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

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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

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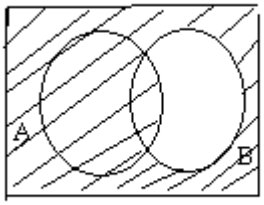
Abbreviations

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	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 nfww	**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 nfww	**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**	
(b)	8.29 or 8.289… to 8.29	**2**	**M1** for $\frac{OP}{11} = \tan 37^\circ$ oe

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 $15.\dot{5}-1.\dot{5}$ oe or **B1** for $\frac{k}{90}$
11	31.4 or 31.36 to 31.37	**3**	**M2** for $\left[\frac{2}{2}\times\right]6.1\times\pi+2\times6.1$ 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	$[\pm]\sqrt{\frac{y-b}{a}}$ 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 nfww	**4**	**B3** 19.3 or 19.28 to 19.29 or **M2** for $\frac{300\times60^2}{56\times1000}$ oe or **M1** for distance divided by speed e.g. *their* 300 ÷ *their* 56 or $\frac{56\times1000}{60^2}$ If **B0** then **B1** for seeing their answer in decimal form correctly written to the nearest integer

15	$\frac{x+4}{x+1}$ final answer	**4**	**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 $ab=-4$
16	198	**4**	**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
17 (a)	Enlargement $\frac{1}{2}$ origin oe	**1** **1** **1**	
(b)	$\begin{pmatrix}\frac{1}{2} & 0\\ 0 & \frac{1}{2}\end{pmatrix}$ oe	**2FT**	correct or **FT** *their* **(a)** allow for 2 marks $\begin{pmatrix}k & 0\\ 0 & k\end{pmatrix}$ where k = *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 $1)$
18 (a)	$\begin{pmatrix}-9 & -5\\ -7 & -5\end{pmatrix}$	**2**	**B1** for two correct elements
(b)	$\frac{1}{10}\begin{pmatrix}4 & 2\\ -3 & 1\end{pmatrix}$ oe	**2**	**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
(c)	Not the same order oe	**1**	

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