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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
nfww 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)	1	
		[factor] 3	1	
2	(a) (i)	640×1.02^6 oe = 720.7…	M1 B1	Must be seen
	(ii)	3.02 or 3.020 to 3.024… nfww	4	**M3** for [$x =$] $\sqrt[4]{721 \div 640}$ or better (implied by answer of 1.03[02…] or $r = 0.0302$[4…] 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 $0.9 \leqslant \text{grad} \leqslant 1.5$	**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 $\frac{rise}{run}$ used
4	(a)	72.5	**3**	**M1** for Σfm with correct frequencies and correct mid-interval values **M1** for ÷ 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 soi

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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 nfww	2	**M1** for $\frac{4}{7}\times\frac{3}{6}$
	(ii)	$\frac{28}{42}$ oe nfww	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 nfww	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 *their* diagram or one relevant angle **and** total in *their* polygon or angle *EDA* + angle *FAD* = 140 or **B1** for one relevant angle or total in *their* polygon
	(b) (i)	50	2	**B1** for angle *ADC* = 80 or angle *BAC* = 30 or angle *ADB* = 50 soi
	(ii)	41	2FT	**FT** 91 – *their* **(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 $\frac{\textit{their } n}{10}$ or $\frac{360}{\textit{their } n}$ for *their* 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 ÷ *their* 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 *their* area of *ABCD* × 150 dependent on *their* area being two dimensional
	(ii)	360	1FT	**FT** *their* **(b)(i)** ÷ 1000
	(c)	3 h 20 min	3	**M2** for 180 000 ÷ 15 ÷ 60 (implied by 200) or **M1** for 180 000 ÷ 15 (implied by 12000) or correct conversion of *their* seconds into h and min
	(d) (i)	$\frac{h}{40} = \frac{\frac{1}{2}(x-50)}{10}$ oe	M1	i.e. a correct statement from similar figures which must contain *h, x* and numbers
		$h = 2(x-50)$	A1	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 $(x^2-2500)\times 150 = 180000$ or better
	(iv)	21.7 or 21.65 to 21.66	1FT	**FT** for 2(*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 *their* $\frac{n}{n+2}=\frac{36}{37}$
	(c)	27	2	**M1** for *their* $(n^2 - 4) = 725$ or 25×29 [= 725]

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