CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 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

Question	Answer	Mark	Part marks
1 (a) (i)	3.9[0]	**2**	**M1** for $2.6 \div 2$
(ii)	$\frac{13}{18}$ cao	**2**	**B1** for any correct unsimplified fraction
(iii)	24	**3**	**M2** for $9 \div 0.375$ oe or **M1** for associating 9 with $(100 - 62.5)\%$
(b)	109 cao	**3**	**B2** for 108.5 to 108.6 or **M1** for $250 \times \left(1 - \frac{8}{100}\right)^{10}$ oe
2 (a) (i)	Image at (–2, 5), (1, 5), (1, 7)	**2**	**SC1** for translation $\begin{pmatrix} -4 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 4 \end{pmatrix}$ or 3 correct vertices plotted but not joined
(ii)	Image at (2, –3), (5, –3), (5, –5)	**2**	**SC1** for a reflection in a horizontal line or in the line $x = -1$ or 3 correct vertices plotted but not joined
(b)	Rotation	**1**	Alt Enlargement SF –1 (–1, 0)
	180 oe	**1**	
	(–1, 0)	**1**	Not as column vector
(c) (i)	Reflection	**1**	
	$y = -x$ oe	**1**	
(ii)	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$	**2**	**SC1** for a correct row or column

3	(a)	43 200	3	**M2** for 0.5 × (35 + 25) × 12 × 120 oe or **M1** for 0.5 × (35 + 25) × 12 oe
	(b) (i)	0.5 × (25 + 30) × 6 ×120 [= 19 800]	M2	Dep on a valid method for obtaining the width of 30 cm **B1** for 0.5 × (25 + 35) oe
	(ii)	45.8 or 45.83…	1FT	**FT** for $\frac{19\,800}{\textit{their}\ \textbf{(a)}} \times 100$
	(c)	1 hr 39 min	4	**B3** for 1.65 [h] or 99 mins or $\frac{33}{20}$ or **M2** for $\frac{19\,800}{12\times1000}$ oe or **M1** for $\frac{19\,800}{12}$ or $\frac{19\,800}{1000}$ or 12 × 1000 If zero scored then **SC1** for figs 165 **and** **B1** for converting their time (in hours) into hours and minutes
	(d)	12.8 or 12.80 to 12.81	3	**M2** for $\sqrt[3]{\frac{19\,800}{3\pi}}$ or **M1** for $\pi r^2\ 3r = 19\,800$
	(e)	21[.0]	2	**M1** for $\frac{19\,800}{1000} + 1.2$

4	**(a)**	–1.5, 0.5	**2**	**B1**, **B1**
	(b)	Correct curve	**5**	**B3 FT** for 10 or 11 points or **B2FT** for 8 or 9 points or **B1FT** for 6 or 7 points and **B1** independent for two branches **SC4** for correct curve but branches joined
	(c)	1.25 to 1.35	**1**	
	(d)	–1	**1**	
	(e) **(i)**	$2 - x$	**1**	
	(ii)	Ruled line with gradient –1 through (0, 2) and fit for purpose	**2FT**	**SC1** for **ruled** line, with gradient –1 or through (0, 2), but not $y = 2$ **FT** *their* $y = mx + c$ from **(e)(i)**, if $m \neq 0$ **SC1FT** for **ruled** line either with correct gradient or through $(0, c)$, but not $y = c$
		1.15 to 1.25 cao	**1**	
5	**(a)**	2180 or 2181…. nfww	**4**	**M2** for $680^2 + 2380^2 - 2 \times 680 \times 2380 \cos 65$ oe or **M1** for correct implicit cosine formula **A1** for 4 760 000 or 4 758 000 to 4 759 000
	(b)	78.7 or 78.71…	**3**	**M2** for $\frac{2380 \sin 40}{1560}$ or **M1** for $\frac{1560}{\sin 40} = \frac{2380}{\sin M}$ oe
	(c)	309 or 308.7…	**2FT**	**FT** 230 + *their* **(b)** **B1FT** 50 + *their* **(b)** for 129 or 128.7… [i.e. for C from M]
	(d) **(i)**	23 39 oe	**1**	
	(ii)	650	**2**	**M1** for 1560 ÷ journey time

6	**(a)**	101.5625 or 102 or 101.5 to 101.6 nfww	**4**	**M1** for 55, 90, 110, 160 soi **M1** for Σfm with frequencies and each m in or on a boundary of a correct interval 2750, 2700, 4400, 6400 **M1 dep on 2nd M** for ÷ 160
	(b)	Correct histogram drawn with correct widths and heights 1, 1.5 and 2 (no gaps)	**3**	**B1** for each correct block If zero scored, **SC1** for correct heights or frequency densities
	(c)	$\frac{40}{160}$ oe	**1**	
	(d) **(i)**	$\frac{1560}{25440}$ oe	**2**	**M1** for $\frac{40}{160} \times \frac{39}{159}$
	(ii)	$\frac{4000}{25\,440}$ oe	**3**	**M2** for $\frac{40}{160} \times \frac{50}{159} + \frac{50}{160} \times \frac{40}{159}$ oe or **M1** for one of these products soi
7	**(a)**	83 nfww	**4**	**B3** for $17x = 1411$ or $17x = 14.11$ oe in form $ax = b$ or final answer of 0.83 or **B2** for $6x + 11x - 55 = 1356$ oe or $6x + 11x - [0.]\ 55 = 13[.]56$ or **M1** for $6x + 11(x - [0.0]5) = 13[.]56$
	(b)	$\frac{1}{3}$ oe nfww	**4**	**M1** for $y(y+3)$ oe or $\frac{1}{2}(2y+1)(y+1)$ oe and **B2** for $2y^2 + 6y = 2y^2 + 2y + y + 1$ oe or better or **B1** for $(2y+1)(y+1) = 2y^2 + 2y + y + 1$ soi

	(c)	25 nfww	**4**	**M1** for $\frac{4[.]80}{w-1}$ or $\frac{7[.]80}{2w-11}$ **M1** for $\frac{4[.]80}{w-1} = \frac{7[.]80}{2w-11}$ oe **M1** for $480(2w-11) = 780(w-1)$ oe or ALT **M1** for $n(w-1) = 4[.]80$ or $n(2w-11) = 7[.]80$ **M1** for $2wn - 11n = 7[.]80$ $2wn - 2n = 9[.]60$ oe **M1** for $9n = 180$ oe or better or ALT **M1** for $n(w-1) = 4[.]80$ or $n(2w-11) = 7[.]80$ **M1** for $\frac{4[.]80+n}{n} = \frac{7[.]80+11n}{2n}$ **M1** for $9n = 180$ oe or better
	(d) (i)	$\frac{1}{2}u(3u-2) = 2.5$ One further correct step leading to $3u^2 - 2u - 5 = 0$ with no errors	**M1** **A1**	First step must involve $\frac{1}{2}u(3u-2)$
	(ii)	$(3u-5)(u+1)$	**2**	**SC1** for $(3u+a)(u+b)$ where $ab = -5$ or $a+3b = -2$ [a, b integers]
	(iii)	29.1 or 29.05…	**3**	**M2** for tan = $\frac{their\ \frac{5}{3}}{3 \times their\ \frac{5}{3} - 2}$ or **M1** for substituting *their* positive value of u into [u and] $3u-2$
8	**(a) (i)**	Angle A is common to both triangles oe $ADB = ABC$ Third angle of triangles equal oe	**1** **1dep**	Accept $DAB = CAB$ oe Dep on previous mark
	(ii)	Similar	**1**	
	(iii)	8.25	**2**	**M1** for $\frac{16}{12} = \frac{11}{BD}$ oe or better
	(b) (i)	38	**1**	
	(ii)	38	**1**	
	(iii)	78	**1**	
	(iv)	26	**1**	

	(c)	36 nfww	**5**	**B4** for an equation in m that simplifies to $5m = 180$ or **B1** for each of 3 of the listed angles expressed in terms of m, in it's simplest form, stated or labelled on diagram Angle $PQO = m$ Angle $QOR = m$ Angle $OQR = 2m$ Angle $PQR = 3m$ or $180 - 2m$ or $90 + \frac{m}{2}$ Angle $POR = 180 - m$ or $4m$ or $360 - 6m$ Reflex angle $POR = 360 - 4m$ or $6m$ or $180 + m$
9	**(a)**	8	**1**	
	(b)	3	**2**	**B1** for [g(0.5) =] 2 soi or **M1** for $2\left(\frac{1}{x}\right) - 1$ or better
	(c)	$\frac{x+1}{2}$ final answer	**2**	**M1** for $x = 2y - 1$ or $y + 1 = 2x$ or better or $\frac{y}{2} = x - \frac{1}{2}$
	(d)	$4x - 3$	**2**	**M1** for $2(2x - 1) - 1$
	(e)	$4x^2 - 4x + 7$	**2**	**B1** for $\left[(2x-1)^2\right] = 4x^2 - 2x - 2x + 1$
	(f)	x	**1**	
	(g)	$g^{-1}(x) = g(x)$	**1**	
	(h)	$fh(x)$	**1**	

10	**A** –13, –20	**1**	
	$-7n + 22$ oe	**2**	**SC1** for $-7n + k$ or $kn + 22$ oe
	B $\frac{9}{22}, \frac{10}{23}$	**1**	
	$\frac{n+4}{n+17}$ oe	**2**	**B1** for $n + 4$ oe or $n + 17$ oe seen, but not in wrong position
	C 26, 37	**1**	
	$n^2 + 1$ oe	**1**	
	D 162, 486	**1**	
	$2 \times 3^{n-1}$ oe	**2**	**SC1** for $k \times 3^{n+p}$ [k, p integers] Accept $2 \times \frac{3^n}{3}$