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CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0580 MATHEMATICS

0580/43

Paper 4 (Extended), maximum raw mark 130

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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) (i)	Triangle at $(-3, 1), (-3, 3), (-4, 3)$	2	SC1 for reflection in line $y = -1$ at $(1, -3), (1, -5), (2, -5)$ or reflection in any vertical line or three correct points not joined
	(ii)	Triangle at $(-1, -1), (-2, -3), (-1, -3)$	2	SC1 for rotation 180° but other centre or three correct points not joined
	(b) (i)	Translation	1	
		$\begin{pmatrix} -2 \\ 2 \end{pmatrix}$ oe	1	
	(ii)	Enlargement	1	
		$(0, 3)$ [factor] 3	1 1	
2	(a) (i)	640×1.02^6 oe $= 720.7\dots$	M1 B1	Must be seen
	(ii)	3.02 or 3.020 to 3.024... nfw	4	M3 for $[x =] \sqrt[4]{721 \div 640}$ or better (implied by answer of 1.03[02...] or $r = 0.0302[4\dots]$ or M2 for $(their\ x)^4 = 721 \div 640$ or M1 for $640 \times (their\ x)^4 = 721$ oe
	(b)	874.8[0] final answer	2	M1 $1200 \times (1 - 0.1)^3$ oe

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Qu		Answers	Mark	Part Marks
3	(a)	1 3 2.5	1 1 1	
	(b)	Fully correct graph	5	B3FT for 11, 12 points correct or B2FT for 9, 10 correct points or B1FT for 7, 8 correct points B1 for branch each side of y -axis and not touching y -axis SC4 for correct graph but branches joined
	(c)	-2.6 to -2.4	1	
	(d)	Correct ruled line fit for purpose -1.6 to -1.5	2 1	SC1 for ruled line through (0, 1) but not $y = 1$ or ruled line with gradient -1 or for correct line but freehand
	(e)	Correct tangent and $0.9 \leq \text{grad} \leq 1.5$	3	Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -3.4$ and -2.6 B2 if close attempt at correct tangent and answer in range (may be small amount of daylight) or B1 for ruled tangent at $x = -3$ within tolerance, no daylight at the point of contact and M1 (dep on B1 or close attempt at tangent) for a tangent at any point and $\frac{\text{rise}}{\text{run}}$ used
4	(a)	72.5	3	M1 for Σfm with correct frequencies and correct mid-interval values M1 for $\div 200$ dep on first M1
	(b)	Correct histogram	4	B1 four correct widths – no gaps B3 for blocks of correct heights 0.5, 5, 16, 4 or B2 for 3 blocks of correct heights or B1 for 2 blocks of correct heights If 0 scored for the heights then SC1 for all four frequency densities so

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Qu		Answers	Mark	Part Marks
5	(a) (i)	$\frac{4}{7}$ oe	1	
	(ii)	$\frac{6}{7}$ oe	1	
	(iii)	$\frac{5}{7}$ oe	1	
	(b) (i)	$\frac{12}{42}$ oe nfw	2	M1 for $\frac{4}{7} \times \frac{3}{6}$
	(ii)	$\frac{28}{42}$ oe nfw	3	M2 for $\frac{4}{7} \times \frac{3}{6} + \frac{2}{7} \times \frac{5}{6} + \frac{1}{7}$ or $1 - \frac{4}{7} \times \frac{3}{6} - \frac{2}{7} \times \frac{1}{6}$ oe or M1 for the sum of two terms of $\frac{4}{7} \times \frac{3}{6}, \frac{2}{7} \times \frac{5}{6}, \frac{1}{7}$
	(c)	$\frac{120}{210}$ oe nfw	2	M1 for $\frac{6}{7} \times \frac{5}{6} \times \frac{4}{5}$ or $\left(\frac{4}{7} \times \frac{3}{6} \times \frac{2}{5}\right) + 3\left(\frac{4}{7} \times \frac{3}{6} \times \frac{2}{5}\right) + 3\left(\frac{4}{7} \times \frac{2}{6} \times \frac{1}{5}\right)$ oe

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Qu		Answers	Mark	Part Marks
6	(a)	100 nfww	4	M3 for a correct calculation that would lead to the answer or B2 two correct relevant different size angles in <i>their</i> diagram or one relevant angle and total in <i>their</i> polygon or angle $EDA + \text{angle } FAD = 140$ or B1 for one relevant angle or total in <i>their</i> polygon
	(b) (i)	50	2	B1 for angle $ADC = 80$ or angle $BAC = 30$ or angle $ADB = 50$ soi
	(ii)	41	2FT	FT 91 – <i>their</i> (b)(i) B1 for angle $XBC = 41$
	(iii)	Similar	1	
	(c)	27.8 or 27.83	2	M1 for evidence of $\left(\frac{11}{10}\right)^2$ or 1.21 or $\left(\frac{10}{11}\right)^2$ or 0.826(4...)
	(d) (i)	60	3	M2 for $\frac{n}{10} = \frac{360}{n}$ oe e.g. $\frac{180(n-2)}{n} = 180 - \frac{n}{10}$ or B1 for exterior sum = 360 or $180(n-2)$ seen
	(ii)	174	2	M1 for $\frac{\text{their } n}{10}$ or $\frac{360}{\text{their } n}$ for <i>their</i> $n < 1800$

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Qu		Answers	Mark	Part Marks
7	(a) (i)	331 or 331.1 to 331.2	2	M1 for $\pi \times 6.2 \times 10.8 + \pi \times 6.2^2$
	(ii)	$\frac{A - \pi r^2}{\pi r}$ oe final answer	2	M1 for correct re-arrangement isolating term in l M1 for correct division by πr
	(b) (i)	4.39 or 4.390...	3	M2 for $18 \div \left(\frac{10}{4} + \frac{8}{5}\right)$ or M1 for $\frac{10}{4}$ or $\frac{8}{5}$
	(ii)	$x + x + 4$ oe	B1	Must be seen
		$\frac{x}{5}$ or $\frac{x+4}{10}$	B1	Must be seen
		$\frac{x+x+4}{\frac{x}{5} + \frac{x+4}{10}} = 7$ oe	M2	or M1 for evidence of total distance $\div$ <i>their</i> total time
		12	B1	
	(c) (i)	16.5[0] final answer	3	M2 for $19.8 \div \left(1 + \frac{20}{100}\right)$ oe or M1 for evidence of $(100 + 20)\%$ associated with 19.8
	(ii)	$\frac{100x}{100+y}$ final answer	3	B2 for $\frac{x}{1 + \frac{y}{100}}$ or $\frac{x}{1 + 0.01y}$ oe or B1 for $1 + \frac{y}{100}$ or $100 + y$ or $1 + 0.01y$ seen

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Qu		Answers	Mark	Part Marks
8	(a)	28.3 or 28.29...	2	M1 for $180\,000 \div (\pi \times 45^2)$
	(b) (i)	360 000	3	M2 for $\frac{1}{2}(70+50) \times 40 \times 150$ oe or M1 for $\frac{1}{2}(70+50) \times 40$ oe or <i>their</i> area of $ABCD \times 150$ dependent on <i>their</i> area being two dimensional
	(ii)	360	1FT	FT <i>their</i> (b)(i) $\div 1000$
	(c)	3 h 20 min	3	M2 for $180\,000 \div 15 \div 60$ (implied by 200) or M1 for $180\,000 \div 15$ (implied by 12000) or correct conversion of <i>their</i> seconds into h and min
	(d) (i)	$\frac{h}{40} = \frac{\frac{1}{2}(x-50)}{10}$ oe $h = 2(x-50)$	M1 A1	i.e. a correct statement from similar figures which must contain h , x and numbers Answer established with at least one more step and no errors or omissions
	(ii)	$\frac{1}{2}(x+50) 2(x-50)$	M1	
	(iii)	60.8 or 60.82 to 60.83	2	M1 for $(x^2 - 2500) \times 150 = 180\,000$ or better
	(iv)	21.7 or 21.65 to 21.66	1FT	FT for $2(\text{their (d)(iii)} - 50)$ evaluated only if $x > 50$

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Qu		Answers	Mark	Part Marks
9	(a)	$\begin{pmatrix} 2 & 13 \\ 1 & 14 \end{pmatrix}$	2	SC1 for one correct column or row
	(b)	$\frac{1}{3}\begin{pmatrix} 3 & -2 \\ 0 & 1 \end{pmatrix}$ oe isw	2	B1 for $k\begin{pmatrix} 3 & -2 \\ 0 & 1 \end{pmatrix}$ oe for $k \neq 0$ or $\frac{1}{3}\begin{pmatrix} a & c \\ b & d \end{pmatrix}$
	(c)	$[u =] 3$ $[v =] 2$	3	B2 for two of $3 = u, 2u + 3v = 4u, 4 = 2 + v, u + 4v = 3 + 4v$ or B1 for one or M1 for $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}\begin{pmatrix} 0 & u \\ 1 & v \end{pmatrix} = \begin{pmatrix} 0 & u \\ 1 & v \end{pmatrix}\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$ B1 for $\begin{pmatrix} 3 & 2u + 3v \\ 4 & u + 4v \end{pmatrix}$ or $\begin{pmatrix} u & 4u \\ 2 + v & 3 + 4v \end{pmatrix}$
	(d)	12 nfww	2	M1 for $w \times 2 - 8 \times 3 [= 0]$ oe
10	(a)	9	2	B1 for $[f(3) =] 5$ or $2(2x - 1) - 1$
	(b)	$4x^2 - 2x$ or $2x(2x - 1)$ final answer	3	M1 for $(2x - 1)^2 + (2x - 1)$ B1 for $[(2x - 1)^2 =] 4x^2 - 2x - 2x + 1$ or $(2x - 1)(2x - 1 + 1)$
	(c)	$\frac{x+1}{2}$ oe final answer	2	M1 for $x = 2y - 1$ or $y + 1 = 2x$ or $\frac{y}{2} = x - \frac{1}{2}$
	(d)	$\frac{4x+4}{x(x+2)}$ or $\frac{4x+4}{x^2+2x}$ or $\frac{4(x+1)}{x(x+2)}$ or $\frac{4(x+1)}{x^2+2x}$ final answer	4	B1 for $x(x+2)$ oe isw as common denominator B2 for $4x + 4$ as numerator or B1 for $2(x+2) + 2x$ or better as numerator

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Qu		Answers	Mark	Part Marks
11	(a)	$\frac{5}{7}$ $\frac{n}{n+2}$ oe 7 $n+2$ oe 3 $n-2$ oe 21 n^2-4 oe	8	B1 each
	(b)	72	2	M1 for $\frac{72}{74}$ or <i>their</i> $\frac{n}{n+2} = \frac{36}{37}$
	(c)	27	2	M1 for <i>their</i> $(n^2-4) = 725$ or $25 \times 29 [= 725]$