

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series**0580 MATHEMATICS****0580/21**

Paper 2 (Extended), maximum raw mark 70

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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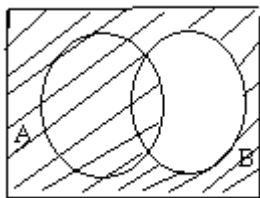
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Abbreviations

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

Question	Answer	Mark	Part Marks
1	[+]17	1	
2		1	
3	Triangle (3, -2), (4, -2), (4, -1)	2	B1 for movement 2 right or 3 down
4	628	2	M1 for $\frac{785}{1+4} [\times 4]$
5	7 nfw	2	M1 for 7.5×8 or for $(7 + 8 + 8 + y + 6 + 9 + 10 + 5) \div 8 = 7.5$ or better oe
6	$\frac{\sqrt{4} \times 30}{9 - 3}$ 10 nfw	M1 A1	Allow one error and 2 for $\sqrt{4}$ and 6 for $9 - 3$
7	18	2	M1 for $36 = 2 \times 2 \times 3 \times 3$ soi or $90 = 2 \times 3 \times 3 \times 5$ soi or listing the correct factors of 36 and 90 showing a minimum of 2, 3, 6, 9 and 18
8 (a)	90	1	
8 (b)	8.29 or 8.289... to 8.29	2	M1 for $\frac{OP}{11} = \tan 37^\circ$ oe

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9	(a) $(a + 3c)(x + y)$ final answer	2	B1 for $a(x + y) + 3c(x + y)$ or $x(a + 3c) + y(a + 3c)$
	(b) $3(a - 2b)(a + 2b)$ final answer	3	B2 for $3(a - 2b)(a + 2b)$ seen and then spoiled or $(3a - 6b)(a + 2b)$ or $(a - 2b)(3a + 6b)$ or $(a - 2b)(a + 2b)$ or B1 for $3(a^2 - 4b^2)$
10	$\frac{14}{90}$ oe must be fraction	2	M1 for $15.5 - 1.5$ oe or B1 for $\frac{k}{90}$
11	31.4 or 31.36 to 31.37	3	M2 for $\left[\frac{2}{2} \times\right] 6.1 \times \pi + 2 \times 6.1$ oe or B2 for 19.16 to 19.17 or 19.2 or M1 for $6.1 \times \pi$ or for $12.2 \times \pi$
12	81	3	M1 for $V = k(r + 1)^3$ and A1 for $k = 3$ or M2 for $\frac{V}{24} = \frac{3^3}{2^3}$ oe
13	$\left[\pm\right] \sqrt{\frac{y-b}{a}}$ oe final answer	3	M1 for correctly subtracting to isolate term in x^2 M1 for correct division M1 for the final stage of correctly finding the square root
14	19 nfw	4	B3 19.3 or 19.28 to 19.29 or M2 for $\frac{300 \times 60^2}{56 \times 1000}$ oe or M1 for distance divided by speed e.g. <i>their</i> $300 \div \textit{their} 56$ or $\frac{56 \times 1000}{60^2}$ If B0 then B1 for seeing their answer in decimal form correctly written to the nearest integer

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15	$\frac{x+4}{x+1}$ final answer	4	<p>B1 for $(x-4)(x+4)$ and B2 for $(x-4)(x+1)$ or SC1 for $(x+a)(x+b)$ where $a+b = -3$ or $ab = -4$</p>	
16	198	4	<p>B3 for 197.7.... or answer 198.00 or M2 for $1800 \times \left(1 + \frac{1.5}{100}\right)^7 - 1800$ or B2 for answer 1998 or M1 for $1800 \times \left(1 + \frac{1.5}{100}\right)^7$ If B0 then B1 for seeing their answer in decimal form correctly written to the nearest integer</p>	
17	<p>(a) Enlargement $\frac{1}{2}$ origin oe</p> <p>(b) $\begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix}$ oe</p>	<p>1 1 1</p> <p>2FT</p>	<p>correct or FT <i>their</i> (a) allow for 2 marks $\begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$ where $k = \text{their scale factor in (a)}$ B1 for one correct row or correct column or $\begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$ ($k \neq 0$ or 1)</p>	
18	<p>(a) $\begin{pmatrix} -9 & -5 \\ -7 & -5 \end{pmatrix}$</p> <p>(b) $\frac{1}{10} \begin{pmatrix} 4 & 2 \\ -3 & 1 \end{pmatrix}$ oe</p> <p>(c) Not the same order oe</p>	<p>2</p> <p>2</p> <p>1</p>	<p>B1 for two correct elements</p> <p>B1 for $\frac{1}{10} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or $k \begin{pmatrix} 4 & 2 \\ -3 & 1 \end{pmatrix}$ seen or det = 10 soi</p>	

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19	281 or 280.8 to 280.9...	5	<p>M2 for $\frac{25}{360} \times 2 \times \pi \times 15 \times 5$ oe</p> <p>or</p> <p>M1 for $\frac{25}{360} \times 2 \times \pi \times 15$ oe</p> <p>and</p> <p>M1 for $[2] \times \frac{25}{360} \times \pi \times 15^2$ oe</p> <p>and</p> <p>B1 for $15 \times 5 [\times 2]$</p>
20 (a)	0.16 oe	2	<p>M1 for 0.4×0.4</p> <p>If zero scored SC1 for fully correct evaluated method involving a without replacement method</p>
(b)	0.58 oe	4	<p>M3 for $1 - (0.4^2 + 0.5^2 + 0.1^2)$ oe</p> <p>or</p> <p>M2 for $0.4^2 + 0.5^2 + 0.1^2$</p> <p>ALT method</p> <p>M3 for</p> <p>$0.4 \times (0.5 + 0.1) + 0.5 \times (0.4 + 0.1) + 0.1 \times (0.4 + 0.5)$ oe</p> <p>or</p> <p>M2 for addition of any three of:</p> <p>$0.4 \times 0.5, 0.4 \times 0.1, 0.5 \times 0.4, 0.5 \times 0.1, 0.1 \times 0.4$</p> <p>and 0.1×0.5</p> <p>or</p> <p>M1 for addition of any two of:</p> <p>$0.4 \times 0.5, 0.4 \times 0.1, 0.5 \times 0.4, 0.5 \times 0.1, 0.1 \times 0.4$</p> <p>and 0.1×0.5</p> <p>If zero scored SC2 for fully correct evaluated method involving a without replacement method</p>
21 (a)	512	2	<p>B1 for $[f(2) =] 8$</p> <p>or</p> <p>M1 for $(x^3)^3$ or better</p>
(b)	$6x - 2$ or $2(3x - 1)$ final answer	2	B1 for $3(2x + 1) - 5$ or better
(c)	$\frac{1}{2}(x - 1)$ oe	2	<p>M1 for correct first step</p> <p>eg $y - 1 = 2x$ or $\frac{y}{2} = x + \frac{1}{2}$</p> <p>or $x = 2y + 1$ or better</p>