Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/22**

Paper 22 (Extended) **March 2017**

MARK SCHEME

Maximum Mark: 70

Published

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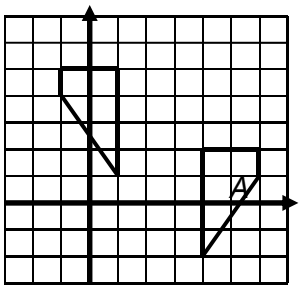
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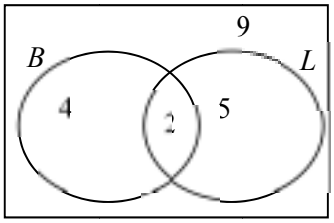
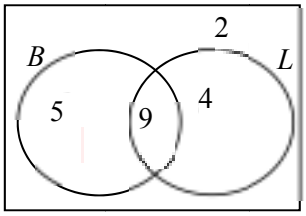
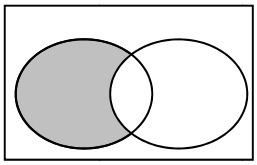
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Abbreviations

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	Marks	Part Marks
1	$18w+14$ final answer	**2**	**M1** for $20w+12$ or $-2w+2$ or answer $18w+k$ or $kw+14$
2	Equilateral triangle with correct arcs	**2**	**M1** for clear evidence of constructed 60° angles or arcs crossing equal in length to AB or an accurate diagram with no/incorrect arcs
3	$\frac{10\times 20}{90-40}$ 4 nfww	**M1** **A1**	
4	4 nfww	**2**	**M1** for [7.31 =] 7 $\left(1+\frac{1.1}{100}\right)^k$ oe
5	150	**2**	**M1** for $2\times 3+16\times 3^2$
6	$10^k\times 0.1\dot{7}-[10]\times 0.1\dot{7}$ $k\geqslant 1$ oe $\frac{16}{90}$ or $\frac{8}{45}$ oe nfww	**M1** **A1**	
7	70.7625 cao and 72.4625 cao	**3**	**B2** for 70.7625 or 72.4625 or **M2** for 9.25 × 7.65 **and** 9.35 × 7.75 or **B1** for two of 9.25, 9.35, 7.65, 7.75 seen
8	$\frac{10}{3}$ or $\frac{5}{2}$ *their* $\frac{10}{3}\times$ *their* $\frac{2}{5}$ $1\frac{1}{3}$ cao	**B1** **M1** **A1**	oe improper fractions accept $\frac{20}{6}\div\frac{15}{6}$
9	18.1 or 18.10….	**3**	**M2** for $\sqrt{20^2-\left(\frac{1}{2}(17)\right)^2}$ oe or **M1** for $h^2+\left(\frac{1}{2}(17)\right)^2=20^2$

Question	Answer	Marks	Part Marks
10	1050	**3**	**M2** for $924 \div \frac{(100-12)}{100}$ oe or **M1** for 88[%] associated with 924 oe
11		**3**	**B2** for correct translation of A seen or **B1** for translation of A by $\begin{pmatrix}-1\\k\end{pmatrix}$ or $\begin{pmatrix}k\\3\end{pmatrix}$ seen and **B1** for correct reflection of their translation in $x = 2$ seen If 0 scored **SC2** for correct TM(A) or **SC1** for reflection in $x = 2$ seen or a correct translation of $\begin{pmatrix}-1\\3\end{pmatrix}$ seen
12	4	**3**	**M1** for $y = \frac{k}{x^2}$ **M1** for $y = \frac{their\ k}{10^2}$ or **M2** for $5^2 \times 16 = 10^2 \times y$ oe
13 (a)	$5c(3c-1)$ final answer	**2**	**B1** for $5\left(3c^2 - c\right)$ or $c\left(15c - 5\right)$
(b)	$\left(2p-m\right)\left(k+3\right)$ final answer	**2**	**B1** for $k\left(2p-m\right)+3\left(2p-m\right)$ or $2p\left(k+3\right)-m\left(k+3\right)$
14 (a)	Point at (3, 5)	**1**	
(b)	$\begin{pmatrix}1\\-3\end{pmatrix}$	**1FT**	**FT** their $\overrightarrow{AC}$
(c)	$\begin{pmatrix}0\\4\end{pmatrix}$ or $\begin{pmatrix}0\\-4\end{pmatrix}$	**2**	**M1** for a vector of magnitude 4 or of form $\begin{pmatrix}0\\\pm k\end{pmatrix}$
15 (a)	t^{20} final answer	**1**	
(b)	x^{10} final answer	**1**	
(c)	$27m^6$ final answer	**2**	**B1** for $27m^k$ or km^6 as final answer

Question	Answer	Marks	Part Marks
16 (a)	0.25 or $\frac{1}{4}$	**1**	
(b)	0.45	**3**	**B2** for 450 or **M2** for $\frac{1}{2} \times 60 \times 15 \div 1000$ or **M1** for $\frac{1}{2} \times 60 \times 15$ If 0 scored **SC1** for correct conversion of their distance in metres to kilometres
17 (a) (i)		**2**	**B1** for 2 correct of 4, 2, 5, 9 in the correct places or **SC1** for 
(ii)	9	**1FT**	**FT** *their* 9
(b)		**1**	
18 (a)	$\begin{pmatrix} 27 & -24 \\ -5 & -10 \end{pmatrix}$	**2**	**B1** for two correct elements
(b)	$-\frac{1}{13}\begin{pmatrix} -2 & -3 \\ -1 & 5 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} -2 & -3 \\ -1 & 5 \end{pmatrix}$ or det = −13 soi
19 (a)	11.4 or 11.40 to 11.41	**2**	**M1** for $\frac{1}{2} \times 2.8 \times 8.3 \times \sin 79$ oe
(b)	231 or 230.8 to 231.1	**2FT**	**FT** *their* **(a)** $\times 4.5^2$ **M1** for 4.5^2 or 20.25 seen

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Question	Answer	Marks	Part Marks
20 (a)	$[y =] -2x + 3$	**3**	**B2** for $[y =] -2x + c$ or **M1** for rise/run and **B1** for $[y =] kx + 3$, $k \neq 0$ or $c = 3$
(b)	$y = \frac{1}{2}x - \frac{5}{2}$ oe final answer	**3**	**M1** for gradient = $-\frac{1}{\textit{their}\text{ gradient in }\textbf{(a)}}$ or gradient = 0.5 oe **M1** for substitution of (3, –1) into *their* $y = mx + c$ oe
21 (a)	10	**2**	**M1** for $\frac{x}{4} - 3 = -0.5$
(b)	$\frac{x+7}{6}$ final answer	**2**	**M1** for $y + 7 = 6x$ or $\frac{y}{6} = x - \frac{7}{6}$ or $x = 6y - 7$
(c)	–2	**2**	**M1** for [f(13) =] $\frac{1}{4}$