CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the March 2016 series

0580 MATHEMATICS

0580/42 Paper 4 (Extended), maximum raw mark 130

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.

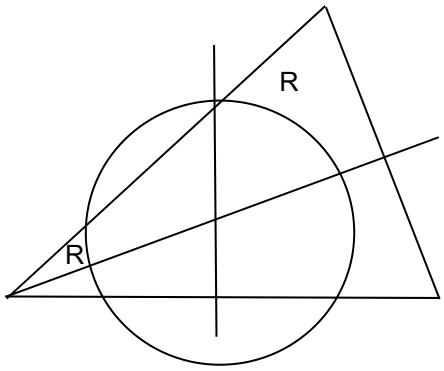
Cambridge is publishing the mark schemes for the March 2016 series for most Cambridge IGCSE® and Cambridge International A and AS Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

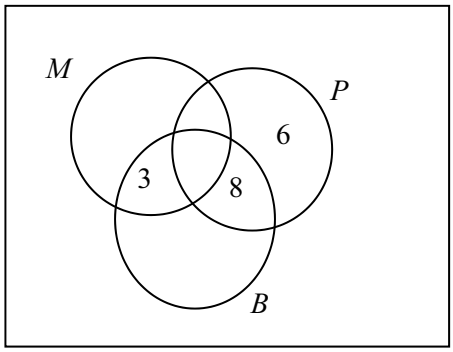
CAMBRIDGE
International Examinations

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	(a)	$\frac{8}{8+15+9} \times 640$ oe	1	With no errors seen
	(b)	300 and 180	2	**B1** for each or **SC1** for answers reversed
	(c)	10 nfww	2	**M1** for 160 ÷ 15.25 implied by 10.5 or 10.49... nfww
	(d)	$\frac{7}{24}$	3	**M1** for $\frac{3}{8}+\frac{1}{3}$ oe **M1dep** on previous **M1** for 1 – *their* $(\frac{3}{8}+\frac{1}{3})$ oe
2	(a)	Correct perpendicular bisector of *AB* with 2 pairs of correct arcs isw	2	**B1** for accurate with no/wrong arcs or **M1** for correct intersecting arcs with no or wrong line
	(b)	Correct angle bisector at *A* with two pairs of correct arcs isw	2	**B1** for accurate with no/wrong arcs or **M1** for two pairs of correct arcs with no or wrong line
	(c)	Circle centre *E* radius 5 cm isw	2FT	**FT** circle centre *their E* radius 5 cm provided (a) and (b) attempted **M1** for 250 ÷ 50 oe soi e.g. from arc If 0 scored **SC1** for circle centre *their E*
	(d)		2	cao **B1** for each If **0** scored, **SC1** for two 'correct' regions but in part **(c)**, centre correct but radius incorrect

© Cambridge International Examinations 2016

Qu.	Answers	Mark	Part Marks
3 (a) (i)		3	**B1** for each
(ii)	46	1FT	**FT** 29 + *their* 3 values from **(a)**
(iii)	11	1	
(iv)	$\frac{7}{19}$ oe	2	**M1** for $\frac{n}{16+their3}$ $(0 < n <$ (16 + *their* 3)) or $\frac{4+their3}{k}$ $(k >$ (4 + *their* 3))
(b) (i)	$\frac{9}{200}$ or 0.045	1	
(ii)	10800	3	**M2** for ½ (900 + 1500) × 9 oe or **M1** for method of finding a relevant area
(iii)	7.2	1FT	**FT** (*their* 10800) ÷ 1500
4 (a) (i)	64	1	
(ii)	16 to 16.5	2	**M1** for UQ = 71 to 71.5 or LQ =55
(iii)	62	2	**B1** for 24 indicated
(iv)	6	2	**B1** for 54 seen
(b)	[8] 12 23 11 [4] 2	3	**B2** for 1 incorrect reading FT others **B1** for 2 correct
(c)	Blocks of height 0.6 2.3 1.1 0.4 with correct widths	4FT	**FT** *their* **(b)** for heights **B1FT** for each correct block If **B0, SC1** for blocks of widths 20, 10, 10, 10 or for *their* correct frequency densities
5 (a)	6250	3	**M2** for $\frac{6000}{100-4}\times 100$ oe or **M1** for 6000 associated with 96 [%]
(b)	4441	3	**B2** for 4441.1 to 4441.2 or 4440 or **M1** for $\frac{6000}{1.351}$

© Cambridge International Examinations 2016

Qu.	Answers	Mark	Part Marks
(c)	1.58 or 1.581…	5	**M1** for $6000\times\left(1+\frac{1.5}{100}\right)^8$ oe **A1** for 6758.95…..... or 6758.96 to 3 sf or better or 758.95 or 758.96 rounded or truncated to 3 sf and **M2** for $\{their(6000\times1.015^8)-6000\}\times\frac{100}{6000\times8}$ oe or **M1** for $\frac{6000\times r\times8}{100}$ oe
6 (a) (i)	Rotation	1	
	90° [anticlockwise] oe	1	
	(4 , 4)	1	
(ii)	Enlargement	1	
	[centre] (5 , 1)	1	
	[scale factor] 2	1	
(b) (i)	Image at (–2, 5) (–2, 7) (–1, 7)	2	**B1** for translation by $\begin{pmatrix}-5\\k\end{pmatrix}$ or $\begin{pmatrix}k\\3\end{pmatrix}$
(ii)	Image at (–2, 1) (–2, –1) (–1, –1)	2FT	**FT** *their* triangle *P* reflected in line $y = 3$ **B1** for reflection of **triangle *P*** in the line $x = 3$ or $y = k$
(c)	Image at (–2, 3) (–4, 3) (–4, 4)	3	**B2** for 2 vertices correct in triangle or 3 correct co-ordinates soi in working or **B1** for 1 vertex in triangle correct soi or **M1** for $\begin{pmatrix}0&-1\\1&0\end{pmatrix}\begin{pmatrix}3&3&4\\2&4&4\end{pmatrix}$ shown or statement rotation 90° [anticlockwise] about (0, 0)
7 (a)	3.5[0] 1.94 3.11	3	**B1** for each
(b)	Fully correct curve	5	**B3 FT** for 10 or 11 points or **B2 FT** for 8 or 9 points or **B1 FT** for 6 or 7 points **B1 indep** two separate branches not touching or cutting *y*-axis **SC4** for correct curve, but branches joined
(c)	– 0.7 to – 0.6	1	

© Cambridge International Examinations 2016

Qu.	Answers	Mark	Part Marks
(d) (i)	– 1	1	
	2.5	1	If 0,0, **M1** for $y = 2.5 - x$ oe seen in working
(ii)	– 0.6 to – 0.5 with correct ruled line	3	**B2FT** for drawing *their* ruled line from **(d)(i)** or **M1** for ruled line through (0, 2.5)FT or gradient –1 FT
(e)	Correct tangent and $0.5 \leqslant$ grad $\leqslant 0.85$	3	**B2** for close attempt at tangent at $x = 2$ and answer in range OR **B1** for ruled tangent at $x = 2$, no daylight at $x = 2$ Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = 1.8$ and 2.2 **and M1** (dep on **B1** or close attempt at tangent [at any point] for $\frac{rise}{run}$
8 (a)	15 nfww	3	**M1** for $y = k\sqrt{(x+2)}$ oe **A1** for $k = 3$
(b)	$\frac{x+6}{x-2}$ nfww final answer	5	**B2** for $(x+6)^2$ oe or **SC1** for $(x+a)(x+b)$ where $ab = 36$ or $a + b = 12$ or $x(x + 6) + 6(x + 6)$ **B2** for $(x-2)(x+6)$ or **SC1** for $(x+a)(x+b)$ where $ab = -12$ or $a + b = 4$ or $x(x + 6) – 2(x + 6)$ or $x(x – 2) + 6(x – 2)$
(c)	$\frac{X}{W^2+1}$ nfww final answer	5	**M1** for $W^2 = \frac{X-a}{a}$ **or** $W\sqrt{a} = \sqrt{X-a}$ **M1** for next productive step **M1** for 2nd productive step **M1** for 3rd productive step **M1** for final step leading to $a =$
(d)	$\frac{-7x-1}{x^2-1}$ or $\frac{-7x-1}{(x-1)(x+1)}$ final answer	5	**M1** for common denominator $(x-1)(x+1)$ isw **M1** for $(x-2)(x-1)-(x+3)(x+1)$ **B2** for $x^2 - 2x - x + 2 - (x^2 + 3x + x + 3)$ oe or **B1** for either expansion

© Cambridge International Examinations 2016

Qu.	Answers	Mark	Part Marks
9 (a) (i)	**y**	**1**	
(ii)	**x + y**	**1**	
(iii)	**x + 2y**	**2**	**M1** for a correct unsimplified route or identifying $\overrightarrow{OS}$
(b)	$-(\frac{1}{2}\mathbf{x} + \mathbf{y})$ oe	**2**	**M1** for a correct unsimplified route or $\overrightarrow{GR} = -\frac{1}{2}\mathbf{x}$ or $\overrightarrow{RG} = \frac{1}{2}\mathbf{x}$
(c) (i)	$\overrightarrow{MG} = 2\mathbf{x} + 2\mathbf{y}$	**2**	**M1** for a correct unsimplified route e.g. $2\overrightarrow{PQ}$
(ii)	$\overrightarrow{MH} = \mathbf{x} + \mathbf{y}$ or $\overrightarrow{HG} = \mathbf{x} + \mathbf{y}$	**M1**	Accept $\overrightarrow{HM} = -\mathbf{x} - \mathbf{y}$ or $\overrightarrow{GH} = -\mathbf{x} - \mathbf{y}$
	$\overrightarrow{MG} = 2\overrightarrow{MH}$ oe	**A1**	Dep on **(c)(i)** correct, arrows essential
10 (a)	5.2[0] or 5.196...	**3**	**M2** for $[h^2=]\ 6^2 - 3^2$ or better or **M1** for $h^2 + 3^2 = 6^2$ or **B1** for PR (or PQ or QR) = 6
(b) (i)	7.2[0] or 7.196...	**1FT**	**FT** *their* **(a)** + 2
(ii)	62.4 or 62.35...	**5**	**M4** for $12 \times 6 \times \frac{1}{2} \tan 60$ oe or **M3** for $6 \times \frac{1}{2} \tan 60$ oe or **M2** for realising that ½ base = $1 \times \tan 60$ oe or **B1** for angle 30 or 60 in correct position on diagram or in a calculation If **0** scored, **SC1** for volume = an area × 12 seen
11 (a) (i)	11	**1**	
(ii)	$14x + 3$ final answer	**1**	
(b)	$17 - 21x$ final answer	**2**	**M1** for $7(2 - 3x) + 3$ oe
(c)	$-\frac{1}{9}$	**3**	**M1** for $3(2 - 3x) = 7$ oe **M1** for correct first step
(d)	–1.3	**3**	**M1** for $2 - 3(x + 4) - (7x + 3) = 0$ **M1** for $-10x - 13 = 0$ oe If **0** scored, **SC1** for answer – 0.7 oe after $2 - 3(x + 4) - 7x + 3 = 0$ shown previously

© Cambridge International Examinations 2016