Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2024

Marking Scheme

Mathematics

Ordinary Level

Note to teachers and students on the use of published marking schemes

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. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

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 all 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 from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

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 their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes 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 in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2024

Mathematics

Ordinary Level

Paper 1

Marking scheme

300 marks

Marking Scheme – Paper 1, Section A and Section B

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, 5	0, 2, 5	0, 2, 3, 5	0, 2, 3, 4, 5
10-mark scale		0, 4, 10	0, 4, 6, 10	0, 3, 5, 7, 10
15-mark scale			0, 5, 8, 15	0, 5, 7, 9, 15
20-mark scale				0, 7, 10, 12, 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

A-scales (two categories)

- response of no substantial merit (no credit)
- correct response (full credit)

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 or incorrect 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.

Unless otherwise specified, an answer without sufficient supporting work is generally awarded the lowest non-zero level of credit (typically *Partial Credit* or *Low Partial Credit*, as appropriate).

Summary of mark allocations and scales to be applied

<table>
<tr><th colspan="2">Section A (150)
Answer any five questions</th><th colspan="2">Section B (150)
Answer any three questions</th></tr>
<tr>
<td>Question 1 (30)
(a)(i)(ii) 10D
(b) 10C
(c) 10C

Question 2 (30)
(a)(i)(ii) 10D
(b) 15C
(c) 5B

Question 3 (30)
(a) 10C
(b) 5C
(c) 15D</td>
<td>Question 4 (30)
(a) 10C
(b) 10C
(c) 10C

Question 5 (30)
(a) 5C
(b) 20D
(c) 5B

Question 6 (30)
(a)(i)(ii) 15D
(b)(i) 5C
(b)(ii) 10C</td>
<td>Question 7 (50)
(a)(i)(ii) 10D
(a)(iii)(iv) 5D
(a)(v) 10B
(b)(i) 10C
(b)(ii) 15C

Question 8 (50)
(a)(i) 5B
(a)(ii) 10C
(a)(iii) 10C
(b)(i)(ii) 10D
(b)(iii) 5A
(b)(iv)(v) 10D</td>
<td>Question 9 (50)
(a)(i)(ii) 15D
(b) 10C
(c)(i) 5B
(c)(ii) 10C
(d)(i)(ii) 10D

Question 10 (50)
(a)(i)(ii) 5D
(b)(i)(ii) 15D
(b)(iii) 10B
(b)(iv) 5C
(c)(i)(ii) 15D</td>
</tr>
</table>

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	Nothing correct but **Work of Merit** within the body of 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) (i) & (ii)	**(i)** $30000 \times 0 \cdot 8 = 24\,000$ **OR** $30\,000 \times 20\% = 6000$ $30\,000 - 6000 = [€]24\,000$ **(ii)** $24000 \times 0 \cdot 8 = [€]19\,200$	**Scale 10D (0, 3, 5, 7, 10)** Accept correct answers without work *Low Partial Credit* • Work of merit, for example, a relevant formula, finds 20%, $0 \cdot 8$ or 80% written down *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part *Full Credit -1* • Correct answer for **(ii)** only (i.e. €19 200) given without work
(b)	$4716 - 4500 = 216$ $\frac{216}{4500} \times 100 = 4 \cdot 8\,[\%]$ **OR** $\frac{4716}{4500} \times 100$ $= 104 \cdot 8$ $4 \cdot 8\,[\%]$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, some correct subtraction or relevant fraction *High Partial Credit* • $\frac{4716-4500}{4500} \times 100$ • $104 \cdot 8$ with work

Q1	Model Solution – 30 Marks	Marking Notes
(c)	$\frac{52\,875}{112 \cdot 5} \times 100 = [€]47\,000$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, mentions $112 \cdot 5$ or $1 \cdot 125$ • Finds $12 \cdot 5$ % and continues or stops *High Partial Credit* • $\frac{52\,875}{112 \cdot 5} \times 100$ • 470

Q2	Model Solution – 30 Marks	Marking Notes
(a) (i) & (ii)	**(i)** $z_1 = 4 + 3i$ $z_2 = 0 + 2i$ (Accept $2i$ for z_2) $z_3 = -2 - i$ **(ii)** $\|z_2\| = 2$	**Scale 10D (0, 3, 5, 7, 10)** **Four items involved in solution:** **1**. z_1 **2.** z_2 **3.** z_3 **4.** $\|z_2\|$ *Low Partial Credit* • One ordinate of one complex number correct • Modulus formula *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • Two items correct *High Partial Credit* • Three items correct
(b)	$\frac{15}{1+2i} \times \frac{1-2i}{1-2i}$ $= \frac{15-30i}{5}$ $= 3 - 6i$	**Scale 15C (0, 5, 8, 15)** *Low Partial Credit* • Work of merit, for example, writes down the conjugate • Some correct multiplication *High Partial Credit* • $\frac{15}{1+2i} \times \frac{1-2i}{1-2i}$ with some correct multiplication *Full Credit -1* • Apply a * if in the form $\frac{15-30i}{5}$
(c)	Box C ticked $1 - 2i$ **OR** The conjugate is reflected in the real axis	**Scale 5B (0, 2, 5)** *Partial Credit* • Correct box ticked • Work of merit in reason, for example, $1 - 2i$

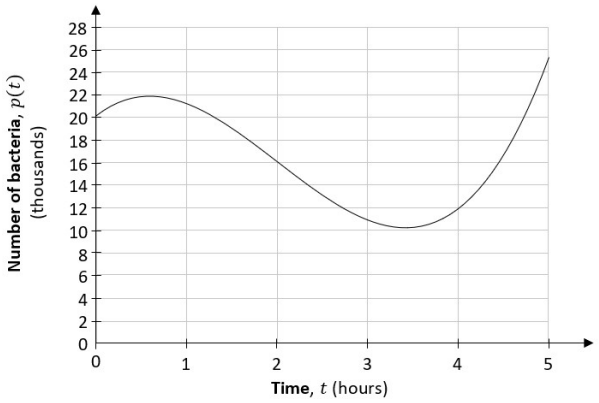
Q3	Model Solution – 30 Marks	Marking Notes
(a)	Set B Set A cost per block $$\frac{12}{60} = 0 \cdot 2$$ Set B cost per block $$\frac{28}{150} = 0 \cdot 1867$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Correct box ticked • Work of merit, for example, a correct calculation/setup, $\frac{12}{60}$ or similar *High Partial Credit* • A full comparable calculation worked out, for example, 150 of set A calculated or 60 of Set B calculated OR The per unit cost of both • Correct box ticked and work of merit
(b)	$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(3)(1)}}{2(3)}$$ $x = 0 \cdot 2324$ and $x = 1 \cdot 43425$ $x = 0 \cdot 23$ and $x = 1 \cdot 43$	**Scale 5C (0, 2, 3, 5)** **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 *High Partial Credit* • Two steps correct • Formula fully correctly substituted • Second value not found *Full Credit -1* • Apply a * for no or incorrect rounding

Q3	Model Solution – 30 Marks	Marking Notes
(c)	$y = 5 - 2x$ $x^2 + (5 - 2x)^2 = 25$ $x^2 + 25 - 20x + 4x^2 - 25 = 0$ $5x^2 - 20x = 0$ $5x(x - 4) = 0$ $x = 0$ or $x = 4$ $y = 5$ or $y = -3$	**Scale 15D (0, 5, 7, 9, 15)** **Four steps involved in solution:** **1.** Writes one variable in terms of the other **2.** Substitute this into the quadratic **3.** Finds both values of x (or y) **OR** one co-ordinate set **4.** Finds the two co-ordinate sets *Low Partial Credit* • Some work of merit, for example, one correct transposition on any step • Trial and improvement • Writes the quadratic formula *Mid Partial Credit* • Two steps correct *High Partial Credit* • Three steps correct

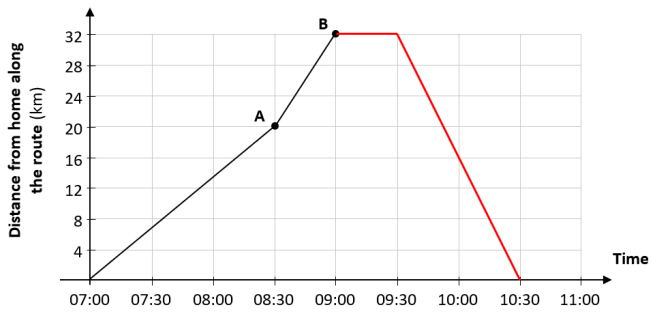
Q4	Model Solution – 30 Marks	Marking Notes
(a)	$8x - 20 - 1 = 3x + 7$ $5x = 28$ $x = \frac{28}{5} = 5 \cdot 6$	**Scale 10C (0, 4, 6, 10)** **Three steps involved in solution:** **1.** Distribution of 4 **2.** Transposing **3.** Solves *Low Partial Credit* • Work of merit, for example, one correct operation *High Partial Credit* • Two steps correct
(b)	$\frac{154}{4+3} = 22$ One part 5 parts = $[€]110$ Martha's	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, 4+3, 12 *High Partial Credit* • Calculates one part
(c) (i) & (ii)	**(i)** 2^7 **(ii)** $2^{4x+1} = 2^7$ $4x + 1 = 7$ $x = 1{\cdot}5$	**Scale 10C (0, 4, 6, 10)** Accept when part **(i)** is correct and part **(ii)** is solved by correct value trialled *Low Partial Credit* • **(i)** correct • Some work of merit in **(ii)**, for example, equates 2^{4x+1} to their answer from **(i)** • Some correct work with indices *High Partial Credit* • Part **(i)** correct and work of merit in part **(ii)** • Part **(ii)** correct

Q5	Model Solution – 30 Marks	Marking Notes
(a)	$$\frac{3(2)+5}{10}-\frac{1}{2+3}$$ $$\left[\frac{11}{10}-\frac{1}{5}\right]$$ $$=\frac{9}{10}$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Some correct substitution • Work towards a single fraction *High Partial Credit* • Fully correct substitution *Full Credit -1* • Apply a * for incorrect form
(b)	$$f'(x)=10x-20$$ $$10x-20=0$$ $$x=2$$ $$f(2)=5(2)^2-20(2)+2$$ $$=-18$$ $$[(2,-18)]$$	**Scale 20D (0, 7, 10, 12, 20)** **Three steps involved in solution:** **1.** Correct differentiation **2.** Finds value of x **3.** Finds $f(2)$ *Low Partial Credit* • Work of merit, for example, indicates differentiation or $\frac{dy}{dx}$ • Some correct differentiation *Mid Partial Credit* • One step correct *High Partial Credit* • Two steps correct
(c)	$$\frac{2}{3}$$	**Scale 5B (0, 2, 5)** Accept correct answer without work *Partial Credit* • Work of merit, for example, work towards finding the equation of the line • Some reference to differentiation • Work on graph towards finding the slope • $\frac{Rise}{Run}$ or mentions slope

Q6	Model Solution – 30 Marks	Marking Notes
(a) (i) & (ii)	**(i)** $$y = 5 \cdot 8$$ Accept y values in the range $5 \cdot 5 \leq y \leq 6$ **(ii)** $$x \geq 1 \cdot 9$$ Accept x values in the range $1 \cdot 7 \leq x < 2$	**Scale 15D (0, 5, 7, 9, 15)** *Low Partial Credit* • Work of merit, for example some correct work on diagram *Mid Partial Credit* • **(i)** or **(ii)** correct • Work of merit in **(i) AND (ii)** *High Partial Credit* • One part correct and work of merit in the other part • Both answers correct but no work on the graph
(b) (i)	$$A = \frac{1}{2}[12 + 2 \cdot 8 + 2(9 + 6 \cdot 8 + 5 \cdot 1 + 3 \cdot 8)]$$ $$A = 32 \cdot 1 \text{ [units}^2\text{]}$$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Work of merit, for example, a relevant formula or relevant addition • Relevant work on diagram *High Partial Credit* • Fully correct substitution
(b) (ii)	$$\frac{32 \cdot 1 - 31 \cdot 8}{31 \cdot 8} \times 100 = 0 \cdot 943$$ $$= 0 \cdot 94[\%]$$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, a relevant formula • Correct numerator or denominator *High Partial Credit* • Fully correct substitution • Incorrect denominator but finishes correctly *Full Credit -1* • Apply a * for no or incorrect rounding

Q7	Model Solution – 50 Marks	Marking Notes
(a) (i) & (ii)	**(i)** <table><tr><td>**Time**</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>**Number of bacteria**</td><td>**20**</td><td>**21**</td><td>16</td><td>**11**</td><td>12</td><td>**25**</td></tr></table> **(ii)**  	**Scale 10D (0, 3, 5, 7, 10)** **Note:** Solution requires 11 items, 4 values in table, 6 points plotted and the curve *Low Partial Credit* • 1 to 3 items correct *Mid Partial Credit* • 4 to 6 items correct *High Partial Credit* • 7 to 9 items correct *Full Credit -1* • Apply a * if 10 items correct
(a) (iii) & (iv)	**(iii)** $$P'(t) = 3t^2 - 12t + 6$$ **(iv)** $$P'(2) = 3(2)^2 - 12(2) + 6 = -6$$	**Scale 5D (0, 2, 3, 4, 5)** *Low Partial Credit* • Work of merit, for example, some correct differentiation in **(iii)** or some correct substitution in **(iv)** *Mid Partial Credit* • Work of merit in **(iii) AND (iv)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part
(a) (v)	After 4 hours the number of bacteria was growing at a rate of 6000 per hour.	**Scale 10B (0, 4, 10)** *Partial Credit* • Partially correct explanation

Q7	Model Solution – 50 Marks	Marking Notes
(b) (i)	**After 1 hour:** $3000 \times 2 \cdot 72^{0 \cdot 5(1)} = 4947 \cdot 7267$ $= 4948$ **After 2 hours:** $3000 \times 2 \cdot 72^{0 \cdot 5(2)} = 8160$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, some correct substitution in one or both *High Partial Credit* • After 1 hour **OR** after 2 hours calculated correctly
(b) (ii)	$3000 \times 2 \cdot 72^{0 \cdot 5(t)} > 35\,000$ $3000 \times 2 \cdot 72^{0 \cdot 5(4)} = 22\,195 \cdot 2$ $< 35\,000$ $3000 \times 2 \cdot 72^{0 \cdot 5(5)} = 36\,605 \cdot 26$ $> 35\,000$ $n = 5$ [hours]	**Scale 15C (0, 5, 8, 15)** Accept correct answer without units *Low Partial Credit* • Work of merit, for example, trialling values for n where $n \neq 1, 2$ *High Partial Credit* • $k(4)$ and $k(5)$ calculated

Q8	Model Solution – 50 Marks	Marking Notes
(a) (i)	13 [km]	**Scale 5B (0, 2, 5)** Accept correct answer without units Accept distances greater than 12 and less than 15 *Partial Credit* • Work of merit, for example, work on diagram • No work shown on graph
(a) (ii)	$S = \frac{12}{0{\cdot}5} = 24$ [km/hour]	**Scale 10C (0, 4, 6, 10)** Accept correct answer without units *Low Partial Credit* • Work of merit, for example, one correct value identified • $S = \frac{D}{T}$ • Relevant work on the diagram *High Partial Credit* • Both values identified and some substitution into $S = \frac{D}{T}$
(a) (iii)		**Scale 10C (0, 4, 6, 10)** *Low Partial Credit* • Work of merit, for example, a relevant point on the diagram *High Partial Credit* • One line segment correct

<table>
<tr><th>Q8</th><th>Model Solution – 50 Marks</th><th>Marking Notes</th></tr>
<tr><td>(b)
(i)
&
(ii)</td><td>(i)
<table>
<tr><td>Week</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Distance</td><td>6</td><td>7·5</td><td>9</td><td>10·5</td><td>12</td><td>13·5</td></tr>
</table>
(ii)
$T_{100} = 6 + (100 - 1)(1 \cdot 5)$
$T_{100} = 154 \cdot 5$ km</td><td>Scale 10D (0, 3, 5, 7, 10)
Low Partial Credit
• Work of merit in (i), for example, one correct term in the table
• Work of merit in (ii), for example, a new term found or a relevant formula
Mid Partial Credit
• Work of merit in (i) AND (ii)
• One part correct
High Partial Credit
• One part correct and work of merit in the other part
Full Credit -1
• Apply a * for no units</td></tr>
<tr><td>(b)
(iii)</td><td>Too far to run</td><td>Scale 5A (0, 5)</td></tr>
<tr><td>(b)
(iv)
&
(v)</td><td>(iv)
$S_n = \frac{n}{2}[2(6) + (n - 1)(1 \cdot 5)]$
(v)
$S_{10} = \frac{10}{2}[12 + (10 - 1)(1 \cdot 5)]$
$S_{10} = 127 \cdot 5$ [km]
OR
$6 + 7 \cdot 5 + 9 + 10 \cdot 5 + 12 + 13 \cdot 5 + 15 + 16 \cdot 5 + 18 + 19 \cdot 5 = 127 \cdot 5$ [km]</td><td>Scale 10D (0, 3, 5, 7, 10)
Accept correct answer without units
Low Partial Credit
• S_n formula
• a or d identified
• Some correct addition in (v)
Mid Partial Credit
• Work of merit in (iv) AND (v)
• One part correct
High Partial Credit
• One part correct and work of merit in the other part</td></tr>
</table>

Q9	Model Solution – 50 Marks	Marking Notes
(a) (i) & (ii)	**(i)** $$\frac{59 \cdot 5}{0 \cdot 85} = [€]70$$ **(ii)** $$70 \times 8 = 560$$ $$560 \times 0 \cdot 8 = [€]448$$	**Scale 15D (0, 5, 7, 9, 15)** *Low Partial Credit* • Work of merit in **(i)**, for example, relevant use of the exchange rate • Work of merit in **(ii)**, for example, some relevant multiplication *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part
(b)	$$\frac{28\,000 \times 394}{244 \times 1000} = 45 \cdot 21311$$ $$= 45 \cdot 2 \text{ [kg]}$$	**Scale 10C (0, 4, 6, 10)** Accept correct answer without units *Low Partial Credit* • Work of merit, for example, one correct operation *High Partial Credit* • Completed with one error • $\frac{28\,000 \times 394}{244 \times 1000}$ *Full Credit -1* • Apply a * for no or incorrect rounding
(c) (i)	$$A(20) = 17\,600 - 160(20)$$ $$= 14\,400$$	**Scale 5B (0, 2, 5)** *Partial Credit* • Work of merit, for example, some relevant substitution

Q9	Model Solution – 50 Marks	Marking Notes
(c) (ii)	$$17\,600 - 160x = 12\,800$$ $$x = \frac{17\,600 - 12800}{160}$$ $$x = [€]30$$	**Scale 10C (0, 4, 6, 10)** Accept correct answer without units *Low Partial Credit* • $A(x) = 12\,800$ • Trial and improvement *High Partial Credit* • $x = \frac{17\,600-12\,800}{160}$ and stops
(d) (i) & (ii)	**(i)** $$15\,000x - 150x^2 = 360\,000$$ $$150x^2 - 15\,000x + 360\,000 = 0$$ $$x^2 - 100x + 2400 = 0$$ **(ii)** $$x^2 - 100x + 2400 = 0$$ $$x = [€]40 \text{ or } x = [€]60$$	**Scale 10D (0, 3, 5, 7, 10)** Accept correct answer without units *Low Partial Credit* • Work of merit in **(i)**, for example, equates expression to 360 000 • Work of merit in **(ii)**, for example, some relevant work towards solving the quadratic *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part

Q10	Model Solution – 50 Marks	Marking Notes
(a) **(i)** **&** **(ii)**	**(i)** $48\,000 - (7650 + 1920 + 1407)$ $= [€]\,37\,023$ **(ii)** $\frac{37\,023}{48\,000} \times 100 = 77 \cdot 13$ $= 77\,[\%]$	**Scale 5D (0, 2, 3, 4, 5)** *Low Partial Credit* • Work of merit in **(i)**, for example, adds some of the deductions • Work of merit in **(ii)**, for example, numerator or denominator correct *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part *Full Credit -1* • Apply a * for no or incorrect rounding
(b) **(i)** **&** **(ii)**	**(i)** $34\,000 \times 0 \cdot 2 = 6800$ $6800 - 3550 = 3250$ $34\,000 - 3250 = [€]30\,750$ **(ii)** $40\,000 \times 0 \cdot 2 = 8000$ $(50\,000 - 40\,000) \times 0 \cdot 4 = 4000$ $(8000 + 4000) - 3550 = [€]8450$	**Scale 15D (0, 5, 7, 9, 15)** *Low Partial Credit* • Work of merit in **(i)** or **(ii)**, for example, indicates $0 \cdot 2$ or $0 \cdot 4$or relevant use of tax credit *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part

Q10	Model Solution – 50 Marks	Marking Notes
(b) (iii)	$3550 \times 5 = [€]17\ 750$ **OR** $\frac{3550}{20\%} = [€]17\ 750$	**Scale 10B (0, 4, 10)** *Partial Credit* • Work of merit, for example, gets 20% of an income
(b) (iv)	$(42\ 000 - 40\ 000) \times 0 \cdot 2 = [€]400$ **OR** $42\ 000 \times 0 \cdot 2 = 8400$ $40\ 000 \times 0 \cdot 2 = 8000$ $2000 \times 0 \cdot 4 = 800$ $8000 + 800 = 8800$ $8800 - 8400 = [€]400$ Or similar	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Work of merit, for example, finding 2000 *High Partial Credit* • $2000 \times 20\%$ • Finding total tax for a person earning $42\ 000$ or more for both years
(c) (i) & (ii)	**(i)** $(1950 + 400) \times \frac{120}{365} \times 0 \cdot 3$ $= 231 \cdot 7808$ $= [€]231 \cdot 78$ **(ii)** $2250 \times \frac{d}{365} \times 0 \cdot 3 = 135$ $d = \frac{135 \times 365}{2250 \times 0 \cdot 3} = 73$ [days]	**Scale 15D (0, 5, 7, 9, 15)** Accept correct answer without units *Low Partial Credit* • Work of merit in **(i) OR (ii)**, for example, some correct substitution *Mid Partial Credit* • Work of merit in **(i) AND (ii)** • One part correct *High Partial Credit* • One part correct and work of merit in the other part *Full Credit -1* Apply a * for no or incorrect rounding