



Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/22

Paper 2 (Extended)

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MARK SCHEME

Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **12** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

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.

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

Annotation	Meaning
	Communication mark
	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
	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.
	Premature rounding/approximation
	Special case
	Indicates that work/page has been seen

Annotation	Meaning
	Transcription error
	Correct
	Correct answer from incorrect working

Question	Answer	Marks	Partial Marks	Guidance
1(a)	320	1		318–322
1(b)	75	2	B1 for 35 or 70 or 110 in correct position or M1 for $180 - 70 - 35$ or $110 - 35$	Check diagram
2(a)	$\frac{1}{6}$	1		Ignore any incorrect conversion to a decimal after correct answer seen. Allow 0.167 or 16.7% or better
2(b)	60	1		
3	15 h 5 min	1		Allow 15 05
4(a)	Triangle at (2, 4), (4, 4), (2, 5)	2	B1 for translation $\begin{pmatrix} 1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$	
4(b)	Rotation 90° clockwise oe (3, 1)	3	B1 for each	More than one transformation scores 0. Extra properties treat as choice. Condone 3, 1 but not $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$
5	3	3	B2 for $\frac{212 - 200}{2}$ or better or B1 for $212 - 200$ soi OR M2 for $\frac{200 \times r \times 2}{100} = 212 - 200$ oe or M1 for $212 - 200$ soi or for $200 \times r \times 2$	Allow 3% $\frac{6}{2}$ implies B2 One year's interest is \$6 scores B2

Question	Answer	Marks	Partial Marks	Guidance
6(a)	$\begin{pmatrix} 7-3 \\ 4-7 \end{pmatrix} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} 7 \\ 4 \end{pmatrix} - \begin{pmatrix} 3 \\ 7 \end{pmatrix} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ oe	1		Must be in vector form. Allow $-\begin{pmatrix} 3 \\ 7 \end{pmatrix} + \begin{pmatrix} 7 \\ 4 \end{pmatrix} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ -7 \end{pmatrix} + \begin{pmatrix} 7 \\ 4 \end{pmatrix} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$
6(b)	5	2	M1 for $4^2 + (-3)^2$ oe	Condone ± 5 Allow 3^2 for $(-3)^2$ Do NOT allow $4^2 + -3^2$ unless recovered
6(c)	(11, 1)	3	B2 for (11, k) or (k, 1) or B1 for $\begin{pmatrix} 8 \\ -6 \end{pmatrix}$ soi or M1 for sketch with QR the same as PQ	Approx same gradient and length
7	$5\frac{1}{12}$ cao	3	B2 for $\frac{61}{12}$ oe OR M2 for $\frac{22}{12} + \frac{39}{12}$ or $4\frac{10}{12} + \frac{3}{12}$ oe or M1 for $\frac{11}{6}$ or $\frac{13}{4}$ or $\frac{10}{12}$ or $\frac{3}{12}$	oe e.g. $\frac{122}{24}$, $4\frac{13}{12}$ Allow other correct common denominators for M2 or M1
8(a)	$\frac{3}{9}$ oe	1		isw attempts to convert to decimal. Allow 0.333 or better
8(b)	$(wy)^3$ or w^3y^3 final answer	2	M1 for $wy = \sqrt[3]{t}$ or $y^3 = \frac{t}{w^3}$ or B1 for wy^3 or w^3y	Condone $w^3 \times y^3$

Question	Answer	Marks	Partial Marks	Guidance
9	87	4	M1 for $\frac{1}{2} \times 4 \times \pi \times 3^2$ oe M1 for $2 \times \pi \times 3 \times 10$ oe M1 for $\pi \times 3^2$ oe	Condone 87π for full marks
10	65	3	M2 for $\frac{360-130-100}{2}$ OR B2 for two of 260, 100, 25 or 40 in correct position soi or B1 for one of 260, 100, 25 or 40 in correct position soi	or for $BOA = 50$ or $COB = 50$ or for $ADC = 50$, where D is a point on the circumference for B2 or B1
11	$\frac{26}{9}$ or $2\frac{8}{9}$ oe final answer	3	M1 for $2t + 2 = 28 - 7t$ M1 for correct $kt = c$ from <i>their</i> 4-term equation	Allow 2.89 or 2.888 or 2.88... e.g. $2t - 2 = 28 + 7t$, $5t = -30$ scores M0M1
12(a)	1	1		Do NOT allow $\{1\}$
12(b)	6	1		Do NOT allow $\{6\}$
12(c)	$\frac{14}{24}$ oe	1		For parts (c) and (d) accept decimals or percentages with the usual rules for 3sf e.g. 0.583 or 0.5833... Do not penalise incorrect converting. Do not accept ratios or words.

Question	Answer	Marks	Partial Marks	Guidance
12(d)	$\frac{18}{35}$ oe	3	M2 for $\frac{9}{15} \times \frac{6}{14}$ [$\times 2$] or $\frac{6}{15} \times \frac{9}{14}$ [$\times 2$] or M1 for $\frac{9}{15}$ or $\frac{9}{14}$ or $\frac{6}{15}$ or $\frac{6}{14}$ oe	e.g. 0.514 or better
13(a)	$81y^{12}$ final answer	2	B1 for ky^{12} , $k \neq 0$, or $81y^k$	$3^4 y^{12}$ scores B1 , $3^4 y^7$ scores B0
13(b)	$2x^4$ final answer	2	B1 for kx^4 , $k \neq 0$, or $2x^k$	
14(a)	$\frac{8}{3}$ or $2\frac{2}{3}$ oe	4	B3 for $\frac{1}{2} \times 4 \times \frac{4}{3}$ or $-\frac{1}{2} \times 4 \times \frac{4}{3}$ OR B1 for x -coord of $B = \frac{4}{3}$ oe soi B1 for y -coord of $A = -4$ soi M1 for $\frac{1}{2} \times their 4 \times their \frac{4}{3}$	oe accept 2.67 or 2.666... but not 2.66 or $OB = -\frac{4}{3}$ or $\frac{4}{3}$ soi or $OA = -4$ or 4 soi, must relate to intercept Allow negatives for M1 but final answer must be positive.
14(b)	$[y =] -\frac{1}{3}x + 5$	2	B1 for $[y =] -\frac{1}{3}x + c$ or $[y =] kx + 5, k \neq 0$	
15(a)	$\frac{\sqrt{3}}{2}$	1		
15(b)	$\frac{\sqrt{3}}{2}$	1	FT their (a)	
16(a)(i)	5	1		

Question	Answer	Marks	Partial Marks	Guidance
16(a)(ii)	$\frac{x-1}{2}$ or $\frac{x}{2} - \frac{1}{2}$ final answer	2	M1 for $x = 2y + 1$ or $y - 1 = 2x$ or $\frac{y}{2} = x + \frac{1}{2}$	Allow $\frac{1-x}{-2}$ or $-\frac{1-x}{2}$ for 2 marks.
16(b)	$\frac{x+2}{2x+5}$ final answer	3	M2 for $\frac{1}{1+2(x+2)}$ or better or $\frac{2x+5}{x+2}$ or M1 for $\frac{1}{\frac{1}{x+2} + 2}$	
16(c)(i)	9	2	M1 for $\log_3 x = 2$	
16(c)(ii)	3^{x-1} oe	2	M1 for $x = \log_3 y + 1$ or $y - 1 = \log_3 x$ or $x - 1 = \log_3 y$	
17(a)	$17\sqrt{2}$	2	B1 for $10\sqrt{2}$ or $7\sqrt{2}$	
17(b)	$\frac{5-\sqrt{5}}{4}$ or $\frac{5}{4} - \frac{\sqrt{5}}{4}$ final answer	3	M2 for $\frac{5(5-\sqrt{5})}{5^2+5\sqrt{5}-5\sqrt{5}-(\sqrt{5})^2}$ oe or M1 for $\times \frac{5-\sqrt{5}}{5-\sqrt{5}}$	e.g. $\frac{5(5-\sqrt{5})}{20}$ or $\frac{25-5\sqrt{5}}{20}$

Question	Answer	Marks	Partial Marks	Guidance
18(a)	$\frac{80}{x} + \frac{450}{x+50}$	M1		
	$80(x+50) + 450x = 7x(x+50)$ oe or better	M1	Algebraic denominators of <i>their</i> fractions correctly cleared in a 3-term equation	Allow $\frac{80(x+50)}{x(x+50)} + \frac{450x}{x(x+50)} - \frac{7x(x+50)}{x(x+50)} = 0$
	$80x + 4000 + 450x = 7x^2 + 350x$ $7x^2 + 350x - (80x + 4000 + 450x) = 0$ Leading to $7x^2 - 180x - 4000 = 0$ with no errors or omissions	A1	Must see at least one line of working	
18(b)	$(7x+100)(x-40)$	M2	M1 for $(7x+a)(x+b)$ with $ab = -4000$ or $a + 7b = -180$ OR $7x(x-40) + 100(x-40)$ or $x(7x+100) - 40(7x+100)$	
	$[x =] 40$	B1		Do NOT accept 40 AND $-\frac{100}{7}$ After M1 for $7x(x-40) + 100(x-40)$ or $x(7x+100) - 40(7x+100)$ and B1 allow M2 B1