Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2021**

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

© UCLES 2021

[Turn over

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.

© UCLES 2021

Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

© UCLES 2021

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

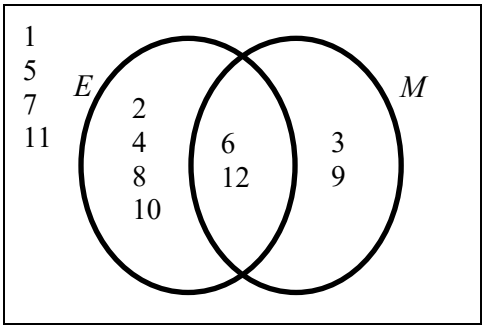
Question	Answer	Marks	Partial Marks
1(a)	6.11	**3**	**M2** for $1.2\times4.2+0.125\times8.56$ oe or **M1** for 1.2×4.2 oe or figs 125×8.56 or **B1** for 0.125
1(b)	13 1.15	**3**	**M1** for $\frac{20}{1.45}$ **M1** for $20-1.45\times k$ where k integer $\leqslant 13$
1(c)	32	**3**	**M2** for $\frac{7}{9}\times\frac{4}{7}\times72$ OR **M1** for $\frac{2}{9}\times72$ or $\frac{7}{9}\times72$ and **M1dep** for $\frac{4}{7}\times$ *their* 56 or $\frac{3}{7}\times$ *their* 56
1(d)	41.7 or 41.66 to 41.67	**1**	
1(e)	55 77	**2**	**M1** for $\frac{132}{5+7}\times k$ oe where k is 1 or 5 or 7
1(f)(i)	87.5	**2**	**M1** for $\frac{24}{12.8}\times100[-100]$ or $\frac{24-12.8}{12.8}[\times100]$ or $\frac{24}{12.8}-1[\times100]$

Question	Answer	Marks	Partial Marks
1(f)(ii)	25.5[0] nfww	**2**	**FT** *their* **(f)(i)** **M1** for $13.6 \times \left(1+\frac{their(\mathbf{f})(\mathbf{i})}{100}\right)$ oe or **B1FT** for 11.90 or **M1** for $\frac{13.6}{x}=\frac{12.8}{24}$ or better
2(a)(i)	48 192 96 24	**2**	**B1** for 2 or 3 correct or **M1** for $\frac{360}{15}\times k \quad k=1,2,4 \text{ or } 8$
2(a)(ii)	Correct pie chart	**2**	**FT** *their* table if angles add up to 360 **B1FT** for one sector correctly drawn
2(b)(i)	$\frac{2}{5}$ oe	**1**	
2(b)(ii)	No with correct reason	**2**	**B1** for $\frac{5}{13}$ **B1** for reason or correct comparison of probabilities
2(b)(iii)	1 1	**2**	**B1** for $\frac{6}{15}$ or 6:9 If 0 scored, **SC1** for final answer 6, 9 or $1 + 2k$, $1 + 3k$ k integer, $k \geqslant 1$
3(a)	*M* marked correctly	**2**	**B1** for correct bearing **B1** for correct distance
3(b)(i)	38 520 000	**2**	**M1** for [1070 ×] 36×1000 or 1070×36 or figs 3852 oe
3(b)(ii)	200	**3**	**M2** for $\frac{36\times1000\times15}{60\times45}$ oe or figs 2 nfww **M1** for $\frac{36\times1000}{60}$ oe or $\frac{60\times45}{15}$ oe
3(c)	28.8	**2**	**M1** for $\frac{36}{75}[\times60]$
3(d)	132	**2**	**M1** for $312-180$ or $180-48$

Question	Answer	Marks	Partial Marks
4(a)	$(-2, 4)$	**1**	
4(b)(i)	-0.5 oe	**1**	
4(b)(ii)	$[y=]-0.5x+3$	**2**	**FT** *their* **(b)(i)** **B1FT** for $[y=]-0.5x+c$ or for $[y=]$ *their* **(b)(i)** $x+c$ or for $[y=]mx+3$
4(c)(i)	Correct ruled line drawn	**1**	
4(c)(ii)	(–4, 0)	**1**	**FT** *their* **(c)(i)** for x-coord
4(c)(iii)	23.0 to 23.8	**2**	**FT** provided *their* 3 lengths seen **M1** for $AB + AC + BC$ soi or **B1FT** for AB = 8.7 to 9.1 or BC = 10 or AC = 4.3 to 4.7
5(a)	2	**1**	
5(b)(i)	e.g. $4 = \frac{k}{2}$ leading to $k = 8$	**1**	accept use of any correct co-ordinates
5(b)(ii)	0.032 oe	**1**	
5(c)(i)	$-1, -2, -4, -8$	**2**	**B1** for 2 correct
5(c)(ii)	Correct curve	**3**	**B2FT** for 3 or 4 correct plots **B1FT** for 1 or 2 correct plots
5(d)	$y = x$ oe $y = -x$ oe	**2**	**B1** for each
6(a)(i)	Enlargement [centre] $(-4, -5)$ [scale factor] 4	**3**	**B1** for each
6(a)(ii)	Rotation [centre] (0, 0) oe 90° clockwise oe	**3**	**B1** for each
6(b)(i)	Correct translation $(-7, 1), (-7, -1), (-8, -1)$	**2**	**B1** for translation $\begin{pmatrix} k \\ 4 \end{pmatrix}$ or $\begin{pmatrix} -5 \\ k \end{pmatrix}$
6(b)(ii)	Correct reflection $(-6, -5), (-7, -3), (-7, -5)$	**2**	**B1** for reflection in $x = k$, $k \neq -4.5$ or in $y = -4.5$

Question	Answer	Marks	Partial Marks
6(c)	$\tan b = \frac{8}{4}$ oe	**M1**	
	63.43…	**A1**	
6(d)	Yes correct reason	**2**	**B1** for evidence that all three triangles each have angles 63.4°, 26.6° and 90° **B1** for yes and statement that triangles are similar because they have the same 3 angles oe
7(a)(i)	$4x-9$ cao	**3**	**B2** for $x+(x-3)+2(x-3)$ oe or **B1** for $k(x-3)$ seen $k=1, 2$ or 3 oe
7(a)(ii)(a)	11 nfww	**3**	**M1** for *their* **(a)(i)** = 35 **M1** for rearranging *their* $(ax+b)=35$ to $ax=35-b$ or $x+\frac{b}{a}=\frac{35}{a}$ or better
7(a)(ii)(b)	5	**2**	**FT** *their x* **M1** for (*their x* $-3)\times 2$ soi or **B1** for [Pierre makes] 16
7(b)(i)	Half-past two shown correctly on clock face	**1**	
7(b)(ii)	105	**2**	**M1** for $\frac{3.5}{12}[\times 360]$ oe
7(c)	8.64×10^5	**2**	**M1** for $60\times 60\times 24\times 10$ or **B1** for figs 864 If 0 scored, **SC1** for correctly changing *their answer* into standard form provided *their answer* > 10 000
7(d)	18 02	**2**	**M1** for $3\frac{1}{2}\times 8$ or **B1** for 1736 seen
7(e)	16 cao	**4**	**B1** for LCM=24 soi **M1** for $\frac{365}{24}$ or $\frac{364}{24}$ or $\frac{365}{48}$ or $\frac{364}{48}$ **A1** for 15 or 15.2 or 15.16 to 15.17 or 15.20 to 15.21 If **A0** scored, **SC1** for 7.60[4..] or 7.58[3..] and 8 final answer
8(a)(i)	Angle [in a] semicircle	**1**	

© UCLES 2021

Question	Answer	Marks	Partial Marks
8(a)(ii)	30	**2**	**M1** for $\frac{6\times10}{2}$
8(a)(iii)	11.7 or 11.66…	**2**	**M1** for $[x^2=]\,6^2+10^2$ or better
8(b)	$[r=]\sqrt{\frac{A}{\pi}}$	**2**	**M1** for $\frac{A}{\pi}=r^2$ or $\sqrt{A}=\sqrt{\pi}\times r$
8(c)	17.4 or 17.37 to 17.38…	**4**	**M3** for $81-\pi\left(\frac{\sqrt{81}}{2}\right)^2$ oe OR **M1** for $\sqrt{81}$ and **M1** for $\pi\left(\frac{their\sqrt{81}}{2}\right)^2$ and **M1** for $81-their\pi\left(\frac{\sqrt{81}}{2}\right)^2$
9(a)(i)		**2**	**B1** for 2 or 3 regions correct
9(a)(ii)	8	**1**	**FT** *their* **(a)(i)**
9(a)(iii)	$\frac{1}{6}$ oe	**2**	**FT** *their* **(a)(i)** **B1FT** for 2 or *their* $\mathrm{n}(E\cap M)$
9(b)	No 2 is even and a prime oe	**1**	