Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/32**

Paper 3 (Core) **May/June 2018**

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.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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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	Marks	Partial Marks
1(a)(i)	138	**1**	
1(a)(ii)	128	**1**	
1(b)(i)	135	**1**	
1(b)(ii)	121	**1**	
1(b)(iii)	134	**1**	
1(b)(iv)	125	**1**	
1(c)	24	**2**	**B1** for numerator of −24 or denominator of −1 or answer of –24
1(d)	$\frac{20\times\sqrt{9}}{30\div 6}$	**M1**	**M1** for all correct roundings
	12	**A1**	If 0 scored **SC1** for 3 correct roundings or 20.[0] and 9.0[0] and 30.[0] and 6.0[0]
2(a)	Trapezium	**1**	
2(b)	Enlargement [Scale factor] $\frac{1}{3}$ oe [Centre] (−5, −5)	**3**	**B1** for each
2(c)	$\frac{1}{9}$	**3**	**B2** for $\left(\frac{1}{3}\right)^2$ or **B1** for [shaded area] 13.5 or [area of A] 1.5 seen **M1** for $\frac{1.5}{their 13.5}$ oe
2(d)(i)	Image at (−6, 6),(−5, 6),(−5, 5), (−7, 5)	**2**	**B1** for image of A at $\begin{pmatrix}-4\\k\end{pmatrix}$ or $\begin{pmatrix}k\\7\end{pmatrix}$
2(d)(ii)	Image at (1, 1), (1, 2), (3, 2), (2, 1)	**2**	**B1** for 180° rotation with incorrect centre

Question	Answer	Marks	Partial Marks
2(d)(iii)	Image at (5, −2), (5, −1), (6, −1), (7, −2)	**2**	**B1** for reflection in $y = 2$ or in $x = k$
3(a)	7 : 4 : 5	**2**	**B1** for any correct ratio other than 21 : 12 : 15, not in simplest form
3(b)(i)	$\frac{7}{16}$ oe $\times 1248$	**B1**	
3(b)(ii)	[Mustapha] 312 [Joshua] 390	**2**	**B1** for each or **M1** for $\frac{1248}{21+12+15} \times k$ where $k = 12$ or 15 or $\frac{1248}{their7 + their4 + their5} \times k$ oe where $k = their\ 4$ or $their\ 5$
3(c)	2912	**2**	**M1** for 1248 ÷ 3 [× 7]
3(d)	13 500 – 0.16 × 13 500 − 500 or 0.84 × 13 500 − 500	**M2**	**M1** for 0.16 × 13 500 or 0.84 × 13 500 seen
3(e)(i)	3 × 12 × 340	**B1**	
3(e)(ii)	12.9 or 12.91 to 12.92	**3**	**M2** for $\frac{12240 - 10840}{10840}[\times 100]$ or $\frac{12240}{10840} \times 100[-100]$ or $\left(\frac{12240}{10840} - 1\right)[\times 100]$ or **M1** for 12240 – 10840 or $\frac{12240}{10840}$ oe
4(a)	−6 4 4 0	**2**	**B1** for 2 or 3 correct
4(b)	Correct smooth curve	**4**	**B3FT** for 7 or 8 correct plots or **B2FT** for 5 or 6 correct plots or **B1FT** for 3 or 4 correct plots
4(c)	$x = 2.5$ cao	**1**	
4(d)(i)	−2 1 5.5	**2**	**B1** for 2 correct
4(d)(ii)	Correct continuous ruled line from $x = -1$ to $x = 6$	**2**	**B1FT** for 2 or 3 correct plots
4(d)(iii)	[x =] −0.6 to −0.4 and 3.9 to 4.1	**2**	**B1FT** for each

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Question	Answer	Marks	Partial Marks
5(a)	250	**2**	**B1** for 5 [cm] oe
5(b)	Correct point *E* joined to *A* and *D* with ruled lines and with arcs	**3**	**B2** for correct point *E* with arcs without lines or correct ruled shape without arcs or **B1** for drawing *AE* = 11 cm or drawing *DE* = 12 cm or correct point *E* without arcs and lines
5(c)(i)	Correct ruled bisector of angle *ABC* which reaches *DE* with two correct pairs of arcs	**B2**	**B1** for a correct ruled angle bisector with no/wrong arcs or two correct pairs of arcs
5(c)(ii)	Correct ruled perpendicular bisector of side *CD* which reaches *AE* with two correct pairs of arcs	**B2**	**B1** for a correct ruled perpendicular bisector with no/wrong arcs or two correct pairs of arcs
5(d)(i)	Constructed circle, centre 7 cm from *B* along bisector of *ABC*, with radius 3 cm	**3**	**3FT** along *their* **(c)(i)** **B1** for a circle, centre 7 cm from *B*, any radius **M1** for a circle, radius 3 cm seen anywhere
5(d)(ii)	942 or 943 or 942.4 to 942.6	**2**	**M1** for $(2 \times 150)\pi$ or 300π soi
6(a)	<table><tr><td></td><td>F</td><td>G</td><td>S</td><td>I</td><td>J</td><td>Tot</td></tr><tr><td>B</td><td></td><td>21</td><td></td><td></td><td>8</td><td></td></tr><tr><td>G</td><td>30</td><td></td><td></td><td>11</td><td></td><td>139</td></tr><tr><td>Tot</td><td>57</td><td></td><td>102</td><td></td><td>20</td><td></td></tr></table>	**3**	**B2** for 6 or 7 correct or **B1** for 3, 4 or 5 correct
6(b)(i)	$\frac{54}{\textit{their}139}$ oe isw	**1**	**FT** *their* table
6(b)(ii)	$\frac{46}{123}$ oe isw	**1**	
6(b)(iii)	$\frac{209}{262}$ oe isw	**1**	
6(c)(i)	[Chemistry] 80° [Physics] 155°	**2**	**B1** for each or if 0 scored **M1** for 125 ÷ 25 or 360 ÷ 72 or 5 If 0 scored **SC1** for the two angles adding to 235°

Question	Answer	Marks	Partial Marks
6(c)(ii)	Two correct lines on the pie chart	**2**	**2FT** only if **(c)(i)** angles total 235° **B1** for a correct sector of 125° or 80° or 155°
7(a)	10 10	**1**	
7(b)(i)	22.4	**1**	
7(b)(ii)	6.2	**2**	**2FT** *their* **(b)(i)** × 1000 ÷ (60 × 60) oe rounded to 1dp or **M1** for *their* **(b)(i)** × 1000 ÷ (60 × 60) oe or 5600 ÷ (15 × 60) oe
7(c)	Two correct ruled lines	**2**	**B1FT** for a line (09 55, 0) to (*their* **7(a)**, 5.6) **B1FT** for horizontal line (*their* **7(a)**, 5.6) to (*their* **7(a)** + 23, 5.6)
7(d)(i)	12	**2**	**M1** for 5.6 ÷ 28 [× 60]
7(d)(ii)	Correct line	**1**	**FT** line from (10 07, 0) to (10 07 + *their* **(d)(i)**, *their* 5.6)
7(e)(i)	Correct line	**1**	**FT** line from (*their* **7(a)** + 23, 5.6) to (10 54, 0)
7(e)(ii)	16	**2**	**2FT** 5.6 ÷ (*their* time in minutes) × 60 **M1** for 5.6 ÷ 21 [× 60] soi or for 5.6 ÷ (*their* time in minutes)[× 60]
8(a)(i)	116	**1**	
8(a)(ii)	32	**1**	**FT** (180 – *their* **(a)(i)**) ÷ 2
8(b)(i)	Pentagon	**1**	
8(b)(ii)	Angle [between] tangent [and] radius	**1**	
8(b)(iii)	108 Angles [on a straight] line [add up to] 180	**2**	**B1** for angle **B1** for reason
8(b)(iv)	72	**1**	

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Question	Answer	Marks	Partial Marks
8(b)(v)	135	**4**	**B3FT** for (540 – (90 + *their* **(b)(iii)** + *their* **(b)(iv)**)) ÷ 2 oe OR **B2** for 540 or **M1** for (5 – 2) × 180 oe **M1** for (*P* – (90 + *their* **(b)(iii)** + *their* **(b)(iv)**)) ÷ 2 oe where *P* is any value >270
9(a)	20 nfww	**3**	**B2** for $6x - 4x = 28 + 12$ or better or **B1** for $6x - 12$ or $4x + 28$ or **B1FT** for correct $ax = b$ after incorrect expansions first step
9(b)(i)	$3a + 8b = 93$	**2**	**B1** for $3a + 8b$
9(b)(ii)	For correctly eliminating one variable	**M1**	For correct method to equate coefficients and eliminate one variable
	[*a* =] 7	**A1**	
	[*b* =] 9	**A1**	If 0 scored **SC1** for 2 values satisfying one of the original equations **SC1** if no working shown, but 2 correct answers given

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