Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2025
Deferred Examinations

Marking Scheme

Mathematics

Ordinary Level

Note to teachers and students on the marking schemes for the deferred examinations

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. However, it should be noted that the marking schemes for the deferred examinations may not necessarily be as detailed as the corresponding marking schemes for the main sitting of an examination, which serve to ensure consistency across a large team of examiners.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination, and the need to maintain consistency in standards between the main sitting and the deferred sitting and from year to year. In the case of the deferred examinations, this means that the level of detail may vary by question, as the marking scheme will only have been finalised for the questions attempted by the candidates who sat these examinations.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with a senior examiner when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes (whether for the main examinations or the deferred examinations) should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination concerned. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination will not necessarily be the same for the deferred sitting as for the main sitting or from one year to the next.

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Deferred Examination 2025

Mathematics

Ordinary Level

Paper 1

Marking scheme

300 marks

Structure of the marking scheme

Candidate responses are marked according to different scales, depending on the types of response anticipated. Scales labelled A divide candidate responses into two categories (correct and incorrect). Scales labelled B divide responses into three categories (correct, partially correct, and incorrect), and so on. The scales and the marks that they generate are summarised in this table:

Scale label	A	B	C	D
No of categories	2	3	4	5
5-mark scale		0, 2, 5	0, 2, 3, 5	
10-mark scale			0, 3, 7, 10	0, 3, 5, 8, 10
15-mark scale				0, 4, 8, 12, 15
20-mark scale				0, 5, 10, 15, 20

A general descriptor of each point on each scale is given below. More specific directions in relation to interpreting the scales in the context of each question are given in the scheme, where necessary.

Marking scales – level descriptors

B-scales (three categories)
- response of no substantial merit (no credit)
- partially correct response (partial credit)
- correct response (full credit)

C-scales (four categories)
- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

D-scales (five categories)
- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- response about half-right (mid partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

In certain cases, typically involving incorrect rounding, omission of units, a misreading that does not oversimplify the work, or an arithmetical error that does not oversimplify the work, a mark that is one mark below the full-credit mark may also be awarded. Such cases are denoted with a * and this level of credit is referred to as *Full Credit -1*. Thus, for example, in Scale 10C, *Full Credit -1* of 9 marks may be awarded.

The only marks that may be awarded for a question are those on the scale below, or *Full Credit -1*.

A rounding penalty is applied each time it occurs in the scheme. There is no penalty for omitted units if the question specifies the unit to be used in the answer, and there is generally no penalty for an omitted euro symbol in questions involving money.

In general, accept a candidate's work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

In general, an answer without sufficient supporting work is awarded the lowest non-zero level of credit (typically Partial Credit or Low Partial Credit, as appropriate).

In general, accept a candidate's work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

Steps
Where steps are listed in the Marking Notes, unless otherwise specified, it is to be taken that they can be independently correct / incorrect – that is, in a candidate's solution, step n can be considered correct even if previous step(s) have not been correctly presented, as long as the work done to arrive at step n from the previous step(s) has not been oversimplified. It is specifically noted where this does not hold. Note also that these steps may not need to be presented in the order specified in the Marking Notes.

Errors
Where a question is **not** marked using steps, if a candidate has a single error, they are generally awarded one level of credit below that which they would otherwise have been awarded. Similarly, where they have two errors, they are generally awarded two levels of credit below that which they would otherwise have been awarded. (If they present sufficient work for *Low Partial Credit*, they will be awarded this at a minimum, regardless of the number of errors.) For example, on a C-scale:

- *High Partial Credit*: One error, otherwise fully correct (or fully correct with a *)
- *Low Partial Credit*: Two errors, otherwise fully correct (or fully correct with a *)

Where a question **is** marked using steps, this does not apply. Instead, an error in a step means that the step has not been completed correctly; this does not affect the completion of other steps (unless it oversimplifies the work). So if a candidate has multiple errors on a single step, they could still be awarded up to *High Partial Credit*, depending on the marking scheme.

Slips and *
Where a candidate has a single * on their solution, this is ignored in the awarding of credit unless they would otherwise have *Full Credit*. Where a candidate has multiple *s, this is generally treated as an error.

Multiple answers
Where the solution requires substantial work, mark all attempts and award the marks for the best one, regardless of crossing out.

Where a solution requires selection from the question, for example "tick the correct box only":

- If a candidate has crossed out answer(s), ignore the crossed-out answers
- If a candidate has multiple answers that are **not** crossed out, award the lowest mark associated with these answers (generally, this will be considered incorrect)

Square brackets
Where something is contained in square brackets in the model solution, it is **not** required for *Full Credit*.

Palette of annotations available to examiners

Symbol	Name	Meaning in the body of the work	Meaning when used in the right margin
✔	Tick	Work of relevance	The work presented in the body of the script merits full credit
✖	Cross	Incorrect work (distinct from an error)	The work presented in the body of the script merits 0 credit
*	Star	Rounding / Unit / Arithmetic error Misreading	
∿	Horizontal wavy	Error	
P			The work presented in the body of the script merits partial credit
L			The work presented in the body of the script merits low partial credit
M			The work presented in the body of the script merits mid partial credit
H			The work presented in the body of the script merits high partial credit
F*	F star		The work presented in the body of the script merits Full Credit (− 1)
[	Left Bracket		Another version of this solution is presented elsewhere and it merits equal or higher credit
§	Vertical wavy	No work on this page (portion of the page)	
▭o▭	Oversimplify	The candidate has oversimplified the work	
wom	Work of Merit	There is some value in the work	

Note: Where work of substance is presented in the body of the script, the annotation on the right margin should reflect a combination of annotations in the work

In a **C scale** where * and ∿ and ∿ appear in the body of the work, then **L** should be placed in the right margin.

In the case of a **D scale** with the same annotations, **M** should be placed in the right margin.

A ✔ in the body of the work may sometimes be used to indicate where a portion of the work presented has value and has merited one of the levels of credit described in the marking scheme. The level of credit is then indicated in the right margin.
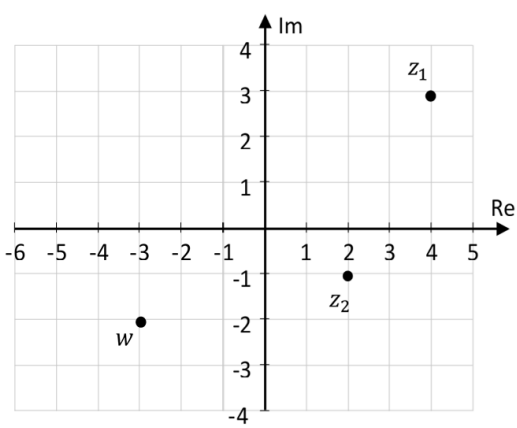
Detailed marking notes

Model Solutions & Marking Notes

Note: The model solutions for each question are not intended to be exhaustive – there may be other correct solutions. Any Examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his / her Advising Examiner.

Q1	Model Solution – 30 Marks	Marking Notes
(a)	$$4(x-2) + 10 = 3x$$ $$4x - 8 + 10 = 3x$$ $$x = -2$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Carries out some relevant correct operation e.g. writes $4x$ *High Partial Credit* • One error, for example error in transposing, but finishes correctly
(b)	$$2x^2 - 4x - 13 = 0$$ $$\frac{4 \pm \sqrt{(-4)^2 - 4(2)(-13)}}{2(2)}$$ $$\frac{4 \pm \sqrt{16 + 104}}{4}$$ $$\frac{4 \pm \sqrt{120}}{4}$$ $$x = 3·738 \ and -1·738$$ $$x = 3·74 \ and -1·74$$	**Scale 10C (0, 3, 7, 10))** **Three steps involved in solution:** **1.** Identifies **a, b,** and **c** **2.** Fully substituted formula **3.** Both correctly evaluated *Low Partial Credit* • Quadratic formula written • Work of merit, for example, identifies one of a, b, or c OR some correct substitution *High Partial Credit* • Two steps correct *Full Credit -1* • Apply a * for no or incorrect rounding

Q1	Model Solution – 30 Marks	Marking Notes
(c)	$$\frac{3x-1}{2} - \frac{2x+2}{5}$$ $$\frac{5(3x-1) - 2(2x+2)}{(2)(5)}$$ $$\frac{15x - 5 - 4x - 4}{10}$$ $$\frac{11x - 9}{10}$$	**Scale 10D (0, 3, 5, 7, 10)** **Four steps involved in solution.** 1. One bit of distribution on numerator correct 2. identifies common denominator 3. Distribution on numerator 4. Simplifying of numerator *Low Partial Credit* • One step correct *Mid Partial Credit* • Two steps correct *High Partial Credit* • Three steps correct

Q2	Model Solution – 30 Marks	Marking Notes
(a) **(i)** **(ii)**	**(i)** **(ii)** $$= -3 - 2i$$	**Scale 10D (0, 3, 5, 8, 10)** **There are 3 items:** **1.** z_1 plotted correctly **2.** z_2 plotted correctly **3.** w correct *Low Partial Credit* • Work of merit *Mid Partial Credit* • One item correct • Work of merit in two items *High Partial Credit* • Two items correct *Full Credit -1* • If part **(ii)** correct and both points plotted correctly in **(i)** but no or incorrect labels
(b)	$$z_3 = z_1 - 3z_2$$ $$= 4 + 3i - 3(2 - i)$$ $$= 4 + 3i - 6 + 3i$$ $$= -2 + 6i$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, some correct work in substitution for $z_1 - 3z_2$ • Some correct expansion of $-3(2 - i)$ *High Partial Credit* • Correctly expands $z_1 - 3z_2$ i.e. $4 + 3i - 6 + 3i$

Q2	Model Solution – 30 Marks	Marking Notes
(c)	$$z_4 = \frac{4+3i}{2-i}$$ Multiply above and below by $2+i$ $$\frac{4+3i}{2-i} \times \frac{2+i}{2+i}$$ $$= \frac{8+4i+6i+3i^2}{4+2i-2i-i^2}$$ $$= \frac{5+10i}{5}$$ $$= 1+2i$$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit, for example, correct substitution OR correct conjugate written • Some relevant correct multiplication *Mid Partial Credit* • Correct substitution AND correct conjugate written • Correct substitution AND some correct multiplication by an incorrect conjugate *High Partial Credit* • $\frac{4+3i}{2-i} \times \frac{2+i}{2+i}$ with some correct multiplication *Full credit -1* • Apply a * if in the form $\frac{5+10i}{5}$

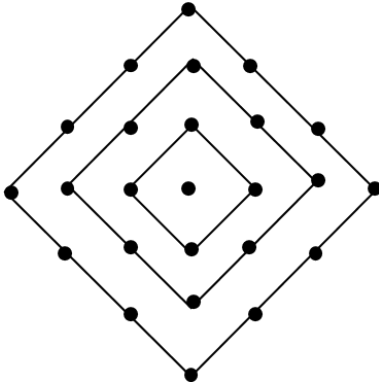| Q3	Model Solution – 30 Marks	Marking Notes
(a) (i)	$$f(5) = 5^2 - 5 - 2 = 18$$ $$f(-3) = (-3)^2 - (-3) - 2 = 10$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Some correct substitution into function *High Partial Credit* • One of 18 or 10 correct i.e. either $f(5)$ or $f(-3)$
(ii)	$$x^2 - x - 2 = 0$$ $$(x - 2)(x + 1) = 0$$ $$x = 2 \text{ and } x = -1$$ $$(2, 0) \text{ and } (-1, 0)$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Some attempt at factorising or quadratic formula *High Partial Credit* • Both factors found correctly but fails to finish i.e. $(x - 2)(x + 1)$ or fully correct formula substituted
(b) (i) (ii)	**(i)** 'positive' box ticked $$x = 4 \text{ and } x = 10$$ **(ii)** $g'(x)$ is positive as the graph is increasing at the point where $x = 11$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit, for example, in (i) correct indication on the graph where slope = 0 OR in (ii) correct box ticked but no or incorrect reason given • One correct answer in (i) *Mid Partial Credit* • One part correct • Work of merit in both parts *High Partial Credit* • One part correct and work of merit in the other part

Q4	Model Solution – 30 Marks	Marking Notes
(a)	$$f'(x) = 3x^2 + 4x$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Some correct differentiation
(b)	$$f'(1) = 3(1)^2 + 4(1)$$ $$= 3 + 4$$ $$= 7$$	**Scale 10C (0, 3, 7, 10))** *Low Partial Credit* • Brings down answer from (a)(i) *High Partial Credit* • Fully correct substitution.
(c)	$$f(1) = 1^3 + 2(1)^2 - 5$$ $$= 1 + 2 - 5$$ $$= -2$$ $$y - y_1 = m\,(x - x_1)$$ $$y - (-2) = 7\,(x - 1)$$ $$[7x - y - 9] = 0$$	**Scale 10C (0, 3, 7, 10)** **Three steps involved in solution:** **1.** Writes answer from (b) **2.** Finds $y = -2$ **3.** Finds equation *Low Partial Credit* • Work of merit, for example, some relevant substitution or writes equation of line formula • One step correct *High Partial Credit* • Two steps correct
(d)	$$g(x^3 + 2x^2 - 5) = x^3 + 2x^2 - 5 + 11$$ $$= x^3 + 2x^2 + 6$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Work of merit, for example, attempts to find $f(k),\ k \neq 1$

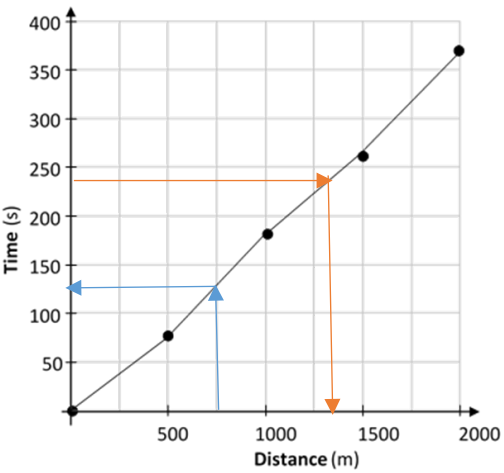| Q5	Model Solution – 30 Marks	Marking Notes
(a) **(i)**	$\begin{array}{\|c\|c\|c\|c\|c\|c\|c\|} \hline x & -2 & -1 & 0 & 1 & 2 & 3 \\ \hline f(x) & 0 & \mathbf{4} & 6 & \mathbf{6} & 4 & \mathbf{0} \\ \hline \end{array}$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • One value correct *High Partial Credit* • Two values correct
(ii)	$A = \dfrac{h}{2}[y_1 + y_n + 2(y_2 + y_3 + \cdots y_{n-1})]$ $A = \dfrac{1}{2}[0 + 0 + 2(4 + 6 + 6 + 4)]$ $A = \dfrac{1}{2}[2(20)]$ $A = 20\ sq\ units$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, the trapezoidal rule written *High Partial Credit* • Formula fully substituted correctly *Full credit -1* • Apply a * for no or incorrect units
(b) **(i)** **(ii)**	**(i)** $16 = 2 \times 2 \times 2 \times 2 = 2^4$ $32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$ **(ii)** $16^x = 32$ $(2^4)^x = 2^5$ $4x = 5$ $x = \dfrac{5}{4}$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit in **(i)**, for example, 2^4 or 2^5 • Work of merit in **(ii)**, for example some relevant work with indices *Mid Partial Credit* • One part correct • Work of merit in both parts *High Partial Credit* • One part correct and work of merit in the other part

Q6	Model Solution – 30 Marks	Marking Notes
(a)	$$3400 \times 1{\cdot}04 = 3536$$ $$3536 \times 1{\cdot}05 = 3712{\cdot}8$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Any relevant percentage written, for example $0 \cdot 04$ or $1 \cdot 04$ *High Partial Credit* • Amount at the end of year one correct
(b)	$$\frac{3750}{25000} \times 100 = 15\%$$ **OR** $$\frac{21250}{25000} \times 100 = 85\%$$ Therefore decreases by 15%	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, finds decrease *High Partial Credit* • $\frac{21250}{25000} \times 100 = 85$ *Full credit -1* • Leaves answer as $0{\cdot}15$
(c)	$8640 = 1{\cdot}2$ so start of Year 3 is 7200 $7200 = 1{\cdot}2$ so start of Year 2 is 6000 $6000 = 1{\cdot}2$ so start of Year 1 is 5000 **OR** $$A = P(1 + R)^T$$ $$8640 = (P)1{\cdot}2^3$$ $$P = \frac{8640}{1{\cdot}2^3}$$ [€]5000	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit, for example, writes $0{\cdot}2$ or compound interest formula *Mid Partial Credit* • Works back one year correctly *High Partial Credit* • Works back two years correctly • $8640 = (P)1{\cdot}2^3$ **Note:** zero marks for getting 60% of €8640 and subtracting

Q7	Model Solution – 50 Marks	Marking Notes
(a) **(i)**	$50\,800 + 48\,500 = 99\,300$ $99\,300 \times 4 = 397\,200$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, indicates addition of 50800 and 48500 *High Partial Credit* • Finds 99300 • Multiplies one of the incomes by 4 and then adds on the other income
(ii)	$395\,000 \times 0\cdot125 = 49\,375$	**Scale 5B (0, 2, 5)** **Note:** Accept correct answer without work for full credit *Partial Credit* • Writes 0·125 • Calculates 1% of 395 000
(iii)	$395\,000 = 115\%$ $\dfrac{395\,000}{115} \times 100 = 343\,478\cdot26$ Cost $= 343\,478$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, writes 115% or use of 15% *High Partial Credit* • $\dfrac{395\,000}{115} \times 100$ *Full credit -1* • Apply a * for no or incorrect rounding
(b)	$55\,000 - (10\,100 + 1561\cdot42)$ $= 43\,338\cdot58$ $\dfrac{43\,338\cdot58}{55\,000} \times 100 = 78\cdot79$ $= 78\cdot8[\%]$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, writes $10\,100 + 1561\cdot42$ • Subtracts one of the deductions from gross income • $\dfrac{x}{55\,000} \times 100, x \neq 43338\cdot58$ *High Partial Credit* • $\dfrac{43\,338\cdot58}{55\,000}$ • Leaves answer as $21\cdot2$ with work *Full credit -1* • Apply a * for no or incorrect rounding

Q7	Model Solution – 50 Marks	Marking Notes
(c) (i)	$49\,572 - (12\,012 + 10908) = 26\,652$ $12\,012 @ 0{\cdot}5\% = 60{\cdot}06$ $10\,908 @ 2\% = 218{\cdot}16$ $26\,652 @ 4\underline{\% = 1066{\cdot}08}$ $ = 1344{\cdot}30$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit, for example writes one of the rates as a percentage, e.g. $0 \cdot 02$ or $0 \cdot 005$ *Mid Partial Credit* • Finds one correct amount of USC *High Partial Credit* • Finds two correct amounts of USC and gets as far as finding €26 652
(ii)	$1400 = 56\%$ $\dfrac{1400}{56} \times 100 = 2500$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Work of merit, for example, writes 44% or 56% *High Partial Credit* • Sets up correct fraction but fails to finish i.e. $\dfrac{1400}{56} \times 100$

Q8	Model Solution – 50 Marks	Marking Notes
(a) (i)		**Scale 10C (0, 3, 7 ,10)** **16 items: 4 lines and 12 dots** *Low Partial Credit* • Any one item drawn *High Partial Credit* • 8 items correct
(a) (ii)	 <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>$f(x)$</td><td>1</td><td>5</td><td>**13**</td><td>**25**</td><td>**41**</td></tr></table>	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • 1 correct entry • Difference between $f(x)$ values found *High Partial Credit* • 2 correct entries
(a) (iii)	$$T_1 = 1$$ $$2 + b + c = 1$$ $$b + c = -1$$ $$T_2 = 5$$ $$8 + 2b + c = 5$$ $$2b + c = -3$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Any correct substitution into T_n *High Partial Credit* • Any one correct equation found
(a) (iv)	$$b + c = -1$$ $$\underline{2b + c = -3}$$ $$-b - c = +1$$ $$\underline{2b + c = -3}$$ $$b = -2$$ $$c = 1$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Some work of merit *High Partial Credit* • Either b or c found
(b)	$$104\,500 - 100\,000 = 4500$$ $$\frac{4500}{3} = 1500$$ $$p = 101\,500 \text{ and } q = 103\,000$$	**Scale 5B (0, 2, 5)** Accept correct answers without work *Partial Credit* • Work of merit, for example, one value correct or writes 4500 or $104\,500 - 100\,000$

Q8	Model Solution – 50 Marks	Marking Notes
(c) (i)	Green is 13 seconds Amber is 2 seconds Red is 20 seconds Total cycle is 35 seconds Two full cycles is 70 seconds An extra Red to Green is 20 seconds An extra Green to Amber is 13 seconds **Total time is 103 seconds**	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, some relevant addition or works way to one change i.e. writes "After 20 seconds turns green" or similar *High Partial Credit* • Doing it in individual steps and finds correct times of 2 steps and adds times. E.g. $60 + 39 = 69$
(c) (ii)	Each cycle is 35 seconds 25 minutes = 1500 seconds 42 full cycles = 1470 seconds, so 30 seconds extra. 20 seconds is Red, meaning 10 seconds remaining The light will be Green!	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Writes what one full cycle of the lights is, i.e. 35 seconds • Finds 25 minutes in seconds *High Partial Credit* • Finds 42 full cycles but fails to finish correctly

Q9	Model Solution – 50 Marks	Marking Notes
(a) **(i)**		**Scale 10D (0, 3, 5, 8, 10)** **Note:** Solution requires 6 items, 5 points plotted and joined *Low Partial Credit* • 1 item correct *Mid Partial Credit* • 2 or 3 items correct *High Partial Credit* • 4 items correct *Full Credit -1* • Apply a * if 5 items correct
(a) **(ii)** **(iii)**	(ii) $t = 130 \; seconds$ (iii) $1650 - 1300$ 350 m	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit in (i) or (ii) , for example a relevant vertical line drawn in either part *Mid Partial Credit* • One part correct • Work of merit in both parts *High Partial Credit* • One part correct and work of merit in the other part *Full credit -1* • Apply a * for no or incorrect units
(b) **(i)** **(ii)**	(i) $\dfrac{2000}{366 \cdot 43} = 5 \cdot 46$ m/sec (ii) $\dfrac{2000}{5 \cdot 31} = 376 \cdot 65$ sec $t = 6 \; minutes \; and \; 17 \; seconds$	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit* • Work of merit in (i) **or** (ii), for example, Distance Speed Time formula written • Work of merit, for example, some relevant substitution into formula, in (i) **and** (ii) *Mid Partial Credit* • One part correct • Work of merit in both parts *High Partial Credit* • One part correct and work of merit in the other part

Q9	Model Solution – 50 Marks	Marking Notes
(c) **(i)**	$$\frac{53{\cdot}55}{21} = \frac{51}{20} = 2{\cdot}55$$ $2 \cdot 55 \times 10$ and $2 \cdot 55 \times 11$ Rower A: $25{\cdot}5$ Rower B: $28{\cdot}05$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, 21 , or correct numerator or denominator *High Partial Credit* • Finds $25{\cdot}5$ or $28{\cdot}05$ with work
(c) **(ii)**	$$57{\cdot}5 - 25 = 32{\cdot}5$$ $$25 : 32{\cdot}5$$ $$R = 1{\cdot}3$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, some relevant subtraction *High Partial Credit* • $25 : 32{\cdot}5$ but fails to find R

Q10	Model Solution – 50 Marks	Marking Notes
(a) **(i)** **(ii)**		**Scale 20D (0, 5, 10, 15, 20)** **Note:** Solution requires 17 items, 7 values in table, 9 points plotted and joined *Low Partial Credit* • Any 1 to 2 items correct *Mid Partial Credit* • 3 to 8 items correct *High Partial Credit* • 9 to 15 items correct *Full Credit -1* Apply a * if 16 items correct
(b) **(i)** **(ii)**	Work to be shown on graph for (i) and (ii). (i) 47 (ii) Between **4** a.m. and **6** a.m.	**Scale 10D (0, 3, 5, 8, 10)** **Note :** In (i) accept $45 <$ speed < 50 for FC *Low Partial Credit* • Work of merit in (i) or (ii) , for example appropriate lines drawn on diagram for either (i) or (ii) *Mid Partial Credit* • One part correct • Work of merit in both parts *High Partial Credit* • One part correct and work of merit in the other part
(c) **(i)**	$$-x^2 + 8x + 9 = 24$$ $$x^2 - 8x + 15 = 0$$ $$(x - 5)(x - 3) = 0$$ $Answer$: 3 [$a.m.$] and 5 [$a.m.$]	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Sets up $g(x) = 24$ • Any correct step in factorising • Writes quadratic formula *High Partial Credit* • Finds correct factors but fails to finish • Solves $g(x) = 0$

The table in (a):

x	0	1	2	3	4	5	6	7	8
$f(x)$	10	35	42	37	26	15	10	17	42

Q10	Model Solution – 50 Marks	Marking Notes
(c) (ii)	$$g(x) = -x^2 + 8x + 9$$ $$g'(x) = -2x + 8$$ $$-2x + 8 = 0$$ $$x = 4$$ Time: 4 $$-(4)^2 + 8(4) + 9$$ Maximum wind speed: $$25 \text{ km/hour}$$	**Scale 10D (0, 3, 5, 8, 10)** **Four steps involved in solution:** **1.** Correct differentiation **2.** Equates derivative to zero **3.** Solves for x **4.** Finds the maximum value *Low Partial Credit* - Work of merit**,** for example, some correct differentiation OR $g'(x) = 0$ written or some relevant substitution into $g(x)$ - One step correct *Mid Partial Credit* - Two steps correct *High Partial Credit* - Three steps correct *Full credit -1* - Apply a * for no or incorrect units

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Deferred Examination 2025

Mathematics

Ordinary Level

Paper 2

Marking scheme

300 marks

Structure of the marking scheme

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Scale label	A	B	C	D
No of categories	2	3	4	5
5-mark scale		0, 2, 5	0, 2, 3, 5	0, 2, 3, 4 ,5
10-mark scale		0, 5, 10	0, 4, 6, 10	0, 3, 5, 7, 10
15-mark scale				0, 6, 8, 10, 15

A general descriptor of each point on each scale is given below. More specific directions in relation to interpreting the scales in the context of each question are given in the scheme, where necessary.

Marking scales – level descriptors

B-scales (three categories)
- response of no substantial merit (no credit)
- partially correct response (partial credit)
- correct response (full credit)

C-scales (four categories)
- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

D-scales (five categories)
- response of no substantial merit (no credit)
- response with some merit (low partial credit)
- response about half-right (mid partial credit)
- almost correct response (high partial credit)
- correct response (full credit)

In certain cases, typically involving incorrect rounding, omission of units, a misreading that does not oversimplify the work, or an arithmetical error that does not oversimplify the work, a mark that is one mark below the full-credit mark may also be awarded. Such cases are denoted with a * and this level of credit is referred to as *Full Credit -1*. Thus, for example, in Scale 10C, *Full Credit -1* of 9 marks may be awarded.

The only marks that may be awarded for a question are those on the scale below, or *Full Credit -1*.

A rounding penalty is applied each time it occurs in the scheme. There is no penalty for omitted units if the question specifies the unit to be used in the answer, and there is generally no penalty for an omitted euro symbol in questions involving money.

In general, accept a candidate's work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

In general, an answer without sufficient supporting work is awarded the lowest non-zero level of credit (typically Partial Credit or Low Partial Credit, as appropriate).

In general, accept a candidate's work in one part of a question for use in subsequent parts of the question, unless this oversimplifies the work involved.

Steps
Where steps are listed in the Marking Notes, unless otherwise specified, it is to be taken that they can be independently correct / incorrect – that is, in a candidate's solution, step n can be considered correct even if previous step(s) have not been correctly presented, as long as the work done to arrive at step n from the previous step(s) has not been oversimplified. It is specifically noted where this does not hold. Note also that these steps may not need to be presented in the order specified in the Marking Notes.

Errors
Where a question is **not** marked using steps, if a candidate has a single error, they are generally awarded one level of credit below that which they would otherwise have been awarded. Similarly, where they have two errors, they are generally awarded two levels of credit below that which they would otherwise have been awarded. (If they present sufficient work for *Low Partial Credit*, they will be awarded this at a minimum, regardless of the number of errors.) For example, on a C-scale:

- *High Partial Credit*: One error, otherwise fully correct (or fully correct with a *)
- *Low Partial Credit*: Two errors, otherwise fully correct (or fully correct with a *)

Where a question **is** marked using steps, this does not apply. Instead, an error in a step means that the step has not been completed correctly; this does not affect the completion of other steps (unless it oversimplifies the work). So if a candidate has multiple errors on a single step, they could still be awarded up to *High Partial Credit*, depending on the marking scheme.

Slips and *
Where a candidate has a single * on their solution, this is ignored in the awarding of credit unless they would otherwise have *Full Credit*. Where a candidate has multiple *s, this is generally treated as an error.

Multiple answers
Where the solution requires substantial work, mark all attempts and award the marks for the best one, regardless of crossing out.

Where a solution requires selection from the question, for example "tick the correct box only":

- If a candidate has crossed out answer(s), ignore the crossed-out answers
- If a candidate has multiple answers that are **not** crossed out, award the lowest mark associated with these answers (generally, this will be considered incorrect)

Square brackets
Where something is contained in square brackets in the model solution, it is **not** required for *Full Credit*.

Palette of annotations available to examiners

Symbol	Name	Meaning in the body of the work	Meaning when used in the right margin
✔	Tick	Work of relevance	The work presented in the body of the script merits full credit
✖	Cross	Incorrect work (distinct from an error)	The work presented in the body of the script merits 0 credit
*	Star	Rounding / Unit / Arithmetic error Misreading	
〰	Horizontal wavy	Error	
P			The work presented in the body of the script merits partial credit
L			The work presented in the body of the script merits low partial credit
M			The work presented in the body of the script merits mid partial credit
H			The work presented in the body of the script merits high partial credit
F*	F star		The work presented in the body of the script merits Full Credit (– 1)
[	Left Bracket		Another version of this solution is presented elsewhere and it merits equal or higher credit
⟩	Vertical wavy	No work on this page (portion of the page)	
⊡	Oversimplify	The candidate has oversimplified the work	
wom	Work of Merit	There is some value in the work	

Note: Where work of substance is presented in the body of the script, the annotation on the right margin should reflect a combination of annotations in the work

In a **C scale** where * and 〰 and 〰 appear in the body of the work, then **L** should be placed in the right margin.

In the case of a **D scale** with the same annotations, **M** should be placed in the right margin.

A ✔ in the body of the work may sometimes be used to indicate where a portion of the work presented has value and has merited one of the levels of credit described in the marking scheme. The level of credit is then indicated in the right margin.

Detailed marking notes

Model Solutions & Marking Notes

Note: The model solutions for each question are not intended to be exhaustive – there may be other correct solutions. Any Examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his / her Advising Examiner.

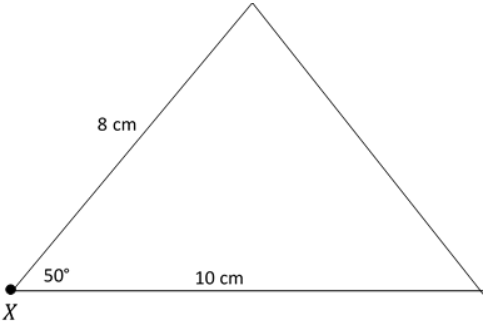| Q1	Model Solution – 30 Marks	Marking Notes
(a)	$$y - y_1 = m(x - x_1)$$ $$y - 4 = \frac{3}{2}(x - 0)$$ $$2y - 8 = 3x$$ $$3x - 2y + 8 = 0$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, writes equation of a line formula or identifies $m = \frac{3}{2}$ or point labelled for substitution. *High Partial Credit* • Formula with partial substitution
(b)	$$(0, 0) \quad (3, 4) \quad (5, -1)$$ $$\frac{1}{2}|x_1 y_2 - x_2 y_1|$$ $$\frac{1}{2}|(3)(-1) - (5)(4)|$$ $$\frac{1}{2}|-3 - 20|$$ $$\frac{23}{2} \ (11{\cdot}5)\text{sq units}$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example correct area formula, length of line formula or point labelled for substitution. *High Partial Credit* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no units
(c)	<table><tr><th>SLOPE</th><th>LABEL</th></tr><tr><td>$-\frac{1}{5}$</td><td>q</td></tr><tr><td>2</td><td>s</td></tr><tr><td>-1</td><td>r</td></tr><tr><td>$\frac{1}{2}$</td><td>p</td></tr></table>	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, mentions slope being positive or negative • $\frac{Rise}{Run}$ • Any one slope correct. *High Partial Credit* • Any 2 slopes correct

Q2	Model Solution – 30 Marks	Marking Notes
(a) (i)	$Centre\ (0,0)$ $Radius = \sqrt{169} = 13$	**Scale 5C (0, 2, 3, 5)** Accept correct answers without work *Low Partial Credit* • Work of merit, for example writes circle formula *High Partial Credit* • Centre or Radius correct
(a) (ii)	Sub 1 in for x and 12 in for y $(1)^2 + (12)^2 = 1 + 144 = 145$ $145 \neq 169$ so not on c	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Substitutes in for either x or y • Work of merit, for example, relevant formula *High Partial Credit* • Substitutes correctly, expands but fails to draw conclusion or incorrect conclusion *Full Credit (-1):* • Apply a * for no reason.
(b)	$(x - h)^2 + (y - k)^2 = r^2$ Centre is mid-point of $\overline{OT}$ x=$\left(\frac{0+4}{2}\right)$, y=$\left(\frac{0+0}{2}\right)$ Centre=(2,0) Radius=$\sqrt{(4\text{-}2)^2+(0\text{-}0)^2}=\sqrt{4}=2$ $(x - 2)^2 + (y - 0)^2 = 2^2$ $(x - 2)^2 + y^2 = 4$	**Scale 10C (0, 4, 6, 10)** Accept correct answers without work *Low Partial Credit* • Work of merit, for example writes midpoint formula, circle formula or length of line formula • Centre or radius correct *High Partial Credit* • Centre and Radius correct • Centre correct and work of merit in Equation part • Work of merit in the Centre **and** Equation part

Q2	Model Solution – 30 Marks	Marking Notes
(c)	Length of square=diameter=4 Area of square=4 × 4 = 16 sq units	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, identifies radius = 2 or diameter = 4 *High Partial Credit* • Identifies square has a side of 4 *Full Credit (-1):* • Apply a * for no units

Q2	Model Solution – 30 Marks	Marking Notes
		Scale 10C (0, 4, 6, 10)

Q3	Model Solution – 30 Marks	Marking Notes
(a)	0 and 6 6 and 0 2 and 4 4 and 2	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Identifies one possible way *High Partial Credit* • Identifies two possible ways
(b)	Spinner A $P(0) = \frac{1}{4}$ Spinner B $P(0) = \frac{2}{6}$ $$P(\text{both } 0) = \frac{1}{4} \times \frac{2}{6} = \frac{2}{24}$$ $$= \frac{1}{12}$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Correct formula written • Identifies $\frac{a}{6}$ **or** $\frac{2}{3}$ **or** $\frac{\#}{24}$ *High Partial Credit* • Equates both fractions but fails to finish
(c)	Expected Number of Tokens $$\frac{2}{6}(0) + \frac{1}{6}(1) + \frac{1}{6}(3) + \frac{1}{6}(4) + \frac{1}{6}(8)$$ $$= 0 + \frac{1}{6} + \frac{3}{6} + \frac{4}{6} + \frac{8}{6} = \frac{16}{6} \left(2 \cdot \dot{6}\right)$$	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit* • Work of merit, correct relevant formula • One correct term or operation indicated for example $\frac{1}{6}(1)$ or similar *Mid Partial Credit* • Works out any one correct expected value *High Partial Credit* • Finds all correct fractions but fails to add
(d)	Advise to chose Option 1 [Option 1] E(A)=3 [Option 2] E(B)=2·6̇ [Option 3] No Spin=2 Reason: Option 1 has the better expected outcome	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, brings down expected average of A from part (c) • Writes expected average of B in this part. *High Partial Credit* • Gives correct option but fails to give a reason

Q4	Model Solution – 30 Marks	Marking Notes
(a) (i)	**50 60** 70 **80 90 100 110**	**Scale 15D (0, 6, 8, 10, 15)** *Low Partial Credit* • Work of merit in any one part. For example • Any one correct box filled in (i) • Indicates mean ± standard deviation *Mid Partial Credit* • Any one part of (i), (ii) or (iii) correct • Work of merit in any two parts *High Partial Credit* • One part correct and work of merit in the other two parts • Any two parts of (i), (ii) or (iii) correct • Work of merit in all three parts
(a) (ii)	68% lie between 70 and 90 $$1500 \times 0 \cdot 68 = 1020$$	
(a) (iii)	$$1500 \times 95\% = 1425$$ $$(90\ to\ 100) = \left(\frac{1425 - 1020}{2}\right)$$ $$= 202 \cdot 5$$ $$(100\ to\ 110) = 1500 \times 2 \cdot 5\%$$ $$= 37 \cdot 5$$ $$(90\ to\ 110) = 202 \cdot 5 + 37 \cdot 5$$ $$= 240$$ $$(\%)\frac{240}{1500} \times 100 = 16\%$$	
(b) (i)	$$\text{Area} = \pi r^2 \times \left(\frac{\text{Angle}}{360}\right)$$ $$= 3 \cdot 1416 \times (12^2) \times \frac{77}{360}$$ $$= 96 \cdot 767$$ $$= 96 \cdot 8[\text{cm}^2]$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, correct formula written OR radius identified as 12 *High Partial Credit* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no or incorrect rounding
(b) (ii)	$$\text{Perimeter} = 2(r) + 2\pi r \times \left(\frac{\text{Angle}}{360}\right)$$ $$= 2(12) + 2\pi(12) \times \frac{77}{360}$$ $$= 24 + 16 \cdot 126..$$ $$= 40 \cdot 1\ [\text{cm}]$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Correct formula written • 2(12) *High Partial Credit* • Formula full substituted correctly • Arc length (16·126) *Full Credit (-1):* • Apply a * for early rounding

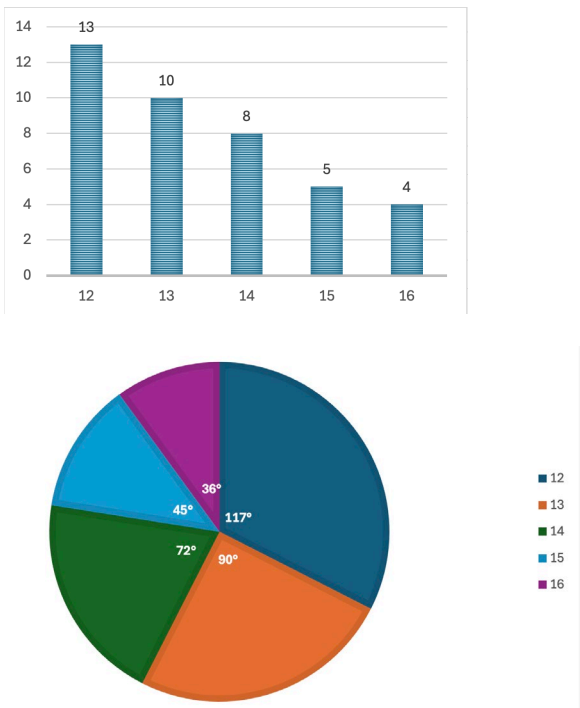| Q5	Model Solution – 30 Marks	Marking Notes
(a) (i)	$$\frac{|DE|}{|BA|} = k = \frac{12}{8} = 1 \cdot 5 \ [\text{cm}]$$	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit* • Work of merit, for example, relevant numerator or denominator • Work of merit in **(ii)**, for example, use of $1 \cdot 5$ **and** 15
(a) (ii)	$$\frac{|OC|}{|OA|} = k = \frac{15}{|OA|} = 1 \cdot 5$$ $$\frac{15}{1 \cdot 5} = |OA| = 10 \text{ cm}$$	*Mid Partial Credit* • Either part (i) or part (ii) correct • Work of merit in (i) and (ii) *High Partial Credit* • One part correct and work of merit in the other *Full Credit (-1):* • Apply a * for no units
(b)	$$\text{Area}\triangle\text{OCD} = k^2 \ \text{Area}\triangle\text{OAB}$$ $$= (1 \cdot 5)^2 \times (36 \cdot 7)$$ $$= 82 \cdot 575 \ \text{cm}^2$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, some correct substitution into formula or k^2 written *High Partial Credit* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no units
(c)	$$Area = \frac{1}{2}\ [b \times h]$$ $$36 \cdot 7 = \frac{1}{2}\ [8 \times h]$$ $$h = 9 \cdot 175 \text{ cm}$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, correct formula written *High Partial Credit* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no units

Q6	Model Solution – 30 Marks	Marking Notes
(a) **(i)**	$Area = \frac{1}{2} abSinC$ $= \frac{1}{2} \mid 8\,X\,10 \mid \times \sin 50°$ $= 30 \cdot 6 \; [\text{cm}^2]$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example correct relevant formula *High Partial Credit* • Correct formula fully substituted
(a) **(ii)**		**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Pilot diagram • Any one line drawn correctly to scale *High Partial Credit* • Two correct elements drawn. • Construction correct without arcs (having checked length of sides). **Note**: Tolerance of ±0·25 cm and ±5°
(b)	$x = 180° - 122° = 58°$ $y = \dfrac{122°}{2} = 61°$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, states straight angle/line = 180° or $\angle Q = \angle y$ *High Partial Credit* • x or y found correctly

Q7	Model Solution – 50 Marks	Marking Notes
(a) (i)	$$\tan \theta = \frac{45 \cdot 7}{35} = 1 \cdot 3057 \ldots$$ $$\theta = 52 \cdot 55° = 53°$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Correct Trig Ratio Formula written • Finds $\lvert AL \rvert = 57 \cdot 6$(in this part) *High Partial Credit* • Finds $\frac{45 \cdot 7}{35}$ *Full Credit (-1):* Apply a * for no or incorrect rounding
(ii)	$$\lvert AL \rvert^2 = 45 \cdot 7^2 + 35^2$$ $$2088 \cdot 49 + 1225 = 3313 \cdot 49$$ $$= 57 \cdot 56$$ $$\lvert AL \rvert = 57 \cdot 6 \text{ m}$$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit, for example, writes Pythagoras theorem *High Partial Credit* • One error but finishes correctly *Full Credit (-1):* Apply a * for early rounding (Trigonometric method)
(iii)	$$Length \ in \ feet \ X \times k = length \ in \ metres$$ $$150(k) = 45 \cdot 7$$ $$k = \frac{45 \cdot 7}{150} = 0 \cdot 3046 = 0 \cdot 305$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Fully substitutes the given formula correctly but fails to finish or finishes incorrectly *Full Credit (-1):* • Apply a * for no or incorrect rounding
(b) (i)	$$\frac{y}{Sin \ 30°} = \frac{3 \cdot 5}{Sin \ 125°}$$ $$y = \frac{3 \cdot 5(Sin \ 30°)}{Sin \ 125°}$$ $$= 2 \cdot 136 = 2 \cdot 14 \text{ [km]}$$	**Scale 10C (0, 3, 7,10)** *Low Partial Credit* • Sine Rule Formula *High Partial Credit* • Sine Rule Formula fully substituted • Error in substituting Sine Rule formula but finishes correctly *Full Credit (-1):* • Apply a * for no or incorrect rounding

Q7	Model Solution – 50 Marks	Marking Notes
(b) **(ii)**	$\|z\|^2=(3{\cdot}5)^2+(2{\cdot}5)^2-2(3{\cdot}5)(2{\cdot}5)\cos 45°$ $=12{\cdot}25+6{\cdot}25-12{\cdot}37436$ $=6{\cdot}1256$ $z = 2 \cdot 48$ [km]	**Scale 10D (0, 3, 5, 7, 10)** ***Zero Credit:*** Treats triangle as right angled *Low Partial Credit* • Work of merit, for example $3 \cdot 5^2$ or $2 \cdot 5^2$ written • Cosine Rule formula written *Mid Partial Credit* • Cosine Rule formula fully substituted *High Partial Credit* • Finds $\|z\|^2$ *Full Credit (-1):* • Apply a * for no or incorrect rounding
(b) **(iii)**	$6! = 720$ **OR** $6 \, x \, 5 \times 4 \times 3 \times 2 \times 1 = 720$	**Scale 5B (0, 2, 5)** Accept correct answer without work *Partial Credit* • Work of merit, for example indicates multiplication of two relevant numbers
(b) **(iv)**	$2 \times 4 \times 3 \times 2 \times 1 \times 1 = 48$	**Scale 5C (0, 2, 3, 5)** Accept correct answer without work *Low Partial Credit* • Work of merit, for example indicates multiplication of two relevant numbers or 2, 3, or 4 written • F,C,E,B,D,A or similar *High Partial Credit* • Identifies correct values to multiply for first and last value, but fails to finish correctly

Q8	Model Solution – 50 Marks	Marking Notes
(a) (i)	$Vol = l \times b \times h$ $= 150 \times 30 \times 20$ $= 90\,000 \ [cm^3]$	**Accept correct answer without work** **Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example writes $l \times b \times h$ *High Partial Credit* • Multiplies any two lengths correctly
(a) (ii)	Volume of cylinder $= \pi r^2 h$ $= 6^2(30)\pi$ $= 1080\pi$ $5 \ cylinders = 5 \times 1080\pi$ $= 5400\pi$ $= 16964 \cdot 6$ $Volume \ of \ step = 90\,000 - 16964 \cdot 6$ $= 73035 \cdot 4 \ [cm^3]$	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit* • Work of merit, for example, writes formula for volume of a cylinder • Substitutes r or h correctly *Mid Partial Credit* • Correctly finds the volume of one cylinder *High Partial Credit* • Correctly finds volume of 5 cylinders but fails to finish *Full Credit (-1):* • Apply a * for no or incorrect rounding
(b)	$0 \cdot 125 \ @ \ €185 \ per \ m^3 = €23 \cdot 125$ $€23 \cdot 125 \ \times \ 50 = €1156 \cdot 25$ $€1156 \cdot 25 \times 1 \cdot 135 = €1312 \cdot 34 = €1312$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, writes $13 \cdot 5\%$ as $0 \cdot 135$ *High Partial Credit* • Finds $1156 \cdot 25$

Q8	Model Solution – 50 Marks	Marking Notes
(c)	Volume of cone $= \dfrac{1}{3}\pi r^2 h$ $= \dfrac{1}{3}\pi r(6)^2(16) = 192\pi$ Volume of sphere $= \dfrac{4}{3}\pi (r)^3$ $= \dfrac{4}{3}\pi(6)^3 = 288\pi$ *Volume of ornament* $= 480\pi$ [cm³]	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Writes formula for cone or sphere. • Substitutes r or h correctly *High Partial Credit* • Finds volume of cone or volume of sphere correctly • Work of merit in (V_{cone}) and (V_{sphere}) *Full Credit (-1):* Apply a * for answer not in terms of π
(d)	S.A.$= 4(29 \times 13) + 2(13 \times 13)$ $= 1508 + 338$ $= 1846$ cm²	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit* • Work of merit, for example any correct dimension written *Mid Partial Credit* • All side surfaces or top and bottom surfaces identified correctly *High Partial Credit* • All surface areas identified correctly

Q9	Model Solution – 50 Marks	Marking Notes
(a) **(i)**		**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, correct degrees found for **one** section if drawing pie chart, or axes draw for bar chart *High Partial Credit* • 4 correct boxes drawn in bar chart • 2 sectors in the pie chart $$\frac{13}{40} \times 360 = 117^{\circ}$$ $$\frac{10}{40} \times 360 = 90^{\circ}$$ $$\frac{8}{40} \times 360 = 72^{\circ}$$ $$\frac{5}{40} \times 360 = 45^{\circ}$$ $$\frac{4}{40} \times 360 = 36^{\circ}$$
(ii)	$$Median = 13$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Work of merit
(iii)	$$P(13) = \frac{10}{40} = \frac{1}{4}$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Work of merit, for example, correct numerator or denominator
(iv)	$$Child\ 2 \quad Child\ 3$$ $$\frac{1}{7} \quad \times \quad \frac{1}{7}$$ $$= \frac{7}{343} = 0{\cdot}02$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Any one correct probability written *High Partial Credit* • Finds three correct probabilities but fails to finish correctly

Q9	Model Solution – 50 Marks	Marking Notes
(b) **(i)**	$$\frac{160}{250}$$ $$= 0 \cdot 64$$ $$= 64\ [\%]$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit, for example, $\frac{160}{250}$ **OR** $\times 100$ *High Partial Credit:* • $\frac{160}{250} \times 100$ **OR** $0 \cdot 64$
(ii)	$$= \frac{1}{\sqrt{250}}$$ $$= 0 \cdot 06324$$ $$= 0 \cdot 06324 \times 100$$ $$= 6 \cdot 3\%$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit for example $n = 250$, $\times 100$ • Correct relevant formula $\left(\frac{1}{\sqrt{n}}\right)$ *High Partial Credit:* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no or incorrect rounding
(iii)	**Calculations** $$\hat{p} \pm \frac{1}{\sqrt{n}}$$ $$64 - 6 \cdot 3 \le p \le 64 + 6 \cdot 3$$ $$57 \cdot 7 \le p \le 70 \cdot 3$$ **Testing** $$\underline{p = 60\%}$$ $$57 \cdot 7 \le 60 \le 70 \cdot 3$$ **Conclusion** *The percentage of youth club members in Connaught is NOT different from the population percentage.* **Reason** *Because 60% lies within the range.*	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit:* • Work of merit, for example, writes answer from **(b)(i)** or **(b)(ii)** in this part • $\hat{p} \pm \frac{1}{\sqrt{n}}$ *Mid Partial Credit* • Correct range written *High Partial Credit* • Correct range and conclusion given, but no reason written • Correct range and reason given, but incorrect conclusion written

Q10	Model Solution – 50 Marks	Marking Notes
(a) (i)		**Scale 10D (0, 3, 5, 7, 10)**

(a) (i)

			Team A						Team B			
					9	5					
			9	9	3	6	3	5	8	8	9
7	7	5	**3**	2	1	1	7	6	6		
			5	4	2	8	**1**	3	4		
					1	9	3	4	5	6	6

Key: 3|6 = 6·3 seconds   Key: 7|6 = 7·6 seconds

Scale 10D (0, 3, 5, 7, 10)

Low Partial Credit
- Work of merit, for example, any one correct addition to diagram

Mid Partial Credit
- Either Team A or Team B diagram fully correct, or additional 20 items added correctly to diagram

High Partial Credit
- Up to 25 items filled in correctly

(a) (ii)

Range of Team A is 5·9 to 9·1
= 3·2 seconds

Range of Team B is 6·3 to 9·6
= 3·3 seconds

Scale 10C (0, 4, 6, 10)

Low Partial Credit
- Any one Range or Median time written correctly

High Partial Credit
- Either part **(ii) or (iii)** fully correct
- Work of merit in **(ii) and (iii)**

(iii)

Median Time for Team A is 7·3 seconds

Median Time for Team B is 8·1 seconds

(a) (iv)

Team B has a bigger range than A, but Team A has the fastest sprinter at 5·9 seconds.

Team B has the slower sprinters with 5 taking longer than 9 seconds, only 1 of team A was longer than 9 seconds.

Scale 5B (0, 2, 5)

Partial Credit
- Work of merit, for example, writes incomplete sentence or doesn't compare A and B

Q10	Model Solution – 50 Marks	Marking Notes
(b) (i)	Tree Diagram	**Scale 10D (0, 3, 5, 7, 10)** *Low Partial Credit* • Work of merit, for example, any one correct additional outcome or probability added to table *Mid Partial Credit* • Fully correct Outcomes column in table, or fully correct Probabilities column in Table • Any three correct additional outcomes or probabilities added to table *High Partial Credit* • Any three correct additional outcomes and probabilities added to table
(b) (ii)	$P(W) = 0 \cdot 4875 + 0 \cdot 343$ $= 0 \cdot 8305$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Identifies any one correct probability/outcomes *High Partial Credit* • Identifies both probabilities/outcomes but fails to add

Q10	Model Solution – 50 Marks	Marking Notes
(b) **(iii)**	$P(walk\ on\ day\ 3)$ $=\ 0{\cdot}1625 \times 0{\cdot}1625 \times 0{\cdot}4875$ $= 0{\cdot}01287304$ $= 0{\cdot}0129$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Identifies any one correct probability/outcome *High Partial Credit* • Identifies three correct probabilities/outcomes but fails to finish correctly *Full Credit (-1):* • Apply a * for no or incorrect rounding