Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2016**

MARK SCHEME

Maximum Mark: 104

Published

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 October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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)	1700 or 5pm	**2**	**B1** for 2200 or [0]5 20 or 10pm or 5:20am or 6**h** 40
(ii)	15 575	**1**	
(b) (i)	2200	**2**	**B1** for 440 or **M1** for $660 \times 2 +$ *their* 440×2 or $\frac{10}{3} \times 660$ or better
(ii)	104.5 105.5	**1** **1**	**SC1** for both correct but reversed
(c) (i)	30 20 72	**1** **1 1**	
(ii)	Correct pie chart	**1**	
2 (a) (i)	94	**2**	**M1** for $\frac{160+58+45+82+125}{5}$ or $\frac{470}{5}$
(ii)	115	**1**	
(b)	$\frac{1800}{5000}$ oe isw	**1**	
(c)	[0].15 oe	**2**	**M1** for 1 – (0.15 + 0.23 + 0.4 + 0.07) or 1 – 0.85
(d)	39.5[0]	**2**	**M1** for [8.50 +] (7.75 × 4) soi by 31 If zero scored, **SC1** for 47.25
(e)	Correct bar chart	**3**	**B1** for any correct linear scale starting at zero soi **B2** for all bars correct height and equal width, with equal gaps or no gaps or **B1** for all bars correct height with unequal widths and/or gaps or at least three bars correct height with equal width, with equal gaps or no gaps

Question	Answer	Mark	Part marks
3 (a) (i)	63	1	
(ii)	8	1	
(iii)	11	1	
(iv)	144	1	
(b)	4^2 [=] 16 5^2 [=] 25	1	
(c) (i)	16384	1	
(ii)	1	1	
(iii)	74.1 or 74.08 to 74.09	1	
(d)	$2 \times 3^2 \times 5$ or $2 \times 3 \times 3 \times 5$	2	**B1** for prime factors 2 , 3 , 5 (and no others) identified or **B1** for any correct product e.g. 9×10, 5×18, $6 \times 3 \times 5$, $1 \times 3 \times 30$
4 (a)	3	1	
	cm^2	1	
(b) (i)	Rotation	1	
	90° [anticlockwise] oe	1	
	[Centre] (0,0) oe	1	
(ii)	Correct trapezium	2	**B1** for translation of $\begin{pmatrix} 5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$
(iii)	Correct trapezium	2	**B1** for correct size and orientation but incorrect position

Question	Answer	Mark	Part marks
5 (a) (i)	17.5	1	
(ii)	She stopped oe	1	
(iii)	8.75	2	**M1FT** for *their* **(a)(i)** ÷ 2 soi
(b)	660 275 385	3	**M2** for one correct value in correct place or $\frac{1320}{(5+12+7)} \times k$ where k is 5, 12 or 7 or better in working or **M1** for $\frac{1320}{(5+12+7)}$ or better If zero scored, **SC1** for all correct answers in incorrect order
(c)	5321.66 cao	4	**M2** for 5000×1.021^3 oe or **M1** for $5000 \times 1.021 \times 1.021$ oe **A1** for 5321.661….. **B1 indep** for their answer corrected to 2 d.p. if their unrounded answer is shown to at least 3 d.p.
6 (a) (i)	46	1	
(ii)	Add 7 oe	1	
(b)	4, 7, 12	2	**M1** for 2 correct or 3 , 4 , 7
(c) (i)	$2a - 3h$ final answer	2	**B1** for $2a$ or $-3h$
(ii)	$13x - 9$ final answer	2	**M1** for $5x + 15$ or $8x - 24$ or $13x$ or -9
(d)	$3(2g + 5)$ final answer	1	
(e)	11 nfww	3	**M2** for $5x = 55$ or $x + 6 = 17$ or **M1** for $5x + 30$ [= 85] or $5(x + 6)$ [= 85] or **M1** for correct first step of incorrect linear equation if of the form $ax + b = 85$, $a \neq 1$

Question	Answer	Mark	Part marks
7 (a)	$-5x + 6$	3	**B2** for $-5x$ (oe) + 6 or $-5x + k$ or **B1** for $kx + 6$ $k \neq 0$ or [gradient =] $\frac{\text{rise}}{\text{run}}$ with correct values or [gradient =] $\pm 5\frac{k}{k}$
(b) (i)	3 12	1 , 1	
(ii)	Correct curve	4	**B3FT** for 5 or 6 correctly plotted points or **B2FT** for 3 or 4 correctly plotted points or **B1FT** for 1 or 2 correctly plotted points
(c)	0.2 to 0.35	1	**FT**
8 (a) (i)	Correct net	3	**B2** for 3 or 4 correct faces in correct position or **B1** for 1 or 2 correct faces in correct position
(ii)	36	2	**M1** for $6 \times 3 \times 2$ oe
(b)	Hexagon	1	
(c)	Obtuse angle indicated	1	
(d)	16	2	**M1** for $\frac{360}{22.5}$ or $\frac{360}{n} = 22.5$ or $\frac{180(n-2)}{n} = 157.5$ oe
(e) (i)	$\sqrt{20^2 - 12^2}$	M2	**M1** for $20^2 = 12^2 + x^2$ or [x^2 =] $20^2 - 12^2$
(ii)	153 or 152.5 to 152.6	5	**M2** for $\frac{\pi 6^2}{2}$ soi by 56.5… . or 18 π or **M1** for $\pi 6^2$ soi by 113 or 113.0…. or 113.1…. or 36 π **M1** for $0.5 \times 12 \times 16$ soi by 96 **M1dep** for *their* 56.5... + *their* 96 dep on at least M1 earned soi

Question	Answer	Mark	Part marks
9 (a)	105 806	**1**	
(b)	1.03×10^5	**1**	
(c) (i)	46 100	**1**	
(ii)	100	**1**	
(iii)	6.82×10^6	**2**	**B1** for figs 682
(d)	1.47 or 1.466 to 1.467	**3**	**M2** for $\left(\frac{30\,851}{30\,405} - 1\right)$ [×100] oe soi by 0.0146…. or 0.0147 or $\left(\frac{30\,851}{30\,405}\right) \times 100$ [–100] oe soi by 101.46…. or 101.47 or **M1** for $\left(\frac{30\,851}{30\,405}\right)$ soi by 1.0146……. or 1.0147 Alternative method **M2** for $\frac{30\,851 - 30\,405}{30\,405}$ [× 100] oe soi by 0.0146…. or 0.0147 or **B1** for 30 851 – 30 405 soi by 446
10 (a)	35	**2**	**B1** for 7
(b)	305	**1**	
(c)	Point marked in correct position	**2**	**B1** for point at 4.5 cm or 050 ° from *Y*