intention to find the square root from p^2 = (expression in y) A1 for $p = \sqrt{\frac{y+4}{3}}$ (oe) (accept ± a correct root)
7.			68	3	M1 for 30 × 60 (= 1800) or 20 × 56 (= 1120) M1 for ("1800" – "1120") ÷ 10 A1 cao
8.	(i)	160 – 90 = 70; 180 – 90 – 70 or 180 – 160	20	3	M1 for 180 – 90 – (160 – 90) or 180 – 90 – 70 or 180 – 160 (oe) A1 cao
	(ii)		Geometric reasoning		B1 for <u>angles</u> in a <u>triangle</u> add up to <u>180°</u> or <u>alternate</u> <u>angle</u>s are equal

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9.	(a)		0.8 on 1st branch 0.3 and 0.05 on 2nd branches	2	B1 0.8 oe on 1st branch B1 0.3 and 0.05 (oe) on 2nd branches
	(b)	0.2 × 0.3	0.06	2	M1 0.2 ×'0.3' A1 0.06 ft from '0.3' in the tree diagram
10.		425 ÷ 17 = 25 Flour : 8 × 25 = 200g Butter : 4 × 25 = 100g Jam : 5 × 25 = 125g Total weight for 200 rolls: = total grams × 200 ÷ 1000 Flour: 200 × 0.2 = 40 kg Butter : 100 × 0.2 = 20 kg Jam : 125 × 0.2 = 25 kg Total cost = 40 × 40p + 20 × £2.50 + 25 × £1 = £16 + £50 + £25	91	6	M1 for 425 ÷ '8+4+5' or 25 seen M1 for two of 8 × 25 (=200,) 4 × 25 (=100), 5 × 25 (=125) M1 for two of '200' × 200 (= 40 000), '100' × 200 (= 20 000) '125'× 200 (= 25 000) M1 for converting g to kg (at least two ingredients) (= 40, 20, 25) M1 for '40' × 40p + ' 20' × £2.50 + ' 25' × £1 (= £16 + £50 + £25) A1 for 91 or 91.00

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11.	(a)	100 − 67	33	2	M1 for use of graph at 50 years or sight of 66, 67, 68 A1 for 32,33,34
	(b)	Median = 44 – 44.5 LQ = 32 – 33, UQ = 51.5 – 52	Box plot drawn	4	B4 for fully correct box plot (B3 for 4 correct values plotted including box and tails) (B2 for 3 correct values plotted including box and tails or 5 correct values plotted and no box and tails) (B1 for 2 correct values plotted including box and tails or for a correct median or quartile)
	(c)		comparison	2	B2(ft) for at least two of : Comparison of a measure of location, e.g. median age of male teachers is less than median age of female teachers Comparison of spread, e.g. IQR for male teachers is greater than IQR for female teachers or the ranges are the same Comparison of skewness, e.g. the age distribution of female teachers is more negatively skewed than the age distribution of male teachers (B1 ft for one of them)

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12.		$\frac{100}{360}\times\pi\times6.8\times2$	25.5	3	M1 for $\frac{100}{360}\times\pi\times6.8\times2$ (=11.86..) M1 for "11.86" + 2 × 6.8 (oe) A1 for answer in the range 25.4 – 25.6
13.	(a)		11	1	B1
	(b)	$y=2x+5$ $\quad x=2y+5$ $y-5=2x$ $\quad x-5=2y$		2	M1 for a correct first stage – subtract 5 from both sides or divide all terms by 2
			$\frac{x-5}{2}$		A1 for $\frac{x-5}{2}$ (oe)
	(c)		–16	1	B1 cao
	(d)(i)	$(2x+5)^2-25$ $4x^2+10x+10x+25$ oe		5	M1 B1 for correct expansion of $(2x + 5)^2$
			$4x^2 + 20x$		A1 for a correct fully or partially factorised expression
	(d) (ii)	$4x(x+5)$ (= 0) or $x(4x + 20)$ (=0) or $2x(2x + 10)$ (=0) or $x(x + 5)$ (=0)	$x = 0,\ x = -5$		M1 for, e.g., $\frac{-20\pm\sqrt{20^2-4\times4\times0}}{2\times4}$ A1 for both solutions

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14.		*d*: UB = 54.5 (or 54.499), LB = 53.5 *C:* UB = 170.5 (or 170.499), LB = 169.5 170.5 ÷ 53.5 169.5 ÷ 54.5	3.19 3.11..	4	B1 for any one correct bound quoted M1 for 170.5 ÷ 53.5 or 169.5 ÷ 54.5 A1 for UB = answer in range 3.18 to 3.19 from correct working A1 for LB = 3.11.. from correct working
15.		$\frac{3(x+1)}{6}+\frac{2(x+3)}{6}=$ $\frac{3x+3+2x+6}{6}$	$\frac{5x+9}{6}$	3	M1 Use of common denominator of 6 (**or** any other multiple of 6) and at least one numerator correct, e.g. $\frac{3(x+1)}{6}$ or $\frac{2(x+3)}{6}$ M1 $\frac{3(x+1)}{6}+\frac{2(x+3)}{6}$ (oe) A1 cao
16.				4	M1 for angle *MXY* = angle *NYX* Reason = 'base angles of an isosceles triangle are equal' (oe) M1 for *MX = NY* Reason = 'M and N divide the equal sides XZ and YZ in equal parts' (oe) C1 for either reason quoted above or '*XY* is common' C1 for All reasons correct and SAS seen

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17.		$x + 1 : 3 : x - 1$ $(\times 10)$ $10x + 10 : 30 : 10x - 10$ $10x + 10 + 30 + 10x - 10 = 60$ $20x = 30$ $x = 1.5$	1.5	5	M2 for $10 \times (x + 1)$ and $10 \times (x - 1)$ (M1 for $x + 1 + 3 + x - 1$ or $2x + 3$ oe or $x + 1 + x - 1 = 30$ or $x = 15$) M1 for '$10x + 10$'$+ 30 +$'$10x - 10$' $= 60$ or '$10x + 10$' $+$'$10x - 10$' $= 30$ oe M1 for an attempt to reduce the form $ax = b$ (condone one error) A1 cao
18.		$4n^2 + 12n + 3^2 - (4n^2 - 12n + 3^2)$ $= 4n^2 + 12n + 9 - 4n^2 + 12n - 9$ $= 24n$ $= 8 \times 3n$	Proof	3	M1 for 3 out of 4 terms correct in expansion of either $(2n + 3)^2$ or $(2n - 3)^2$ A1 for $24n$ from correct expansion of both brackets A1 (dep on A1) for $24n$ is a multiple of 8 or $24n = 8 \times 3n$ or $24n \div 8 = 3n$

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	2MB01	2H	1411	Q03	Ratio	3	2.10	2.50	2.33	2.35	2.21	1.50	1.00
2	1MA0	2H	1511	Q05	Fractions, percentages and decimals	4	2.40	3.92	3.78	3.54	2.97	2.14	0.97
3	2MB01	2H	1406	Q07	Angles and parallel lines	4	2.25	3.45	3.10	2.70	1.96	1.08	0.52
4	1380	2H	1106	Q18	Solve quadratic equations	6	2.66	5.75	4.51	2.55	1.11	0.35	0.10
5	5AM2	2H	1506	Q13	Pythagoras in 2D	5	2.61	4.72	3.88	2.52	1.11	0.28	0.08
6	1MA0	2H	1306	Q18	Rearranging equations	3	1.01	2.73	2.28	1.43	0.44	0.07	0.01
7	2MB01	1H	1406	Q11	Mean, median, mode	3	1.21	2.88	2.39	1.68	0.76	0.22	0.06
8	5AM2	2F	1206	Q13	Angles	3	1.39				2.12	1.40	0.91
9	5AM2	2F	1106	Q20	Probability tree diagrams	4	0.59				1.00	1.22	0.50
10	5AM2	2H	1211	Q12	Ratio	6	3.10	5.55	4.34	3.38	2.40	1.87	0.43
11	5AM1	1H	1111	Q17	Cumulative frequency diagrams	8	4.59	7.33	6.15	4.50	2.95	1.85	0.00
12	5MM2	2H	1106	Q22	Area of a circle	3	0.82	2.59	2.00	0.81	0.13	0.02	0.00
13	4MA0	1H	1401	Q20	Functions	9	4.76	7.89	5.68	3.42	1.41	0.47	0.25
14	1MA0	2H	1306	Q23	Bounds	4	0.83	3.66	2.49	0.85	0.13	0.01	0.00
15	1MA0	2H	1211	Q20	Simplify algebraic expressions	3	0.49	2.36	1.79	0.84	0.19	0.03	0.00
16	5MM2	2H	1506	Q23	Congruence and similarity	4	1.09	2.86	1.80	0.61	0.15	0.03	0.10
17	5MM2	2H	1111	Q16	Ratio	5	1.14	3.17	2.11	1.01	0.34	0.25	0.00
18	1MA0	2H	1206	Q21	Algebraic proof	3	0.29	1.78	0.49	0.14	0.04	0.02	0.00
						80							