



National
Qualifications
2026

2026 Applications of Mathematics

Higher

Question Paper Finalised Marking Instructions

These marking instructions have been prepared by examination teams for use by Qualifications Scotland appointed markers when marking external course assessments.

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General marking principles for Higher Applications of Mathematics

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

For each question, the marking instructions are generally in two sections:

generic scheme – this indicates why each mark is awarded

illustrative scheme – this covers methods which are commonly seen throughout the marking

In general, you should use the illustrative scheme. Only use the generic scheme where a candidate has used a method not covered in the illustrative scheme.

- (a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.
- (b) If you are uncertain how to assess a specific candidate response because it is not covered by the general marking principles or the detailed marking instructions, you must seek guidance from your team leader.
- (c) One mark is available for each •. There are no half marks.
- (d) If a candidate's response contains an error, all working subsequent to this error must still be marked. Only award marks if the level of difficulty in their working is similar to the level of difficulty in the illustrative scheme.
- (e) Only award full marks where the solution contains appropriate working. A correct answer with no working receives no mark, unless specifically mentioned in the marking instructions.
- (f) Candidates may use any mathematically correct method to answer questions, except in cases where a particular method is specified or excluded.
- (g) If an error is trivial, casual or insignificant, for example $6 \times 6 = 12$, candidates lose the opportunity to gain a mark, except for instances such as the second example in point (h) below.

- (h) If a candidate makes a transcription error (question paper to script or within script), they lose the opportunity to gain the next process mark, for example

This is a transcription error and so the mark is not awarded.

This is no longer a solution of a quadratic equation, so the mark is not awarded.

$$x^2 + 5x + 7 = 9x + 4$$

$$x - 4x + 3 = 0$$

$$x = 1$$

The following example is an exception to the above

This error is not treated as a transcription error, as the candidate deals with the intended quadratic equation. The candidate has been given the benefit of the doubt and all marks awarded.

$$x^2 + 5x + 7 = 9x + 4$$

$$x - 4x + 3 = 0$$

$$(x - 3)(x - 1) = 0$$

$$x = 1 \text{ or } 3$$

(i) **Horizontal/vertical marking**

If a question results in two pairs of solutions, apply the following technique, but only if indicated in the detailed marking instructions for the question.

Example:

$$\begin{array}{cc} \bullet^5 & \bullet^6 \\ \bullet^5 & x = 2 \quad x = -4 \\ \bullet^6 & y = 5 \quad y = -7 \end{array}$$

Horizontal: $\bullet^5 x = 2 \text{ and } x = -4$ Vertical: $\bullet^5 x = 2 \text{ and } y = 5$
 $\bullet^6 y = 5 \text{ and } y = -7$ $\bullet^6 x = -4 \text{ and } y = -7$

You must choose whichever method benefits the candidate, **not** a combination of both.

- (j) In final answers, candidates should simplify numerical values as far as possible unless specifically mentioned in the detailed marking instruction. For example

$\frac{15}{12}$ must be simplified to $\frac{5}{4}$ or $1\frac{1}{4}$ $\frac{43}{1}$ must be simplified to 43

$\frac{15}{0.3}$ must be simplified to 50 $\frac{4}{\cancel{5}}/3$ must be simplified to $\frac{4}{15}$

$\sqrt{64}$ must be simplified to 8*

*The square root of perfect squares up to and including 144 must be known.

- (k) Commonly Observed Responses (COR) are shown in the marking instructions to help mark common and/or non-routine solutions. CORs may also be used as a guide when marking similar non-routine candidate responses.
- (l) Do not penalise candidates for any of the following, unless specifically mentioned in the detailed marking instructions:
- working subsequent to a correct answer
 - correct working in the wrong part of a question
 - legitimate variations in numerical answers/algebraic expressions, for example angles in degrees rounded to nearest degree
 - omission of units
 - bad form (bad form only becomes bad form if subsequent working is correct), for example

$$(x^3 + 2x^2 + 3x + 2)(2x + 1) \text{ written as}$$

$$(x^3 + 2x^2 + 3x + 2) \times 2x + 1$$

$$= 2x^4 + 5x^3 + 8x^2 + 7x + 2$$

gains full credit

- repeated error within a question, but not between questions or papers
- (m) In any ‘Show that...’ question, where candidates have to arrive at a required result, the last mark is not awarded as a follow-through from a previous error, unless specified in the detailed marking instructions.
- (n) You must check all working carefully, even where a fundamental misunderstanding is apparent early in a candidate’s response. You may still be able to award marks later in the question so you must refer continually to the marking instructions. The appearance of the correct answer does not necessarily indicate that you can award all the available marks to a candidate.
- (o) You should mark legible scored-out working that has not been replaced. However, if the scored-out working has been replaced, you must only mark the replacement working.
- (p) If candidates make multiple attempts using the same strategy and do not identify their final answer, mark all attempts and award the lowest mark. If candidates try different valid strategies, apply the above rule to attempts within each strategy and then award the highest mark.

For example:

Strategy 1 attempt 1 is worth 3 marks.	Strategy 2 attempt 1 is worth 1 mark.
Strategy 1 attempt 2 is worth 4 marks.	Strategy 2 attempt 2 is worth 5 marks.
From the attempts using strategy 1, the resultant mark would be 3.	From the attempts using strategy 2, the resultant mark would be 1.

In this case, award 3 marks.

Marking Instructions for each question

Question			Generic scheme	Illustrative scheme	Max mark
1.			Method 1 •¹ evidence of first accumulation •² evidence of second accumulation •³ calculate third accumulation and the amount owed	Method 1 •¹ eg $3000 \times 1.073^{\frac{3}{12}}$ •² eg $\dots \times 1.079^{\frac{5}{12}}$ •³ eg $\dots \times 1.0067^4$ and (£)3236.91	3
			Method 2 •¹ evidence of first accumulation •² evidence of second accumulation •³ calculate third accumulation and the amount owed	Method 2 •¹ eg $3000 \times 1.0058(\dots)^3$ •² eg $\dots \times 1.0063(\dots)^5$ •³ eg $\dots \times 1.0067^4$ and (£)3236.91	

Notes:

1. In method 1, •² is only available if a fractional power is used.

Commonly Observed Responses:

Candidate A

$$3000 \times 1.073^{\frac{2}{12}} \times 1.079^{\frac{4}{12}} \times 1.0067^3 = £3176.35$$

award ✗ ✓₁ ✓₁

Candidate B

$$3000 \times 1.073^{\frac{1}{12}} \times 1.079^{\frac{1}{12}} \times 1.0067 = £3057.19$$

award ✗ ✗ ✗

Candidate C

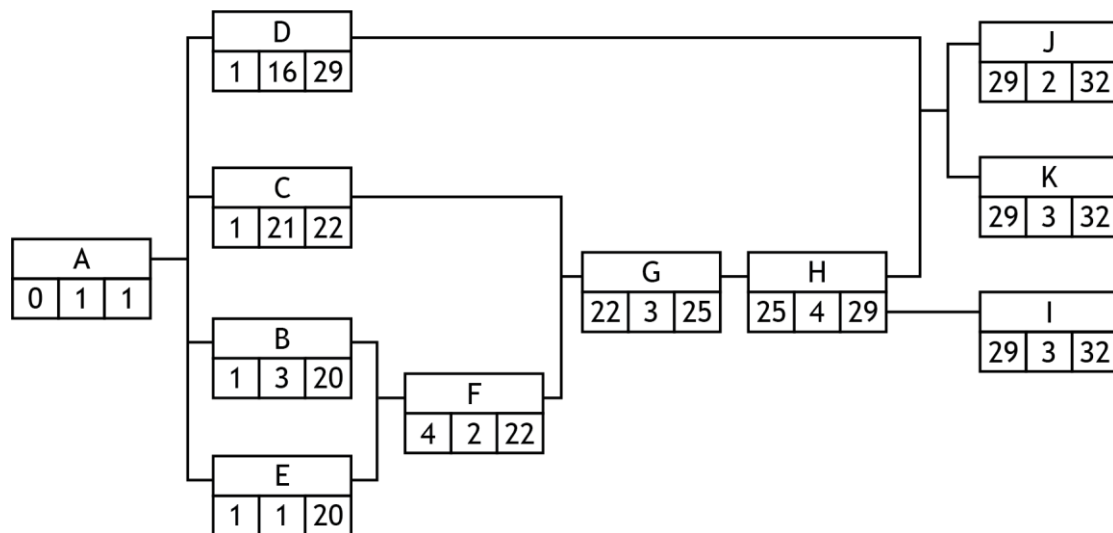
$$3000 \times 1.0059^3 \times 1.0064^5 \times 1.0067^4 = £3237.72$$

award ✓ ✓ ✓

Question			Generic scheme	Illustrative scheme	Max mark
2.	(a)		•¹ tasks and durations in correct sequence •² forward scan A-F correct •³ forward scan for remaining 5 consistent with previous working •⁴ backward scan I, J, K and H correct •⁵ backward scan for remaining 7 consistent with previous working	•¹ see note 1 •² see note 1 •³ see note 1 •⁴ see note 1 •⁵ see note 1	5

Notes:

1. Completed PERT chart

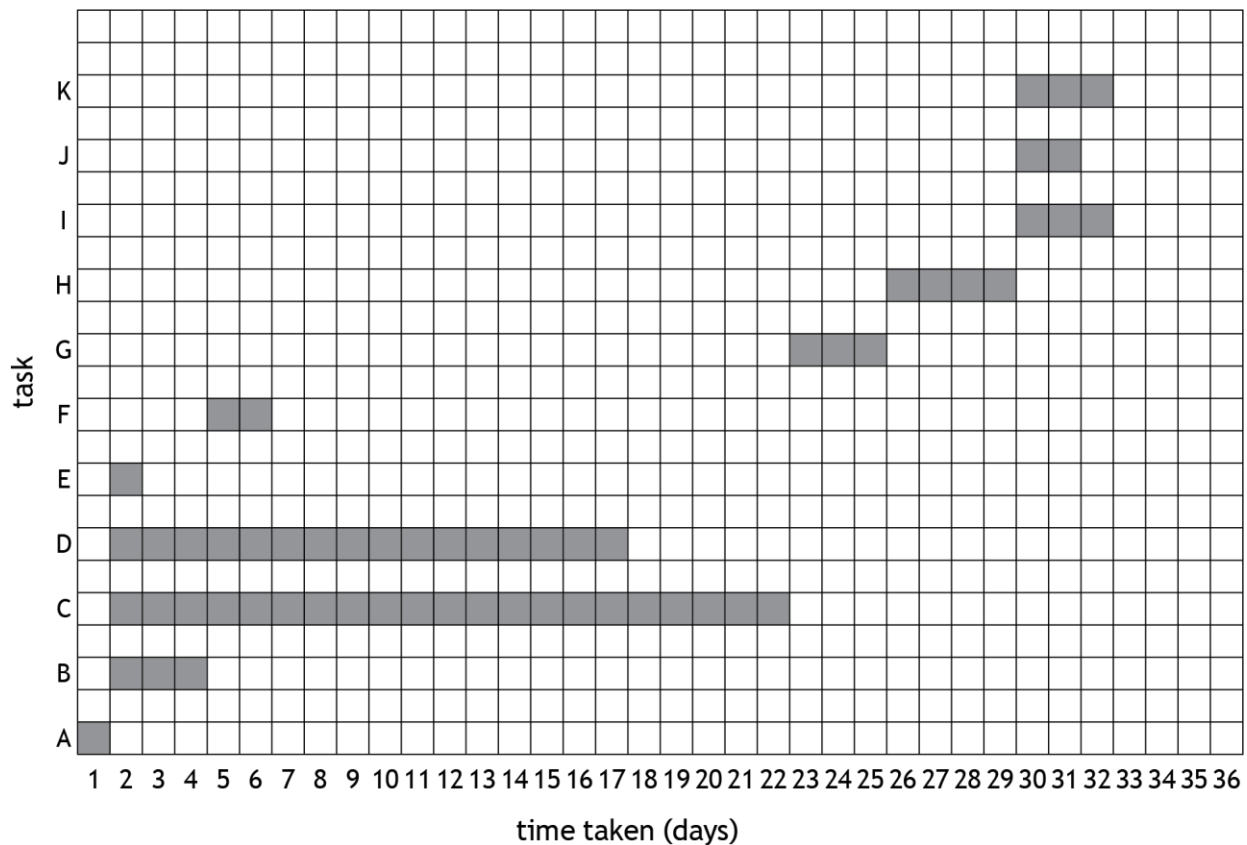


Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
2.	(b)		•⁶ add task labels and plot tasks A-E •⁷ interpret start times of tasks F, G, J and K •⁸ complete Gantt chart	•⁶ see note 1 •⁷ see note 1 •⁸ see note 1	3

Notes:

1. Completed Gantt chart



2. Gantt chart must be consistent either with the candidate's PERT chart or the precedence table.
3. Tasks must be ordered by start times.

Commonly Observed Responses:

	(c)		• ⁹ state float time	• ⁹ 1 day	1
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Notes:

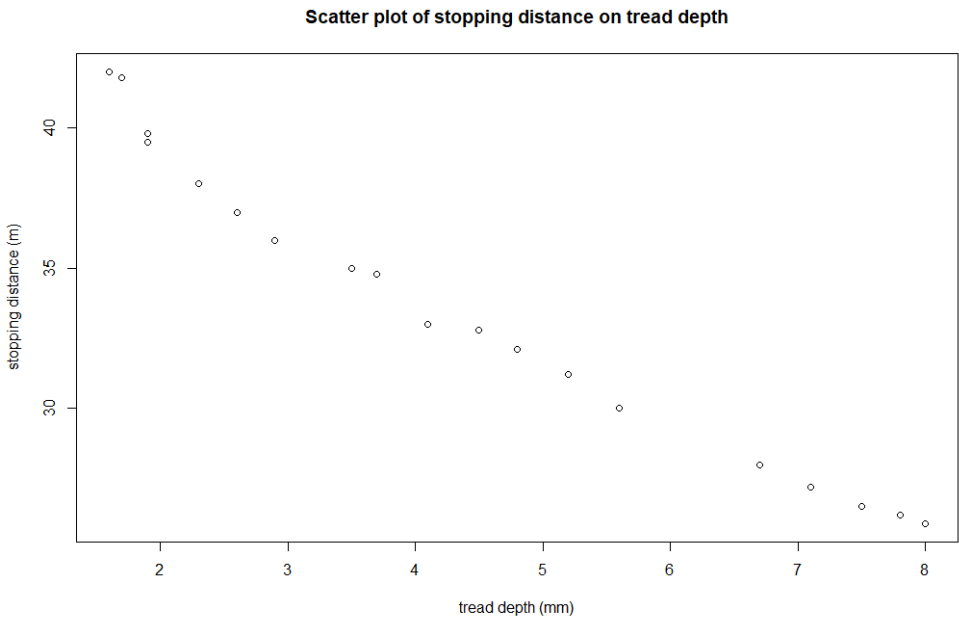
1. Float time can be interpreted from the precedence table, PERT chart or Gantt chart.

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
3.	(a)		• ¹ generate scatterplot	• ¹ see below	1

Notes:

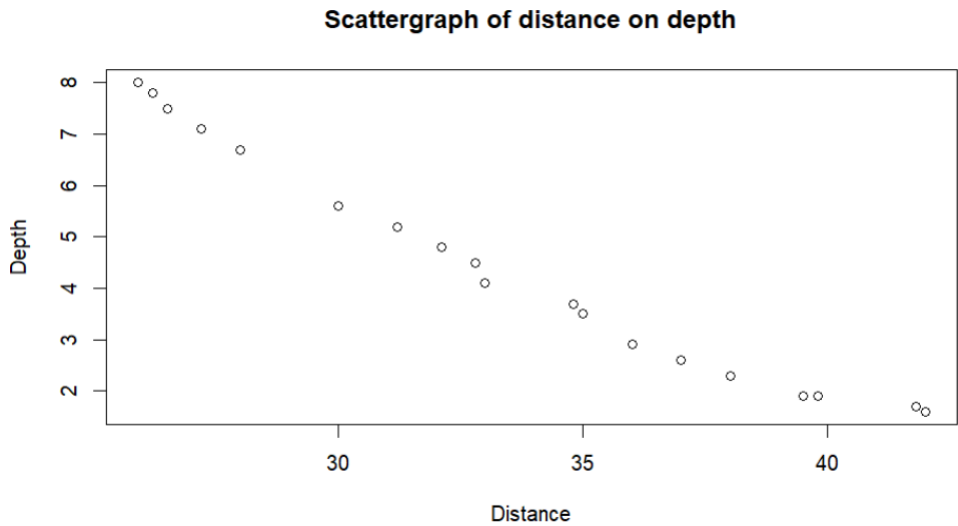
1. Scatterplot



2. Do not penalise incorrect title or axes labels.

Commonly Observed Responses:

Candidate A



award ✖

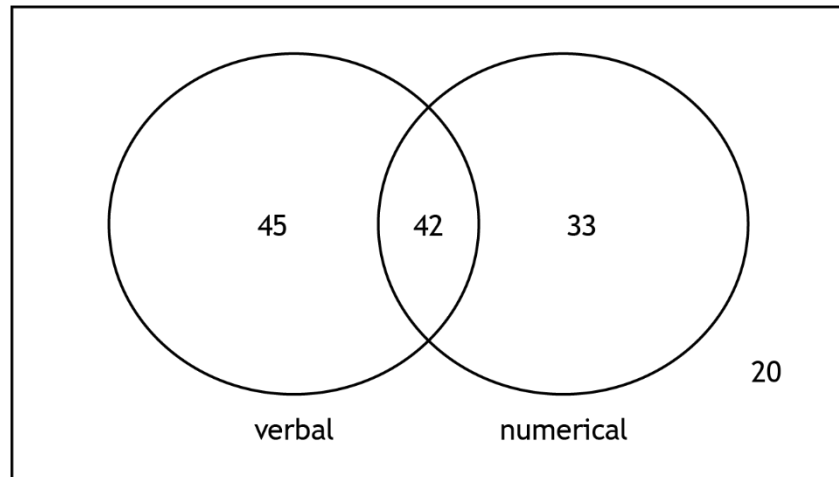
Question			Generic scheme	Illustrative scheme	Max mark
3.	(b)	(i)	• ² find correlation coefficient	• ² -0.9864292	1
Notes: 1. R Output Pearson's product-moment correlation data: Depth and Distance t = -24.771, df = 17, p-value = 8.839e-15 alternative hypothesis: true correlation is not equal to 0 95 percent confidence interval: -0.9948849 -0.9642455 sample estimates: cor -0.9864292 2. For • ² the correlation coefficient must be stated explicitly, separate from the output. 3. Accept answers rounded or truncated to 2 decimal places for • ² . 4. If a candidate generates an R ² value, they must state r to award • ² .					
Commonly Observed Responses:					
		(ii)	• ³ appropriate comment	• ³ eg this suggests there is a (strong) negative correlation between tread depth and stopping distance	1
Notes: 1. For • ³ accept 'linear relationship' or 'linear association' as alternative to 'correlation'. 2. • ³ is only available where context is included in the comment.					
Commonly Observed Responses:					
	(c)		• ⁴ generate coefficient and intercept • ⁵ communicate equation	• ⁴ output from software (see below) • ⁵ stopping distance = 43.944 – 2.376 × tread depth	2
Notes: 1. R Output Call: lm(formula = Distance ~ Depth) Coefficients: (Intercept) Depth 43.944 -2.376 2. • ⁴ can be implied by • ⁵ .					

Question			Generic scheme	Illustrative scheme	Max mark
3.	(c)		(continued)		
Commonly Observed Responses:					
Candidate A > lm(Depth~Distance) Call: lm(formula = Depth ~ Distance) Coefficients: (Intercept) Distance 18.1166 -0.4096 leading to tread depth = 18.1166 – 0.4096 × stopping distance award ✗ ✓ ₁					
Candidate B $y = 43.944 - 2.376x$ award ✓ ✗					
	(d)		• ⁶ use an appropriate strategy • ⁷ estimate stopping distance	• ⁶ eg generate prediction interval OR substitution into linear model • ⁷ 29.2(...) (metres)	2
Notes: 1. R Output fit lwr upr 1 29.21441 27.23409 31.19474 2. • ⁶ is available where a candidate generates a line of best fit and states they are using their graph. 3. • ⁷ is not available for a negative distance.					
Commonly Observed Responses:					
Candidate A 29.2(...) (metres) without working award ✓ ✓					
Candidate B 29 (metres) without working award ^ ✗					
Candidate C Candidate has predicted tread depth from a stopping distance of 6.2 mm. Leading to 15.5(...) award ✗ ✓ ₁					

Question			Generic scheme	Illustrative scheme	Max mark
4.	(a)		•¹ complete 'both' and either 'verbal' or 'numerical' •² complete diagram	•¹ 42 and 45 - OR 42 and 33 •² see below	2

Notes:

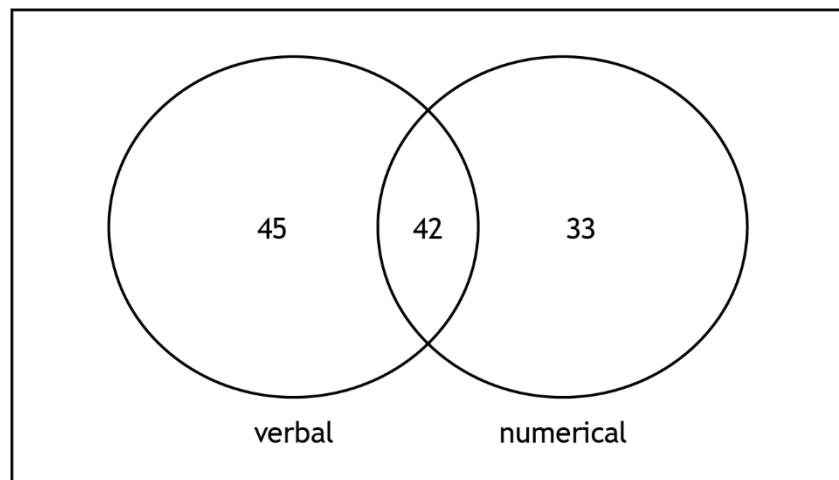
1. Completed Venn diagram



2. •² not available if total of values in diagram exceeds 140.

Commonly Observed Responses:

Candidate A



award ✓ ^

	(b)		•³ calculate probability	•³ $\frac{78}{140} \left(= \frac{39}{70} \right)$	1
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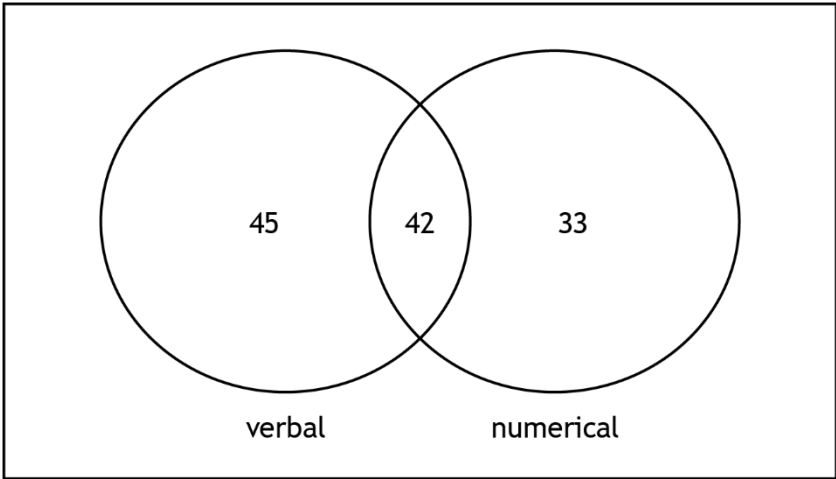
Notes:

1. No simplification required.
2. Accept 0.55(...) or 55.(...) % without working.
3. •³ is not available for an answer expressed as a ratio.

Question			Generic scheme	Illustrative scheme	Max mark
4.	(b)		(continued)		

Commonly Observed Responses:

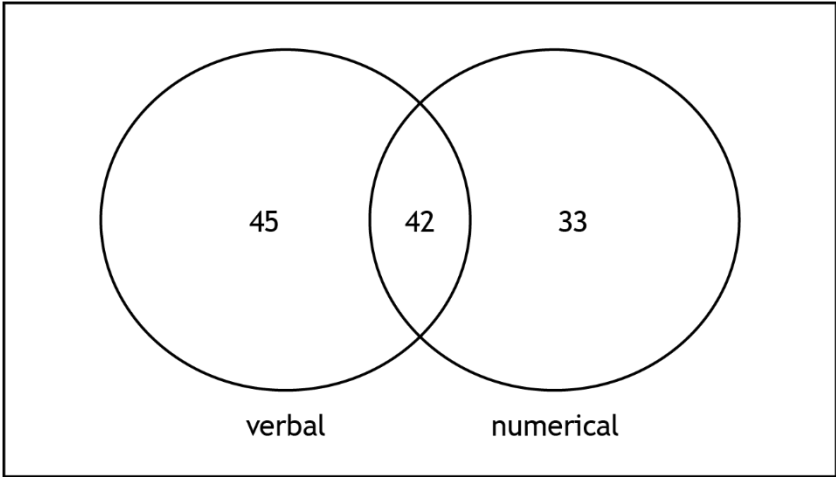
Candidate A
For an answer in (a) of



leading to $\frac{78}{120}$.

award ✓₁

Candidate B
For an answer in (a) of



leading to $\frac{78}{140}$.

award ✓

Question			Generic scheme	Illustrative scheme	Max mark
5.	(a)	(i)	•¹ enter appropriate values into cells C7 and C8 •² use appropriate formula in cell C11 •³ fill down to complete worksheet showing the profit of producing and selling up to 500 candles	•¹ 9 and 3 •² eg $=(\\$C\\$7-\\$C\\$8)*B11-0.015*B11^2$ •³ -750 in cell C36	3

Notes:

1. •² is available if 0 is in C11 and the correct formula appears in C12.
2. •² is **not** available if the INT function is used.
3. •² is available if the ROUND function is used correctly to 2 decimal places.

Commonly Observed Responses:

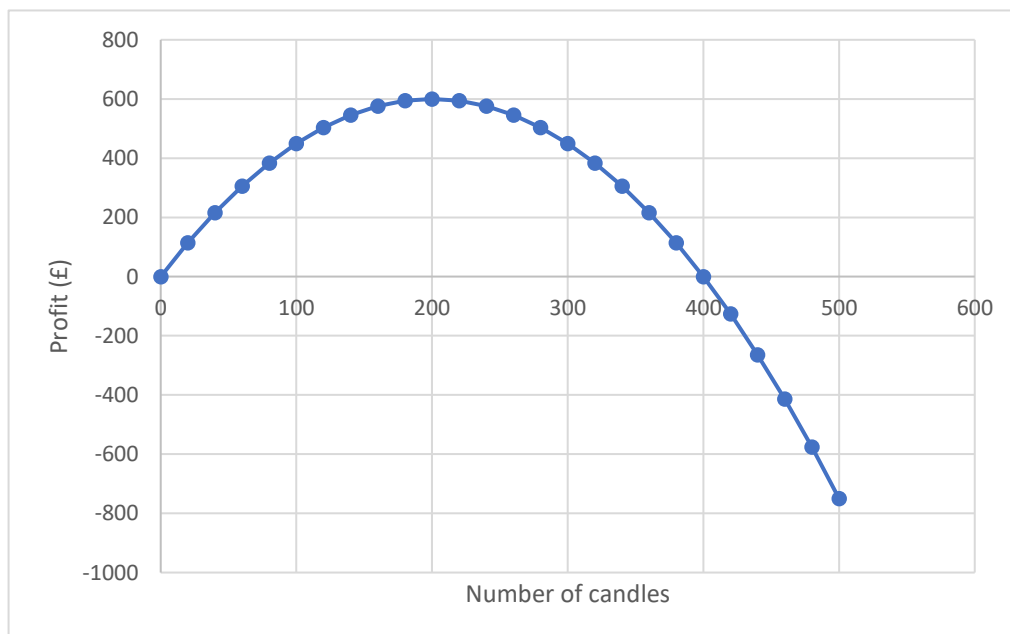
Candidate A

$=(\$C\$7-\$C\$8)*B11-0.015^2$ leading to £3000.00 in cell C36

award ✓ ✗ ✓₁

		(ii)	•⁴ construct graph •⁵ appropriate axis labels	•⁴ eg see note below •⁵ eg see note below	2
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Notes:

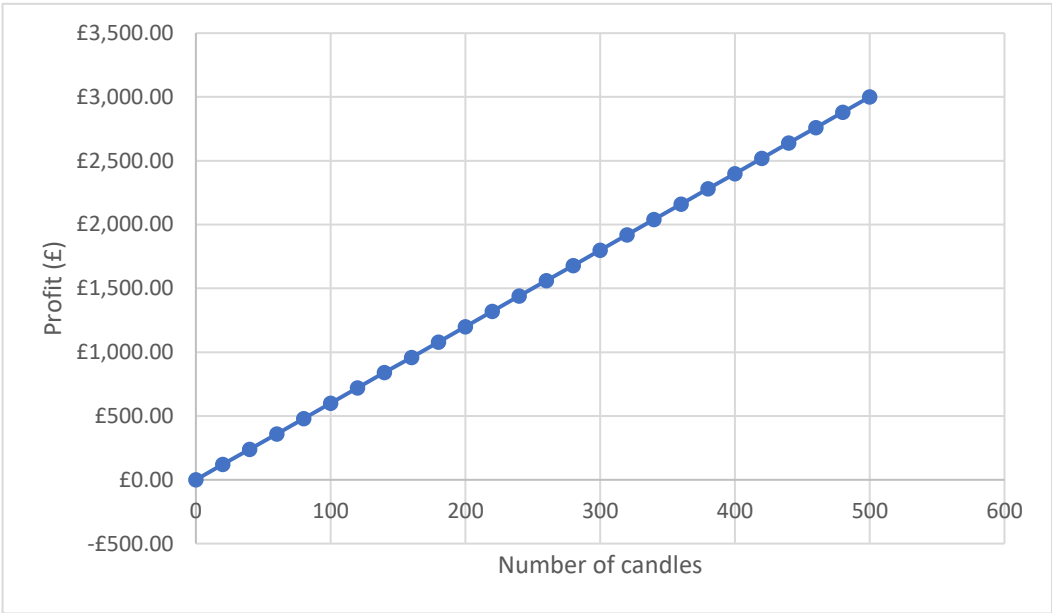


Question			Generic scheme	Illustrative scheme	Max mark
5.	(a)	(ii)	(continued)		

Commonly Observed Responses:

Candidate A

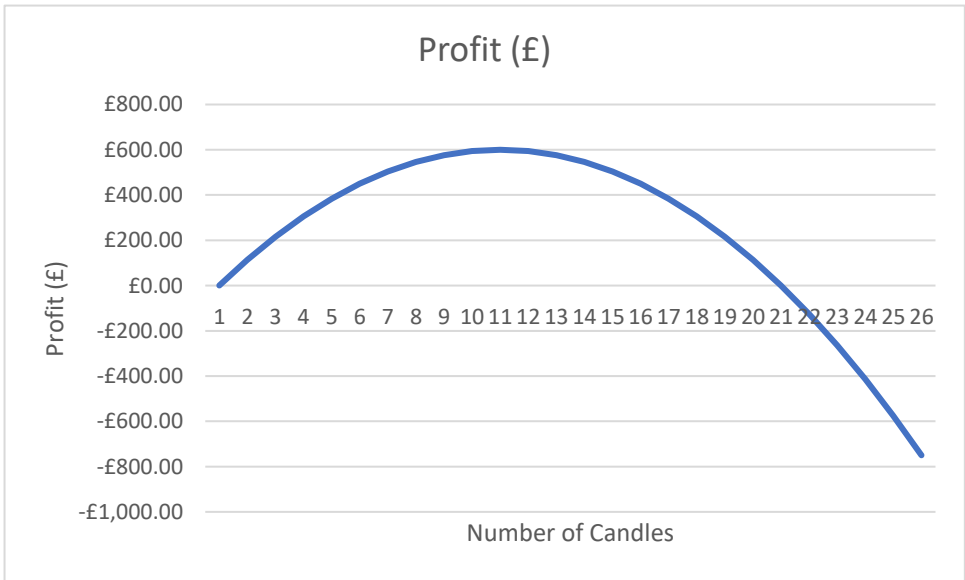
For an answer in (a) of $=(\$C\$7-\$C\$8)*B11-0.015^2$ leading to £3000.00 in cell C36, leading to



award ✓₁ ✓

Candidate B

Model of profit without number of candles. Incorrect x axis label.



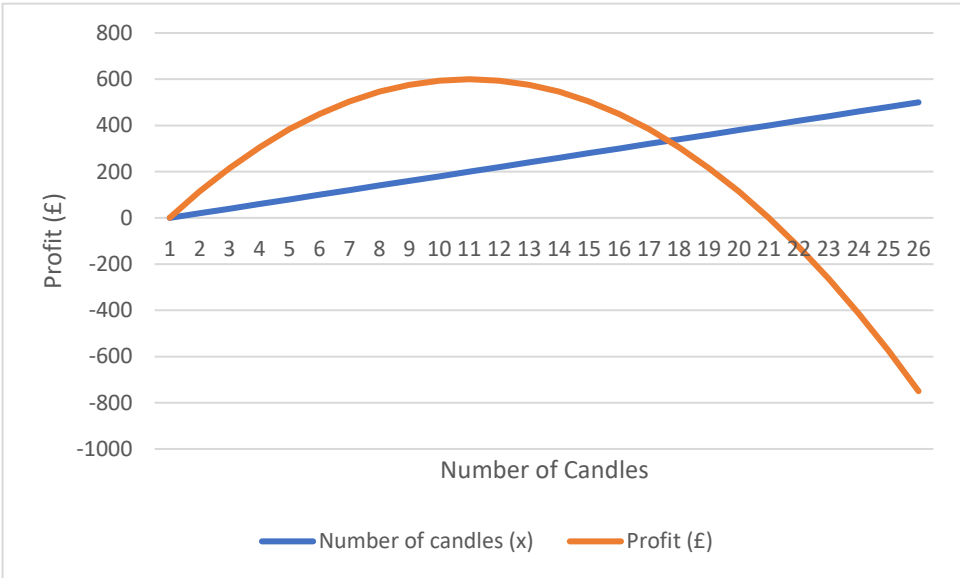
award ✓ ✗

Question				Generic scheme	Illustrative scheme	Max mark
5.	(a)	(ii)	(continued)			

Commonly Observed Responses:

Candidate C

Inappropriate graph selected and labels incorrect for graphs generated.



award✖✖

Question			Generic scheme	Illustrative scheme	Max mark
5.	(b)	(i)	• ⁶ state type of model	• ⁶ quadratic	1
Notes: 1. Type of model can be interpreted from the formula given in the question or the graph constructed in (a)(ii).					
Commonly Observed Responses:					
		(ii)	• ⁷ appropriate explanation	• ⁷ eg Claire will make a loss	1
Notes: 1. • ⁷ is only available if a graph has been generated in (a)(ii). 2. Accept: a. negative profit b. loses money 3. Do not accept: a. losing profit b. no profit 4. • ⁷ is only available as a follow through mark for linear models if profit and constant rate of change are discussed.					
Commonly Observed Responses:					
		(iii)	• ⁸ state number of candles	• ⁸ 200 (candles)	1
Notes: 1. • ⁸ is only available if a graph has been generated in (a)(ii). 2. For linear models accept: a. 500 b. more than 500 c. as many as she can d. no maximum					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
5.	(c)		•⁹ interpret relative error •¹⁰ calculate absolute error	•⁹ eg 2% of 84 (stated or implied by 82.32 or 85.68 in working) OR 2% of 7 (stated or implied by 6.86 or 7.14 in working) •¹⁰ 1.68 (cubic centimetres)	2
Notes: 1. 1.68 stated without working, award 2/2.					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark																
6.	(a)		• ¹ calculate monthly effective rate of interest	• ¹ 0.124...%	1																
Notes: 1. Accept: a. 0.00124... b. 0.12% with correct working c. 0.0012 with correct working 2. Do not accept: a. 0.00124...% b. 0.12% with no working c. 0.125% d. 0.12																					
Commonly Observed Responses:																					
	(b)		• ² calculate interest earned, deposit and balance after first deposit • ³ calculate interest earned, deposit and balance after second deposit	• ² see note 1 • ³ see note 1	2																
Notes: 1. Based on candidate using 0.124...%. <table><tr><th>Time (months)</th><th>Interest earned (£)</th><th>Deposit (£)</th><th>Balance (£)</th></tr><tr><td>0</td><td></td><td></td><td>1000</td></tr><tr><td>1</td><td>1.24</td><td>150</td><td>1151.24</td></tr><tr><td>2</td><td>1.43</td><td>150</td><td>1302.67</td></tr></table> 2. If the interest earned is the same in months 1 and 2 then • ³ is unavailable. 3. For • ³ , only available if balance after second deposit is rounded or truncated to 2 decimal places. 4. Interest earned and deposit values can be implied by working - see Candidate D.						Time (months)	Interest earned (£)	Deposit (£)	Balance (£)	0			1000	1	1.24	150	1151.24	2	1.43	150	1302.67
Time (months)	Interest earned (£)	Deposit (£)	Balance (£)																		
0			1000																		
1	1.24	150	1151.24																		
2	1.43	150	1302.67																		

Question			Generic scheme	Illustrative scheme	Max mark																
6.	(b)		(continued)																		
Commonly Observed Responses:																					
Candidate A																					
Based on candidate using 0.12%.																					
<table><tr><th>Time (months)</th><th>Interest earned (£)</th><th>Deposit (£)</th><th>Balance (£)</th></tr><tr><td>0</td><td></td><td></td><td>1000</td></tr><tr><td>1</td><td>1.20</td><td>150</td><td>1151.20</td></tr><tr><td>2</td><td>1.38</td><td>150</td><td>1302.58</td></tr></table>						Time (months)	Interest earned (£)	Deposit (£)	Balance (£)	0			1000	1	1.20	150	1151.20	2	1.38	150	1302.58
Time (months)	Interest earned (£)	Deposit (£)	Balance (£)																		
0			1000																		
1	1.20	150	1151.20																		
2	1.38	150	1302.58																		
award					✓ ✓																
Candidate B																					
Based on candidate using 0.125%.																					
<table><tr><th>Time (months)</th><th>Interest earned (£)</th><th>Deposit (£)</th><th>Balance (£)</th></tr><tr><td>0</td><td></td><td></td><td>1000</td></tr><tr><td>1</td><td>1.25</td><td>150</td><td>1151.25</td></tr><tr><td>2</td><td>1.44</td><td>150</td><td>1302.69</td></tr></table>						Time (months)	Interest earned (£)	Deposit (£)	Balance (£)	0			1000	1	1.25	150	1151.25	2	1.44	150	1302.69
Time (months)	Interest earned (£)	Deposit (£)	Balance (£)																		
0			1000																		
1	1.25	150	1151.25																		
2	1.44	150	1302.69																		
award					✓ ₁ ✓ ₁																
Candidate C																					
Based on candidate using 0.1%.																					
<table><tr><th>Time (months)</th><th>Interest earned (£)</th><th>Deposit (£)</th><th>Balance (£)</th></tr><tr><td>0</td><td></td><td></td><td>1000</td></tr><tr><td>1</td><td>1.00</td><td>150</td><td>1151.00</td></tr><tr><td>2</td><td>1.15</td><td>150</td><td>1302.15</td></tr></table>						Time (months)	Interest earned (£)	Deposit (£)	Balance (£)	0			1000	1	1.00	150	1151.00	2	1.15	150	1302.15
Time (months)	Interest earned (£)	Deposit (£)	Balance (£)																		
0			1000																		
1	1.00	150	1151.00																		
2	1.15	150	1302.15																		
award					✓ ✓																
Candidate D																					
Based on candidate using 0.124%.																					
<table><tr><th>Time (months)</th><th>Interest earned (£)</th><th>Deposit (£)</th><th>Balance (£)</th></tr><tr><td>0</td><td></td><td></td><td>1000</td></tr><tr><td>1</td><td>1001.24</td><td>150</td><td>1151.24</td></tr><tr><td>2</td><td>1152.67</td><td>150</td><td>1302.67</td></tr></table>						Time (months)	Interest earned (£)	Deposit (£)	Balance (£)	0			1000	1	1001.24	150	1151.24	2	1152.67	150	1302.67
Time (months)	Interest earned (£)	Deposit (£)	Balance (£)																		
0			1000																		
1	1001.24	150	1151.24																		
2	1152.67	150	1302.67																		
award					✓ ✓																

Question			Generic scheme	Illustrative scheme	Max mark
7.	(a)	(i)	• ¹ state appropriate test	• ¹ (two sample) <i>t</i> -test	1
Notes: 1. Accept “independent t-test” or “unpaired t-test”.					
Commonly Observed Responses:					
		(ii)	• ² state null and alternative hypotheses	• ² null hypothesis: there is no difference in the mean time taken to run 100 metres between pupils aged 10 and pupils aged 12 AND alternative hypothesis: there is a difference in the mean time taken to run 100 metres between pupils aged 10 and pupils aged 12	1
Notes: 1. Answer must be consistent with the research question. 2. Do not accept “average” in place of “mean”. 3. Null and alternative hypotheses must reference age groups.					
Commonly Observed Responses:					
	(b)		• ³ interpret <i>p</i> -value • ⁴ relate to context of research question	• ³ since <i>p</i> -value > 0.05, fail to reject null hypothesis • ⁴ eg (there is evidence that suggests) there is no significant difference in the mean time taken to run 100 metres between pupils aged 10 and pupils aged 12	2
Notes: 1. • ⁴ is still available if • ³ has not been attempted. 2. If omission of “mean” has already been penalised in • ² , do not penalise again in • ⁴ . 3. Award • ⁴ where “average” is used instead of “mean”. 4. Accept: there is evidence to suggest that age does not have a significant effect on the mean time taken to run 100 metres for • ⁴ .					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
8.	(a)		•¹ calculate taxable income •² calculate taxable income for each band •³ calculate total tax •⁴ calculate net monthly income	•¹ (£)31,137 •² see table •³ see table; (£)3721.59 •⁴ (£)2154.46	4

Notes:

1. Table of taxable income and tax

Band	Taxable Income (£)	Tax Payable (£)
Personal Allowance	12,570	£0
Starter rate	2827	537.13
Basic rate	12,094	2,418.80
Intermediate rate	3646	765.66
Total	31,137	3721.59

2. •¹ is only available where £31,137 is labelled as the taxable income, or is used in a tax calculation.

3. If there is no tax calculation •¹ can be implied in (c) by appearance of £8718.36 or £726.53.

4. •⁴ is only available if tax, National Insurance and pension contributions are all deducted.

5. Final answer must be stated to two decimal places, ignore any rounding errors or truncation.

Question			Generic scheme	Illustrative scheme	Max mark																		
8.	(a)		(continued)																				
Commonly Observed Responses:																							
Candidate A																							
Candidate calculates tax on gross pay (£32,100).																							
<table><tr><th>Band</th><th>Taxable Income (£)</th><th>Tax Payable (£)</th></tr><tr><td>Personal Allowance</td><td>12,570</td><td>£0</td></tr><tr><td>Starter rate</td><td>2827</td><td>537.13</td></tr><tr><td>Basic rate</td><td>12,094</td><td>2418.80</td></tr><tr><td>Intermediate rate</td><td>4609</td><td>967.89</td></tr><tr><td>Total</td><td>32,100</td><td>3923.82</td></tr></table>						Band	Taxable Income (£)	Tax Payable (£)	Personal Allowance	12,570	£0	Starter rate	2827	537.13	Basic rate	12,094	2418.80	Intermediate rate	4609	967.89	Total	32,100	3923.82
Band	Taxable Income (£)	Tax Payable (£)																					
Personal Allowance	12,570	£0																					
Starter rate	2827	537.13																					
Basic rate	12,094	2418.80																					
Intermediate rate	4609	967.89																					
Total	32,100	3923.82																					
Leading to a net monthly income of (£)2137.61. award ^ ✓₁ ✓₁ ✓₁																							
Candidate B																							
Candidate deducted pension correctly and then deducted monthly NI contribution (£31,006.84).																							
<table><tr><th>Band</th><th>Taxable Income (£)</th><th>Tax Payable (£)</th></tr><tr><td>Personal Allowance</td><td>12,570</td><td>£0</td></tr><tr><td>Starter rate</td><td>2827</td><td>537.13</td></tr><tr><td>Basic rate</td><td>12,094</td><td>2418.80</td></tr><tr><td>Intermediate rate</td><td>3515.84</td><td>738.33</td></tr><tr><td>Total</td><td>31,006.84</td><td>3694.26</td></tr></table>						Band	Taxable Income (£)	Tax Payable (£)	Personal Allowance	12,570	£0	Starter rate	2827	537.13	Basic rate	12,094	2418.80	Intermediate rate	3515.84	738.33	Total	31,006.84	3694.26
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Total	31,006.84	3694.26																					
Leading to a net monthly salary of (£)2276.05. award * ✓₁ ✓₁ *																							

Question			Generic scheme	Illustrative scheme	Max mark
8.	(b)		•⁵ calculate monthly interest rate •⁶ create formula for interest content, capital content and mortgage outstanding •⁷ complete schedule to month 24 •⁸ calculate monthly payment	•⁵ 0.44...% •⁶ D16, E16 and F16 (see spreadsheet) •⁷ check cells C16:C39, D39, E39 •⁸ check cells C11 and F39	4

Notes:

1. •⁶ is only available if formula view is provided so that the use of the ROUND function can be seen.
2. •⁸ is only available if Mortgage outstanding is less than or equal to 93,000 at month 24 (cell F39).
3. Be aware of “ $=(1+C8)^{1/12}-1$ ” instead of “ $=(1+C8)^{(1/12)}-1$ ” in cell C10.
4. For marks •⁵, •⁶, •⁷ and •⁸, see below:

	Formula View	Value view
• ⁵	$C9=(1+C8)^{(1/12)}-1$	0.44%
• ⁶	D16=ROUND(\$C\$9*F15,2) E16=C16-D16 F16=F15-E16	430.45 198.00 97,802.00
• ⁷	C16:C39=\$C\$11 D39=ROUND(\$C\$9*F38,2) E39=C39-D39	628.45 409.45 219.00
• ⁸	C11=628.45 F39=F38-E39	628.45 93,000

Commonly Observed Responses:

Candidate A - formula view included

Monthly interest rate calculated by dividing by 12 (0.45%).

Leading to a monthly repayment of £638.76 and final Mortgage outstanding of £92,999.86.

award ✗ ✓ ✓ ✓ ✓₁

Candidate B - formula view included

Goal Seek to £0.00 in cell F39.

Leading to a monthly repayment of £4311.30 and final Mortgage outstanding of -£0.25.

award ✓ ✓ ✓ ✗

Candidate C - formula view included

Goal Seek to £0.00 in cell F39 and month 24 repayment adjusted.

Leading to a monthly repayment of £4311.30 in months 1-23 and a repayment of £4311.05 in month 24.

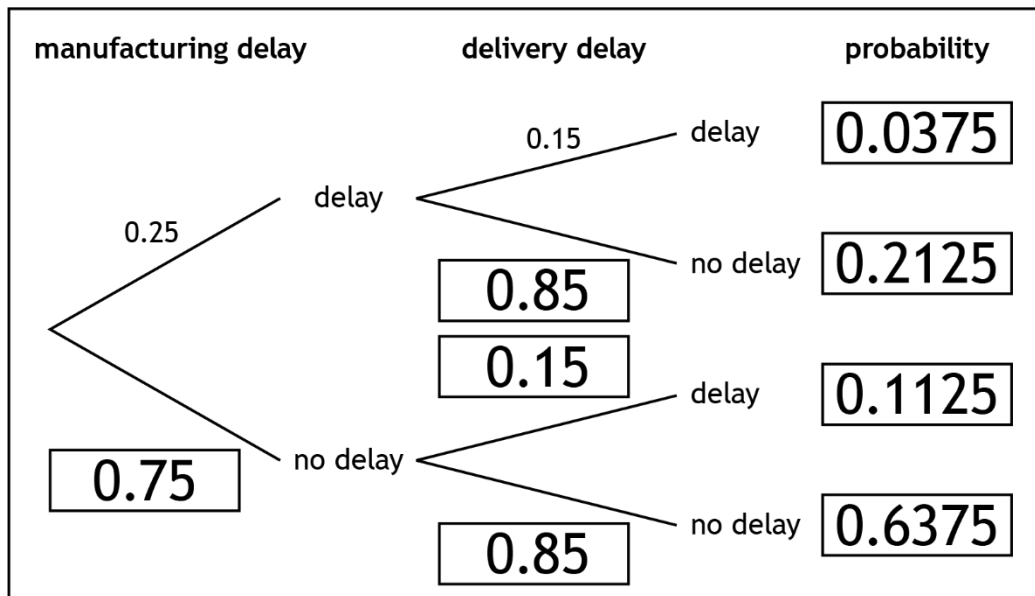
award ✓ ✓ ✗ ✗

Question			Generic scheme	Illustrative scheme	Max mark
8.	(c)		•⁹ state answer with reason	•⁹ eg yes, because 24.2% is less than the recommended 28% OR eg yes, because £628.45 is less than £726.53	1
Notes: 1. Answer must reference, or imply the use of, 28% from the data booklet. 2. Working must be consistent with the taxable monthly income used in (a).					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
9.	(a)	(i)	•¹ complete tree diagram •² calculate combined probabilities	•¹ see note 1 •² see note 1	2

Notes:

1. Completed probability tree diagram.



2. Accept fraction and percentage equivalents.

3. Do not accept any rounding.

Commonly Observed Responses:

		(ii)	•³ calculate the probability of a delay occurring	•³ 0.3625	1
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Notes:

1. •³ is not available for a probability greater than 1.

2. Accept fraction and percentage equivalent.

Commonly Observed Responses:

		(iii)	•⁴ calculate the expected cost of a delay	•⁴ (£)43,500	1
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Notes:

1. •⁴ is still available for using a probability greater than 1 in (a)(ii).

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
9.	(b)	(i)	• ⁵ calculate expected cost using control measure 1	• ⁵ (£) 38,000	1
		(ii)	• ⁶ calculate expected cost using control measure 2	• ⁶ (£) 42,500	1
Notes: 1. • ⁶ is only available where the calculation in • ⁵ includes the penalty (£120,000) or the expected cost of the delay calculated in (a)(iii).					
Commonly Observed Responses: Candidate A Repeated error in probabilities (i) $120,000 \times 0.1125 + 20,000 = (£)33,500$ award ✗ (ii) $120,000 \times 0.2125 + 12,500 = (£)38,000$ award ✓ ₁ Candidate B Repeated error in probabilities (i) $120,000 \times 0.25 + 20,000 = (£)50,000$ award ✗ (ii) $120,000 \times 0.15 + 12,500 = (£)30,500$ award ✓ ₁ Candidate C Repeated error in additional costs (i) $120,000 \times 0.15 + 12,500 = (£)30,500$ award ✗ (ii) $120,000 \times 0.25 + 20,000 = (£)50,000$ award ✓ ₁					
	(c)		• ⁷ give valid explanation	• ⁷ using both control measures has the lowest expected cost OR (£)32,500 is the lowest expected cost	1
Notes: 1. Answer must be consistent with (b)(i) and (b)(ii). 2. Accept: a. 'they' have the lowest expected cost b. it has the lowest expected cost 3. Do not accept: a. 'cheaper' b. the cost is less 4. • ⁷ is not available where • ⁵ or • ⁶ have not been attempted.					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
10.	(a)		•¹ identify multiplier within context •² calculate minimum deposit	•¹ eg $PV \times 1.071^3 = 8175$ stated or implied by •² •² (£)6654.57	2
Notes: 1. Accept (£)6654.56.					
Commonly Observed Responses: Candidate A $PV = 8175 \times 1.071^3 = (£)6554.43$ award ✗ ✗ Candidate B $PV \times 1.071 = 8175$ $PV = (£)7633.05$ award ✗ ✓₁					
	(b)		•³ interpret change from CPI •⁴ interpret relative increase in savings and state conclusion	•³ eg $\frac{133.0}{111.4}$ •⁴ 1.228... and 1.193... leading to 'yes'	2
Notes: 1. Calculations must be consistent with answer from (a). 2. For • ³ , accept any appropriate CPI ratio which can be interpreted from $\frac{133.0}{111.4}$ and $\frac{8175}{6654.57}$.					
Commonly Observed Responses: Candidate A $\frac{111.4}{133.0}$ 0.814... and 0.837... leading to 'yes'. award ✓ ✓ Candidate B Apply the percentage change to the savings deposit calculated in (a) $\frac{(133.0 - 111.4)}{111.4} = 0.193...$ $6654.57 \times 1.193... = (£)7944.86$ leading to 'yes'. award ✓ ✓					

Question			Generic scheme	Illustrative scheme	Max mark
10.	(c)		•⁵ valid reason	•⁵ eg protect no claims bonus OR eg so that future premiums are not affected	1
Notes: 1. Accept: a. cost isn't too much more b. can't afford the excess c. not worth the effort of claiming to save £15 d. so that cost at renewal is not affected 2. Do not accept: a. so that future payments do not increase b. don't get it repaired c. cost of insurance will increase					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
11.	(a)		¹ appropriate comment	¹ eg some beekeepers might not take part so the data might not be accurate OR eg data is self-submitted so there could be errors in the numbers entered	1
Notes: 1. Accept: does not include beehives in the wild 2. Do not accept: - honeybees have died - some hives have been destroyed after the count					
Commonly Observed Responses:					
	(b)		² appropriate explanation	² eg newspaper statement based on extrapolation; future cannot be predicted from data provided OR the trend line does not take into account all the data points	1
Notes: 1. Accept: the graph has no pattern to it 2. Do not accept: bees will reproduce					
Commonly Observed Responses:					

Question			Generic scheme	Illustrative scheme	Max mark
11.	(c)		•³ state assumption for number of honeybees per colony •⁴ state assumption for weight of honey in one jar •⁵ calculate estimate	•³ eg 10 000 - 100 000 bees •⁴ eg 100 grams - 1 kilogram •⁵ eg $288311 \times \frac{\text{number of bees}}{17000}$ × number of months × weight of honey in one jar = estimated weight of honey	3
Notes: 1. •³ and •⁴ can be awarded for reasonable estimates outwith the examples in the illustrative scheme. 2. If •³ or •⁴ are not attempted then •⁵ is not available. 3. •⁵ is available for candidates who use 12 months in their calculation without an explicit assumption. 4. Do not penalise candidates for stating valid, additional assumptions and using them in their calculations.					
Commonly Observed Responses:					

[END OF MARKING INSTRUCTIONS]