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CAMBRIDGE
International Education

Cambridge IGCSE™

ADDITIONAL MATHEMATICS **0606/13**

Paper 1 Non-calculator **May/June 2026**

MARK SCHEME

Maximum Mark: 80

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.

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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.

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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
	Communication mark

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Annotation	Meaning
	Incorrect
FT	Follow through
Highlighter	Highlight a key point in the working
ISW	Ignore subsequent work
M0	Method mark awarded zero
M1	Method mark awarded one
M2	Method mark awarded two
M3	Method mark awarded three
MR	Misread
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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Annotation	Meaning
XP	Correct answer from incorrect working

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation 'dep' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

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Question	Answer	Marks	Guidance	Notes
1(a)	**EITHER** Solution 1 $2\left(x-\frac{3}{2}\right)^2+\frac{1}{2}$	**(B3**	**B2** for $2\left(x-\frac{3}{2}\right)^2$ **B1** for $+\frac{1}{2}$	**SC B1** for $2\left(x-\frac{3}{2}\right)$ oe with index omitted
1(b)	$2\left(x-\frac{3}{2}\right)^2+\frac{1}{2}>13$ $\left(x-\frac{3}{2}\right)^2>\frac{25}{4}$	**M1**	**FT** *their* **1(a)** in the correct form with an attempt to solve to obtain x	
	Critical values 4 and -1	**A1**		
	$x>4,\ x<-1$	**A1)**		
	OR Solution 2 $2x^2-6x+5>13$ $x^2-3x-4>0$	**(M1**	Must have an attempt to solve to obtain x	Attempt to solve *their* quadratic in form $ax^2+bx+c=0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left(x+\frac{b}{2}\right)^2=-\frac{c}{a}+\frac{b^2}{4}$ or equivalent, condone one sign error.
	Critical values 4 and -1	**A1**		
	$x>4,\ x<-1$	**A1)**		

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Question	Answer	Marks	Guidance	Notes
2	$a+5d+a+10d=0$ oe	**M1**		$2a+15d=0$
	$\frac{6}{2}(2a+5d)=-30$ oe	**M1**		$2a+5d=-10$
	$d=1,\ a=-\frac{15}{2}$ oe	**3**	**M1 dep** on at least one previous M1 for an attempt to obtain an equation in one unknown only **A1** for $d=1$ or $a=-\frac{15}{2}$	
3(a)	**EITHER** Solution 1 $x=3,\ x=\frac{1}{3}$ and no other solutions	**(4)**	**B1** for $\log_x 9=\frac{1}{\log_9 x}$ or $\frac{\log_9 9}{\log_9 x}$ **B1 dep** for $(\log_9 x)^2=\frac{1}{4}$ **B1 dep** for $x=3$ or $x=\frac{1}{3}$	$x=\pm3,\ x=\pm\frac{1}{3}$ gets ¾ **SC B2** for each by T and I
	OR Solution 2 $x=3,\ x=\frac{1}{3}$ and no other solutions	**(4)**	**B1** for $\log_9 x=\frac{1}{\log_x 9}$ **B1 dep** for $(\log_x 9)^2=4$ **B1 dep** for $x=3$ or $x=\frac{1}{3}$	$x=\pm3,\ x=\pm\frac{1}{3}$ gets ¾ **SC B2** for each by T and I

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Question	Answer	Marks	Guidance	Notes
3(b)	$\frac{1}{4}\left(2^{2x}\right)+3\left(2^{x}\right)-40=0$	**M1**	Allow use of a substitution	
	$2^{2x}+12\left(2^{x}\right)-160=0$ oe leading to $\left(2^{x}+20\right)\left(2^{x}-8\right)=0$	**M1**	**Dep** Allow use of a substitution	Attempt to solve *their* quadratic in form $a(2x)^2 + b(2x) + c = 0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left((2^{x})+\frac{b}{2}\right)^{2}=-\frac{c}{a}+\frac{b^{2}}{4}$ or equivalent, condone one sign error.
	$2^{x}=8$	**A1**		Condone inclusion of $2^{x}=-20$
	$x=3$ only	**A1**		

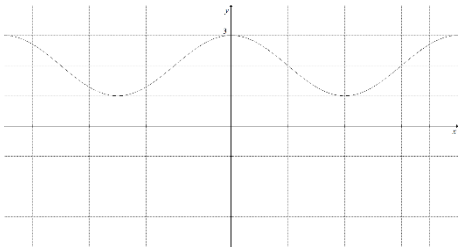
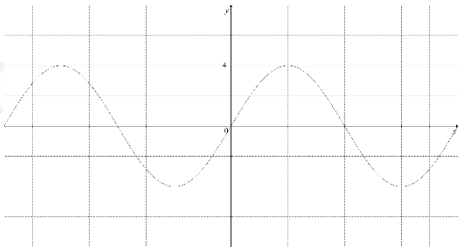
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Question	Answer	Marks	Guidance	Notes
3(c)	**EITHER** Solution 1 $x^2+3x-4=\pm 6$ soi	**(B1**		
	$(x-2)(x+3)=0$ soi or $(x+1)(x+2)=0$ soi	**M1**		$x^2+3x-10=0$ $x^2+3x+2=0$ Attempt to solve *their* quadratic in form $ax^2+bx+c=0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left(x+\frac{b}{2}\right)^2=-\frac{c}{a}+\frac{b^2}{4}$ or equivalent, condone one sign error.
	$x=2, -5$	**A1**		
	$x=-1, -2$	**A1)**		
	OR Solution 2 $\left(x^2+3x-4\right)^2=36$	**(B1**		
	$x^4+6x^3+x^2-24x-20=0$	**M1**	For expansion and simplification **and** an attempt to find one solution	
	$x=-5,\ -2,\ -1,\ 2$	**2)**	**A1** for one correct pair, must be from correct working	

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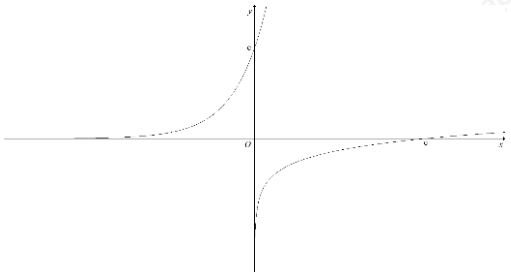
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Question	Answer	Marks	Guidance	Notes
4(a)	$32 - 20 - 14 + 2 = 0$	**B1**	May be implied by correct algebraic long division	
4(b)	$(x-2)(4x^2+3x-1)$ or $(x+1)(4x^2-9x+2)$ or $(4x-1)(x^2-x-2)$	**2**	**M1** for an attempt to obtain a quadratic factor of the form $4x^2+3x...$ or $4x^2+kx-1$ or for an attempt to obtain a quadratic factor of the form $4x^2-9x...$ or $4x^2+kx+2$ or for an attempt to obtain a quadratic factor of the form $x^2-x...$ or x^2+kx-2	
	$(x-2)(4x-1)(x+1)$	**A1**		
4(c)	$u = \sqrt{2}, -\sqrt{2}, \frac{1}{2}, -\frac{1}{2}$ $u = \pm\sqrt{2}, \pm\frac{1}{2}$ only	**2**	**B1** for any 2 correct solutions **FT** on *their* part **4(b)**	
5(a)		**B1**	Must have correct endpoints and intercept at $y = 3$, amplitude and symmetry about the y axis	
5(b)		**2**	**B1** for sin curve passing through the origin with amplitude 4 or period 180° with correct endpoints **B2** for a completely correct graph	

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Question	Answer	Marks	Guidance	Notes
6(a)	$r = \frac{h}{\sqrt{3}}$ soi	**B1**		$\tan 30^\circ = \frac{r}{h}$
	$V = \frac{1}{3}\pi\left(\frac{h}{\sqrt{3}}\right)^2 \times h$ $V = \frac{1}{9}\pi h^3$	**B1**	**Dep** for correct substitution and sufficient detail shown	
6(b)	$\frac{dV}{dh} = \frac{1}{3}\pi h^2$	**B1**		
	$\frac{dh}{dt} = \frac{dh}{dV} \times \frac{dV}{dt}$	**M1**	soi	
	$\frac{50}{\frac{1}{3}\pi h^2}$ oe	**M1**	**FT** 50 / *their* $\frac{dV}{dh}$	
	Rate = $\frac{50}{\frac{1}{3}\pi \times 60^2} = \frac{1}{24\pi}$ oe	**A1**		
7	${}^{20}C_r = \frac{4}{3} \times {}^{20}C_{r+1}$ soi	**B1**		
	$\frac{20!}{r!(20-r)!} = \frac{4}{3} \times \frac{20!}{(r+1)!(20-(r+1))!}$ oe, soi	**B1**	**Dep**	
	$\frac{1}{20-r} = \frac{4}{3} \times \frac{1}{r+1}$	**B1**	**Dep**	
	$r = 11$	**B1**	**Dep**	

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Question	Answer	Marks	Guidance	Notes
8(a)	□	**B1**		Must be using correct notation if used
8(b)	$x > 0$	**B1**		Must be using correct notation if used
8(c)	$\left(f^{-1}(x)\right) = \frac{1}{2}(\ln x - 1)$	**2**	**M1** for complete method	
8(d)		**2**	**B1** for each graph, must have the correct shape with asymptotic behaviour	
	(0, e), (e, 0) and no other intercepts	**2**	**B1** for each seen or marked on the axes.	Must be associated with the correct graph
9(a)	$(x-3)^2 + (y-1)^2 = 1$ soi	**B1**		
	$(c-2y-3)^2 + (y-1)^2 = 1$ oe	**M1**	Substitute $x = c - 2y$ into equation of circle	Allow in terms of x
	$5y^2 + y(10-4c) + (c^2 - 6c + 9) = 0$ oe	**2**	**M1 dep** for an attempt to obtain a quadratic in y, must have at least 2 of the 3 terms correct	Allow in terms of x
	$(10-4c^2) - 20(c^2 - 6c + 9) = 0$	**M1**	Calculate the discriminant from *their* 3-term equation, equate to zero	
	$4c^2 - 40c + 80 = 0$ oe	**A1**		$c^2 - 10c + 20 = 0$
	$c = 5 \pm \sqrt{5}$	**A1**		

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Question	Answer	Marks	Guidance	Notes
9(b)	Line meets the circle twice. Line intersects the circle. Line is a chord.	**B1**	A correct statement	
10	$\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$	**B1**		Must all be in terms of **a** and **b**
	$\overrightarrow{OD} = \frac{1}{3}\mathbf{b}$ or $\overrightarrow{AC} = (\mathbf{b} - \mathbf{a} - \mathbf{a})$ oe	**B1**		
	$\overrightarrow{OE} = \mathbf{a} + \frac{2}{3}(\mathbf{b} - 2\mathbf{a})$ $[= \frac{2}{3}\mathbf{b} - \frac{1}{3}\mathbf{a}]$	**B1**	**FT** $\mathbf{a} + \frac{2}{3}$(*their* $\overrightarrow{AC}$)	Allow other valid pathways
	$\overrightarrow{DE} = \frac{2}{3}\mathbf{b} - \frac{1}{3}\mathbf{a} - \frac{1}{3}\mathbf{b}$	**B1**	**FT** *their* $\overrightarrow{OE}$ − *their* $\overrightarrow{OD}$	Allow other valid pathways
	$= \frac{1}{3}(\mathbf{b} - \mathbf{a})$ Hence $\overrightarrow{DE}$ is a multiple of $\overrightarrow{AB}$ so *DE* is parallel to *AB*	**B1**		

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Question	Answer	Marks	Guidance	Notes
11	**EITHER** Solution 1 $8-2x=\frac{5}{2x-1}+1$ leading to $4x^2-16x+12=0$ oe	**(M1**		
	$x=3,\quad x=1$	**2**	**M1** dep for solution of quadratic equation	**M1** for attempt to solve *their* quadratic in form $ax^2+bx+c=0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left(x+\frac{b}{2}\right)^2=-\frac{c}{a}+\frac{b^2}{4}$ or equivalent, condone one sign error.
	$y=2,\ y=6$	**B1**	For use of *their* values and an attempt to find the area of the trapezium	
	Area of trapezium = 8	**B1**		
	$\int\left(\frac{5}{2x-1}+1\right)\mathrm{d}x=\frac{5}{2}\ln(2x-1)+x$	**2**	**M1** for $k\ln(2x-1)+x$, $k\neq\frac{5}{2}$	

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Question	Answer	Marks	Guidance	Notes
11	$\int_1^3 \left(\frac{5}{2x-1}+1\right) \mathrm{d}x$ $= \frac{5}{2}\ln 5 + 3 - \frac{5}{2}\ln 1 - 1$ $= 2 + \frac{5}{2}\ln 5$	**2**	**M1 dep** for application of *their* limits, allow one sign error	
	$6 - \frac{5}{2}\ln 5$	**A1)**		
	OR Solution 2 $8 - 2x = \frac{5}{2x-1} + 1$ leading to $4x^2 - 16x + 12 = 0$ oe	**(M1**		
	$x = 3, \quad x = 1$	**2**	**M1** dep for solution of quadratic equation	**M1** for attempt to solve *their* quadratic in form $ax^2 + bx + c = 0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left(x + \frac{b}{2}\right)^2 = -\frac{c}{a} + \frac{b^2}{4}$ or equivalent, condone one sign error.
	$\int_1^3 (8 - 2x)\ \mathrm{d}x = 8$	**2**	**B1** for $8x - x^2$	

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Question	Answer	Marks	Guidance	Notes
11	$\int\left(\frac{5}{2x-1}+1\right)\mathrm{d}x=\frac{5}{2}\ln(2x-1)+x$	**2**	**M1** for $k\ln(2x-1)+x$, $k\neq\frac{5}{2}$	
	$\int_1^3\left(\frac{5}{2x-1}+1\right)\mathrm{d}x$ $=\frac{5}{2}\ln 5+3-\frac{5}{2}\ln 1-1$ $=2+\frac{5}{2}\ln 5$	**2**	**M1 dep** for application of *their* limits, allow one sign error	
	$6-\frac{5}{2}\ln 5$	**A1)**		
	OR Solution 3 $8-2x=\frac{5}{2x-1}+1$ leading to $4x^2-16x+12=0$ oe	**(M1**		
	$x=3,\quad x=1$	**2**	**M1** dep for solution of quadratic equation	**M1** for attempt to solve *their* quadratic in form $ax^2+bx+c=0$ by: factorising – factorisation must result in correct a and c for FT equation, or scaled form of FT equation. quadratic formula – discriminant of FT equation must not be negative. Formula must be correct but condone one sign error in substitution. completing the square – must get as far as $\left(x+\frac{b}{2}\right)^2=-\frac{c}{a}+\frac{b^2}{4}$ or equivalent, condone one sign error.

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Question	Answer	Marks	Guidance	Notes
11	$\int\left(8-2x-\left(\frac{5}{2x-1}+1\right)\right)\mathrm{d}x =$ $7x-x^2-\frac{5}{2}\ln(2x-1)$ oe	**3**	**M1** for $k\ln(2x-1)+x$, $k\neq\frac{5}{2}$ **A1** for $8-2x$	
	$\int_1^3\left(8-2x-\left(\frac{5}{2x-1}+1\right)\right)\mathrm{d}x$ $=\left(21-9-\frac{5}{2}\ln 5\right)-\left(7-1-\frac{5}{2}\ln 1\right)$	**3**	**M1 dep** for application of *their* limits, with 2 sign errors **M2 dep** for application of *their* limits, with 1 sign error	
	$6-\frac{5}{2}\ln 5$	**A1)**		
12(a)	$-\frac{2a}{x^2}\mathrm{e}^{\frac{2a}{x}}$	**2**	Allow **M1** for any f(x) × $\mathrm{e}^{\frac{2a}{x}}$	
12(b)	At $x = a$ gradient = $-\frac{2}{a}\mathrm{e}^2$	**M1**	Substitute $x = a$ into *their* gradient of form f(x) × $\mathrm{e}^{\frac{2a}{x}}$	
	Gradient of normal = $\frac{a}{2}\mathrm{e}^{-2}$	**M1**	**FT** on *their* gradient	
	$y-\mathrm{e}^2=\frac{a}{2}\mathrm{e}^{-2}(x-a)$ oe	**M1**	**FT** *their* gradient of normal	
	$-\mathrm{e}^2=-\frac{a^2}{2}\mathrm{e}^{-2}$	**M1**	**Dep** on all previous **M** marks Substitute in $x=0$, $y=0$	
	$a=\sqrt{2}\mathrm{e}^2$	**A1**		

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