National Qualifications 2024

2024 Applications of Mathematics

Paper 2

Question Paper Finalised Marking Instructions

General marking principles for National 5 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.
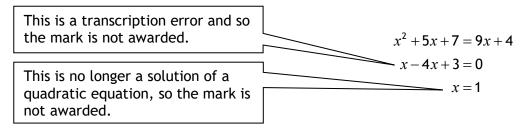
For each question, the marking instructions are generally in two sections:

generic scheme — this indicates why each mark is awarded
illustrative scheme — this covers methods which are commonly seen throughout the marking
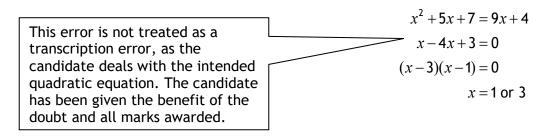
In general, you should use the illustrative scheme. Only use the generic scheme where a candidate has used a method not covered in the illustrative scheme.

(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:

$$\bullet^5 \qquad \bullet^6$$
$$\bullet^5 \quad x = 2 \quad x = -4$$
$$\bullet^6 \quad y = 5 \quad y = -7$$

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

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

$\dfrac{15}{0 \cdot 3}$ must be simplified to 50 $\dfrac{4/5}{3}$ must be simplified to $\dfrac{4}{15}$

$\sqrt{64}$ 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

$(x^3 + 2x^2 + 3x + 2)(2x + 1)$ 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.	$\bullet^1$ Strategy: know how to calculate percentage increase $\bullet^2$ Strategy: identify power or equivalent $\bullet^3$ Strategy/process: use valid strategy to calculate expected number of pupils $\bullet^4$ Process/communication: round to 3 significant figures	$\bullet^1$ evidence of 1.053 or equivalent $\bullet^2$ $\ldots^4$ or equivalent $\bullet^3$ 1475… $\bullet^4$ 1480	**4**

Notes:

1. Correct answer without working   award 0/4
2. $\bullet^3$ can only be awarded for a calculation involving a multiplication and a power or equivalent.
3. Candidates using repeated addition must work to a minimum of 4 significant figures, rounded or truncated, to gain $\bullet^3$.
4. Where all calculations are shown, $\bullet^3$ can be implied by $\bullet^4$.

Commonly Observed Responses:

1. $1475.3 \rightarrow 1480$ with no other working shown   award 4/4 ✓✓✓✓
2. $1200 \times 1.053^4 = 1480$ with no unrounded answer   award 4/4 ✓✓✓✓
3. $1200 \times 1.053^4 = 1470$ with no unrounded answer   award 3/4 ✓✓✓✗
4. $1475.3\ldots$ award 3/4 ✓✓✓✗
5. $1200 \div 1.053^4 = 976.04\ldots \rightarrow 976$ award 3/4 ✓✓✗✓
6. $1200 \times 0.947^4 = 965.11\ldots \rightarrow 965$ award 3/4 ✗✓✓✓
7. $1200 \times 5.3^4 = 946857.7\ldots \rightarrow 947000$ award 3/4 ✗✓✓✓
8. $1200 + \left(0.053^4 \times 1200\right) = 1200.0\ldots \rightarrow 1200$ award 2/4 ✗✓✓✗
9. $1200 \div 0.947^4 = 1492 \rightarrow 1490$ award 2/4 ✗✓✗✓
10. $1200 + \left(0.053 \times 1200\right) \times 4 = 1454.4 \rightarrow 1450$ award 2/4 ✓✗✗✓

Question			Generic scheme	Illustrative scheme	Max mark
2.	(a)		•¹ Strategy: substitute into sphere formula •² Process: calculate the volume of a snooker ball including units	•¹ $\dfrac{4}{3} \times \pi \times 2.6^3$ •² $73.62\ldots \text{ cm}^3$	**2**

Notes:
1. Correct answer without working   award 2/2
2. •² is only available for a calculation involving a fraction, a power and π.

Commonly Observed Responses:

1. $\dfrac{4}{3} \times 3.14 \times 2.6^3 \rightarrow 73.58\ldots \text{ cm}^3$ award 2/2 ✓✓

2. $\dfrac{4}{3} \times \pi \times 5.2^3 = 588.97\ldots \text{ cm}^3$ award 1/2 ✗✓

3. $\dfrac{4}{3} \times \pi \times 2.6^2 = 28.31\ldots \text{ cm}^3$ award 1/2 ✗✓

4. $\dfrac{3}{4} \times \pi \times 2.6^3 \rightarrow 41.41\ldots \text{ cm}^3$ award 1/2 ✗✓

5. $\dfrac{4}{3} \times \pi \times 2.6 \rightarrow 10.89\ldots \text{ cm}^3$ award 0/2 ✗✗

	(b)		•³ Process: calculate the density of a snooker ball	•³ $1.92\ldots$ (grams per cubic centimetre)	**1**

Notes:

Commonly Observed Responses:

1. $\dfrac{142}{74} = 1.91\ldots$ award 1/1 ✓
2. 2, with no working   award 1/1 ✓

Question			Generic scheme	Illustrative scheme	Max mark
3.			$\bullet^1$ Process: calculate total number of balls remaining, or number of balls less than 8 remaining	$\bullet^1$ 43 or 5	**2**
			$\bullet^2$ Process/communication: calculate other value and state probability	$\bullet^2$ $\dfrac{5}{43}$	

Notes:

1. $\bullet^2$ is not available for an answer expressed as a ratio.

Commonly Observed Responses:

1. $\dfrac{5}{43} \rightarrow 0.116\ldots$ award 2/2 ✓✓

2. $\dfrac{7}{49}$ award 0/2 ✗✗

Question			Generic scheme	Illustrative scheme	Max mark
4.			$\bullet^1$ Process: calculate the area of the circle	$\bullet^1$ 50.265…	**4**
			$\bullet^2$ Process: calculate the dimensions of triangles or diagonals of rhombus	$\bullet^2$ 7 or 14 and 9 or 18	
			$\bullet^3$ Process: calculate the total area	$\bullet^3$ 126	
			$\bullet^4$ Process: calculate the area of the patio	$\bullet^4$ 75.734…	

Notes:
1. Correct answer without working   award 0/4
2. Do not penalise candidates who truncate or round to the nearest whole number.
3. $\bullet^1$ and $\bullet^4$ are not available when a candidate does not use πr^2 .
4. $\bullet^4$ is only available when a candidate has subtracted an area from an area.
5. When a candidate uses Pythagoras to calculate the area $\bullet^3$ and $\bullet^4$ are unavailable with the exception of COR 2.
6. $\bullet^4$ is not available when a candidate's calculated total area is less than their calculated circle area.
7. Accept use of π to at least 2 decimal places.

Commonly Observed Responses:
1. $50.265… \rightarrow$ dimensions of 14 and $18 \rightarrow 14 \times 18 - 50.265 = 201.73…$ award 3/4 ✓✓✗✓
2. $50.265… \rightarrow \sqrt{9^2 + 7^2} = 11.4… \rightarrow 11.4…^2 - 50.265… = 79.7…$ award 3/4 ✓✓✗✓
3. $50.265… \rightarrow \sqrt{9^2 + 7^2} = 11.4… \rightarrow 50.265… - 11.4… = 38.86…$ award 2/4 ✓✓✗✗
4. $50.265… \rightarrow$ dimensions of 3 and $5 \rightarrow 30 \rightarrow (50.265 - 30 =)20.265…$ award 2/4 ✓✗✓✗

	Question		Generic scheme	Illustrative scheme	Max mark
5.	(a)		$\bullet^1$ Strategy/process: calculate amount taxed at 12%	$\bullet^1$ 23 086	**2**
			$\bullet^2$ Process: calculate national insurance	$\bullet^2$ 2770.32	

Notes:
1. Correct answer without working   award 2/2
2. Where final answer is not a whole number $\bullet^2$ is only available where final answer is rounded or truncated to 2 decimal places.
3. If 50 284 or 2% is used in any calculation $\bullet^2$ is not available.
4. If 35 670 is not used in any calculation   award 0/2
5. Do not penalise candidates who subtract their National Insurance calculation from the annual salary.

Commonly Observed Responses:
1. 88% of 23 086 $\rightarrow$ 20 315.68   award 1/2 ✓✗
2. 12% of 35 670 $\rightarrow$ 4280.40   award 1/2 ✗✓
3. 12% of $(50\ 284 - 12\ 584) \rightarrow 4524$ award 0/2 ✗✗
4. 12% of 9568 $\rightarrow$ 1148.16   award 0/2 ✗✗

	(b)		$\bullet^3$ Process: calculate pension contribution	$\bullet^3$ 3352.98	**2**
			$\bullet^4$ Process: calculate weekly salary	$\bullet^4$ 491.39	

Notes:
1. Correct answer without working   award 2/2
2. $\bullet^3$ is only available for 3352.98 or 32 317.02.
3. Where final answer is not a whole number $\bullet^4$ is only available where final answer is rounded or truncated to 2 decimal places.
4. $\bullet^4$ must include a subtraction of a calculated National Insurance, 3994.42 and a third value from annual salary and a division by 52.

Commonly Observed Responses:
1. From COR 2 in (a) $35\ 670 - (4280.40 + 3994.42 + 3352.98) = 24\ 042.20 \rightarrow 462.35$ award 2/2 ✓✓
2. 25 552.28   award 1/2 ✓✗
3. $(35\ 670 - (3352.98 + 3994.42)) \div 52 \rightarrow 544.66$ or 544.67   award 1/2 ✓✗

Question	Generic scheme	Illustrative scheme	Max mark
6.	$\bullet^1$ Strategy/communication: substitute into Pythagoras' theorem	$\bullet^1$ $600^2 - 500^2$	**4**
	$\bullet^2$ Process: calculate distance from Harbour to position 1	$\bullet^2$ $331.66\ldots$	
	$\bullet^3$ Strategy/communication: substitute into Pythagoras' theorem	$\bullet^3$ $500^2 + 731.66^2$	
	$\bullet^4$ Process: calculate the distance from lighthouse to position 2	$\bullet^4$ $886.18\ldots$	

Notes:

1. Correct answer without working   award 0/4
2. $\bullet^1$ is not available if a candidate writes $500^2 - 600^2$.
3. $\bullet^2$ is available if a candidate writes $500^2 - 600^2 \rightarrow 331.66\ldots$.
4. Do not penalise candidates who truncate, or round to the nearest whole number throughout.

Commonly Observed Responses:

1. $600^2 + 500^2 \rightarrow 781.0\ldots \rightarrow 500^2 + 1181.0\ldots^2 \rightarrow 1282.5\ldots$ award 3/4 ✗✓✓✓
2. $600^2 - 500^2 \rightarrow 331.6\ldots \rightarrow 731.6\ldots^2 - 500^2 \rightarrow 534.1\ldots$ award 3/4 ✓✓✗✓
3. $\sqrt{600^2 - 500^2} = 331.6\ldots$ and $\sqrt{600^2 + 400^2} = 721.1$ award 2/4 ✓✓✗✗
4. $600^2 + 500^2 \rightarrow 781.0\ldots \rightarrow 1181.0\ldots^2 - 500^2 \rightarrow 1069.9\ldots$ award 2/4 ✗✓✗✓
5. $600^2 + 400^2 \rightarrow 721.1\ldots$ award 1/4 ✗✓✗✗
6. $400^2 + 500^2 \rightarrow 640.3\ldots$ award 1/4 ✗✓✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
7.	(a)		$\bullet^1$ Process: calculate total paid	$\bullet^1$ $(1.015 \times 85\,800 + 250 =)\,87\,337$	**1**

Notes:

Commonly Observed Responses:

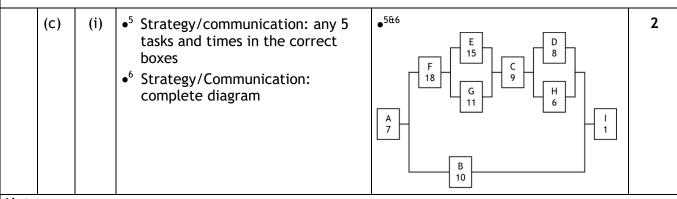|	Question		Generic scheme	Illustrative scheme	Max mark
	(b)		$\bullet^2$ Process: calculate cost for shop A	$\bullet^2$ 780	**3**
			$\bullet^3$ Process: calculate cost for shop B	$\bullet^3$ 806.40	
			$\bullet^4$ Process/communication: calculate cost for shop C and state conclusion consistent with working	$\bullet^4$ 792 and 780 or Shop A	

Notes:
1. Where a candidate only considers shop C award 0/3
2. For $\bullet^3$ do not penalise candidates who round or truncate to a whole number of pounds within the calculation or omit the trailing zero.
3. $\bullet^4$ is only available if a candidate considers 3 calculated cost, see COR 1.
4. Where cheapest value is not a whole number $\bullet^4$ is only available where cheapest value is rounded or truncated to 2 decimal places.

Commonly Observed Responses:
1. Shop A: 780, Shop B: 345.60, Shop C: 792 leading to 345.60 or Shop B award 1/3 ✓✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
	(c)	(i)	$\bullet^5$ Strategy/communication: any 5 tasks and times in the correct boxes	$\bullet^{5\&6}$	**2**
			$\bullet^6$ Strategy/Communication: complete diagram		

Notes:
1. If a candidate omits any numbers, all tasks must be correct to be awarded 1/2.
2. If a candidate omits letters, all times must be correct to be awarded 1/2.
3. E and G are interchangeable.
4. D and H are interchangeable.

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
7.	(c)	(ii)	$\bullet^7$ Strategy: select critical path	$\bullet^7$ $7+18+15+9+8+1$	**2**
			$\bullet^8$ Process: state time consistent with path chosen	$\bullet^8$ 58	

Notes:
1. Correct answer with no working   award 2/2
2. $\bullet^8$ is only available for any complete path through the diagram.

Commonly Observed Responses:
1. $(7+10+1=)18$ award 1/2 ✗✓
2. $(7+18+15+9+6+1=)56$ award 1/2 ✗✓
3. $(7+18+11+9+8+1=)54$ award 1/2 ✗✓
4. $(7+18+11+9+6+1=)52$ award 1/2 ✗✓
5. $(7+18+15+9+8+1+10=)68$ award 0/2 ✗✗
6. $(7+10+9+8+15+18+11+6+1=)85$ award 0/2 ✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
	(d)		$\bullet^9$ Process: divide by 5 or multiply by 3	$\bullet^9$ 2 or 30	**3**
			$\bullet^{10}$ Process: calculate time for 5 workers	$\bullet^{10}$ 6	
			$\bullet^{11}$ Communication: state date work finishes	$\bullet^{11}$ (Monday) 9 October	

Notes:
1. Correct answer without working   award 0/3
2. Only $\bullet^{10}$ and $\bullet^{11}$ are available for candidates who write **both** $(10\div3=)3.33\ldots$ and $(10\div5=)2$.
3. Only $\bullet^{11}$ is available if candidates use direct proportion, see COR 4.
4. $\bullet^{11}$ is not available if the calculated number of days is 5 or fewer.
5. For $\bullet^{11}$ when the day of the week is stated it **must** be consistent with the date.

Commonly Observed Responses:
1. $(10\div5=)2\rightarrow(10-2-2=)6\rightarrow9$ October   award 3/3 ✓✓✓
2. $30\rightarrow(30\div2=)15\rightarrow20$ October   award 2/3 ✓✗✓
3. $30\rightarrow(30\times5=)150\rightarrow26$ or 27 April   award 2/3 ✓✗✓
4. $10\div3\times5\rightarrow16.66\ldots\rightarrow24$ October   award 1/3 ✗✗✓
5. $(10\div3=)3.33\ldots\rightarrow(10-3.33\ldots-3.33\ldots=)3.33\ldots\rightarrow5$ October   award 0/3 ✗✗✗

Question			Generic scheme	Illustrative scheme	Max mark
8.	(a)	(i)	$\bullet^1$ Process: calculate mean	$\bullet^1$ 39	**1**
		(ii)	Method 1 $\bullet^2$ Process: calculate $\left(x-\overline{x}\right)^2$ $\bullet^3$ Strategy/process: substitute into formula $\bullet^4$ Process: calculate standard deviation	$\bullet^2$ 25, 256, 49, 0, 16, 169, 25 $\bullet^3$ $\sqrt{\dfrac{540}{7-1}}$ $\bullet^4$ 9.48…	**3**
			Method 2 $\bullet^2$ Process: calculate $\sum x$ and $\sum x^2$ $\bullet^3$ Strategy/process: substitute into formula $\bullet^4$ Process: calculate standard deviation	$\bullet^2$ 273, 11187 $\bullet^3$ $\sqrt{\dfrac{11187-\dfrac{273^2}{7}}{7-1}}$ $\bullet^4$ 9.48…	

Notes:
1. Correct answer without working   award 0/3
2. Do not accept rounding or truncating to the nearest whole number for final answer.
3. For $\bullet^3$ do not penalise a square root sign that does not extend to the denominator.
4. $\bullet^4$ can only be awarded for a calculation involving at least 2 steps including a division followed by a square root.

Commonly Observed Responses:

1. $\dfrac{\sqrt{540}}{6} \rightarrow 3.872…$ award 2/3 ✓✓✗

2. $\sqrt{\dfrac{540}{6}} \rightarrow \sqrt{9.48…}$ award 2/3 ✓✓✗

3. $\sqrt{\dfrac{540}{7}} \rightarrow 8.783…$ award 2/3 ✓✗✓

4. $\sqrt{\dfrac{540}{39-1}} \rightarrow 3.769…$ award 2/3 ✓✗✓

5. $\dfrac{540}{6} \rightarrow 90$ award 1/3 ✓✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
8.	(b)		•⁵ Communication: comment regarding mean •⁶ Communication: comment regarding standard deviation	•⁵ eg, on average the number of visitors to the Aberdeen shop on a Sunday was greater. •⁶ eg, the number of visitors to the Aberdeen shop was more consistent.	**2**

Notes:

1. Answer must be consistent with answer to part (a).
2. Numerical comparisons are not required but when used they must be accurate.
3. For the award of •⁵

   Accept eg
   a) On average there were more visitors in Aberdeen.
   b) The average number of people was lower in Stirling.
   c) Stirling had lower average customers.
   d) On average Aberdeen was busier.
   e) On average the Aberdeen shop is more popular.

   Do not accept eg
   f) Aberdeen had **overall** higher visitors.
   g) On average Stirling is lower.
   h) On average the **mean** number of visitors in Aberdeen was higher.
   i) On average the number of customers in Aberdeen was **better**.

4. For the award of •⁶

   Accept eg
   a) The number of visitors in the Stirling shop was more varied.
   b) The visitors to the Stirling shop were more spread out.
   c) There is less variation in the number of visitors in Aberdeen.
   d) The spread of the number of visitors was higher for Stirling.
   e) The customers in Aberdeen were more consistent.

   Do not accept eg
   f) **"On average"** contained in any statement.
   g) The **numbers** in Stirling are more varied.
   h) The **standard deviation** in Aberdeen was more consistent.
   i) The **range** of customers in Stirling was higher.
   j) The Aberdeen shop is more consistent.

Commonly Observed Responses:

1. On average the number of customers in Aberdeen was higher and the **number of customers** was more consistent.   award 2/2 ✓✓
2. On average the number of customers in Aberdeen was higher and more consistent. award 1/2 ✓✗

	Question		Generic scheme	Illustrative scheme	Max mark
8.	(c)		•^{7} Process: calculate one share	•^{7} 43	**2**
			•^{8} Process: calculate the total number of bathrooms purchased	•^{8} 387	

Notes:
1. Correct answer without working   award 2/2
2. For commonly observed answers illustrated below, 19·… multiplied by 3, 4 or 2 •^{8} can be awarded.
3. Where the candidate attempts more than one COR all calculations must be correct for •^{8} to be awarded.
4. •^{7} cannot be awarded if the candidate has also calculated $172 \div 3$ and/or $172 \div 2$ and/or $172 \div 9$.

Commonly Observed Responses:
1. $172 \div 9 \times 3 \rightarrow 57 \cdot …$ award 1/2 ✗✓
2. $172 \div 9 \times 4 \rightarrow 76 \cdot …$ award 1/2 ✗✓
3. $172 \div 9 \times 2 \rightarrow 38 \cdot …$ award 1/2 ✗✓

	Question		Generic scheme	Illustrative scheme	Max mark
	(d)		•^{9} Process: calculate deposit	•^{9} 837.50	**3**
			•^{10} Process: calculate total cost of payment plan	•^{10} 7025	
			•^{11} Process/communication: calculate the cost of 1 monthly instalment	•^{11} 123.75	

Notes:
1. Correct answer without working   award 3/3
2. Where the final answer is not a whole number, •^{11} is only available where final answer is rounded or truncated to 2 decimal places.
3. For •$^{9\ \&\ 10}$ do not penalise candidates who omit the trailing zero.
4. •^{10} can be implied by a candidate who states 6187.50.
5. •^{11} can only be awarded for a calculation involving subtracting a calculated deposit and a division by 50.

Commonly Observed Responses:
1. $(12.5\% \text{ of } 7025 =)878.12… \rightarrow 6146.87… \rightarrow 122.93 \text{ or } 122.94$ award 2/3 ✗✓✓
2. $837.50 \rightarrow (7025 + 837.50 =)7862.50 \rightarrow 157.25$ award 2/3 ✓✓✗
3. $837.50 \rightarrow (6700 - 837.50 =)5862.5 \rightarrow 117.25$ award 2/3 ✓✗✓
4. $(837.50 + 325 =)1162.5 \rightarrow 23.25$ award 1/3 ✓✗✗
5. $837.50 \div 50 = 16.75$ award 1/3 ✓✗✗
6. $7025 \div 50 = 140.50$ award 1/3 ✗✓✗
7. $6700 \div 50 = 134$ award 0/3 ✗✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
9.	(a)		$\bullet^1$ Strategy/process: convert dollars into pounds	$\bullet^1$ 76.92…	**2**
			$\bullet^2$ Process: convert pounds into euros	$\bullet^2$ 85.38	

Notes:
1. Correct answer without working award 2/2
2. $\bullet^1$ can be rounded or truncated to a whole number or any number of decimal places.
3. $\bullet^2$ must be rounded or truncated to the nearest cent, 10 cents or euro
   eg 85.38 rounded to 85.40 or 85.4 .
4. Do not penalise the wrong units in the final answer.

Commonly Observed Responses:
1. $100 \div 1.3 \div 1.11 = 69.29$ or 69.30 award 1/2 ✓✗
2. $100 \times 1.30 \div 1.11 = 117.11$ or 117.12 award 1/2 ✗✓
3. $100 \times 1.3 \times 1.11 = 144.30$ award 1/2 ✗✓
4. $100 \times 1.11 = 111$ award 0/2 ✗✗

	(b)		$\bullet^3$ Process: calculate normal pay	$\bullet^3$ 480	**3**
			$\bullet^4$ Process: calculate overtime hours	$\bullet^4$ 10	
			$\bullet^5$ Process: calculate total pay	$\bullet^5$ 672	

Notes:
1. Correct answer without working award 3/3
2. $\bullet^5$ is only available for a calculation involving the candidate's answer to $\bullet^4$ multiplied by 12.8 and by 1.5, added to the candidate's answer to $\bullet^3$ with the exception of COR 2.
3. Where answer is not a whole number $\bullet^5$ is only available where final answer is rounded or truncated to 2 decimal places.

Commonly Observed Responses:
1. $47.5 \times 12.80 = 608$ award 1/3 ✓✗✗
2. $47.5 \times 12.80 \times 1.5 = 912$ award 1/3 ✗✗✓
3. $480 + (47.5 \times 12.80 \times 1.5) = 1392$ award 1/3 ✓✗✗

	Question		Generic scheme	Illustrative scheme	Max mark
9.	(c)		$\bullet^6$ Process: calculate number of gallons	$\bullet^6$ $(492 \div 48 =)10.25$	**4**
			$\bullet^7$ Process: calculate number of litres	$\bullet^7$ $(10.25 \times 4.545 =)46.58\ldots$	
			$\bullet^8$ Process: calculate total cost of Manchester option	$\bullet^8$ $(46.58\ldots \times 1.42 + 152 + 49 =)267.15$	
			$\bullet^9$ Process/communication: calculate total for Edinburgh and state consistent conclusion	$\bullet^9$ 270.50, Manchester is cheaper	

Notes:

1. Correct answer without working   award 0/4
2. $\bullet^6$ is also available for 11 gallons provided there is evidence of a valid strategy.
3. $\bullet^7$ is also available for 47 litres.
4. $\bullet^6$ is not available to candidates who round down number of gallons.
5. $\bullet^7$ is not available to candidates who round down number of litres.
6. $\bullet^{6\&7}$ are not available for 48×4.545 or $48 \div 4.545$.
7. For $\bullet^8$ do not penalise candidates who do not round their answer to 2 decimal places.
8. For $\bullet^9$ do not penalise candidates who omit the trailing zero.

Commonly Observed Responses:

1. $10.25 \rightarrow 4.545 \times 1.42 = 6.4539 \rightarrow (6.45 \times 10.25 + 152 + 49 =)267.11 \rightarrow 270.50$, Manchester

                                                                     award 4/4 ✓✓✓✓

2. 10.25 rounded to 11 gallons $\rightarrow 49.995l \rightarrow £70.99$ or $£71 \rightarrow £272$ and £270.50, Edinburgh

                                                                     award 4/4 ✓✓✓✓

3. $492 \div 48 = 10.25$ rounded to 10 gallons $\rightarrow 45.45 \times 1.42 = 64.539 \rightarrow £265.54$ and £270.50, Manchester

                                                                     award 3/4 ✗✓✓✓

4. $48 \times 4.545 = 218.16 \rightarrow (218.16 \times 1.42 + 152 + 49 =)510.78\ldots \rightarrow 270.50$, Edinburgh

                                                                     award 2/4 ✗✗✓✓

5. $48 \div 4.545 = 10.561\ldots$ rounded to 11 gallons $\rightarrow 11 \times 1.42 = 15.62 \rightarrow £216.62$ and £270.50, Manchester   award 2/4 ✗✗✓✓

6. $48 \div 4.545 = 10.561\ldots$ rounded to 11 gallons $\rightarrow 70.99$ or $71 \rightarrow £272$ and £270.50, Edinburgh   award 2/4 ✗✗✓✓

Question			Generic scheme	Illustrative scheme	Max mark
9.	(d)		Method 1 •¹⁰ Process: calculate time of flight in hours •¹¹ Process: convert time to hours and minutes and add on •¹² Process/communication: calculate local time in Alicante when flight landed	•¹⁰ 2.7 •¹¹ 14:12 •¹² 15:12 or 3:12 pm	**3**
			Method 2 •¹⁰ Process: calculate local time in Alicante when flight left •¹¹ Process: calculate time of flight in hours •¹² Process/communication: state time flight landed	•¹⁰ 12:30 or 12:30 pm •¹¹ 2.7 •¹² 15:12 or 3:12 pm	

Notes:
1. Correct answer without working   award 3/3
2. For •¹² accept 03:12 pm or 15:12 pm.
3. For •¹² do not accept 3:12, 03:12 or 3 hours 12 minutes.

Commonly Observed Responses:
1. $2.7 \rightarrow 2:40$ pm $\rightarrow 3:40$ pm   award 2/3 ✓✗✓
2. $2.7 \rightarrow 1:37$ pm $\rightarrow 2:37$ pm   award 2/3 ✓✗✓

[END OF MARKING INSTRUCTIONS]