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MATHEMATICS **0580/22**

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

MARK SCHEME

Maximum Mark: 70

Published

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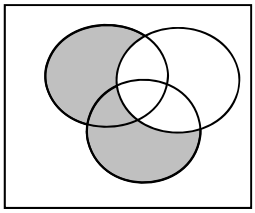
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Abbreviations

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	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

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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**	

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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

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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 $[y=]\,mx+2$ $(m\neq 0)$

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