

Cambridge IGCSE™

MATHEMATICS**0580/41**

Paper 4 (Extended)

May/June 2026**MARK SCHEME**Maximum Mark: 100

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 **18** 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
	Transcription error

Annotation	Meaning
	Correct
	Correct answer from incorrect working

PUBLISHED**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.

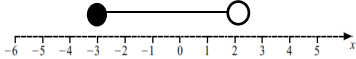
Types of mark

- 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
nfwf	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Partial Marks	Guidance
1	$6x - 7y$ final answer	2	B1 for $6x$ or $-7y$ in final answer or for $6x - 7y$ seen then spoilt	Answer $6x + -7y$ scores B1 only
2(a)	1600	1		
2(b)	4.5 oe	1		oe is $\frac{9}{2}$ or $4\frac{1}{2}$
3	42	1		
4	198	1		
5	1 61 $\sqrt{41}$	3	B1 for each	
6		2	B1 for shaded circle at -3 and unshaded circle at 2 but line missing or incorrect or for line between -3 and 2 with any circles at each end	For 2 marks must be solid horizontal line (not dashed) and no other lines or shading between circles. Accept solid line on x -axis. Line need not be ruled but intention must be clear.
7	14950	2	M1 for $23000 \times \left(1 - \frac{35}{100}\right)$ oe or B1 for answer 8050	$\frac{35}{100}$ oe or 0.35 for M1 but not 35%

Question	Answer	Marks	Partial Marks	Guidance
8(a)	5340 or 5343 to 5345	2	M1 for $\pi \times \left(\frac{18}{2}\right)^2 \times 21$	Mark at most accurate. Award 2 marks for final answer 1701π . Accept 3.14 or $\frac{22}{7}$ for method. M1 implied by 5341 to 5346
8(b)	5.34 or 5.343 to 5.345	1	FT <i>their</i> (a) $\div 1000$	Correct answer or FT, mark to candidate's advantage. For FT <i>their</i> 8(a) must be at least 3sf if rounded or at least 4sf if truncated. Any rounding must be correct in all digits. If final answer is inaccurate, mark at most accurate.
9	$7y(3y - 1)$ final answer	2	B1 for $7(3y^2 - y)$ or $y(21y - 7)$ or correct answer seen then spoilt	Accept e.g. $-7 \times y(1 - 3 \times y)$ for 2 marks. Condone omission of final bracket. Accept $-7(y - 3y^2)$ or $-y(1 - 21y)$.
10	75	3	B2 for 150 or B1 for 30 OR M2 for $\frac{180 - (360 \div 12)}{2}$ oe or $\frac{(12 - 2) \times 180}{12} \div 2$ oe or M1 for $180 - (360 \div 12)$ oe or $\frac{(12 - 2) \times 180}{12}$ oe	M2 is method leading to 75 M1 is method leading to 150

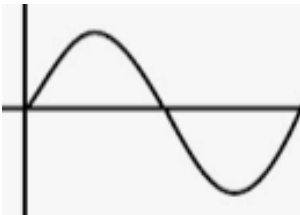
Question	Answer	Marks	Partial Marks	Guidance
11	115.215	4	M1 for $\frac{1}{2} \times 7.5 \times (8.1 + 18)$ M2 for $\frac{1}{2} \times 5.1 \times \sqrt{8.5^2 - 5.1^2}$ oe or M1 for $x^2 + 5.1^2 = 8.5^2$ oe or for $\frac{1}{2} \times 5.1 \times \text{their } 6.8$	Accept 115, 115.2, 115.22 for 4 marks. implied by 97.8[75] implied by 17.3[4] implied by 6.8 where <i>their</i> 6.8 is from Pythagoras
12(a)	28	3	M1 for $\frac{200+51+2n+n+1}{4} = 3n$ oe M1 for correctly dealing with the denominator of <i>their</i> equation e.g. $200 + 51 + 2n + n + 1 = 12n$ or $\frac{252}{4} + \frac{3n}{4} = 3n$	A short fraction line can be recovered but otherwise must go under all the '+' signs. e.g. $252 = 9n$ scores M1M1
12(b)	42.4 nfw	4	 M1 for midpoints soi 10, 30, 50, 70 M1 for use of Σfm where m is in the correct interval including boundaries $10 \times 29 + 30 \times 67 + 50 \times 55 + 70 \times 49$ M1 (dep on 2nd M1) for $\Sigma fm \div 200$	isw group containing the mean stated after correct answer seen. Condone 1 error or omission. Condone 1 further error or omission. No more than one midpoint outside interval. M1 M1 implied by $290 + 2010 + 2750 + 3430$ or 8480 Accept $29+67+55+49$ for the 200.
13	$(x + 3y)(3 + 5p)$ final answer	2	B1 for $3(x + 3y) + 5p(x + 3y)$ or $x(3 + 5p) + 3y(3 + 5p)$	Condone omission of final bracket.

Question	Answer	Marks	Partial Marks	Guidance
14	17	3	M2 for $\frac{1}{2} (10 + (10 - 6)) \times v [= 119]$ oe or M1 for $\frac{1}{2} \times 6 \times v$ or $4 \times v$ oe	M2 for $7v [= 119]$ oe M1 for $3v$ or $4v$
15	$x \leq 2$ final answer	3	M1 for correctly removing the bracket $7x - 2 \leq 3x + 6$ or $\frac{7}{3}x - \frac{2}{3} \leq x + 2$ M1 for isolating x terms after <i>their</i> first step $7x - 3x \leq 2 + 6$ oe or $\frac{7}{3}x - x \leq \frac{2}{3} + 2$ oe	Allow any inequality symbol or equals sign for M marks. e.g. $4x \leq 8$ or $-8 \leq -4x$ or $x = 2$ scores M1M1 Collecting <i>their</i> four terms e.g. after incorrect expansion of brackets
16	40.6 or 40.60...	2	M1 for $\tan = \frac{6}{7}$	Mark at most accurate. M1 for $\cos = \frac{7}{\sqrt{6^2 + 7^2}}$ oe or $\sin = \frac{6}{\sqrt{6^2 + 7^2}}$ oe
17(a)	8280	3	B2 for answer 1080 or M2 for $7200 + \frac{7200 \times 3 \times 5}{100}$ or M1 for $\frac{7200 \times 3 [\times 5]}{100}$	M1 implied by 216
17(b)	500	2	M1 for $x \times \left(1 + \frac{30}{100}\right) = 650$ oe or better	$\frac{30}{100}$ oe or 0.3 oe for M1 but not 30%
17(c)	2.35 or 2.349...	3	M2 for $\sqrt[6]{\frac{4598}{4000}}$ or $\sqrt[6]{1.1495}$ or M1 for $4000 \times [\dots]^6 = 4598$	Mark at most accurate. M2 implied by 1.023... or 102.3... Condone for M2 $\sqrt[6]{1.15}$ or $\sqrt[6]{1.149}$.

Question	Answer	Marks	Partial Marks	Guidance
18	2 : 1 cao nfw	4	B3 for 12 : 6 OR B1 for $PSO = 12$ B2 for $PQO = 6$ or B1 for SOQ (acute) = 36 or SOQ (reflex) = 324 or $SPO = 12$ or $RSQ = 18$ or $OSQ = 72$ or $OQS = 72$ or $SQP = 78$ OR If 0 or B1 scored, instead award SC2 for 6 and 12 obtained	1 : 0.5 is B3 marks Angles may be on diagram. Mark diagram first. If awarding marks in working, angles must be correctly identified. B1 implied by 12 : k as answer or leading to answer. B2 implied by $k : 6$ as answer or leading to answer.
19(a)(i)	0.76 oe	1		In both parts isw attempts to change form after correct answer seen. Accept e.g. $\frac{76}{100}$, $\frac{38}{50}$, $\frac{19}{25}$, 76%.
19(a)(ii)	0.3648 oe	2	M1 for $[2 \times] 0.24 \times \text{their } 0.76$	Accept $\frac{228}{625}$ or 0.365 oe for 2 marks. M1 implied by 0.1824 or $\frac{114}{625}$ or 0.182

Question	Answer	Marks	Partial Marks	Guidance
19(b)	15 nfw	3	M2 for $n^2 - n - 210 [=0]$ oe or $15 \times 14 = 210$ or M1 for $\frac{n}{50} \times \frac{n-1}{49} = \frac{3}{35}$ or better, n can be an integer < 50 or $\frac{50 \times 49}{35} \times 3$ or 210	Allow other letters for n for method marks. where coefficients have been evaluated as a single number e.g. $35n^2 - 35n = 7350$ $n(n-1) = 210$ $35n(n-1) = 7350$ e.g. $n(n-1) = \frac{50 \times 49}{35} \times 3$ Do not accept $\frac{n \times n - 1}{50 \times 49} = \frac{3}{35}$ unless missing brackets recovered.
20(a)(i)	48	1		
20(a)(ii)	7 nfw	4	M2 for $10 - 3x = \pm \sqrt{121}$ or $9x^2 - 60x - 21 [=0]$ oe or M1 for $(10 - 3x)^2 - 1$ oe or better M1 dep on at least M1 for $10 \pm 11 = 3x$ or $[3](3x + 1)(x - 7)$ oe or correct use of formula or correct factorisation of <i>their</i> 3-term quadratic	Mark at most accurate. Final answer 7 and $-\frac{1}{3}$ is M2M1 nfw. oe 3-term quadratic e.g. $3x^2 - 20x - 7 [=0]$ $9x^2 - 60x = 21$ e.g. or better $(10 - 3x)^2 - 1 = 120$ accept $10 - 3x = 11$ for M1 M1 dep must lead to 2 solutions.
20(b)	-13, -3, 1	2	B1 for 2 correct values as answers with maximum 3 values	Allow values in any order. Do not award any marks for 14 after -13, -3 and 1 shown in working.
20(c)	4096	2	M1 for $x = j(4)$ or $x = 2^{3 \times 4}$ oe	

Question	Answer	Marks	Partial Marks	Guidance
21	27.8 or 27.75 to 27.76	3	M2 for $\frac{8.1 \sin 105}{16.8}$ oe or M1 for $\frac{16.8}{\sin 105} = \frac{8.1}{\sin y}$ oe	Mark at most accurate. M2 implied by 0.466 or 0.4657... Accept longer methods: M2 for explicit method for siny or cosy M1 for implicit method for siny or cosy Note: if using longer method third side is 12.77...
22	$[m =] \frac{7x}{5-x}$ oe final answer	3	M1 for $5m = 7x + mx$ or $\frac{5m}{x} = 7 + m$ or $m = \frac{7x}{5} + \frac{mx}{5}$ M1 for isolating <i>their</i> terms in m M1 for correctly finding m from <i>their</i> equation using e.g. factorisation and division To a maximum of 2 marks for an incorrect answer	oe e.g. $\frac{-7x}{-5+x}$ Final answer must not have tiered fractions $m = \frac{7x + mx}{5}$ alone is M0 The 2nd and 3rd M marks must include $am + bmx$ oe or $\frac{k}{m} = f(x)$ $5m - mx = 7x$ or $\frac{5m}{x} - m = 7$ $[m(5 - x) = 7x] \quad m = \frac{7x}{5-x}$ or $m = \frac{7}{\frac{5}{x} - 1}$ Mark final M mark on answer line.

Question	Answer	Marks	Partial Marks	Guidance
23(a)	692 or 692.3 to 692.4	2	M1 for $\frac{1}{2} \times 52.3 \times 60.4 \times \sin 26$	Mark at most accurate.
23(b)	83.9 or 83.92 to 83.93	3	M2 for $\frac{60.4^2 + 31.5^2 - 65.1^2}{2 \times 60.4 \times 31.5}$ oe or M1 for $65.1^2 = 60.4^2 + 31.5^2 - 2 \times 60.4 \times 31.5 \cos[\dots]$	Mark at most accurate. $\frac{402.4}{3805.2} = 0.10575$ or 0.106 or 0.1057 or 0.1058
24(a)	 Correct sketch with amplitude 1 and going through (0, 0), (180, 0) and (360, 0)	2	B1 for correct shape starting at (0, 0) but inaccurate at roots and/or max/min. Needs at least one cycle, but may have more than one. or for starting at (0,0) with all roots and max/ min correct but some incorrect curvature.	Ignore any sketch outside the region $0 \leq x \leq 360$ for 1 or 2 marks. For 2 marks: - Correct curve through (0, 0), and (360, 0) and reasonably close to (180, 0) by eye and these points only - Correct amplitude at max/min - Award B1 if the 'curve' includes straight lines or has vertex at max/min but all other features are correct. Ruled graphs score zero.
24(b)	233.1, 306.9	3	B2 for one correct or M1 for $\sin x = -\frac{4}{5}$ oe If M1 or 0 scored, SC1 for two reflex angles with a sum of 540 or two non-reflex angles with a sum of 180	Mark at most accurate. Allow 233 or 233.1... 307 or 306.8 to 306.87. Ignore answers outside of 0 to 360. implied by $x = -53.1$ Not multiples of 90 Accept from 179.9 to 180.1 or from 539.9 to 540.1.

Question	Answer	Marks	Partial Marks	Guidance
25	64	3	M2 for a correct equation with a single term in x e.g. $x^{\frac{2}{3}} = 16$, $x^{-\frac{2}{3}} = 16^{-1}$, $x^2 = 16^3$ or M1 correct first step e.g. $\frac{1}{x^{\frac{1}{3}}} = \frac{16}{x}$, $x^{\frac{1}{3}} = \frac{x}{16}$ $x^{\frac{1}{3}-1} = 16$, $x^{-1} = 16^3 x^{-3}$ or better	Or better e.g. M2 for $16^{\frac{3}{2}}$ x to a power of a single value dealing with both negative powers or getting x onto one side or cubing both sides Allow $\sqrt[3]{x}$ for $x^{\frac{1}{3}}$.
26	$2x + 4$ or $2(x + 2)$ final answer	4	B3 for $\frac{(6x-30)(x+5)(x+2)}{(3x-15)(x+5)}$ or better or B1 for $(x+5)(x+2)$ B1 for $(x-5)(x+5)$ or $(3x-15)(x+5)$ or $(3x+15)(x-5)$ Alternative method B3 for $\frac{6(x^2-25)(x+2)}{3(x^2-25)}$ or better or B2 for $(x^2-25)(x+2)$ or B1 for $(x+5)(x+2)$	Allow missing final bracket for all B marks and answer. Other missing brackets must be recovered before awarding marks. B3 is for a correct expression where all factors can be cancelled to give the correct answer.

Question	Answer	Marks	Partial Marks	Guidance
26			Alternative method B3 for $\frac{(6x^2 - 150)(x + 2)}{3x^2 - 75}$ or better or B2 for $(kx^2 - 25k)(x + 2)$ or B1 for $kx^2(x + 2) - 25k(x + 2)$ or $x(kx^2 - 25k) + 2(kx^2 - 25k)$	k must be 1,2,3 or 6 $\frac{6x^3 + 12x^2 - 15x - 300}{3x^2 - 75} =$ $\frac{6x^2(x + 2) - 150(x + 2)}{3x^2 - 75} =$ $\frac{(6x^2 - 150)(x + 2)}{3x^2 - 75}$
27	3 nfw	3	M2 for $\frac{28 \text{ to } 29}{9.5}$ or $\frac{28.5}{9 \text{ to } 10}$ accept equivalent in metres or M1 for 28.5 , 27.5 , 10.5 or 9.5	Answer of 3 following 2.8 seen and no correct bounds seen scores zero. Answer of 3 following incorrect bounds and no correct bounds seen scores zero. Answer of 3 with no calculations but some bounds shown must include 9.5 and 28.5 to score 3 marks. Answer of 3 following calculation(s) and $\frac{28.5}{9.5}$ not seen scores maximum M2. correct working is $\frac{28.5}{9.5}$ or e.g. $\frac{28500}{9500}$ in metres M2 for $\frac{28 \text{ to } 29}{10 - 0.5}$ or $\frac{28 + 0.5}{9 \text{ to } 10}$ accept equivalent in metres M1 for $28 + 0.5$, $28 - 0.5$, $10 + 0.5$ or $10 - 0.5$ or for 28500 or 29500 or 9500 or 10500 oe

Question	Answer	Marks	Partial Marks	Guidance
28	5360 or 5358 to 5359.4...	5	M4 for $\frac{1}{3}\pi \times 13.2^2 \times 50.8 - \frac{1}{3}\pi \times 9.9^2 \times 38.1$ oe or $\frac{1}{3}\pi \times 13.2^2 \times 50.8 \times \left(1 - \left(\frac{3}{4}\right)^3\right)$ oe or M3 for $\frac{1}{3}\pi \times 13.2^2 \times 50.8$ oe or $\frac{1}{3}\pi \times 9.9^2 \times 38.1$ oe or B2 for 50.8 or 38.1 or for $\left(\frac{9.9}{13.2}\right)^3$ oe or $\left(\frac{13.2}{9.9}\right)^3$ oe or B1 for scale factor $\frac{9.9}{13.2}$ or $\frac{13.2 - 9.9}{13.2}$ soi or M1 for $\frac{h}{9.9} = \frac{h + 12.7}{13.2}$ oe If 0 scored, SC1 for $\frac{1}{3}\pi \times 13.2^2 \times (h + 12.7) - \frac{1}{3}\pi \times 9.9^2 \times h$	Mark at most accurate. 1705.737π scores 5 marks. M4 implied by 5356... or 5360... to 5361 oe for M4 for correct substitution into $\frac{1}{3} \times h \times (A_1 + \sqrt{A_1 A_2} + A_2)$, e.g. $\frac{1}{3}\pi \times 12.7 \times (13.2^2 + 13.2 \times 9.9 + 9.9^2) =$ $\frac{1}{3}\pi \times 12.7 \times (174.24 + 130.68 + 98.01) =$ $\frac{1}{3} \times 12.7 \times \left(\begin{array}{l} 547.1 \text{ to } 547.6 \dots + \\ 410.3 \text{ to } 410.7 \dots + 307.7 \text{ to } 308 \dots \end{array} \right)$ B2 accept scale factors as ratio e.g. $3^3 : 4^3$ oe e.g. $\left(\frac{3}{4}\right)^3$ or $\frac{27}{64}$ or $\left(\frac{1}{4}\right)^3$ or $\frac{1}{64}$ accept eg $\frac{13.2}{9.9}$ oe or $\frac{13.2}{13.2 - 9.9}$ oe $\frac{3}{4}$, 0.75 or $\frac{1}{4}$, 0.25 or $\frac{4}{3}$ etc. B1 accept scale factors as ratio e.g. 3 : 4.