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**MATHEMATICS**

**0580/22**

Paper 22 (Extended)

**March 2017**

MARK SCHEME

Maximum Mark: 70

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**Published**

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.

Cambridge will not enter into discussions about these mark schemes.

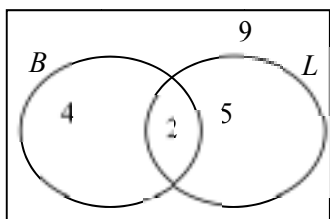
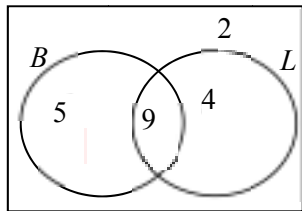
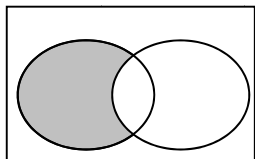
Cambridge is publishing the mark schemes for the March 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

**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	<b>M1</b> for $20w + 12$ or $-2w + 2$ or answer $18w + k$ or $kw + 14$
2	Equilateral triangle with correct arcs	2	<b>M1</b> for clear evidence of constructed $60^\circ$ 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	<b>M1</b> <b>A1</b>	
4	4 nfww	2	<b>M1</b> for $[7.31 =] 7 \left(1 + \frac{1.1}{100}\right)^k$ oe
5	150	2	<b>M1</b> for $2 \times 3 + 16 \times 3^2$
6	$10^k \times 0.1\dot{7} - [10] \times 0.1\dot{7}$ $k \geq 1$ oe $\frac{16}{90}$ or $\frac{8}{45}$ oe nfww	<b>M1</b> <b>A1</b>	
7	70.7625 cao and 72.4625 cao	3	<b>B2</b> for 70.7625 or 72.4625 or <b>M2</b> for $9.25 \times 7.65$ and $9.35 \times 7.75$ or <b>B1</b> for two of 9.25, 9.35, 7.65, 7.75 seen
8	$\frac{10}{3}$ or $\frac{5}{2}$  <i>their</i> $\frac{10}{3} \times$ <i>their</i> $\frac{2}{5}$  $1\frac{1}{3}$ cao	<b>B1</b> <b>M1</b> <b>A1</b>	oe improper fractions  accept $\frac{20}{6} \div \frac{15}{6}$
9	18.1 or 18.10....	3	<b>M2</b> for $\sqrt{20^2 - \left(\frac{1}{2}(17)\right)^2}$ oe or <b>M1</b> for $h^2 + \left(\frac{1}{2}(17)\right)^2 = 20^2$

Question	Answer	Marks	Part Marks
10	1050	3	<b>M2</b> for $924 \div \frac{(100-12)}{100}$ oe or <b>M1</b> for 88[%] associated with 924 oe
11		3	<b>B2</b> for correct translation of $A$ seen or <b>B1</b> for translation of $A$ by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ seen and <b>B1</b> for correct reflection of their translation in $x = 2$ seen  If 0 scored <b>SC2</b> for correct $TM(A)$ or <b>SC1</b> for reflection in $x = 2$ seen or a correct translation of $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$ seen
12	4	3	<b>M1</b> for $y = \frac{k}{x^2}$ <b>M1</b> for $y = \frac{\text{their } k}{10^2}$ or <b>M2</b> for $5^2 \times 16 = 10^2 \times y$ oe
13 (a)	$5c(3c - 1)$ final answer	2	<b>B1</b> for $5(3c^2 - c)$ or $c(15c - 5)$
(b)	$(2p - m)(k + 3)$ final answer	2	<b>B1</b> for $k(2p - m) + 3(2p - m)$ or $2p(k + 3) - m(k + 3)$
14 (a)	Point at (3, 5)	1	
(b)	$\begin{pmatrix} 1 \\ -3 \end{pmatrix}$	1FT	<b>FT</b> their $\overline{AC}$
(c)	$\begin{pmatrix} 0 \\ 4 \end{pmatrix}$ or $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	2	<b>M1</b> 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	<b>B1</b> 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	<b>B2</b> for 450 or <b>M2</b> for $\frac{1}{2} \times 60 \times 15 \div 1000$ or <b>M1</b> for $\frac{1}{2} \times 60 \times 15$ If 0 scored <b>SC1</b> for correct conversion of their distance in metres to kilometres
17 (a) (i)		2	<b>B1</b> for 2 correct of 4, 2, 5, 9 in the correct places or <b>SC1</b> for 
(ii)	9	1FT	<b>FT</b> their 9
(b)		1	
18 (a)	$\begin{pmatrix} 27 & -24 \\ -5 & -10 \end{pmatrix}$	2	<b>B1</b> for two correct elements
(b)	$-\frac{1}{13} \begin{pmatrix} -2 & -3 \\ -1 & 5 \end{pmatrix}$ oe isw	2	<b>B1</b> 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	<b>M1</b> for $\frac{1}{2} \times 2.8 \times 8.3 \times \sin 79$ oe
(b)	231 or 230.8 to 231.1	2FT	<b>FT</b> their (a) $\times 4.5^2$ <b>M1</b> for $4.5^2$ or 20.25 seen

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