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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the March 2016 series

0580 MATHEMATICS

0580/22 Paper 2 (Paper 22 – Extended), maximum raw mark 70

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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

Qu.	Answers	Mark	Part Marks
1	7, – 4	**1**	
2	$2x(1 - 2y)$ final answer	**2**	**M1** for $2(x - 2xy)$ or $x(2 - 4y)$ or for correct answer then spoilt
3	75.1 or 75.09 to 75.10	**2**	**M1** for cos […=] $\frac{0.9}{3.5}$
4	$n < 1.5$ oe final answer	**2**	**B1** for 1.5 oe in answer or **M1** for $3 > 8n - 6n$ oe
5	9.1 oe	**2**	**M1** for $\frac{5.2}{PQ} = \frac{12.4}{21.7}$ oe
6	$\frac{4}{9}$ oe, must be fraction	**2**	**M1** for $10 \times 0.\dot{4} - 0.\dot{4}$ oe
7	130 or 130.0 to 130.1	**2**	**M1** for ½ × 22.3 × 27.6 × sin25
8	$\frac{1}{5}\begin{pmatrix} 7 & 2 \\ 8 & 3 \end{pmatrix}$ oe isw	**2**	**M1** for $\frac{1}{5}\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ soi or $k\begin{pmatrix} 7 & 2 \\ 8 & 3 \end{pmatrix}$ $k \neq 0$ or det = 5 soi
9	$\frac{35(or\ 95)}{60} + \frac{39}{60}$ $2\frac{7}{30}$	**M1** **A2**	accept $\frac{35k(or\ 95k)}{60k} + \frac{39k}{60k}$ or **A1** for $\frac{67}{30}$ or $\frac{134k}{60k}$ or $1\frac{74k}{60k}$ or $2\frac{14k}{60k}$
10	64 000	**3**	**M2** for $\frac{1.6 \times 20000^2}{100^2}$ oe or **M1** for figs 64 in answer or $1\,cm^2 = 40\,000\,m^2$

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Qu.	Answers	Mark	Part Marks
11	16.58 cao	**3**	**B2** for 16.6 or 16.580 to 16.583 final answer or 16.58 not as final answer or **M1** for $\frac{38}{360}\times2\times\pi\times25$ and **B1** for rounding their more accurate answer correctly to 4sf
12	87 cao nfww	**3**	**B2** for 87.04…. or 87.0 nfww or **M1** for 500.5 or 5.75 seen or for (500 + 0.5) ÷ (5.8 – 0.05) and **B1** for **truncating** their decimal answer to an integer
13 (a)	$2^5\times3^2\times7$ oe final answer	**3**	**B2** for product of two of 2^5, 3^2, 7 or **B1** for 2, 3 and 7 seen or **M1** for 2 × 1008 or 3 × 672 or 7 × 288 soi
(b)	2.016×10^3	**1**	
14 (a)	x^8y^7 final answer	**2**	**B1** for answer x^8y^k or $x^ky^7\ (k\neq0)$
(b)	$27p^6m^{15}$ final answer	**2**	**B1** for 2 correct of 27, p^6, m^{15} in a product as answer
15	111.2 or 111.1 to 111.2	**4**	**M2** for [cos =] $\frac{2.8^2+3.6^2-5.3^2}{2\times2.8\times3.6}$ or **M1** for implicit form **A1** for [cos =] –0.362 to –0.361
16	44.1 or 44.07...	**4**	**M1** for 4 of mid-values 15 30 45 55 75 soi **M1** for $\sum fx$ for any x in intervals including boundaries **M1 dep** for $\sum fx \div 70$ **Dep** on 2nd **M** mark earned

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Qu.	Answers	Mark	Part Marks
17	$\frac{-(-11)\pm\sqrt{(-11)^2-4(3)(4)}}{2\times 3}$	**2**	**B1** for $\sqrt{(-11)^2-4(3)(4)}$ or better and, if in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$, **B1** for $p=-(-11)$ and $r=2(3)$
	0.41 and 3.26 final ans cao	**B1B1**	**SC1** for 0.4 and 3.3 or 0.409... and 3.257... or -0.41 and -3.26 or 0.41 and 3.26 seen in working
18 (a)	47	**1**	
(b)	117	**2**	**M1** for 360 – (115 + 85 + 97)
(c)	244	**2**	**B1** for 116 seen at centre or 122 seen at circumference
19	$y < 2$ oe and $x \geqslant -2$ oe	**2**	**B1** for either correct
	$y \geqslant \frac{1}{2}x + 1$ oe and $y \leqslant -x + 3$ oe	**3**	**B2** for either $y \geqslant \frac{1}{2}x + 1$ oe or $y \leqslant -x + 3$ oe or **SC2** for $y = \frac{1}{2}x + 1$ oe **and** $y = -x + 3$ oe or **SC1** for $y = \frac{1}{2}x + 1$ oe **or** $y = -x + 3$ oe or **SC4** for $y \leqslant 2$ oe , $x > -2$ oe, $y > \frac{1}{2}x + 1$ oe and $y < -x + 3$ oe
20 (a)	$9a + 3b$	**1**	
(b)	$36a + 6b = 96$ or $9a + 3b = 21$	**B1**	
	for correct method to eliminate one variable	**M1**	
	$a = 3$ $b = -2$	**A1** **A1**	If **M0 A0 A0** scored **SC1** for 2 values satisfying $36a+6b=96$ or $9a+3b=21$ or if no working shown, but 2 correct answers given

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Qu.	Answers	Mark	Part Marks
21 (a)	$\frac{2}{3}$ oe	**1**	
(b)	*their* $\frac{2}{3}$, $\frac{7}{8}$, $\frac{5}{8}$ oe	**2**	**B1** for either $\frac{7}{8}$ or $\frac{5}{8}$
(c) (i)	$\frac{1}{24}$ oe	**2**	**M1** for $\frac{1}{3}\times\frac{1}{8}$ seen
(ii)	$\frac{17}{24}$ oe	**3**	**M2FT** for $\frac{1}{3}\times\frac{7}{8}+\frac{2}{3}\times\frac{5}{8}$ or **M1FT** for $\frac{1}{3}\times\frac{7}{8}$ or $\frac{2}{3}\times\frac{5}{8}$

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