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MATHEMATICS **0580/42**

Paper 4 (Extended) **February/March 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 February/March 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
	Benefit of the doubt
	Communication mark
	Incorrect point
	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
	Misread

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 point
XP	Not from wrong 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.

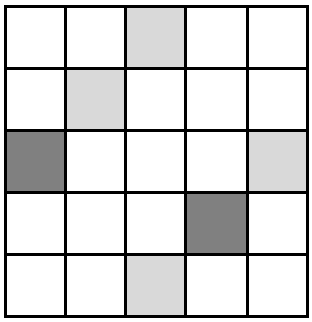
A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

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

Question	Answer	Marks	Partial Marks
1	2 or 7	**1**	
2	$3y^2 + 5y$ or $y(3y + 5)$ final answer	**2**	**B1** for $3y^2$ or $5y$ correct in final answer or for correct answer seen then spoilt
3		**1**	
4	2.6 cao	**2**	**B1** for 2.64 or 2.635 to 2.636 If 0 scored**, SC1** for *their* more accurate value seen rounded correctly to 1 decimal place

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Question	Answer	Marks	Partial Marks
5	[C =] (7.5, 3) [D =] (9.5, 6.5)	**3**	**B2** for [C =] (7.5, 3) or [D =] (9.5, 6.5) or for [C =] (7.5, k) **and** [D =] (9.5, m) or for [C =] (q, 3), $q \neq 8$ **and** [D =] (s, 6.5) or **B1** for [C =] (7.5, p) or (q, 3), $q \neq 8$ or [D =] (9.5, r) or (s, 6.5)
6	565.8[0]	**3**	**M2** for $12 \times 40 + 5.5 \times 12 \times \left(1+\frac{30}{100}\right)$ oe or **M1** for 12×40 oe or 12×45.5 or [5.5 ×] $12 \times \left(1+\frac{30}{100}\right)$ oe or [12 ×] $5.5 \times \left(1+\frac{30}{100}\right)$ oe or $12 \times 0.3 \times 5.5$
7(a)	4 points correctly plotted	**2**	**B1** for 2 points correctly placed
7(b)	Positive	**1**	
7(c)	Ruled line of best fit	**1**	
7(d)	FT reading at 14 weeks from *their* straight line of best fit with positive gradient	**1**	
8(a)	2.1	**2**	**B1** for 4.2 [cm] or **M1** for answer *their* written measurement × 0.5 correctly evaluated
8(b)	Correct construction for position of L with intersecting arcs 8.8 cm from A and 6.6 cm from B	**3**	**B2** for correct position of L indicated with no/incorrect arcs or for completely correct with intersecting arcs but L to the west of A and B or **B1** for 8.8 cm from A or 6.6 cm from B soi If 0 scored, **SC1** for fully correct with arcs but distances reversed 6.6 cm from A and 8.8 cm from B or for position of L to the east with intersecting arcs 4.4 cm from A and 3.3 cm from B
9(a)	7.09×10^{-3}	**1**	
9(b)	1.6×10^{9}	**2**	**B1** for 16×10^{8} oe
10(a)(i)	Triangle drawn at (2, 0), (1, –1) and (3, –3)	**2**	**B1** for reflection in $y = k$ or for reflection in $x = 1$

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Question	Answer	Marks	Partial Marks
10(a)(ii)	Triangle drawn at (–4, 3), (–5, 4) and (–3, 6)	**2**	**B1** for translation by $\begin{pmatrix}-6\\k\end{pmatrix}$ or by $\begin{pmatrix}k\\1\end{pmatrix}$
10(b)	Rotation 90° anticlockwise oe [centre] (3, –1)	**3**	**B1** for each
11(a)	1842.59	**2**	**M1** for $1500 \times \left(1+\frac{4.2}{100}\right)^5$ oe
11(b)	6.5[0…]	**3**	**M2** for $\sqrt[11]{2}$ or $2^{\frac{1}{11}}$ or **M1** for $[k\times]y^{11} = 2[\times k]$ oe
12	267 or 267.0 to 267.1	**2**	**M1** for $\pi\times12\times5+\pi\times5^2$
13	$n^3 + 4$ oe final answer and $\frac{11-n}{n+2}$ oe final answer and 2^{n+1} oe final answer	**6**	**B2** for $n^3 + 4$ oe final answer or **B1** for any cubic expression or for 3rd diff = 6 with at least two shown or for correct answer seen then spoilt **B2** for $\frac{11-n}{n+2}$ oe final answer or **B1** for fraction with numerator or denominator correct or for correct answer seen then spoilt **B2** for 2^{n+1} oe final answer or **B1** for answer of form $[a\times]2^{n[+b]}$ or $[a\times]\left(\frac{1}{2}\right)^{[b]-n}$ or for correct answer seen then spoilt
14(a)	17	**1**	
14(b)	$8x – 7$ final answer nfww	**2**	**M1** for $5 – 4(3 – 2x)$ oe or better
14(c)	$\frac{5-x}{4}$ oe final answer	**2**	**M1** for $x = 5 – 4y$ or $y – 5 = –4x$ or $\frac{y}{4}=\frac{5}{4}-x$ or better

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Question	Answer	Marks	Partial Marks
15(a)	1.606 25	**4**	**M1** for mid-points **soi** (1.35, 1.55, 1.65, 1.8) **M1** for use of Σfm with m in correct interval including both boundaries **M1 dep** (dep on 2nd M1) for $\Sigma fm \div 80$
15(b)	Correct histogram	**3**	**B2** for 3 correct blocks or **B1** for 2 correct blocks If 0 scored, **SC1** for 3 correct freq densities soi (40, 200, 340, 70)
16(a)	0	**1**	
16(b)	Ruled tangent to curve at time = 7.5 seconds	**B1**	
	0.25 to 0.4	**B1**	Dep on tangent correct or close attempt
16(c)	6.666 to 6.733…	**3**	**M2** for $(10 \text{ to } 10.25) \times 8 + \frac{(4.75 \text{ to } 5) \times 8}{2}$ oe or **M1** for attempt at one relevant area under graph for time between 15 and 30 seconds
17(a)	287	**2**	**M1** for North line at C with angle 35 or 145 marked on diagram at C isw or for 360 – 35 – 38 oe
17(b)	$\sqrt{65^2 + 95^2 - 2 \times 65 \times 95 \cos 38}$	**M2**	**M1** for $65^2 + 95^2 - 2 \times 65 \times 95 \cos 38$ **A1** for 3518[.0] to 3518.1
	59.31…	**A1**	

Question	Answer	Marks	Partial Marks
17(c)	244.4 to 244.6	**4**	**B3** for **[***BAC* **=]** 99.5 or 99.6 or 99.49 to 99.58… isw or for answer 225.4 to 225.5… OR **M2** for [sin *A* =] $\frac{95\sin 38}{59.3}$ oe or [cos *A* =] $\frac{59.3^2+65^2-95^2}{2\times 59.3\times 65}$ or **M1** for $\frac{59.3}{\sin 38}=\frac{95}{\sin A}$ oe or $95^2 = 59.3^2+65^2-2\times 59.3\times 65 cosA$ oe **M1dep** for 145 + *their BAC* leading to answer
18(a)	$2(3a-7)(3a+7)$ final answer	**2**	**M1** for $2(9a^2-49)$ or $(6a-14)(3a+7)$ or $(6a+14)(3a-7)$ isw or for correct answer seen and spoilt
18(b)	$2x^3+3x^2-18x+8$ final answer	**3**	**B2** for correct expansion unsimplified or for answer simplified 4 term expression of correct form with 3 terms correct or **B1** for one pair of brackets expanded with at least 3 terms out of 4 correct
19	113.6 and 246.4	**3**	**B2** for one correct angle as answer or **M1** for cos $x = -0.4$ oe If M1 or 0 scored, **SC1** for 2 angles that add and round to 360.0
20	6.2 nfww	**3**	**M2** for $\frac{7800-50}{1240 \text{ to } 1260}$ or $\frac{7700 \text{ to } 7800}{1240+10}$ or **M1** for 7850 or 7750 or 1250 or 1230 seen

Question	Answer	Marks	Partial Marks
21	$\frac{14}{9}\mathbf{m}+\frac{4}{9}\mathbf{n}$ oe simplified final answer	**4**	**B3** for $2\mathbf{m}+\frac{4}{9}(-\mathbf{m}+\mathbf{n})$ oe or **M2** for $\overrightarrow{AE}=\frac{4}{9}(-\mathbf{m}+\mathbf{n})$ or $\overrightarrow{EA}=\frac{4}{9}(\mathbf{m}-\mathbf{n})$ or $\overrightarrow{BE}=\frac{5}{9}(\mathbf{m}-\mathbf{n})$ or $\overrightarrow{EB}=\frac{5}{9}(\mathbf{n}-\mathbf{m})$ **M1** for $\overrightarrow{OB}=\mathbf{m}+\mathbf{n}$ or $\overrightarrow{BO}=-\mathbf{m}-\mathbf{n}$ or $\overrightarrow{AB}=\mathbf{n}-\mathbf{m}$ or $\overrightarrow{BA}=\mathbf{m}-\mathbf{n}$ or for a correct vector route along the lines on the diagram
22	$2x^2-5x-15$ [= 0] or $y^2-34y+144$ [= 0] oe	**M2**	**M1** for $4x+12=2x^2-x-3$ or better or $y=2\left(\frac{y-12}{4}\right)^2-\left(\frac{y-12}{4}\right)-3$ or better
	$\frac{-(-5)\pm\sqrt{(-5)^2-4(2)(-15)}}{2(2)}$ oe or for $\frac{5}{4}\pm\sqrt{\frac{15}{2}+\left(\frac{5}{4}\right)^2}$ oe	**M2**	**FT** *their* 3-term quadratic in x or y or **M1** for $\sqrt{(-5)^2-4(2)(-15)}$ or better or for $\frac{-(-5)+\sqrt{q}}{2\times2}$ oe or $\frac{-(-5)-\sqrt{q}}{2\times2}$ oe or for $\left(x-\frac{5}{4}\right)^2$
	(4.26, 29.04) and (– 1.76, 4.96)	**B2**	**B1** for one correct pair or both x-values correct or both y – values correct

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Question	Answer	Marks	Partial Marks
23	9835 to 9844 nfww	**7**	**B5** for [area of segment =] 12.29 to 12.31 nfww **M1** for 12.29 to 12.31 × 800 **OR** **B2** for angle at centre = 157 or 156.9 or 156.92 to 156.93 or for [reflex angle =] 203 to 203.1 or **M2** for $2 \times \cos^{-1}\left(\frac{3-2.5}{2.5}\right)$ oe or **M1** for $\cos x = \frac{3-2.5}{2.5}$ oe **M2dep** for $\frac{360-\textit{their}\theta}{360} \times \pi \times 2.5^2$ or **M1dep** for $\frac{[360-]\textit{their}\,\theta}{360} \times \pi \times 2.5^2$ seen **M1dep** for $\frac{1}{2} \times 2.5 \times 2.5 \times \sin(\textit{their}\,\theta)$ oe or $2 \times 0.5 \times \sqrt{2.5^2 - 0.5^2} \times 0.5$ oe **M1** for *their* area × 800 leading to answer

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