



Cambridge O Level

MATHEMATICS (SYLLABUS D)

4024/11

Paper 1

October/November 2021

MARK SCHEME

Maximum Mark: 80

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

This document consists of 7 printed pages.

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).

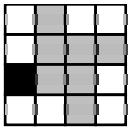

GENERIC MARKING PRINCIPLE 6:

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.

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.

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)	$\frac{5}{8}$ oe	1	
1(b)	0.016 oe	1	
2	$\frac{3}{4}$, 0.8, 82%, 0.83, $\frac{17}{20}$	2	B1 for four correct when one is covered up If 0 scored, SC1 for $\frac{17}{20}$, 0.83, 82%, 0.8, $\frac{3}{4}$
3	13.5 or $13\frac{1}{2}$	2	M1 for $\frac{45}{100} \times 30$ oe
4(a)		1	
4(b)		1	
5	4a final answer	1	
6(a)	Acceptable triangle with intersecting arcs	2	B1 for acceptable vertex <i>C</i> clearly indicated with no/incorrect arcs If 0 scored, SC1 for reflection of correct triangle with arcs
6(b)	Acceptable perpendicular bisector of <i>AB</i> with correct arcs	2	B1 for acceptable perpendicular bisector with no/incorrect arcs
6(c)	Shade inside triangle to left of perpendicular bisector	1	Dependent on at least B1 in (b)
7(a)	1	1	
7(b)	m^8	1	
8(a)	6.3	1	
8(b)	100	1	
9	15	2	M1 for $\frac{360}{180-156}$ oe or $\frac{180(n-2)}{n} = 156$ oe

Question	Answer	Marks	Partial Marks
10	50	3	<p>M2 for $\frac{(180-55)}{(3+2)} \times k$ oe where $k = 1, 2$ or 3</p> <p>or M1 for $180 - 55$ oe or $\frac{n}{3+2}$</p> <p>Alternative method:</p> <p>M2 for $\frac{3}{2}y + y = 125$ oe or $x + \frac{2}{3}x = 125$ oe</p> <p>or M1 for $x + y = 125$ oe or $\frac{x}{y} = \frac{3}{2}$ oe</p>
11	60 and 30 and 0.1 seen as rounded values, and final answer 20	2	M1 for two of 60, 30 and 0.1 seen as rounded values
12	Correct method to eliminate one variable	M1	
	$x = 5, y = -2$ Both correct solutions nfw	A2	A1 for either $x = 5$ or $y = -2$ nfw or after A0, SC1 for a pair of values that satisfy either equation or correct values with no working
13(a)	Translation $\begin{pmatrix} -5 \\ 4 \end{pmatrix}$	2	B1 for each
13(b)	Vertices at (6, -1), (6, -5) and (4, -5)	2	B1 for correct size and orientation, wrong centre
14(a)	$2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$	2	B1 for 2, 2, 3, 5 or M1 for any two stages correct in factor tree or ladder method
14(b)	7 (packs of pens) 10 (packs of rulers)	3	<p>B2 for LCM = 420 soi or $2^2 \times 3 \times 5 \times 7$ or for simplified ratio pens : rulers = 10 : 7</p> <p>or B1 for $42 = 2 \times 3 \times 7$</p> <p>or M1 for three multiples of 60 and 42 listed</p>
15(a)	(-2, 5)	2	B1 for each value or for $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$ seen
15(b)	13	2	M1 for $(-5)^2 + 12^2$ oe

Question	Answer	Marks	Partial Marks
16(a)	17	3	M2 for $\frac{1 \times 6 + 2 \times 5 + 3 \times 13 + 4p}{6 + 5 + 13 + p} = 3$ oe or M1 for either $1 \times 6 + 2 \times 5 + 3 \times 13 + 4p$ or for $3 \times (6 + 5 + 13 + p)$
16(b)	$\frac{5}{41}$ oe	1	FT $\frac{5}{24 + \text{their (a)}}$
17(a)	$(2b + c)(2b - c)$ final answer	1	
17(b)	$(x + 6)(x - 1)$ final answer	2	B1 for final answer $(x + a)(x + b)$ where $ab = -6$ or $a + b = 5$ or for $x(x - 1) + 6(x - 1)$ seen or for $x(x + 6) - [1](x + 6)$ seen or for correct answer seen and spoilt
18		4	B1 for $y = 3 - x$ correctly drawn B1 for $y = 4$ correctly drawn B1 for $x = 1$ and $x = 5$ correctly drawn
19(a)(i)	2, 3, 5	1	
19(a)(ii)	$\frac{4}{12}$ oe	1	
19(b)		1	
20(a)	128	1	

Question	Answer	Marks	Partial Marks
20(b)(i)	$2^{n+1} - 3$ final answer	1	
20(b)(ii)	$2^{n+1} + 5n + 1$ oe final answer	2	B1 for $2^{n+1} + 5n + k$ oe or M1 for 6 11 16 21 [26]
21(a)	2	1	
21(b)	$2 - \frac{6}{x}$ oe or $\frac{2x-6}{x}$ oe final answer	3	B2 for $2 - y = \frac{6}{x}$ or $2x - 6 = xy$ or $2 - \frac{6}{y} = x$ or $\frac{2y-6}{y} = x$ or M1 for correct first step e.g. $x = \frac{6}{2-y}$ or $y(2-x) = 6$ or better
21(c)	-0.5 or $-\frac{1}{2}$ nfw	3	B2 for $2 - t = 2 - (5t + 2)$ oe or $t = 5t + 2$ oe OR B1 for $\left[\frac{6}{2-t} = \right] \frac{6}{2-(5t+2)}$ oe M1 for correct removal of <i>their</i> different algebraic denominators
22(a)	$\angle ACB = \angle ECD$ [vertically] opposite $\angle CAB = \angle CDE$ alternate $\angle ABC = \angle CED$ alternate Three angles equal therefore the triangles are similar	3	B2 for two correct pairs of angles with correct reasons or B1 for one correct pair of angles with correct reason or two correct pairs of angles with incorrect/no reasons
22(b)	5	2	B1 for $\left(\frac{2}{6}\right)^2$ oe or $\left(\frac{6}{2}\right)^2$ oe soi
23(a)	$x^2 + 3x - 10$ final answer	2	B1 for 3 terms out of $x^2 + 5x - 2x - 10$ soi
23(b)	$\frac{5x+7}{(x+5)(x-4)}$ or $\frac{5x+7}{x^2+x-20}$ final answer	3	B1 for $3(x+5) + 2(x-4)$ oe isw B1 for denominator $(x+5)(x-4)$ oe isw
24(a)	$\begin{pmatrix} 38 & -4 \\ -2 & 18 \end{pmatrix}$	2	B1 for two or three correct elements in final answer
24(b)	4	2	B1 for $[\mathbf{B} =] -3x - 2(-5)$ soi