Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/23**

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

MARK SCHEME

Maximum Mark: 70

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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	36	**1**	
2	n^7 final answer	**1**	
3	*B*	**1**	
4 (a)	2.47×10^6	**1**	
(b)	7.9×10^{-3}	**1**	
5	$\frac{18}{30}$ and $\frac{5}{30}$ oe must be shown $\frac{23}{30}$ cao	**M1** **A1**	$\frac{18k}{30k}$ and $\frac{5k}{30k}$
6	Thursday	**2**	**M1** for 5.4 found or at least two of: 3.8, 3.6 and 4 found
7	0.4^2 0.6^3 0.22 $\sqrt{0.09}$	**2**	**M1** for decimal conversion 0.216 and 0.3 and 0.16
8	4.25 4.15	**2**	**B1** for each or both answers reversed
9 (a)	*A*	**1**	
(b)	A ruled line joining (65, 23) to (80, 28)	**1**	
10 (a)	2.9[0] or 2.900 to 2.901	**1**	
(b)	3.17 or 3.172 to 3.173	**1**	
11	18 360	**2**	**M1** for $34\,000 \times \left(1-\frac{40}{100}\right)\times\left(1-\frac{10}{100}\right)$ oe
12	32.7 or 32.72 to 32.73	**2**	**M1** for $\left[\frac{1}{2}\times\right]\frac{4}{3}\times\pi\times\left(\frac{5}{2}\right)^3$

Question	Answer	Mark	Part marks
13	$\frac{2}{9}$ oe, must be a fraction	**2**	**M1** for $2.\dot{2} - 0.\dot{2}$ oe or **B1** for $\frac{k}{9}$
14 (a)	30	**1**	
(b)	47.5	**2**	**M1** for 4.5 × 5 oe
15 (a)	68	**1**	
(b)	9	**2**	**M1** for 360 ÷ 40 oe or $\frac{180(n-2)}{n}$ = 140 oe
16	1.25	**3**	**M1** for $d = \frac{k}{(w+1)^2}$ or better **M1** for [d=] $\frac{their\ k}{(7+1)^2}$ or **M2** for $3.2(4 + 1)^2 = d(7 + 1)^2$ oe
17	$y = 2x$ oe	**3**	**M1** for $\frac{1-3}{12-8}$ oe **M1** for perpendicular gradient × *their* $\frac{1-3}{12-8}$ = –1 oe If zero scored, **SC1** for answer $y = kx$ $k \neq 2$ or 0
18 (a)	25	**1**	
(b)	$\frac{x^2-3}{2}$ oe final answer	**1**	
(c)	$2x + 3$ final answer	**2**	**M1** for correct first step, e.g. $x = \frac{y-3}{2}$ or $2y = x - 3$

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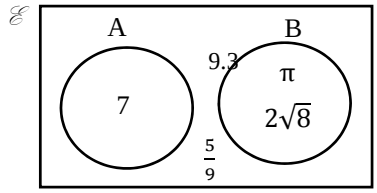
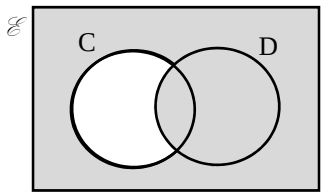
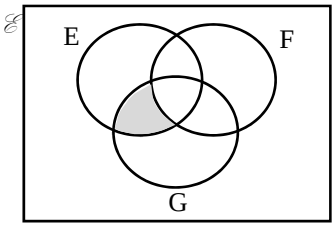
Question	Answer	Mark	Part marks
19 (a)	Correct tangent	**B1**	No daylight between tangent and curve at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = 0.8$ and $x = 1.2$
	$2.1 \leqslant \text{grad} \leqslant 3.9$	**2**	dep on **B1** **M1** for $\frac{rise}{run}$ also dep on any tangent drawn or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent
(b)	(–2, 8)	**1**	
20 (a)		**2**	**B1** for 3 elements in the correct place
(b)		**1**	
		**1**	
21 (a)	14.4 or 14.42 to 14.43	**2**	**M1** for $\frac{1}{2} \times 6.2 \times 4.7 \times \sin 82$ oe
(b)	30.7 or 30.72…	**2**	**M1** for $\sin = \frac{2050}{\frac{1}{2} \times 107 \times 75}$
22	1 3.5 1	**4**	**B3** for 2 correct **B2** for 1 correct or **M1** for 2, 7, […] and 2 seen [FDs]
23	$\frac{7n}{2t+3m}$ final answer	**4**	**M1** for $7n(6p - 1)$ seen and **M2** for $(2t + 3m)(6p - 1)$ seen or **M1** for $2t(6p - 1) + 3m(6p - 1)$ or $6p(2t + 3m) - 1(2t + 3m)$

Question	Answer	Mark	Part marks
24	$y \leqslant -\frac{3}{5}x + 6$ oe $x \geqslant 2$ oe $y > x$ oe final answers	**5**	**SC4** for $y < -\frac{3}{5}x + 6$, $x > 2$, $y \geqslant x$ oe or **B3** for $y \leqslant -\frac{3}{5}x + 6$ oe or **B2** for $y = -\frac{3}{5}x + 6$ oe or **B1** for gradient $= -\frac{3}{5}$ oe soi and **B2** for $x \geqslant 2$ and $y > x$ oe or **B1** for either $x \geqslant 2$ or $y > x$ oe or for $x = 2$ and $y = x$ with incorrect inequalities
25 (a)	**CB**	**1**	
(b)	$\begin{pmatrix} 36 & -2 \\ 18 & -1 \end{pmatrix}$	**2**	**B1** for two correct entries
(c)	$\frac{1}{47}\begin{pmatrix} 5 & 3 \\ -4 & 7 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 5 & 3 \\ -4 & 7 \end{pmatrix}$ seen or det = 47 soi
(d)	The determinant is 0 oe	**1**	