Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2016**

MARK SCHEME

Maximum Mark: 70

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.

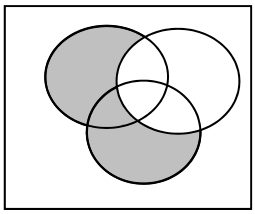
Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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 (a)	15000 cao	**1**	
(b)	1.5×10^4	**1FT**	**FT** *their* **(a)**
2	25	**2**	**B1** for 67 or 113 seen once in correct position or **M1** for $a + 42 = 67$ or $a + 42 + 113 = 180$ or better
3	21	**2**	**M1** for $k - 8 = 13$ or $6k - 48 = 78$ or better
4	58	**2**	**M1** for $\frac{(13+16)\times4}{2}$ or $4\times13+\frac{1}{2}\times4\times3$ oe
5	$9y^3$ final answer	**2**	**B1** for $9y^k$, $9\times y^3$ or ky^3 ($k \neq 0$) as final answer
6	72.25 cao	**2**	**M1** for 8 + 0.5 or better seen
7	1, 2, 3	**3**	**B2** for $t < 4$ or **M1** for $2 + 6 > 3t - t$ oe or better If zero scored, **SC1** for answer 0, 1, 2, 3 or 1, 2, 3, 4
8	correctly eliminating one variable [x =] 9 [y =] 3.5	**M1** **A1** **A1**	If zero scored, **SC1** for 2 values satisfying one of the original equations **SC1** if no working shown but 2 correct answers given
9	234 or 234.3 to 234.4	**3**	**M2** for [dist =] $\frac{300}{\tan 52}$ oe or **M1** for correct implicit trig statement allow **M1** if they use *their* 52 or *their* 38 provided it is marked on the diagram or **B1** for 52 or 38 correctly placed If zero scored, **SC1** for final answer 384

Question	Answer	Mark	Part marks
10	46.3 or 46.29 to 46.30	**3**	**M2** for $53\times\sqrt[3]{\frac{20}{30}}$ oe or **M1** for $\sqrt[3]{\frac{20}{30}}$ or $\sqrt[3]{\frac{30}{20}}$ or $\left(\frac{53}{x}\right)^3=\frac{30}{20}$ or better
11 (a)	Accurate angle bisector with correct arcs	**2**	**B1** for accurate angle bisector **or** correct arcs with no/wrong line
(b)	Equidistant (oe) from AB and AC	**1**	
12 (a)	38	**2**	**M1** for 57 ÷ (2 + 1) or better
(b)	12 : 7	**2**	**M1FT** for *their* 38 – 2 **and** *their* 19 + 2 seen dep on sum = 57 If M0 **SC1** for answer 7 : 12
13 (a)	$m\left(m^2+1\right)$ final answer	**1**	
(b)	$(5-y)(5+y)$ final answer	**1**	
(c)	$(x-4)(x+7)$ final answer	**2**	**B1** for $(x-4)(x+7)$ seen then spoiled or **M1** for $(x+a)(x+b)$ where $ab = -28$ or $a + b = 3$ or for $x(x+7)-4(x+7)$ or $x(x-4)+7(x-4)$
14	Common denominator 24	**B1**	accept $k \times 24$
	Two correct from $\frac{18}{24}$, $\frac{16}{24}$ and $\frac{3}{24}$ oe	**M1**	accept $\frac{18k}{24k}$, $\frac{16k}{24k}$ and $\frac{3k}{24k}$
	$1\frac{7}{24}$ cao	**A2**	**A1** for $\frac{31}{24}$ or $\frac{31k}{24k}$ or $1\frac{7k}{24k}$
15 (a) (i)	9	**1**	
(ii)	12	**1**	
(b)	$\frac{5}{14}$	**1**	
(c)		**1**	

Question	Answer	Mark	Part marks
16 (a)	$\begin{pmatrix}-7\\3\end{pmatrix}$	**2**	**M1** for $\overrightarrow{CB}=\begin{pmatrix}-2\\-3\end{pmatrix}$ or for correct route allow e.g. $BA - BC$, $CB + BA$
(b)	7.81 or 7.810….	**2**	**M1** for $\sqrt{(-5)^2+6^2}$
17	1024 cao	**5**	**B4** for 1023 to 1024.0… or 1020 or **M3** for $\frac{125}{360}\times\pi\times48^2-\frac{125}{360}\times\pi\times40^2+32\times8$ or **M1** for $\frac{125}{360}\times\pi\times48^2$ or $\frac{125}{360}\times\pi\times40^2$ **and M1** for $32\times8+k\pi$ If B0 scored **B1** for *their* more accurate decimal answer rounded correctly to an integer
18 (a)	Enlargement [s.f.] $\frac{1}{2}$ [centre] (−1 , 3)	**1** **1** **1**	
(b)	Triangle at (3 ,−1) (5,−1) (5,−5)	**3**	**M2** for 2 correct vertices on grid or in working or **M1** for identifying matrix as a reflection in the x-axis or for $\begin{pmatrix}1&0\\0&-1\end{pmatrix}\begin{pmatrix}3&5&5\\1&1&5\end{pmatrix}$ oe
19 (a)	$\frac{1}{7}\begin{pmatrix}-4&3\\-5&2\end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix}-4&3\\-5&2\end{pmatrix}$ or det = 7 soi
(b)	6 nfww	**4**	**M3** for $(w-6)^2=0$ or **M2** for $w^2-12w+36[=0]$ or **M1** for $w(w-12)-4\times(-9)[=0]$ oe or clear attempt at determinant = 0 oe

Question	Answer	Mark	Part marks
20 (a)	(7 , 1)	**1**	
(b)	-1.25 or $-\frac{5}{4}$ or $-1\frac{1}{4}$	**2**	**M1** for rise/run
(c)	$y=\frac{4}{5}x+2$ oe	**3**	**B2** for $\frac{4}{5}x+2$ **or** $y=\frac{-1}{their\textbf{(b)}}x+2$ oe or **M1** for $-\frac{1}{their(\textbf{b})}$ oe or **B1** for $\frac{4}{5}x$ seen or $[y=]\,mx+2$ $(m\neq 0)$