Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/42**

Paper 4 (Extended) **March 2021**

MARK SCHEME

Maximum Mark: 130

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 March 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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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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.

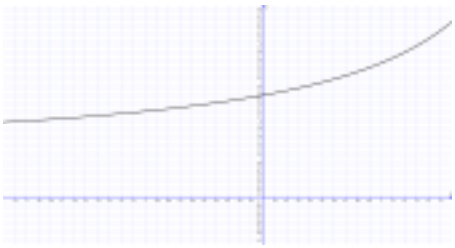
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Abbreviations

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)	245	**1**	
1(b)	8	**2**	**M1** for $40 + 26.5x = 252$ oe or **B1** for 212 seen
1(c)	6	**2**	**M1** for $(224 - 2 \times 48) \div 32$ oe or $2 \times 48 + 32(x - 2) = 224$ soi
1(d)	35 : 36 : 32 final answer	**2**	**B1** for *their* (a) : 252 : 224 or equivalent ratio
2(a)(i)	rotation 90 anticlockwise oe (–3, 2)	**3**	**B1** for each
2(a)(ii)	enlargement $-\frac{1}{2}$ $(-2,-1)$	**3**	**B1** for each
2(b)	Image at (– 3, – 5) (1, − 5) (1, 3)	**2**	**B1** for translation by $\begin{pmatrix}-5\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-10\end{pmatrix}$
2(c)	Image at (2, 3) (6, 3) (6, − 5)	**2**	**B1** for reflection in $y = k$ or $x = 4$
3(a)	126 54 117	**3**	**B1** for each
3(b)	angle [in a] semicircle is 90	**B1**	Do not accept triangle for angle
	Allied, co-interior [add to 180] or Angles in triangle [= 180] **and** alternate oe	**B1**	
	32	**B1**	
3(c)	109	**2**	**B1** for 218 or 71 in correct places or correctly labelled

Question	Answer	Marks	Partial Marks
4(a)	462	**1**	
4(b)(i)	$\frac{7}{15}$ oe	**1**	
4(b)(ii)	$\frac{7}{15}\times\frac{6}{14}+\frac{6}{15}\times\frac{5}{14}+\frac{2}{15}\times\frac{1}{14}$ $=\frac{37}{105}$	**3**	**M2** for addition of two of $\frac{7}{15}\times\frac{6}{14}+\frac{6}{15}\times\frac{5}{14}+\frac{2}{15}\times\frac{1}{14}$ or **M1** for one of the products seen
4(b)(iii)	$\frac{29}{65}$ oe	**4**	**M3** for $\frac{7}{15}\times\frac{6}{14}\times\frac{5}{13}+3\times\frac{7}{15}\times\frac{6}{14}\times\frac{6}{13}+3\times\frac{7}{15}\times\frac{6}{14}\times\frac{2}{13}$ oe or $1-3\left(\frac{8}{15}\times\frac{7}{14}\times\frac{7}{13}\right)-\left(\frac{8}{15}\times\frac{7}{14}\times\frac{6}{13}\right)$oe or **M2** for the sum of at least two of $\frac{7}{15}\times\frac{6}{14}\times\frac{5}{13}$, $N\times\frac{7}{15}\times\frac{6}{14}\times\frac{6}{13}$, $N\times\frac{7}{15}\times\frac{6}{14}\times\frac{2}{13}$ seen or for $\frac{7}{15}\times\frac{6}{14}\times\frac{13}{13}$ or $\frac{7}{15}\times\frac{6}{14}+N\times\frac{7}{15}\times\frac{6}{14}\times\frac{k}{13}$ seen or **M1** for $\frac{7}{15}\times\frac{6}{14}\times\frac{5}{13}$ or $N\times\frac{7}{15}\times\frac{6}{14}\times\frac{6}{13}$ or $N\times\frac{7}{15}\times\frac{6}{14}\times\frac{2}{13}$ seen If 0 scored **SC1** for $\frac{1519}{3375}$ oe
5(a)	27[.0] or 26.97… nfww	**3**	**M2** for [cos =] $\frac{8.6^2+9.7^2-4.4^2}{2\times8.6\times9.7}$ or **M1** for implicit form
5(b)	9.19 or 9.192 to 9.193	**4**	**B1** for [angle BCD =] 73 seen **M2** for $\frac{9.7\times\sin 65}{\sin(180-65-42)}$ oe or **M1** for $\frac{\sin(180-65-42)}{9.7}=\frac{\sin 65}{DC}$ oe

Question	Answer	Marks	Partial Marks
5(c)	6.15 or 6.149 to 6.151…	**3**	**M2** for $\frac{d}{their\,9.19} = \sin 42$ oe or **M1** for right angle between line from C to BD and BD soi
6(a)(i)	$[a =]$ 4 $[b =] -3$ nfww	**2**	**B1** for $[a =]$ 4 **B1** for $[b =] -3$ nfww
6(a)(ii)	$y = 4$ oe	**1**	
6(a)(iii)	$y = -6x + 7$ oe final answer	**2**	**B1** for answer $-6x + 7$ or answers $y = -6x + c$ or $y = kx + 7$ $(k < 0)$
6(b)(i)	2.25 2.67 3.5	**3**	**B1** for each
6(b)(ii)	correct curve 	**4**	**B3 FT** for 7 or 8 points or **B2 FT** for 5 or 6 points or **B1 FT** for 3 or 4 points
6(c)(i)	–0.78 to –0.72 and 0.55 to 0.59	**2**	**B1** for each
6(c)(ii)	$3x^3 - 9x^2 - 3x + 4$ $[= 0]$ final answer	**4**	**B3FT** for 3 out of 4 correct terms or for $bx^3 - 3bx^2 + (a - 1)x + 8 - 3a$ $[= 0]$ oe or **B2FT** for 2 out of 4 correct terms or for 3 out of 4 terms from $bx^3 - 3bx^2 + (a - 1)x + 8 - 3a$ $[= 0]$ or **M1** for $1 + \frac{5}{3 - x} = their\ 4 + (their(-3))x^2$ oe
7(a)(i)	70	**1**	
7(a)(ii)	78	**1**	
7(a)(iii)	Value in range $86 < V \leq 90$	**1**	

Question	Answer	Marks	Partial Marks
7(a)(iv)	One general comment interpreting the median comparison nfww e.g. Students did better on second test oe OR One general comment interpreting IQR/range comparison nfww e.g. Students marks were more consistent on the 2nd test oe	**1**	
7(b)	31.2	**4**	**M1** for mid-values soi **M1** for Σfm where m is any value in interval including boundaries **M1** (dep on second **M1**) for *their* $\Sigma fm \div 50$
7(c)(i)	38	**1**	
7(c)(ii)	Blocks of heights 4.4 and 3.4 with correct widths	**2**	**B1** for each correct block If **B0** scored, **SC1** for both correct frequency densities soi

Question	Answer	Marks	Partial Marks
8(a)(i)	$\frac{53}{360}\times\pi\times9.5^2$	**M1**	
	41.74 to 41.75	**A1**	
8(a)(ii)	5.9[0] or 5.899 to 5.903..	**4**	**M3** for $\left[OA^2=\right]\ \frac{\frac{1}{3}\times41.7}{\frac{1}{2}\sin53}$ oe **M2** for $\frac{1}{2}\times OA^2\times\sin53=\frac{1}{3}\times41.7$ oe **M1** for $\frac{1}{2}\times OA\times OB\times\sin53=\frac{1}{3}\times41.7$ seen or better
8(b)	396 or 397 or 396.4 to 396.6	**6**	**M2** for $\left[r=\right]\left(\frac{60}{360}\times2\times\pi\times24\right)\div2\pi$ oe or better or **M1** for $2\pi r=\frac{60}{360}\times2\times\pi\times24$ oe **M2** for $\sqrt{24^2-a^2}$ or **M1** for $h^2+a^2=24^2$ **M1** for $\frac{1}{3}\pi\times their\ r^2\times their\ h$
9(a)(i)	$(5a-b)(m+2p)$ final answer	**2**	**M1** for $5a(m+2p)-b(m+2p)$ or $m(5a-b)+2p(5a-b)$ or **B1** for correct answer seen
9(a)(ii)	$5(k+g)(3k+3g-4)$ final answer	**2**	**M1** for correct partial factorisation by 5 or $(k+g)$ isw eg $5\left(3k^2+6kg+3g^2-4k-4g\right)$ or $5(3(k+g)^2-4(k+g))$ or $(k+g)\left(15(k+g)-20\right)$ or $(5k+5g)(3k+3g-4)$ or **B1** for correct answer seen
9(a)(iii)	$\left(2x-y^2\right)\left(2x+y^2\right)$ final answer	**2**	**M1** for answer in form $(a+b)(a-b)$ or **B1** for correct answer seen
9(b)	$3x^3-10x^2-x+12$ final answer	**3**	**B2** for correct unsimplified expansion or simplified expression with 3 terms correct in a 4-term expression of required form or **B1** for correct expansion of two of the brackets with at least 3 terms correct
9(c)	$[a=]$ 11 $[b=]$ 121	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
10(a)	1600	**3**	**B2** for answer figs 16 or **M2** for 90.72 ÷ (figs45 × figs3 × figs42) or **M1** for volume = figs 45 × figs 3 × figs 42 isw
10(b)	62.8 or 62.83 to 62.84	**3**	**M2** for $\frac{\pi\times10^2\times30}{15000}\times100$ or **M1** for $\pi\times10^2\times30$
10(c)	12.9[0]	**3**	**B2** for 86 OR **M2** for $\frac{98.9}{1+\frac{15}{100}}\times0.15$ oe or $98.9-\frac{98.9}{1+\frac{15}{100}}$ oe or **M1** for $\left(1+\frac{15}{100}\right)a=98.9$ oe isw
10(d)	50	**2**	**M1** for 3540 ÷ 70.8
11(a)	$\frac{48}{x}$ final answer	**1**	Accept 48 ÷ x
11(b)	$their(a)-\frac{60}{x+2}=4$ oe	**M1**	FT *their* (a) provided expression in x
	$48(x+2)-60x=4x(x+2)$ oe	**M2**	**FT** *their* 3 term eqn with algebraic denominators, x and $x + 2$, for M2 or M1 **M1** for common denominator $x(x+2)$ oe seen or any two terms in a 3 term equation from ± 48 (x + 2) , ± 60x , ± 4x(x + 2) oe seen
	$48x + 96 – 60x = 4x^2 + 8x$ oe leading to $x^2+5x-24=0$	**A1**	With brackets expanded and no errors or omissions seen
11(c)	$(x-3)(x+8)$	**B2**	**B1** for $x(x + 8) – 3(x + 8)$ or $x(x – 3) + 8(x – 3)$ or $(x + a)(x + b)$ [= 0] where $ab = – 24$ or $a + b = 5$ [a, b integers]
	3 and − 8	**B1**	
11(d)	12	**1**	
12(a)	17	**3**	**M2** for $3\times2x^2-7$ or better isw or **M1** for $3\times2x^2$ oe or $kx^2 – 7$ seen

Question	Answer	Marks	Partial Marks
12(b)(i)	13.4 or 13.41 to 13.42	**3**	**M2** for $\sqrt{(-5-7)^2+(8-2)^2}$ oe or **M1** for $(-5-7)^2+(8-2)^2$ oe
12(b)(ii)	[$y=$] $2x+5$ final answer	**4**	**M1** for [gradient of AB =] $\frac{8-2}{-5-7}$ oe **M1dep** for gradient $p = -1 \div$ *their* $-\frac{1}{2}$ oe **M1dep** on previous M1 for substituting (−1, 3) into $y =$ *their* $px + c$ oe where *their* $p \neq 0$
12(b)(iii)	(5, 0)	**4**	**B3** for $\overrightarrow{AD}=\begin{pmatrix}-2\\-2\end{pmatrix}$ or $\overrightarrow{DA}=\begin{pmatrix}2\\2\end{pmatrix}$ or coordinates of C (−7, 6) and $\left[\overrightarrow{CD}=\right]\ \begin{pmatrix}12\\-6\end{pmatrix}$ oe seen or **B2** for $a = b = 2$ soi or coordinates of C (−7, 6) or **M1** for $a = b$ oe soi or for $a^2+b^2=\left(\sqrt{8}\right)^2$ oe or cos 45 = $\frac{a}{\sqrt{8}}$ oe or for $\left[\overrightarrow{DC}=\right]\begin{pmatrix}-12\\6\end{pmatrix}$ or $\left[\overrightarrow{CD}=\right]\ \begin{pmatrix}12\\-6\end{pmatrix}$ seen or $\frac{y-8}{x--5}=1$ oe or $\frac{y-2}{x-7}=1$