Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/22**

Paper 22 (Extended) **March 2021**

MARK SCHEME

Maximum Mark: 70

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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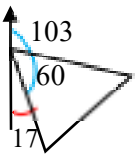
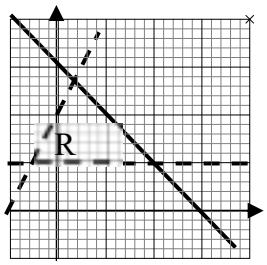
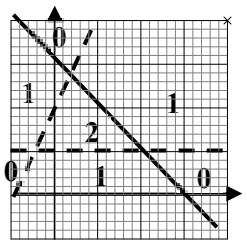
Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, 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.

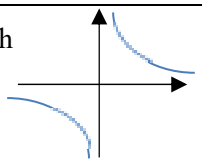
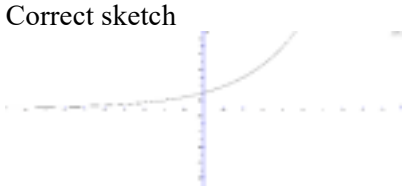
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Abbreviations

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)	2	**1**	
1(b)	2 correct lines	**2**	**B1** for each
2	30 48	**2**	**M1** for $\frac{78}{5+8} \times k$ oe where $k = 1$, 5 or 8
3(a)	1 | 5 7 8 9 9 2 | 2 4 4 5 9 3 | 1 5 6 8	**2**	**B1** for two rows correct or for a fully correct unordered stem-and-leaf diagram or for a correct diagram with one leaf incorrect or omitted
3(b)	24	**1**	
4	3, 80, 30 and 10 seen and answer 12	**2**	**M1** for 3 out of 4 correct elements or for all correct but with any trailing zeros If 0 scored **SC1** for answer 12
5	Negative	**1**	
6	271.2[0]	**2**	**M1** for 56.50 ÷ 5 or 56.50 × 24 oe or better
7	$\frac{9}{4}$ and $\frac{11}{3}$ oe improper fractions	**M1**	
	$\frac{99}{12}$ oe improper fraction	**A1**	
	$8\frac{1}{4}$ cao final answer	**A1**	dep on 1st A1 If M0 scored **SC1** for $\frac{9}{4}$ or $\frac{11}{3}$ oe improper fraction
8	$\frac{37}{99}$ oe fraction	**1**	
9	4.18×10^{7} cao	**1**	

Question	Answer	Marks	Partial Marks
10	343	**2**	**B1** for 103 in correct position **and** 60 or 17 in correct position 
11	12	**2**	**M1** for $2^2 \times 3^2$ and $2^2 \times 3 \times 7$ or for $2 \times 2 \times 3$ final answer or **B1** for 2, 3, 4 or 6 as final answer
12	34.6 or 34.63 to 34.64	**3**	**M2** for $\frac{1}{4} \times \pi \times 5^2 + \frac{1}{2} \times 5 \times 6$ oe or **M1** for $\frac{1}{4} \times \pi \times 5^2$ oe or $\frac{1}{2} \times 5 \times 6$ oe
13	15.8 or 15.76 to 15.77	**2**	**M1** for $125.9 \times \left(1 - \frac{34}{100}\right)^5$ oe
14(a)	1 − 6	**2**	**B1** for each If 0 scored, **SC1** for two terms with a difference of –7
14(b)	$n^2 + 3$ oe	**2**	**M1** for any quadratic or second differences = 2
15	36	**2**	**M1** for angle $EHG = 72$ or for angle $EHF = 47$ **and** $GHF = 25$
16	3 correct ruled lines and *R* clearly indicated 	**5**	**B1** for each line $y = 1$ dashed $y = 2x + 2$ dashed $x + y = 3$ solid **B2** for correct region or **B1** for region satisfying 2 inequalities  or **SC1** for shading of the **wanted** region only

Question	Answer	Marks	Partial Marks
17	13 nfww	**3**	**M2** for $251+7x=7.6(32+x)$ or better or **M1** for $\frac{5\times4+6\times5+7x+8\times11+9\times7+10\times5}{32+x}=7.6$ oe
18	$49x^6$ final answer	**2**	**B1** for $49x^k$ or nx^6 as final answer
19	$x^2+x-156$ [=0] or $y^2+15y-100$ [=0]	**M2**	**M1** for $x^2+x=7+149$ or correct substitution
	$(x-12)(x+13)$ [=0] or $(y-5)(y+20)$ [=0]	**M1**	or for correct factors for *their* quadratic equation or for correct use of quadratic formula or completing the square for *their* equation
	[x =] 12 [y =] 5 [x =] –13 [y =] –20	**B2**	**B1** for $x = 12$, $x = -13$ or for $y = 5$, $y = -20$ or for a correct pair of x and y values If B0 scored and at least 2 method marks scored **SC1** for correct substitution of both of *their* x values or *their* y values into $x - y = 7$ or $x^2 + y = 149$
20(a)	1.84	**2**	**M1** for $\frac{1.61}{x}=\frac{2.8}{3.2}$ oe
20(b)	9.20 or 9.204 to 9.205	**3**	**M2** for $11.5\times\sqrt[3]{\frac{4}{7.8}}$ oe or **M1** for $\sqrt[3]{\frac{4}{7.8}}$ or $\sqrt[3]{\frac{7.8}{4}}$ oe seen or for $\frac{11.5^3}{x^3}=\frac{7.8}{4}$ oe
21(a)	Correct sketch 	**2**	**B1** for one correct branch or attempt at correct shape
21(b)	Correct sketch 	**2**	**B1** for correct shape but crossing x-axis or correct shape but just in one quadrant

Question	Answer	Marks	Partial Marks
22(a)	245	**1**	
22(b)	69 cao nfww	**3**	**M2** for $\frac{200+0.5}{3-0.1}$ oe or **M1** for 200 ± 0.5 oe or 3 ± 0.1 oe seen
23	56.1 or 56.09…	**4**	**M3** for $\cos[\ldots] = \frac{\frac{1}{2}\sqrt{10^2+12^2}}{14}$ oe or **M2** for $[MC =] \frac{1}{2}\sqrt{10^2+12^2}$ oe or **M1** for $[AC^2 =] 10^2+12^2$ oe or **B1** for indicating required angle
24	(0, 5) $\left(\frac{4}{3}, \frac{103}{27}\right)$ oe	**5**	**B2** for $3x^2 - 4x$ or **B1** for $3x^2$ or $-4x$ **M1** for *their* derivative = 0 oe or $\frac{dy}{dx} = 0$ **B1** for $[x =] 0$ and $\frac{4}{3}$ or for 1 correct coordinate pair

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