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CAMBRIDGE
International Education

Cambridge O Level

MATHEMATICS (SYLLABUS D) **4024/21**

Paper 2 **October/November 2025**

MARK SCHEME

Maximum Mark: 100

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 2025 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 descriptions 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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Mathematics-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, non-integer 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 or sign 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 A or B 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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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	More information required
	Accuracy mark awarded zero
	Accuracy mark awarded one
	Accuracy mark awarded two
	Accuracy mark awarded three
	Independent mark awarded zero
	Independent mark awarded one
	Independent mark awarded two
	Independent mark awarded three
	Benefit of the doubt
	Incorrect
	Follow through
Highlighter	Highlight a key point in the working
	Ignore subsequent work
	Method mark awarded zero
	Method mark awarded one
	Method mark awarded two
	Method mark awarded three
	Misread

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Annotation	Meaning
O	Omission
Off-page comment	Allows comments to be entered at the bottom of the RM marking window and then displayed when the associated question item is navigated to.
On-page comment	Allows comments to be entered in speech bubbles on the candidate response.
Pre	Premature rounding/approximation
SC	Special case
SEEN	Indicates that work/page has been seen
TE	Transcription error
	Correct

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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)	49	**1**	
1(b)	27	**1**	
1(c)	$\sqrt{169}$	**1**	
1(d)	$\sqrt{8}$	**1**	
2(a)	$(4.2 - 3) \times 5 + 1.2 = 7.2$	**1**	
2(b)	$5 - 3^2 - \left(\sqrt[3]{64} + 2\right) = -10$	**1**	
3(a)	108.28	**2**	**M1** for $[2 \times]$ $(3 \times 5.2 + 4.7 \times 5.2 + 3 \times 4.7)$ oe
3(b)	3	**1**	
4(a)	Three points plotted correctly	**2**	**B1** for 2 correct plots
4(b)	Ruled line of best fit	**1**	
4(c)	Reading from *their* straight line of best fit with positive gradient at 75 marks for physics	**1**	
5(a)	62	**2**	**M1** for $\frac{180-56}{2}$ oe soi
5(b)	298	**1**	**FT** 360 – *their* 62
6	113.14 cao	**2**	**B1** for 113 or 113.1 or 113.143…or 113.14 seen and spoiled or for *their* more accurate decimal answer seen and correctly rounded to 2 decimal places
7	144	**2**	**M1** for $\left[180-\right]\frac{360}{10}$ or $(10-2)\times 180\left[\div 10\right]$ oe

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Question	Answer	Marks	Partial Marks
8	28.2[0]	**2**	**M1** for $240 \times \frac{2.35}{100}[\times 5]$ oe If 0 scored **SC1** for answer of 268.2[0]
9	0.82[0…]	**3**	**M2** for $0.88 \times \frac{500}{536.58}$ oe OR **M1** for 500×0.88 **M1** for $\frac{their 440}{536.58}$ oe OR **M1** for $\frac{500}{536,58}$ oe **M1** for *their* $\frac{500}{536,58} \times 0.88$ OR **M1** for $\frac{536.58}{500}$ **M1** for $0.88 \div$ *their* $\frac{536.58}{500}$
10(a)	17 and 21	**1**	
10(b)	$4n + 1$ oe final answer	**2**	**B1** for answer $4n + k$ oe or answer $jn + 1$ oe $j \neq 0$ or for $4n + 1$ oe seen
10(c)	276	**2**	**M1** for *their* $(4p + 1) = 1105$ soi
11(a)(i)	$\begin{pmatrix} 6 \\ -10 \end{pmatrix}$	**1**	
11(a)(ii)	(–1, –2)	**2**	**B1** for each Or **M1** $(\frac{-4+2}{2}, \frac{3+-7}{2})$ oe
11(b)	12.1 or 12.08…	**2**	**M1** for $(-5)^2 + (11)^2$ oe
12(a)	1.42×10^{-2} cao	**1**	
12(b)	[x =] 8.125 oe [y =] 6	**2**	**M1** for $\frac{2.6 \times 10^3}{3.2 \times 10^{-4}}$ soi

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Question	Answer	Marks	Partial Marks
13	Correct method to eliminate one variable	**M1**	E.g. substitution of $a = \frac{1.5 - 5b}{2}$ or $b = \frac{1.5 - 2a}{5}$ or equating coefficients.
	[a =] 6.5 oe [b =] –2.3 oe nfww	**A2**	**A1** for either a = 6.5 oe or b = –2.3 oe nfww or if **A0** scored, **SC1** for a pair of values that satisfy either equation or for correct answers with no working
14	12 cao	**3**	**B2** for 11.1[1…] or answer 11 or **M2** for $[5.4]\left(1+\frac{3.6}{100}\right)^{11}$ oe or $[5.4]\left(1+\frac{3.6}{100}\right)^{12}$ oe or **M1** for $5.4\left(1+\frac{3.6}{100}\right)^{n}$ oe where $n > 1$ or $\left(1+\frac{3.6}{100}\right)^{n} = \frac{40}{27}$ oe
15	$2^2 \times 3^n \times 7$ final answer	**2**	**B1** for 2^2 or 3^n or 7 in final answer
16(a)	[y =] $3x$ – 11 final answer	**3**	**M1** for $\frac{4 - -2}{5 - 3}$ oe **M1** for substitution of (3, –2) or (5, 4) into y = (*their* 3)x + c or use of $y - b$ = (*their* 3)($x - a$) oe where (a, b) = (3, –2) or (5, 4)
16(b)	$-\frac{1}{3}$ oe	**1**	**FT** $-\frac{1}{their3}$
17(a)	43.875 oe	**4**	**M1** for correct midpoints soi **M1** for use of Σfx where x is in the correct interval including boundaries **M1** (dep on 2nd M1) for $\Sigma fx \div 80$

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Question	Answer	Marks	Partial Marks
17(b)	$\frac{5}{158}$ oe	**3**	**M2** for $[2\times]\frac{20}{80}\times\frac{5}{79}$ oe or **M1** for $\frac{20}{80}$ or $\frac{5}{79}$ or $\frac{5}{80}$ or $\frac{20}{79}$ seen If M0, **SC1** for answer $\frac{1}{32}$ oe
18(a)	$\frac{3}{4y}$ final answer	**3**	**M2** for any 2 of the 3 correct elements in the final answer eg $\frac{3x}{4xy}$, $\frac{9}{12y}$, $\frac{3}{4}y$ or **M1** for $\frac{2x}{3y}\times\frac{9}{8x}$ or for $\frac{18x}{27y}\div\frac{24xy}{27y}$ or better
18(b)	$\frac{x+10}{2x+5}$ final answer	**4**	**B2** for $(2x - 5)(x + 10)$ or **M1** for $2x(x + 10) - 5(x + 10)$ or $x(2x - 5) + 10(2x - 5)$ or $(2x + a)(x + b)$ where $ab = -50$ or $2b + a = 15$ **B1** for $(2x - 5)(2x + 5)$
19	60 nfww	**3**	**M2** for $\frac{310 \text{ to } 320}{5.25}$ oe or for $\frac{315}{5.2 \text{ to } 5.3}$ oe or **M1** for 315 or 325 or 5.25 or 5.15 oe seen
20(a)	$\sqrt{65^2+75^2-2\times65\times75\cos125}$	**M2**	**M1** for $65^2 + 75^2 - 2\times65\times75\times\cos125$
	124.26 to 124.27	**A1**	
20(b)	29.6 or 29.59 to 29.64	**3**	**M2** for $\frac{75\sin125}{124.3}$ oe $[\cos\ldots =]\ \frac{65^2+124.3^2-75^2}{2\times65\times124.3}$ oe or **M1** for $\frac{75}{\sin B} = \frac{124.3}{\sin125}$ oe $75^2 = 65^2 + 124.3^2 - 2\times65\times124.3\times\cos B$ oe

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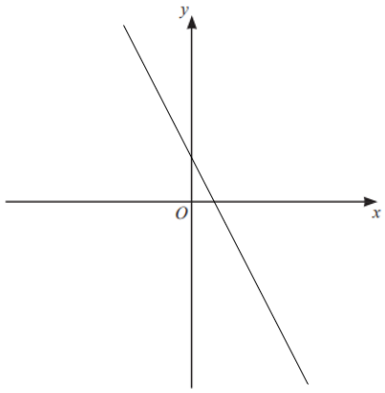
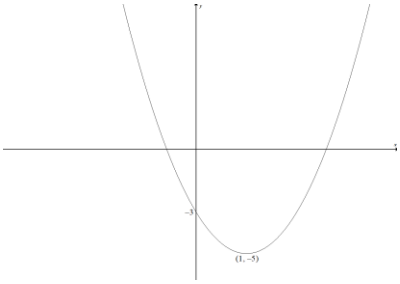
Question	Answer	Marks	Partial Marks
20(c)	32.1 or 32.09 to 32.15	**3**	**M2** for $\frac{\text{distance}}{65} = \sin(\textit{their } ABC)$ oe or $\left[\frac{1}{2}\times\right]75\times65\sin125 = \left[\frac{1}{2}\times\right]124.3\times h$ or **M1** for recognition that shortest distance is perpendicular to BC
21	$\frac{w+5}{3w-2}$ or $\frac{-w-5}{2-3w}$ oe final answer	**4**	**M1** for $w(3a - 1) = 2a + 5$ **M1** for expanding the bracket in *their* equation **M1** isolating terms in a **M1** for factorising using a and for division by bracket to final answer Max **M3** if answer incorrect
22(a)	Correct sketch  	**1**	Ruled line with negative gradient and positive y intercept
22(b)(i)	$2(x - 1)^2 - 5$ final answer	**3**	**B2** for $2(x - 1)^2 \pm k$ where k can be any value including 0 OR **M1** for $ax^2 - 2abx + ab^2$ [+ c] or $2(x^2 - 2x)$ **B1** for $b = 1$ soi or FT $c = -3 - 2(\textit{their } b)^2$
22(b)(ii)	Correct sketch  and (1, –5) and –3 marked	**3**	**B1** for positive U shape **B1** for –3 marked as single y-intercept on an attempt at a parabola **B1FT** for (1, –5) indicated as TP FT *their* **(b)(i)** Max 2 marks if sketch not correct

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Question	Answer	Marks	Partial Marks
23	$\frac{3}{7}$ oe	**4**	**M2** for $x(x-5)-4(x+3)=(x-5)(x+3)$ or $\frac{x(x-5)-4(x+3)}{(x-5)(x+3)}=1$ or **M1** for $x(x-5)-4(x+3)$ or denominator $(x-5)(x+3)$ soi **M1** for correct expansion of all brackets and clearing the fraction correctly in *their* equation
24	$3x^3+2x^2-17x+12$ final answer	**3**	**B2** for correct unsimplified expression 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 out of 4 correct
25(a)	$12^2+10^2+7^2$ or better	**M2**	**M1** for 12^2+10^2 oe or 10^2+7^2 oe or 12^2+7^2 oe
	17.11 to 17.12	**A1**	
25(b)	24.1… or 24.2	**3**	**M2** for $\sin[\ ]=\frac{7}{17.1}$ oe or **M1** for recognising the correct angle *CEG*

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