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MATHEMATICS **0580/41**

Paper 4 (Extended) **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.

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GENERIC MARKING PRINCIPLE 1:

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- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
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- 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.

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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:

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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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^	More information required
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A1	Accuracy mark awarded one
A2	Accuracy mark awarded two
A3	Accuracy mark awarded three
B0	Independent mark awarded zero
B1	Independent mark awarded one
B2	Independent mark awarded two
B3	Independent mark awarded three
BOD	Benefit of the doubt
C	Communication mark
	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

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Annotation	Meaning
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
XP	Correct answer from incorrect working

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	Partial Marks
1	rhombus	**1**	
2	3.5 or $3\frac{1}{2}$ or $\frac{7}{2}$	**2**	**M1** for $11 - 4 = 2x$ or $-2x = 4 - 11$ or $\frac{11}{2} - \frac{2x}{2} = \frac{4}{2}$ or better
3	125	**2**	**M1** for 125 or 55 correctly placed on diagram
4	[0]4 08	**1**	
5(a)	Triangle accurately completed with arcs at *C*.	**2**	**B1** for accurate triangle with no/incorrect arcs or for accurate triangle with arcs but with AC and BC reversed
5(b)	80 to 85	**1**	FT *their* triangle if 0 scored in **(a)**
5(c)(i)	0.8	**1**	
5(c)(ii)	270	**1**	
6	$3g - 2g^2$ final answer	**1**	
7(a)	$-3 < x \leqslant 2$	**2**	**B1** for $-3 < x$ or $x \leqslant 2$
7(b)	–1, 0, 1, 2, 3, 4	**2**	**B1** for 5 correct (and no extras) or 6 correct with one extra or **B1** for $-2 < x \leqslant 4$
8	1.13 or 1.125…	**1**	
9	34.2	**2**	**M1** for figs 342 or for $k \times 60 \times 60$ or for $k \div 1000$
10	(4, 5)	**2**	**B1** for each
11(a)	51	**2**	**M1** for $60 \times \frac{100-15}{100}$ oe or **B1** for 9
11(b)	68.40	**2**	**M1** for [ ] $\times \frac{100-15}{100} = 58.14$ oe
12(a)	37	**1**	
12(b)	$F' \cap R$ oe	**1**	

Question	Answer	Marks	Partial Marks
13	18.6 or 18.59…	**3**	**M2** for tan = $\frac{12.6-1.5}{33}$ oe or **M1** identifying the correct angle of elevation or for 18.6 or 18.59… seen and spoiled After 0 scored **SC1** for [angle *ETP* =] 71.4 or 71.4[0…] or 71.41
14(a)	$\frac{4}{3}\times\pi\times4^3\left[=\frac{256}{3}\pi\right]$	**1**	
14(b)	47.6 nfww or 47.63 to 47.64… nfww	**3**	**B2** for 52.4 or 52.35 to 52.37 or $\frac{50}{3}\pi$ nfww OR **M2** for $\frac{8^3-\frac{256}{3}\pi}{8^3}\times100$ oe or **M1** for $\frac{8^3-\frac{256}{3}\pi}{8^3}[\times100]$ oe or $\frac{\frac{256}{3}\pi}{8^3}\times100$ oe
14(c)	2.11 or 2.107…	**2**	**M1** for $\frac{256}{3}\pi\times7.86$
14(d)	233 or 233.3 to 233.4	**4**	**M1** for $\pi\times3.1^2\times h=\frac{256}{3}\pi$ **M2dep** for $2\times\pi\times3.1^2+2\times\pi\times3.1\times$*their h* or **M1dep** for $2\times\pi\times3.1\times$*their h* or **M1** for $2\pi\times3.1^2$

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Question	Answer	Marks	Partial Marks
15	46	**3**	**M2** for [angle ATB] = 180 – 2 × 67 oe OR **M1** for [obtuse] angle AOB = 2 × 67 **M1** for angle OAT or angle OBT = 90 OR **M1** for angle TBA = 67 or angle TAB = 67 **M1** for angle TDA or TDB = 90 where D is the intersection of OT and AB OR **M1** for angle BOT = 67 or angle AOT = 67 **M1** for angle OTB = 180 – 67 – 90 or angle OTA = 180 – 67 – 90
16	13.09	**4**	**M1** for mid-values 7.5, 11 and 16 soi **M1** for Σfx where x-values in correct interval (including boundaries) **M1dep** on second **M1** for $\frac{\Sigma fx}{50}$
17	[y =] $-2x + 4$	**3**	**M1** for gradient = $\frac{4-0}{0-2}$ oe **M1** for answer $mx + 4$
18(a)	72	**2**	**M1** for 8 × 8 or for $\frac{1}{2}\times 2\times 8$ or $\frac{1}{2}(10+8)\times 8$
18(b)	13.5 or $13\frac{1}{2}$	**2**	**B1** for 3.5 oe or **M1** for $\frac{100 - \textit{their } 72}{8}$ [+ 10]

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Question	Answer	Marks	Partial Marks
19	29	**3**	**B2** for 28.4[3…] OR **M2** for 20×0.9^{28} or 20×0.9^{29} evaluated to at least 1 dp or for 0.9^{28} or 0.9^{29} evaluated to at least 2 dp or **M1** for at least two trials of [20 ×] 0.9^n soi or for $1 > 20\left(1-\frac{10}{100}\right)^n$ oe
20(a)	1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$	**1**	
20(b)	$96\times\left(\frac{1}{2}\right)^n$ oe final answer	**2**	**M1** for answer $96\times\left(\frac{1}{2}\right)^{n+k}$ oe or for $96\times\left(\frac{1}{2}\right)^n$ oe seen
21	27.6 or 27.57 to 27.58	**2**	**M1** for $\frac{1}{2}\times 9\times 8\times \sin 50$ oe
22	1.65 or 1.649[9…]	**3**	**M2** for $\sqrt[25]{\frac{301.10}{200}}$ oe or **M1** for $200\times[\quad]^{25} = 301.10$
23	[y =] $\frac{9}{\sqrt{x+1}}$ oe final answer	**2**	**M1** for $3=\frac{k}{\sqrt{8+1}}$ oe or for $\frac{9}{\sqrt{x+1}}$ seen and spoiled

Question	Answer	Marks	Partial Marks
24(a)	$\frac{10}{x}$	**1**	
24(b)	*their* $\frac{10}{x}+\frac{5}{x+4}=\frac{7}{2}$ oe	**M1**	
	$20x+80+10x=7x^2+28x$ oe	**M2**	Strict **FT** for correctly clearing fractions from *their* three-term equation with two algebraic denominators in x and $x + 4$ and expanding all brackets Strict **M1FT** for correctly expressing their two algebraic fractions with two denominators in x and $x + 4$ as a single fraction or with a common denominator within a correct equation or for correctly clearing fractions from *their* three-term equation with two algebraic denominators in x and $x + 4$ but not all brackets expanded
	Leading to $7x^2-2x-80=0$	**A1**	No errors or omissions
24(c)	$\frac{-(-2)\pm\sqrt{([-]2)^2-4(7)(-80)}}{2(7)}$ oe	**B2**	or **B1** for $\sqrt{([-]2)^2-4(7)(-80)}$ oe or for $\frac{-(-2)-\sqrt{p}}{2(7)}$ oe or for $\frac{-(-2)+\sqrt{p}}{2(7)}$ oe or $\left(x-\frac{2}{14}\right)^2$
	–3.24 and 3.53	**B1**	
24(d)	2h 10min	**3**	**B2** for 2.168 to 2.18 [h] or for 130.08 to 130.8 [min] or for 2hours 10.08 min to 2 hours 10.8 min OR **M2** for $\frac{10}{\textit{their positive } x}-\frac{5}{\textit{their positive } x+4}$ or **M1** for $\frac{10}{\textit{their positive } x}$ or $\frac{5}{\textit{their positive } x+4}$

Question	Answer	Marks	Partial Marks
25(a)	40	**1**	
25(b)	Correct column, from 2 to 5 and height 34	**2**	**M1** for $\frac{102}{5-2}$
26	$2x^2-5x[=0]$ or better or $2y^2+18y+28[=0]$ or better	**M2**	**M1** for $2x^2-3x-7=2x-7$ oe or for $y=2\left(\frac{y+7}{2}\right)^2-3\left(\frac{y+7}{2}\right)-7$
	$x = 0$, $y = –7$ $x = 2.5$, $y = –2$	**B2**	**B1** for $x = 0$, $y = –7$, or for $x = 0$ and $x = 2.5$ or for $x = 2.5$, $y = –2$ or for $y = –2$ and $y = –7$ If **M1B0** or **M2B0** scored then **SC1** for correct substitution seen of both of their x-values or their y-values into $y=2x^2-3x-7$ or $y=2x-7$
27	16.8 or 16.80 to 16.81	**4**	**M3** for $\tan=\frac{5}{\sqrt{15^2+7^2}}$ oe or $\sin=\frac{5}{\sqrt{15^2+7^2+5^2}}$ oe or $\cos=\frac{\sqrt{15^2+7^2}}{\sqrt{15^2+7^2+5^2}}$ oe or **M2** for 15^2+7^2 or $15^2+7^2+5^2$ or **M1** for indication of correct angle
28(a)	4	**1**	
28(b)	$\frac{1}{343}$	**2**	**M1** for [x =] f(1) or better
29(a)	63.0 or 63.02 to 63.03	**3**	**M2** for $[\cos y =]\frac{10^2+14^2-13^2}{2\times10\times14}$ oe or **M1** for $13^2=10^2+14^2-2\times10\times14\times\cos y$ oe
29(b)	15.1 or 15.13 to 15.14	**5**	**M2** for $[AD]=\frac{14\sin38}{\sin97}$ or **M1** for $\frac{AD}{\sin38}=\frac{14}{\sin97}$ oe **M2** for $10^2+(their\,AD)^2-2\times10\times their\,AD\times\cos(their\,y+180-97-38)$ or **M1** for angle $BAD = their\,y+180-97-38$ soi

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cao correct answer only
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FT follow through after error
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rot rounded or truncated
SC Special Case
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Question	Answer	Marks	Partial Marks
1	50	**2**	**M1** for 60 : 3000 oe
2	5.5 or $5\frac{1}{2}$ or $\frac{11}{2}$	**2**	**M1** for $8x = 27 + 17$ or $x - \frac{17}{8} = \frac{27}{8}$ oe
3	10	**1**	
4(a)	216	**2**	**M1** for $8 \times 60 \div 20$ oe or $9 \times 60 \div 20$ oe
4(b)	317 or 316.6 to 316.7	**2**	**M1** for $\frac{50-12}{12}[\times 100]$ oe or for $\frac{50}{12} \times 100$ [–100] oe
5	3.86 cao	**2**	**M1** for 953×0.152 oe isw If 0 scored, **SC1** for answer 25.4 or 25.36 to 25.37
6	[Patient P =] 27 [Patient Q =] 16	**4**	**B1** for answer $P = 27$ **M2** for $10 \times 16 - (1 + 4 + 10 + 12 + 19 + 21 + 25 + 25 +$ *their* 27) oe isw or **M1** for 10×16 oe or for $\frac{1+4+10+12+19+21+25+25+P+Q}{10} = 16$ oe
7(a)	$2 \times \pi \times 4 = 6.51 \times 2 + 2x$ or better	**M3**	**M1** for $2 \times \pi \times 4$ oe **M1** for $6.51 \times 2 + 2x$ soi
	6.055 to 6.058 [= 6.06]	**A1**	
7(b)	574 or 575 or 574.1 to 574.5…	**4**	**M2** for $6.51 \times 6.06 \times \cos 36$ oe or **M1** for [height =] $6.06 \times \cos 36$ oe seen **M1** for *their* area × 18 leading to answer Alternative method: **M2** for $2 \times \frac{1}{2} \times 6.51 \times 6.06 \times \sin(90 + 36)$ oe or **M1** for $\frac{1}{2} \times 6.51 \times 6.06 \times \sin(90 + 36)$ oe seen **M1** for *their* area × 18 leading to answer

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Question	Answer	Marks	Partial Marks
8(a)(i)	Image drawn at (–2, –3), (–3, –2), (–4, –2) and (–3, –4)	**2**	**B1** for translation by $\begin{pmatrix}1\\k\end{pmatrix}$ or by $\begin{pmatrix}k\\-7\end{pmatrix}$
8(a)(ii)	Image drawn at (2, –3), (3, –2), (4, –3) and (4, –4)	**3**	**B2** for correct size and orientation but wrong position or for quadrilateral with 3 correct vertices or **B1** for $y = x + 1$ drawn soi long enough to be recognised
8(b)	Rotation 90° anticlockwise oe (–2, 6)	**3**	**B1** for each
9	24.2 or 24.16 to 24.17	**3**	**M2** for $\frac{60+80}{2}\times\frac{15}{60}+\frac{80\times10}{2\times60}$ oe or **M1** for a correct partial area under line e.g. $\frac{60+80}{2}\times\frac{15}{60}$ or $\frac{80\times10}{2\times60}$ oe OR If 0 scored, **SC2** for final answer 1450 or **SC1** for $\frac{60+80}{2}\times15+\frac{80\times10}{2}$ oe seen
10(a)	$25 – 8n$ oe final answer	**2**	**B1** for answer $k – 8n$ (any k) oe or $25 – jn$ ($j \neq 0$) or for correct answer seen then spoilt
10(b)	$3n^2$ oe final answer	**2**	**B1** for quadratic or for second difference = 6 (at least two, with none incorrect) or for correct answer seen then spoilt
11(a)	2.63 and 3.38	**2**	**B1** for each
11(b)	Correct graph	**4**	**B3FT** for 8 correct plots or **B2FT** for 6 correct plots or **B1FT** for 4 correct plots
11(c)	$y = 2 + 0.5x$ ruled	**M2**	**M1** for [y =] $2 + 0.5x$ oe soi e.g. $x^3 – 2x + 3 = 2 + 0.5x$ or $y = k + 0.5x$ ruled or $y = kx + 2$ ruled, but not $y = 2$
	–1.85 to –1.7 , 0.4 to 0.5, 1.25 to 1.4	**A2**	**A1** for two correct values dep on M2 If M0 or M1 scored, **SC1** for three correct values

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Question	Answer	Marks	Partial Marks
12(a)	104 and angle at the centre is twice the angle at the circumference	**2**	**B1** for each
12(b)	27	**2**	**B1** for angle $BAC = 65$ or angle $ACD = 52$ or **M1** for $OCB = 25$ and reflex $AOC = 360 - \textit{their}$ 104 or for OAC or $OCA = 38$ FT $\frac{180 - \textit{their}\ 104}{2}$
13	$\frac{31}{8m}$ final answer	**2**	**M1** for $\frac{28}{8m} + \frac{3}{8m}$ oe
14(a)	27 223	**2**	**M1** for $24\,000 \times \left(1 + \frac{3.2}{100}\right)^4$
14(b)	10 370	**3**	**B2** for 30 500 or **M2** for $\frac{40\,870}{134} \times 34$ oe or **M1** for $\left(1 + \frac{34}{100}\right)x = 40\,870$ oe
14(c)	$V = 32\,500 \times 0.77^n$ final answer	**3**	**B2** for answer $32\,500 \times 0.77^n$ or for correct explicit formula seen in working, may be unsimplified or **M1** for $32\,500 \times (1 - 0.23)^n$ oe seen or for correct implicit formula seen, may be unsimplified or answer of form $V = 32\,500 \times k^n$ or answer of form $V = p \times (0.77 \text{ oe})^n$

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Question	Answer	Marks	Partial Marks
15(a)	392 or 392.4 to 392.5	**3**	**M2** for $\sqrt{300^2+112^2-2\times300\times112\times\cos140}$ OR **M1** for $300^2+112^2-2\times300\times112\times\cos140$ **A1** for 154 022[…]
15(b)	10.6 or 10.7 or 10.55 to 10.69	**3**	**M2** for $\frac{112\sin140}{their\ \textbf{(a)}}$ oe or $\cos[DBC]=\frac{300^2+(their\ \textbf{(a)})^2-112^2}{2\times300\times their\ \textbf{(a)}}$ or **M1** for $\frac{112}{\sin DBC}=\frac{their\ \textbf{(a)}}{\sin140}$ oe or $112^2=300^2+(their\ \textbf{(a)})^2-2\times300\times their\ \textbf{(a)}\times\cos DBC$ oe
15(c)	279 or 278.9…	**4**	**M3** for $(35\,900-\frac{1}{2}\times112\times300\times\sin140)\div\left(\frac{1}{2}\times180\right)$ oe OR **M1** for $\frac{1}{2}\times112\times300\times\sin140$ oe **M1** for recognition that the shortest distance from D is perpendicular to AB
16(a)	(1.6 – 1.35) oe × 40 [= 10]	**1**	
16(b)	$\frac{5}{39}$ oe	**3**	**M2** for $\frac{10}{10+170\times0.1}\times\frac{9}{9+170\times0.1}$ oe or **M1** for $\frac{10}{10+17}$ or $\frac{9}{10+16}$ or $\frac{9}{10+17}$ or $\frac{10}{10+16}$ oe seen or $\frac{10}{k}\times\frac{9}{k-1}$ oe with $k > 10$ and an integer or $\frac{m}{10+17}\times\frac{m-1}{10+16}$ oe with $0 < m < 27$ and an integer
16(c)	1.26 or 1.259… nfww	**4**	**M1** for frequencies 6, 15, 17 soi **M1** for midpoints soi (1, 1.175, 1.3, 1.475) **M1** for use of *their* $\Sigma fm \div$ *their* Σf with m in correct interval including both boundaries

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Question	Answer	Marks	Partial Marks
17	$2x^3 + 7x^2 - 10x - 24$ final answer	**3**	**B2** for correct expansion unsimplified or for simplified four-term expression of correct form with three terms correct or **B1** for one pair of brackets expanded with at least three terms out of four correct
18(a)	$\mathbf{b} - \mathbf{a}$	**1**	
18(b)	$-\frac{11}{8}\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe simplified final answer	**3**	**B2** for a correct unsimplified vector for $\overrightarrow{AM}$ seen or for $\overrightarrow{OM} = \frac{1}{2}\mathbf{b} - \frac{3}{8}\mathbf{a}$ oe soi or **B1** for $\overrightarrow{OC} = \mathbf{b} - \frac{3}{4}\mathbf{a}$ oe soi or for a correct vector route for $\overrightarrow{AM}$ along lines on the diagram
19	$3x^2 - 5x - 11$ [= 0] or $3y^2 - 20y - 19$ [= 0]	**M2**	**M1** for $3x^2 - 7x - 6 = 5 - 2x$ or for $y = 3\left(\frac{5-y}{2}\right)^2 - 7\left(\frac{5-y}{2}\right) - 6$
	$\frac{[-(-)]5 \pm \sqrt{([-]5)^2 - 4\times3\times-11}}{2\times3}$ OR $x - \frac{5}{6} = \pm\sqrt{\frac{11}{3} + \left(\frac{5}{6}\right)^2}$ oe	**M2**	**M1** for $\frac{[-(-)]5 + \sqrt{k}}{2\times3}$ oe or $\frac{[-(-)]5 - \sqrt{k}}{2\times3}$ oe or for $\sqrt{([-]5)^2 - 4\times3\times-11}$ oe OR **M1** for $\left(x - \frac{5}{6}\right)^2$
	$x = 2.92$, $y = -0.84$ **and** $x = -1.25$, $y = 7.51$	**B2**	**B1** for one correct solution for x and y or for $x = 2.92$ and -1.25 or for $y = -0.84$ and 7.51 If B0 scored and at least two method marks scored, **SC1** for correct substitution shown of both of their x-values or their y-values into $y = 3x^2 - 7x - 6$ or $y = 5 - 2x$
20	620 nfww	**3**	**M2** for $\frac{4810 - 5}{7.7 \text{ to } 7.8}$ or $\frac{4800 \text{ to } 4810}{7.7 + 0.05}$ oe or **M1** for 4815 or 4805 or 7.75 or 7.65 oe seen

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Question	Answer	Marks	Partial Marks
21	$y = \dfrac{242}{(6w+2)^2}$ oe final answer	**4**	**M3** for $\dfrac{8(3.5+2)^2}{\left(\dfrac{90}{15}w+2\right)^2}$ may be done in stages or for correct answer seen then spoiled OR **M2** for $y = \dfrac{242}{(x+2)^2}$ or **M1** for $y = \dfrac{k}{(x+2)^2}$ oe or better **B1** for $w = \dfrac{x}{6}$ oe

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MATHEMATICS **0580/43**

Paper 4 (Extended) **October/November 2025**

MARK SCHEME

Maximum Mark: 100

Published

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GENERIC MARKING PRINCIPLE 6:

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	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
	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

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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	Partial Marks
1(a)	–7	**1**	
1(b)	3	**1**	
2(a)	51	**1**	
2(b)	43	**1**	
2(c)	37.5	**2**	**M1** for $\frac{6}{16}$ oe
3	432	**1**	
4(a)	B marked 6 cm from A on a bearing of 080°.	**2**	**M1** for a correct bearing of 080° but incorrect length or for a 6 cm line from A
4(b)	310	**2**	**M1** for 180 + 130 oe or indicates required bearing on a sketch
5(a)	72	**3**	**M2** for $\frac{180\times(10-2)}{10}$ or $180-\frac{360}{10}$ or **M1** for $180\times(10-2)$ or $\frac{360}{10}$
5(b)	8	**1**	
6(a)	y^3	**1**	
6(b)	$15x^8$ final answer	**2**	**B1** for kx^8 or $15x^k$ as final answer or for correct answer spoilt
7(a)	Translation $\begin{pmatrix}2\\-8\end{pmatrix}$	**2**	**B1** for translation **B1** for $\begin{pmatrix}2\\-8\end{pmatrix}$
7(b)	Enlargement [scale factor] $-\frac{1}{3}$ [centre] (–3, 4)	**3**	**B1** for each
8	320% of $\frac{m}{10}$ 33% of m $\frac{1}{3}$ of m m	**2**	**B1** for three in the correct order
9	$n\times\frac{5}{13}$ identified	**1**	
10	$x = 10$ $y = -5$	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
11	0.3×10^{-2} 1.3×10^{12} 2.03×10^{-5}	**2**	**B1** for two correct
12	0.55 oe	**2**	**B1** for P(red) = 0.1 or P(pink) = 0.35 or **M1** for 0.9 + 0.65 – 1 or 1 – (0.1 + 0.35)
13	0.0625 or $\frac{1}{16}$	**3**	**B2** for $c = 4$ soi or **M1** for $1024 = c^5$
14	–5	**5**	**B3** for $x = 4$ or **M2** for $5x + 3x = 30 + 2$ or better or **M1** for $5x - 2 = 3(10 - x)$ or better **M1** 10 – *their* $x = y + 11$ or better or $\frac{5 \times \textit{their } x - 2}{3} = y + 11$ or better Alternative method: **B4** for $3y + 5y = -5 - 2 - 33$ or **B3** for $-5 - 5y - 2 = 3y + 33$ or **B2** for $\frac{5(-1-y)-2}{3} = y + 11$ or **B1** for $x = -1 - y$
15(a)	4192 or 4193	**3**	**B2** for 49 807 to 49 808 or **M2** for $54000 - 54000 \times \left(1 - \frac{2}{100}\right)^4$ oe or **M1** for $54000 \times \left(1 - \frac{2}{100}\right)^4$ oe
15(b)	11 nfww	**2**	**M1** for $54000 \times \left(1 - \frac{2}{100}\right)^n$ evaluated with $n = 10$ or $n = 11$ or **B1** for 10.1 or 10.13 to 10.14
16(a)	$19x - 6$ final answer	**2**	**B1** for $7x + 14$ or $12x - 20$ or for $19x - 6$ seen then spoilt
16(b)	$15x^2 + xy - 2y^2$ final answer	**2**	**B1** for $15x^2 + 6xy - 5xy - 2y^2$ with at least three terms correct

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Question	Answer	Marks	Partial Marks
17	$\frac{5x}{x+7}$ oe final answer	**3**	**M1** for correctly clearing the denominator and expanding bracket **M1FT** for correctly collecting terms in t on one side and terms not in t on the other **M1FT** for correct factorising and for correct division Maximum 2 marks for an incorrect answer
18(a)	38.8 or 38.77 to 38.78	**3**	**M2** for $[\sin x =] \frac{41.3\sin 102}{64.5}$ oe or better or **M1** for $\frac{64.5}{\sin 102} = \frac{41.3}{\sin x}$ oe
18(b)	73.2 or 73.16…	**3**	**M2** for $\frac{64.5^2 + 52.1^2 - 70.2^2}{2 \times 64.5 \times 52.1}$ or **M1** for $70.2^2 = 64.5^2 + 52.1^2 - 2 \times 64.5 \times 52.1 \times \cos y$
19(a)	3125	**1**	
19(b)	$24x - 2$ or $2(12x - 1)$ final answer	**1**	
19(c)	$\frac{x+2}{3}$ or $\frac{x}{3} + \frac{2}{3}$ final answer	**2**	**M1** for correct first step e.g. $x = 3y - 2$ or $y + 2 = 3x$ or $\frac{y}{3} = x - \frac{2}{3}$ oe
19(d)	11	**3**	**M2** for $3x^2 + 1 = 364$ or better or **M1** for $3(x^2 + 1) - 2$ Alternative method: **M2** for $x^2 + 1 = (364 + 2) \div 3$ or **M1** for $3x - 2 = 364$
19(e)	12	**1**	
20(a)	$3x^2 + 6x - 13$ final answer	**2**	**B1** for two terms correct or correct answer seen then spoilt
20(b)	32	**2**	FT *their* $\frac{dy}{dx}$ dep on **B1** earned in **(a)** **M1** for correct substitution of $x = 3$ into *their* $\frac{dy}{dx}$

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Question	Answer	Marks	Partial Marks
21	35	**4**	**M3** for $\frac{27 \div (75 - 12.5)}{4 \div 12.5} \times 100[-100]$ oe or $\left(\frac{27 \div (75 - 12.5)}{4 \div 12.5} - 1\right)[\times 100]$ oe or $\frac{27 \div (75 - 12.5) - (4 \div 12.5)}{4 \div 12.5}[\times 100]$ oe or $\left(\frac{12.5}{4} \div \frac{62.5}{27}\right) \times 100[-100]$ OR **M1** for $4 \div 12.5$ oe **M1** for $27 \div (75 - 12.5)$ oe
22(a)	63	**2**	**M1** for $\frac{14}{x} = \frac{10}{45}$ oe or better
22(b)	189	**3**	**M2** for $\left(\frac{279}{124}\right)^{\frac{3}{2}}$ [× 56] or [56 ÷] $\left(\frac{124}{279}\right)^{\frac{3}{2}}$ oe or better or **M1** for $\left(\frac{279}{124}\right)^{\frac{1}{2}}$ or $\left(\frac{124}{279}\right)^{\frac{1}{2}}$ or better or $\left(\frac{279}{124}\right)^{3} = \left(\frac{x}{56}\right)^{2}$ oe
23(a)	208	**4**	**M1** for midpoints soi 190, 205, 212.5, 222.5 **M1** for use of Σfx where x is in the correct interval including boundaries $190 \times 32 + 205 \times 64 + 212.5 \times 74 + 222.5 \times 30$ **M1** (dep on second M1) for $\Sigma fx \div 200$
23(b)	0.8 3.2 1	**3**	**B2** for two correct or **B1** for one correct or **M1** for three of 1.6, 6.4, 14.8 and 2 seen

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Question	Answer	Marks	Partial Marks
24(a)	10.1 or 10.10…	**3**	**M2** for $EF^2 + 6.4^2 + 5.1^2 = 13^2$ or better or **M1** for $6.4^2 + 5.1^2$ or $13^2 - 6.4^2$ or $13^2 - 5.1^2$
24(b)	29.5 or 29.49… to 29.54…	**3**	**M2** for $\sin[\ldots =] \frac{6.4}{13}$ oe or **M1** for identifying angle AGE
25	[LB =] 52.7 [UB =] 53.9	**3**	**B2** for answer [LB=] 52.7 or [UB=] 53.9 or **M1** for 68 + 0.5 or 68 – 0.5 or 4.7 + 0.05 or 4.7 – 0.05 or 10[.0] + 0.05 or 10[.0] – 0.05. oe seen
26(a)	$\mathbf{m} + \frac{7}{15}\mathbf{p}$	**3**	**M2** for correct unsimplified expression in terms of **m** and **p** or **M1** for a correct route
26(b)	$\frac{3}{7}\mathbf{m}$	**2**	**M1** for using the ratio $\frac{2}{3}[\mathbf{p}] : \frac{1}{5}[\mathbf{p}]$

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MATHEMATICS **0580/41**

Paper 4 (Extended) **May/June 2025**

MARK SCHEME

Maximum Mark: 100

Published

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B3	Independent mark awarded three
BOD	Benefit of the doubt
C	Communication mark
	Incorrect
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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	Partial Marks
1	5.5 or $5\frac{1}{2}$ or $\frac{11}{2}$	**2**	**M1** for a correct first step $4c = 13 + 9$ or $c - \frac{9}{4} = \frac{13}{4}$ or better
2	8.0 cao	**2**	**B1** for 7.99[9…] or for *their* answer seen to 3 or more sf and rounded correctly
3	UK by [$]0.69 or [$]0.692…	**3**	**B2** for 1.96[8…] or 1.97 **and** 1.27[6…] or 1.28 or **M2** for $1.62 \times 1.215 - \frac{4.83}{3.785}$ oe or **M1** for 1.62×1.215 or $\frac{4.83}{3.785}$
4(a)(i)	Translation $\begin{pmatrix} 8 \\ -3 \end{pmatrix}$	**2**	**B1** for translation or for correct vector oe
4(a)(ii)	Rotation 90° [anticlockwise] [centre] (0, 0)	**3**	**B1** for each
4(b)	Image drawn at (0, 5) (0, 6) (2, 6) (2, 2) (1, 2) (1, 5)	**2**	**B1** for reflection in $x = k$ If 0 scored, **SC1** for reflection in $y = -2$
5(a)	1000 or 10^3	**1**	
5(b)	$n^2 + 4$ final answer oe	**2**	**B1** for second difference = 2 or for answer as a quadratic expression or for a correct expression shown in the working and then spoilt
5(c)(i)	9	**1**	
5(c)(ii)	12	**2**	**B1** for 21
6	$15x^3 - 10x^2$ final answer	**2**	**B1** for $15x^3$ or $-10x^2$ or correct answer seen in working and spoilt
7	$-1.5 \leqslant y < 4$ final answer	**2**	**B1** for $-1.5 \leqslant y$ or $y < 4$
8(a)	1099	**2**	**M1** for $\frac{20}{100} \times 980$

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Question	Answer	Marks	Partial Marks
8(b)	12.1 or 12.14…	**2FT**	FT for 2 marks for $\left(\frac{their\ 1099}{980}-1\right)\times 100$ oe correctly evaluated to at least 3sf **M1** for $\frac{their\ 1099-980}{980}[\times 100]$ or for $\left(\frac{their\ 1099}{980}-1\right)[\times 100]$ or for $\frac{their\ 1099-980}{980}\times 100\,[-100]$
9	475	**2**	**M1** for $x\times\frac{8}{100}=38$ or for $\frac{38}{8}\times 100$ oe
10(a)	1, 2, 3, 6, 9, 18	**2**	**B1** for a list with one error or one omission
10(b)	$(y + 5)(3 – x)$ final answer	**2**	**M1** for $y(3 – x) + 5(3 – x)$ or for $3(y + 5) – x(y + 5)$ or for correct answer seen and spoilt
10(c)	$x = 2$, $y = 13$ or $x = 1$, $y = 4$	**2**	FT *their* **(b)** for **M1** **M1** for *their* $3-x=a$ and *their* $y+5=b$ where $ab=18$ and a, b integers
11	3200	**3**	**M2** for $800 \div 50^2\ [\times 10^n]$ oe or **B1** for 50^2 or 800×100^2 If 0 scored, **SC1** for 160 000 as final answer
12	8.36 or 8.364…	**3**	**M2** for $\frac{\text{dist}}{12.5}=\sin 42$ oe or better or **M1** for recognition of shortest distance soi
13	$[\pm]\sqrt{\frac{A-w^2}{5}}$ oe final answer	**3**	**M1** for $A – w^2 = 5x^2$ or for $\frac{A}{5}=\frac{w^2}{5}+x^2$ **M1** for $x^2 = \ldots$ FT *their* first step **M1** for correct square root , FT *their* $x^2 =$ An incorrect answer scores a maximum of **M1 M1**

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Question	Answer	Marks	Partial Marks
14(a)	2, 0, 12	**3**	**B1** for each correct value
14(b)	Correct curve	**4**	**B3FT** for 7 or 8 correct points or **B2FT** for 5 or 6 correct points or **B1FT** for 3 or 4 correct points
14(c)	$y = 10 - x$ ruled	**M2**	**B1** for [y =] $10 - x$ soi or $y = k - x$ ruled or $y = 10 + kx$ ruled, but not $y = 10$
	$x = -1.7$ to -1.4 $x = 2$ $x = 4.4$ to 4.7	**A2**	**A1** for any two values If 0 scored, **SC1** for 3 correct values
15(a)	192 or 192.4… nfww	**4**	**M1** for midpoints soi (170, 182.5, 187.5, 195, 205) **M1** for use of Σfm with m in correct interval including both boundaries **M1** (dep on second M1) for $\Sigma fm \div 140$
15(b)	$\frac{69}{278}$ oe	**2**	**M1** for $\frac{70}{140} \times \frac{69}{139}$
15(c)	Correct histogram	**3**	**B2** for three correct blocks or **B1** for two correct blocks If 0 scored, **SC1** for three of $\frac{7}{20}, \frac{12}{5}, \frac{31}{5}, \frac{70}{10}$ or 0.35, 2.4, 6.2, 7
16	2.9[0] or 2.901…	**3**	**M2** for $\sqrt[6]{\frac{1484}{1250}}$ or **M1** for $1250 \times k^6 = 1484$
17(a)	10.4 or 10.42…	**3**	**M2** for $\sqrt{9.6^2 + 12.1^2 - 2 \times 9.6 \times 12.1 \times \cos 56}$ OR **M1** for $9.6^2 + 12.1^2 - 2 \times 9.6 \times 12.1 \times \cos 56$ **A1** for 108.6 to 108.7

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Question	Answer	Marks	Partial Marks
17(b)	107.2 to 107.3	**4**	**B3** for 72.7[4…] OR **M3** for $180-\sin^{-1}\left(15.8\times\frac{\sin 47}{12.1}\right)$ **M2** for [sinBDC =] $15.8\times\frac{\sin 47}{12.1}$ or **M1** for $\frac{\sin BDC}{15.8}=\frac{\sin 47}{12.1}$
17(c)	89.59 to 89.80…	**3**	**M1** for $\frac{1}{2}\times 9.6\times 12.1\times\sin 56$ **M1** for $\frac{1}{2}\times 15.8\times 12.1\times\sin(133-$ *their* $\angle BDC)$
18	$a = 2$ $b = 3$ $c = 20$	**3**	**B2** for any two correct For c, FT 2 + *their* a × *their* $(b)^2$ or **B1** for $b=3$ nfww OR **B2** for $2(x+3)^2-20$ or **M1** for $(x + 3)^2$ seen or for $ax^2+2abx+ab^2-c$ or for $a=2$ and one of $2ab=12$ and $ab^2-c=-2$
19	45.6 or 45.63…	**4**	**B3** for 30.6 or 30.63… OR **M3** for $\frac{360-126}{360}\times 2\times\pi\times 7.5+15$ or **M2** for $\frac{360-126}{360}\times 2\times\pi\times 7.5$ or **M1** for $\frac{126}{360}\times 2\times\pi\times 7.5$ or **B1** for major sector angle = 234

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Question	Answer	Marks	Partial Marks
20(a)	72.8 or 72.81…	**4**	**M3** for $\frac{24}{\frac{1}{2}\sqrt{10.5^2+10.5^2}}$ oe or better or **M2** for $AM = \frac{1}{2}\sqrt{10.5^2+10.5^2}$ oe or $AM = 10.5\cos 45$ oe or **M1** for $AC^2 = 10.5^2 + 10.5^2$ or $AM^2 = 5.25^2 + 5.25^2$ or $\frac{AM}{10.5} = \cos 45$ oe If 0 scored, **SC1** for identifying $\angle OAM$
20(b)	849 $\frac{1}{3}$ or 849 or 849.3…	**5**	**Method 1** **B2** for side of small square = 3.5 or **M1** for $\frac{10.5}{x} = \frac{24}{24-16}$ or better **M2** for $\frac{1}{3} \times 10.5^2 \times 24 - \frac{1}{3} \times (their\ 3.5)^2 \times (24 - 16)$ or **M1** for $\frac{1}{3} \times 10.5^2 \times 24$ or for $\frac{1}{3} \times (their\ 3.5)^2 \times (24 - 16)$ **Method 2** **B2** for $\frac{1}{27}$ **or** $\frac{26}{27}$ or **M1** for volume scale factor = $\left(\frac{24-16}{24}\right)^3$ **M2** for $\left(1 - their\frac{1}{27}\right) \times \frac{1}{3} \times 10.5^2 \times 24$ oe or **M1** for $\frac{1}{3} \times 10.5^2 \times 24$ or $their\ \frac{1}{27} \times \frac{1}{3} \times 10.5^2 \times 24$ oe
21	$[m =]\ \frac{6n+1}{10}$ oe	**3**	**M2** for $2(5m) - 1 = 3(2n)$ oe or better or **M1** for $42(5m)$ or for $43(2n)$ oe or better

Question	Answer	Marks	Partial Marks
22	4.4 nfww	**3**	**M2** for $\frac{50 \text{ to } 60}{13 - 0.5}$ or $\frac{50 + 5}{12 \text{ to } 13}$ oe or **M1** for 50 + 5, 50 – 5, 13 + 0.5 or 13 – 0.5 seen

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MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 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.

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- the specific skills defined in the mark scheme or in the generic level descriptors for the question
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GENERIC MARKING PRINCIPLE 2:

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GENERIC MARKING PRINCIPLE 3:

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- marks are not deducted for omissions
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GENERIC MARKING PRINCIPLE 5:

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GENERIC MARKING PRINCIPLE 6:

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Mathematics-Specific Marking Principles

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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
A0	Accuracy mark awarded zero
A1	Accuracy mark awarded one
A2	Accuracy mark awarded two
A3	Accuracy mark awarded three
B0	Independent mark awarded zero
B1	Independent mark awarded one
B2	Independent mark awarded two
B3	Independent mark awarded three
BOD	Benefit of the doubt
C	Communication mark
	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

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Annotation	Meaning
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
XP	Correct answer from incorrect working

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	Partial Marks
1	rhombus	**1**	
2	triangular prism	**1**	
3	[A =] 3.2 [B =] 5.6	**3**	**B2** for one correct or for both correct but reversed or **M1** for $\frac{2.4}{7-4}\times k$ where k = 1, 4, 7 or 11 oe or for $\frac{x}{x+2.4}=\frac{4}{7}$ oe
4	88	**2**	**M1** for $\frac{1}{2}(10+12)\times 8$ oe
5	250	**1**	
6	149 or 148.7 to 148.8…	**3**	**M1** for $\frac{1}{3}\times\pi\times 4^2\times 12$ oe **M1** for 0.74 × *their* volume
7	$[m=]\frac{y-c}{x}$ or $\frac{y}{x}-\frac{c}{x}$ final answer	**2**	**M1** for $y - c = mx$ or $c - y = -mx$ or $\frac{y}{x}=m+\frac{c}{x}$
8	5.02 cao	**1**	
9	Correct elimination of one variable	**M1**	
	[w =] 4 [y =] –1	**A2**	**A1** for one correct If A0 scored, **SC1** for answers satisfying one of the original equations
10	17.5[0] cao	**3**	**M1** for $12n + 9(n – 10) = 277.50$ oe **M1** dep on *their* equation using n and $n – 10$ for simplifying *their* equation correctly to $an = b$
11	27.8[0]	**2**	**M1** for $X\times\left(\frac{100-15}{100}\right)=23.63$ oe
12	58 nfww	**2**	**M1** for 15.5 oe or 13.5 oe seen
13(a)	8	**2**	**M1** for $\frac{9}{6}=\frac{12}{PR}$ oe

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Question	Answer	Marks	Partial Marks
13(b)	3780	**2**	**M1** for $\frac{6^3}{1120}=\frac{9^3}{V}$ or better or $1120\times\left(\frac{9}{6}\right)^3$ oe or for $\left(\frac{9}{6}\times\sqrt[3]{1120}\right)^3$
14	$(x-2)(5-a)$ final answer	**2**	**M1** for $5(x-2)-a(x-2)$ or for $x(5-a)-2(5-a)$ or $-5(2-x)+a(2-x)$ or $2(a-5)-x(a-5)$ or for correct answer seen then spoilt
15	45	**2**	**M1** for $\frac{360}{180-172}$ oe or $\frac{(n-2)180}{n}=172$ oe
16(a)	0.3 oe	**1**	
16(b)	0.69 oe	**3**	**M2** for $0.7\times0.9+(\textit{their}\ 0.3)\times0.2$ oe or **M1** for 0.7×0.9 oe or $(\textit{their}\ 0.3)\times0.2$ oe
17(a)	446	**3**	**B2** for answer 46 or **M2** for $400+\frac{400\times2.3\times5}{100}$ oe or **M1** for $\frac{400\times2.3[\times5]}{100}$ oe
17(b)	20 nfww	**3**	**M2** for $x+1.1x+1.1^2x=[100-]\ 33.80$ oe or **M1** for $\left(1+\frac{10}{100}\right)^2[x]$ oe seen or for one correctly evaluated trial

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Question	Answer	Marks	Partial Marks
17(c)	742.97 to 742.99	**4**	**B3** for 1.02[0…] or interest rate = 2[.0…][%] OR **M3** for $500\times\left(\sqrt[17]{\frac{700.13}{500}}\right)^{20}$ oe or for $700.13\times\left(\sqrt[17]{\frac{700.13}{500}}\right)^{3}$ oe or **M2** for $\sqrt[17]{\frac{700.13}{500}}$ oe OR **M1** for $500(\ldots)^{17}=700.13$ oe **M1** dep on previous M1 for $500\times\left(1+\frac{\textit{their } r}{100}\right)^{20}$ or $700.13\times\left(1+\frac{\textit{their } r}{100}\right)^{3}$
18	[x =] 29 [y =] 52 [z =] 107	**4**	**B1** for 29 **B1** for 52 **B2FT** for 107 or for z = *their* x + *their* y + 26 or **B1** for $\angle EAC = 73$ or $\angle EBC = 73$ or **B1FT** for $\angle EAC = 180 - (\textit{their } x + \textit{their } y + 26)$
19(a)	–2	**1**	
19(b)	11, 5, 1	**2**	**B1** for 2 correct listed on answer line
19(c)	–5	**1**	
19(d)	8	**2**	**M1** for [x =] h(3) or [x =] 2^3
20(a)	8.09 or 8.094…	**2**	**M1** for $\tan 34 = \frac{AB}{12}$ oe
20(b)	98.3 or 98.28 to 98.31	**3**	**M1** for $\frac{1}{2}\times 10\times 12\sin 56$ oe **M1** for $\frac{1}{2}\times 12\times \textit{their}$ **(a)** oe

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Question	Answer	Marks	Partial Marks
20(c)	43[.0] to 43.1	**5**	**M2** for $[BC =]\ \sqrt{10^2+12^2-2\times10\times12\cos56}$ or **M1** for $[BC^{[2]} =]\ 10^2+12^2-2\times10\times12\cos56$ **M2** for $[AD =]\ \frac{12}{\cos34}$ oe or **M1** for $\cos 34 = \frac{12}{AD}$ oe
20(d)	6.71 or 6.706 to 6.710…	**3**	**M2** for $\sin 34 = \frac{dist}{12}$ oe or $\frac{1}{2}\times12\times their(a)=\frac{1}{2}\times theirAD\times dist$ oe or **M1** for recognition of perpendicular distance
21(a)	$15t^8$ final answer	**2**	**B1** for answer kt^8 or $15t^k$ $(k > 0)$ or correct answer seen
21(b)	$32u^{30}$ final answer	**2**	**B1** for answer ku^{30} or $32u^k$ $(k > 0)$ or correct answer seen
22(a)(i)	$\frac{5}{33}$ oe	**1**	
22(a)(ii)	$\frac{13}{33}$ oe	**1**	
22(b)	$\frac{91}{190}$ oe	**3**	**M2** for $[2\times]\ \frac{13}{20}\times\frac{7}{19}$ oe or for $1-\frac{13}{20}\times\frac{12}{19}-\frac{7}{20}\times\frac{6}{19}$ oe or **M1** for $\frac{13}{20}$ or $\frac{13}{19}$ or $\frac{7}{20}$ or $\frac{7}{19}$ oe seen If 0 scored, **SC1** for answer $\frac{91}{200}$ oe
23	$\frac{h}{h-4}$ final answer	**3**	**B1** for $h(h + 4)$ isw **B1** for $(h + 4)(h – 4)$ isw

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Question	Answer	Marks	Partial Marks
24(a)	$\frac{2}{x}+\frac{3}{x+1}=\frac{5}{4}$ oe	**M2**	**M1** for $\frac{2}{x}$ seen or $\frac{3}{x+1}$ seen
	$2 \times 4(x + 1) + 3 \times 4x = 5x(x + 1)$ or $\frac{2(x+1)}{x(x+1)}+\frac{3x}{x(x+1)}=\frac{5}{4}$	**M1**	Correctly removing algebraic fractions or use of common denominator from *their* three-term equation with two fractions with different algebraic denominators
	$8x + 8 + 12x = 5x^2 + 5x$ oe	**M1**	Correctly multiplying *their* brackets and clearing algebraic fractions from *their* three-term equation with two fractions with different algebraic denominators
	Leading to $5x^2 – 15x – 8 = 0$	**A1**	With no errors or omissions
24(b)	$\frac{[--]15+\sqrt{([-]15)^2-4(5)(-8)}}{2(5)}$ oe or $\frac{3}{2}+\sqrt{\frac{8}{5}+\left(\frac{3}{2}\right)^2}$ oe	**B2**	**B1** for $\sqrt{([-]15)^2-4\times5\times-8}$ oe or for $\frac{15+\sqrt{p}}{2(5)}$ oe or $\frac{15-\sqrt{p}}{2(5)}$ oe or for $\left(x-\frac{3}{2}\right)^2$ oe
	3.46	**B1**	
25	[y =] $–2x + 31$	**5**	**B1** for (14, 3) AND **M1** for $\frac{6-0}{20-8}$ (m_1) oe **M1** for $m = -\frac{1}{their\ m_1}$ AND **M1dep** for *their* 3 = *their m* × *their* 14 + *c* oe
26	[a =] 4 [b =] 6 [c =] 5	**2**	**B1** for one correct

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Question	Answer	Marks	Partial Marks
27	35.3 or 35.26…	**4**	**M3** for correct numerical trig statement for angle PAC e.g. tan = $\frac{l}{\sqrt{l^2+l^2}}$ or $\frac{1}{\sqrt{2}}$ oe or sin = $\frac{l}{\sqrt{l^2+l^2+l^2}}$ or $\frac{1}{\sqrt{3}}$ oe or cos = $\frac{\sqrt{l^2+l^2}}{\sqrt{l^2+l^2+l^2}}$ or $\frac{\sqrt{2}}{\sqrt{3}}$ oe where l is a value or **M2** for a correct Pythagoras statement soi or correct trig statement for diagonal of a face with angle 45 used soi e.g. For side length k, AC shown as $k\sqrt{2}$ or **M1** for recognition of angle PAC

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MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2025**

MARK SCHEME

Maximum Mark: 100

Published

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Annotations guidance for centres

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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
	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

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Annotation	Meaning
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
XP	Correct answer from incorrect working

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	Partial Marks
1	12	**1**	
2	Correct triangle constructed with $AC = 7$ cm and $BC = 5.3$ cm and intersecting arcs	**3**	**B2** for correct triangle with no incorrect arcs or for a triangle with reversed sides with correct arcs or **B1** for any triangle with a side of 7 cm or a side of 5.3 cm or for 7[cm] or 5.3[cm] soi
3(a)	23 or $\sqrt{144}$	**1**	Accept 12 for $\sqrt{144}$
3(b)	$\sqrt{15}$	**1**	
4	7.2[0] or $7\frac{1}{5}$	**3**	**M2** for $\frac{1}{2}\times\frac{14}{2}\times(x+11.4)=\frac{130.2}{2}$ oe or better or **M1** for $\frac{1}{2}\times\frac{14}{2}\times(x+11.4)$ ALTERNATIVE METHOD 1 **M2** for $14x+\frac{1}{2}\times(11.4-x)\times 14=130.2$ oe or **M1** for $14x+\frac{1}{2}\times(11.4-x)\times 14$ ALTERNATIVE METHOD 2 **M2** for $14\times 11.4-2\times\frac{1}{2}\times\frac{14}{2}\times(11.4-x)=130.2$ oe or **M1** for $14\times 11.4-2\times\frac{1}{2}\times\frac{14}{2}\times(11.4-x)$ If 0 scored, **SC1** for height of obtuse-angled triangle = 4.2 (condone their choice of variables)
5(a)	0.078[0] oe	**1**	
5(b)	37 000	**1**	
6	1.26×10^{25} or 1.257×10^{25} to 1.258×10^{25}	**2**	**M1** for $\frac{1000}{7.95\times10^{-23}}$ oe or **B1** for 1.26×10^{k} or 1.257×10^{k} to 1.258×10^{k}

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Question	Answer	Marks	Partial Marks
7(a)	4	**1**	
7(b)	6, 12	**1**	
7(c)	1, 5, 7 or 11	**1**	
8(a)	$4x(7y - 3)$ final answer	**2**	**B1** for $4x(7y - 3)$ seen then spoilt or final answers $4(7xy - 3x)$ or $x(28y - 12)$ or $2x(14y - 6)$
8(b)	$(2x + 1)(y - 3)$ final answer	**2**	**B1** for $2x(y - 3) + y - 3$ or $2x(y - 3) + 1(y - 3)$ or $y(2x + 1) - 3(2x + 1)$ or correct answer seen then spoilt
9(a)	$35x^8y^3$ final answer	**2**	**B1** for two correct parts from: 35, x^8 and y^3 or for correct answer seen then spoilt
9(b)	$\frac{1}{5}$ oe	**1**	
10(a)	$x^3 - 3x$ final answer	**2**	**B1** for x^3 or $-3x$ in the final answer or for $2x - 5x + x^3$ or for $x^3 - 3x$ seen then spoilt
10(b)	$x^3 + 2x^2 - 23x - 60$ final answer	**3**	**B2** for correct expansion of three brackets unsimplified or for simplified four-term expression of correct form with three terms correct or **B1** for correct expansion of two brackets with at least three terms out of four correct
11	<table><tr><th>6th term</th><th>nth term</th></tr><tr><td>-2</td><td>$34 - 6n$</td></tr><tr><td>$\frac{6}{11}$</td><td>$\frac{n}{n+5}$</td></tr><tr><td>8</td><td>2^{n-3}</td></tr></table>	**8**	Mark the table first **B1** for -2 **B2** for $34 - 6n$ or **B1** for answer $-6n + c$ or $34 - kn$ ($k \neq 0$) or for a correct answer seen and spoilt **B1** for $\frac{6}{11}$ **B1** for $\frac{n}{n+5}$ **B1** for 8 **B2** for 2^{n-3} or **B1** for answer 2^{n-k} (k can be 0) or for a correct answer seen and spoilt

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Question	Answer	Marks	Partial Marks
12	50 nfww	**3**	**B2** for $\sqrt{10^{100}}$ or $\frac{10^{200}}{10^{150}}$ or answer $k = 10^{50}$ or for $10^{100} = 10^{2k}$ or **M1** for any correct first step from: $10^{220} \times 10^{80} = 10^{300}$, $10^{400} \div 10^{220} = 10^{180}$, $10^{400} \div 10^{80} = 10^{320}$, $\sqrt{10^{400}} = 10^{200}$, $\sqrt{10^{220}} = 10^{110}$, $\sqrt{10^{80}} = 10^{40}$ If 0 scored, **SC1** for correct manipulation of 400, 220 and 80 to give 100 or for correctly dealing with the square root of an expression involving power(s) of 10 to find an explicit value for k or for $\frac{10^{20}}{10^{10\sqrt{3}}}$ seen
13(a)	(0, –10)	**1**	
13(b)	14.5 or $14\frac{1}{2}$	**2**	**M1** for $\frac{19}{2} = x - 5$ or for $19 = 2x - 10$ or better
13(c)	$y = -\frac{1}{2}x + 4$ or $y = -0.5x + 4$ final answer	**3**	**B2** for a correct answer in the wrong form OR **M1** for $y = -\frac{1}{2}x + c$ or gradient = $-\frac{1}{2}$ soi **M1** for correct substitution of (2, 3) into $y = (their\ -\frac{1}{2})x + c$ or into $y - k = (their\ -\frac{1}{2})(x - h)$
14	2.128 to 2.13[0…]	**3**	**M2** for $\sqrt[4]{\frac{1523.15}{1400}}$ oe or **M1** for $1523.15 = 1400(k)^4$ oe for any k
15	0.25 or $\frac{1}{4}$	**3**	**M2** for $m\sqrt{98+2} = 0.5\sqrt{23+2}$ OR **M1** for $m = \frac{k}{\sqrt{t+2}}$ **M1** for $m = \frac{their\ k}{\sqrt{98+2}}$

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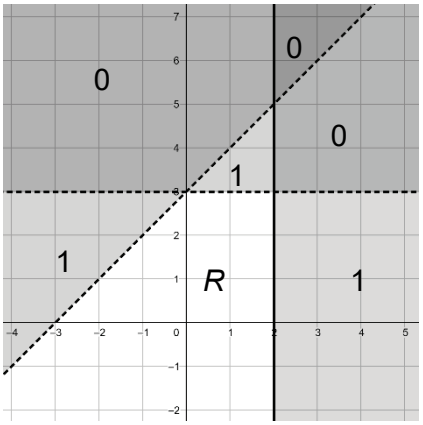
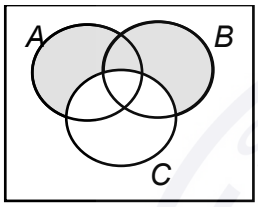
Question	Answer	Marks	Partial Marks
16	Correct lines and region indicated  	**5**	**B1** for each correct line **B2** for correct region If *R* labelled, take the lines surrounding *R* to be the boundaries of their region and ignore shading. or **B1dep** for region identified satisfying 2 of these inequalities If $y = 3$ and $x = 2$ interchanged, **SC1** for a region satisfying $y < x + 3$, $y < 2$ and $x < 3$
17	 	**1**	
18(a)	475.2	**1**	
18(b)	402	**3**	**M2** for [2 ×] (13.2 × 4.5 + 13.2 × 8 + 4.5 × 8) or **M1** for [2 ×] 13.2 × 4.5 or [2 ×] 13.2 × 8 or [2 ×] 4.5 × 8
18(c)	29.8 or 29.83 to 29.84…	**4**	**M3** for tan = $\frac{8}{\sqrt{13.2^2 + 4.5^2}}$ oe or **M2** for $13.2^2 + 4.5^2$ or for $13.2^2 + 4.5^2 + 8^2$ or **M1** for identifying correct angle
19(a)	A correct cumulative frequency curve through [(20, 0)], (30, 6) (40, 42), (50, 76), (60, 170), (70, 190) and (80, 200)	**3**	**B1** for correct horizontal placement for 6 plots **B1** for correct vertical placement for 6 plots **B1FT** dep on at least B1 for reasonable increasing curve or polygon through *their* 6 points If 0 scored, **SC1FT** for 5 out of 6 points correctly plotted
19(b)	Reading at 150 FT *their* increasing curve	**1**	
20(a)	$\frac{2}{9}$ oe	**2**	**M1** for $\frac{3}{5} \times p = \frac{2}{15}$ oe or better

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Question	Answer	Marks	Partial Marks
20(b)	$\frac{14}{45}$ oe	**3**	FT $(1 - \textit{their}\frac{2}{9}) \times \frac{2}{5}$ correctly evaluated **M2** for $(1 - \textit{their}\frac{2}{9}) \times (1 - \frac{3}{5})$ oe or **M1** for $1 - \textit{their}\frac{2}{9}$ or $1 - \frac{3}{5}$ oe
21	28.8 or 28.83 to 28.84…	**4**	**M3** for $\frac{1}{2} \times 12 \times 12 \times \sin 60 - \frac{60}{360} \times \pi \times \left(\frac{2}{3} \times 12\right)^2$ OR **M1** for $\frac{k}{360} \times \pi \times \left(\frac{2}{3} \times 12\right)^2$ oe where $k < 90$ or $\frac{k}{360} < \frac{1}{4}$ **M1** for $\frac{1}{2} \times 12 \times 12 \times \sin k$ oe where $k < 90$ If 0 scored, **SC1** for [radius =] 8 **and** [$\angle A$ =] 60 seen
22(a)	14.15 cao	**1**	
22(b)	7.296 cao nfww	**3**	**M2** for $\frac{14.2 \text{ to } 14.3}{(1.3 - 0.05)^3}$ or $\frac{14.3 - 0.05}{(1.2 \text{ to } 1.3)^3}$ or **M1** for 14.25 or 1.35 or 1.25 seen

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Question	Answer	Marks	Partial Marks
23	168 or 167.5 to 167.6	**4**	**M3** for $\frac{\pi}{3}\times\left[4.2^2\times(4.5+7.5)-\left(4.2\times\frac{7.5}{4.5+7.5}\right)^2\times 7.5\right]$ oe or **M2** for $\left(\frac{7.5}{7.5+4.5}\right)^3\times\frac{1}{3}\times\pi\times4.2^2\times(4.5+7.5)$ or for $\frac{1}{3}\times\pi\times\left(4.2\times\frac{7.5}{4.5+7.5}\right)^2\times7.5$ or **M1** for $\frac{1}{3}\times\pi\times4.2^2\times(4.5+7.5)$ OR **M1** for $\frac{1}{3}\times\pi\times4.2^2\times(4.5+7.5)$ **M1** for $\frac{4.2}{4.5+7.5}=\frac{radius}{7.5}$ oe or better **M1** for $\frac{1}{3}\times\pi\times(their\ 2.625)^2\times7.5$
24(a)	14 37 24	**3**	**B1** for each correct answer
24(b)	6	**1**	
25(a)	Correct sketch to go through (0, 0), (180, 0) and (360, 0)	**2**	**B1** for correct sine curve shape through the origin (minimum one cycle)
25(b)	191.5, 348.5 and no others	**3**	**B2** for one correct or **M1** for $\sin x = -\frac{1}{5}$ oe If M1 or 0 scored, **SC1** for two reflex angles with a sum that rounds to 540.0 or two non-reflex angles with a sum that rounds to 180.0

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Question	Answer	Marks	Partial Marks
26(a)	$-3\mathbf{a} + 12\mathbf{b}$ oe	**1**	
26(b)	2 : 3 oe nfww	**4**	**B3** for any two of • $\overrightarrow{OP} = 5\mathbf{a} + 10\mathbf{b}$ • $\overrightarrow{OT} = 2\mathbf{a} + 4\mathbf{b}$ • $\overrightarrow{TP} = 3\mathbf{a} + 6\mathbf{b}$ OR **M2** for any two of • $\overrightarrow{OP} = 5\mathbf{a} + 10\mathbf{b}$ • $\overrightarrow{OT} = 3\mathbf{a} + \frac{1}{3}$*their* **(a)** • $\overrightarrow{TP} = \frac{2}{3}$*their* **(a)** $+ 5\mathbf{a} - 2\mathbf{b}$ or better OR **M1** for any one of • $\overrightarrow{OP} = 12\mathbf{b} + 5\mathbf{a} - 2\mathbf{b}$ • $\overrightarrow{OT} = 3\mathbf{a} + \frac{1}{3}$*their* **(a)** • $\overrightarrow{TP} = \frac{2}{3}$*their* **(a)** $+ 5\mathbf{a} - 2\mathbf{b}$ or better or for $\pm\frac{1}{3}(-3\mathbf{a} + 12\mathbf{b})$ or $\pm \frac{1}{3}$*their* **(a)** or for $\pm\frac{2}{3}(-3\mathbf{a} + 12\mathbf{b})$ or $\pm \frac{2}{3}$*their* **(a)**

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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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[Turn over

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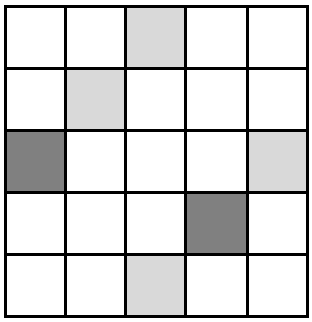
awrt answers which round to
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
nfww not from wrong working
oe or equivalent
rot rounded or truncated
SC Special Case
soi seen or implied

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 $x = 1$

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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