

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

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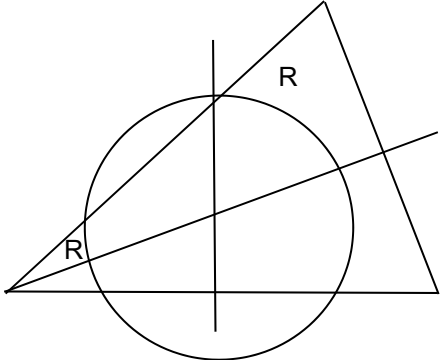
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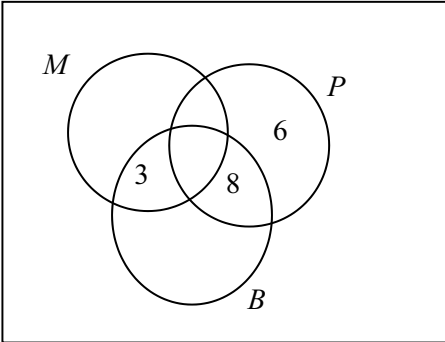
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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfw	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 nfw	2	M1 for $160 \div 15.25$ implied by 10.5 or 10.49... nfw
(d)	$\frac{7}{24}$	3	M1 for $\frac{3}{8} + \frac{1}{3}$ oe M1dep on previous M1 for $1 - \text{their} (\frac{3}{8} + \frac{1}{3})$ oe
2			
(a)	Correct perpendicular bisector of <i>AB</i> 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 <i>A</i> 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 <i>E</i> radius 5 cm isw	2FT	FT circle centre <i>their E</i> radius 5 cm provided (a) and (b) attempted M1 for $250 \div 50$ oe soi e.g. from arc If 0 scored SC1 for circle centre <i>their E</i>
(d)		2	cao B1 for each If 0 scored, SC1 for two 'correct' regions but in part (c), centre correct but radius incorrect

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Qu.	Answers	Mark	Part Marks
3 (a) (i)		3	B1 for each
(ii)	46	1FT	FT $29 + \text{their } 3 \text{ values from (a)}$
(iii)	11	1	
(iv)	$\frac{7}{19}$ oe	2	M1 for $\frac{n}{16 + \text{their } 3}$ ($0 < n < (16 + \text{their } 3)$) or $\frac{4 + \text{their } 3}{k}$ ($k > (4 + \text{their } 3)$)
(b) (i)	$\frac{9}{200}$ or 0.045	1	
(ii)	10800	3	M2 for $\frac{1}{2} (900 + 1500) \times 9$ oe or M1 for method of finding a relevant area
(iii)	7.2	1FT	FT $(\text{their } 10800) \div 1500$
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 <i>their (b)</i> for heights B1FT for each correct block If B0 , SC1 for blocks of widths 20, 10, 10, 10 or for <i>their</i> 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 $\frac{6000}{1.351}$

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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 $\{their(6000 \times 1.015^8) - 6000\} \times \frac{100}{6000 \times 8}$ oe or M1 for $\frac{6000 \times r \times 8}{100}$ 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 <i>their</i> triangle <i>P</i> 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 <i>y</i> -axis SC4 for correct curve, but branches joined
(c)	– 0.7 to – 0.6	1	

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Qu.	Answers	Mark	Part Marks
(d) (i)	– 1 2.5	1 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 <i>their</i> ruled line from (d)(i) or M1 for ruled line through (0, 2.5)FT or gradient –1 FT
(e)	Correct tangent and $0.5 \leq \text{grad} \leq 0.85$	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 $\frac{\text{rise}}{\text{run}}$
8 (a)	15 nfw	3	M1 for $y = k\sqrt{(x+2)}$ oe A1 for $k = 3$
(b)	$\frac{x+6}{x-2}$ nfw 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)	$\frac{X}{W^2+1}$ nfw 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

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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 $\overline{OS}$
	(b) $-(\frac{1}{2}x + y)$ oe	2	M1 for a correct unsimplified route or $\overline{GR} = -\frac{1}{2}x$ or $\overline{RG} = \frac{1}{2}x$
	(c) (i) $\overline{MG} = 2x + 2y$	2	M1 for a correct unsimplified route e.g. $2\overline{PQ}$
	(ii) $\overline{MH} = x + y$ or $\overline{HG} = x + y$ $\overline{MG} = 2\overline{MH}$ oe	M1 A1	Accept $\overline{HM} = -x - y$ or $\overline{GH} = -x - y$ 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 $\frac{1}{2} \text{ base} = 1 \times \tan 60$ 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 $\times 12$ 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