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Cambridge International General Certificate of Secondary Education

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**MATHEMATICS**

**0580/21**

Paper 2 (Extended)

**October/November 2017**

MARK SCHEME

Maximum Mark: 70

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**Published**

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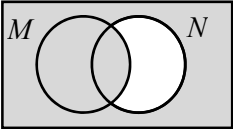
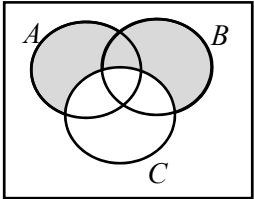
This document consists of **5** printed pages.



**Abbreviations**

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfw	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	$\frac{5}{3}$	$\frac{2}{3} + \frac{4}{15}$	<b>B1</b>	Allow $\frac{5k}{3k}$
	$\frac{25}{15}$ [and $\frac{11}{15}$ ]	$\frac{10}{15}$ [and $\frac{4}{15}$ ]	<b>M1</b>	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 <b>M1</b> mark
	$\frac{14}{15}$ cao	$\frac{14}{15}$ cao	<b>A1</b>	
11	54		<b>3</b>	<b>M2</b> for $\frac{180 \times (5-2)}{5}$ or $180 - \frac{360}{5}$ or <b>M1</b> for $180 \times (5-2)$ or $\frac{360}{5}$
12(a)	343		<b>1</b>	
12(b)	-11		<b>1</b>	
12(c)	343		<b>1</b>	
13(a)	$m^{10}$ final answer		<b>1</b>	
13(b)	$20x^5y^2$ final answer		<b>2</b>	<b>B1</b> for 2 out of 3 elements correct in final answer or correct answer spoiled
14(a)	(9, -4)		<b>1</b>	
14(b)	-5		<b>2</b>	<b>M1</b> for $t^2 + 12^2 = 13^2$ oe or <b>SC1</b> for answer 5 or $\pm 5$
15(a)	Fewer than 6 elements from {1, 2, 3, 4, 5, 6} or $\emptyset$		<b>1</b>	
15(b)			<b>1</b>	
			<b>1</b>	

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

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