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MATHEMATICS

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Paper 2 (Extended)

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MARK SCHEME

Maximum Mark: 70

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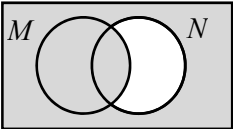
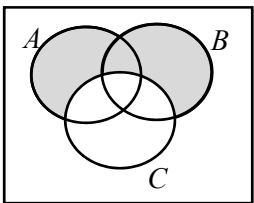
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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Mark	Partial marks
1	101	1	
2	2	1	
3(a)	1.49220....	1	
3(b)	1.5	1FT	FT <i>their</i> answer to (a) rounded correctly to 2 significant figures
4	88	2	M1 for $\frac{68+81+74+89+x}{5} = 80$ oe or B1 for 400
5	$3x(4x + 5y - 3)$ final answer	2	B1 for $3(4x^2 + 5xy - 3x)$ or $x(12x + 15y - 9)$ allow in working or correct answer spoiled If zero scored, SC1 for $3x(4x + 5y - 3)$ with only 2 correct elements in the brackets, allow in working
6(a)	(-2, 3)	1	
6(b)	Correct rhombus with 4th point at (2,2)	1	
7	Diagonal line from (0, 0) to (30, 12)	1	
	and Horizontal line from (30, 12) to (70, 12)	1FT	FT for horizontal line from (30, k) to (70, k) where k is <i>their</i> 12
8	19.65 cao	2	B1 for 6.55 seen (must be evaluated, not $6.5 + 0.05$) or M1 for $3 \times (6.5 + 0.05)$
9	7615.15	2	M1 for $12\,400 \times \left(1 - \frac{15}{100}\right)^3$ oe

Question	Answer		Mark	Partial marks
10	$\frac{5}{3}$	$\frac{2}{3} + \frac{4}{15}$	B1	Allow $\frac{5k}{3k}$
	$\frac{25}{15}$ [and $\frac{11}{15}$]	$\frac{10}{15}$ [and $\frac{4}{15}$]	M1	Correct method to find common denominator e.g. $\frac{75}{45}$ and $\frac{33}{45}$ Follow through <i>their</i> $\frac{5}{3}$ for the M1 mark
	$\frac{14}{15}$ cao	$\frac{14}{15}$ cao	A1	
11	54		3	M2 for $\frac{180 \times (5-2)}{5}$ or $180 - \frac{360}{5}$ or M1 for $180 \times (5-2)$ or $\frac{360}{5}$
12(a)	343		1	
12(b)	-11		1	
12(c)	343		1	
13(a)	m^{10} final answer		1	
13(b)	$20x^5y^2$ final answer		2	B1 for 2 out of 3 elements correct in final answer or correct answer spoiled
14(a)	(9, -4)		1	
14(b)	-5		2	M1 for $t^2 + 12^2 = 13^2$ oe or SC1 for answer 5 or ± 5
15(a)	Fewer than 6 elements from {1, 2, 3, 4, 5, 6} or \emptyset		1	
15(b)			1	
			1	

Question	Answer	Mark	Partial marks
16	Enlargement	1	
	$\frac{1}{3}$	1	
	(2, 1)	1	
17(a)	$(y =) \frac{72}{(x+1)^2}$ oe	2	M1 for $y = \frac{k}{(x+1)^2}$
17(b)	32	1FT	FT correct evaluation from <i>their</i> equation in (a) using 0.5
18	Correct position of <i>S</i> with 2 pairs of correct construction arcs for line	4	B3 for correct position of <i>S</i> with missing/incorrect construction arcs but correct line or B2 for correct ruled line equidistant from the two trees with correct arcs or B1 for correct line with no/wrong arcs or correct arcs with no line and B1 for arc centre bird bath, radius 5 cm or <i>S</i> in correct position with no/incorrect working
19	$\frac{x^2 + 20x + 31}{2(x-3)(x+7)}$ final answer	4	B1 for a common denominator of $[2](x-3)(x+7)$ seen isw M1 for $2 \times 5 \times (x+7) + 2 \times 3 \times (x-3) + (x-3)(x+7)$ oe and must have attempted to expand all the brackets in the numerator M1 for $10x + 70 + 6x - 18$ or $x^2 - 3x + 7x - 21$ or $[2](5x + 35 + 3x - 9)$ or better
20(a)	1480	1	
20(b)	30	3	M2 for $10 \times \sqrt{\frac{3960}{440}}$ or $10 \div \sqrt{\frac{440}{3960}}$ or M1 for $\sqrt{\frac{3960}{440}}$ or $\sqrt{\frac{440}{3960}}$ or $\left(\frac{h}{10}\right)^2 = \frac{3960}{440}$ oe

Question	Answer	Mark	Partial marks
21	46.7 or 46.68 to 46.69	4	M3 for $\tan [\dots] = \frac{9}{\frac{1}{2}\sqrt{12^2 + 12^2}}$ oe or M1 for $\left[\frac{1}{2} \times\right] \sqrt{12^2 + 12^2}$ oe e.g. $\sqrt{\frac{12^2}{2}}$ and M1 for identifying angle <i>MCE</i>
22(a)	80 to 84	2	M1 for 116 to 120
22(b)	Correct curve or ruled lines	3	B2 for 7 or 8 correct points B1 for 5 or 6 correct points
22(c)	26	2	B1 for 156 or 130 or for <i>their</i> 130 from <i>their</i> increasing curve (or lines)
23(a)	$x + y \leq 16$ oe $x \geq 4$ oe	2	B1 for each mark final answers If zero scored, SC1 for $x + y < 16$ and $x > 4$
23(b)	Correct shading	3	M2 for lines at $x = 4$ and $x + y = 16$ or for correct shading of $x < 4$ or $x + y > 16$ or M1 for line at $x = 4$ or <i>their</i> $x = 4$ or for line at $x + y = 16$ or <i>their</i> $x + y = 16$
23(c)	144	2	M1 for (8, 8) selected or for $10 \times x + 8 \times y$ for any numerical point which is inside or on the boundary of <i>their</i> unshaded region