2017 Lifeskills Mathematics

National 5 Paper 1

Finalised Marking Instructions

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General marking principles for National 5 Lifeskills Mathematics

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

For each question the marking instructions are generally in two sections, namely Illustrative Scheme and Generic Scheme. The illustrative scheme covers methods which are commonly seen throughout the marking. The generic scheme indicates the rationale for which each mark is awarded. In general, markers should use the illustrative scheme and only use the generic scheme where a candidate has used a method not covered in the illustrative scheme.
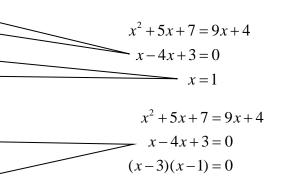
(a) Marks for each candidate response must <u>always</u> be assigned in line with these general marking principles and the detailed marking instructions for this assessment.

(b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

(c) If a specific candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader.

(d) Credit must be assigned in accordance with the specific assessment guidelines.

(e) One mark is available for each •. There are no half marks.

(f) Working subsequent to an error must be **followed through**, with possible credit for the subsequent working, provided that the level of difficulty involved is approximately similar. Where, subsequent to an error, the working for a follow through mark has been eased, the follow through mark cannot be awarded.

(g) As indicated on the front of the question paper, full credit should only be given where the solution contains appropriate working. Unless specifically mentioned in the marking instructions, a correct answer with no working receives no credit.

(h) Candidates may use any mathematically correct method to answer questions except in cases where a particular method is specified or excluded.

(i) As a consequence of an error perceived to be trivial, casual or insignificant, eg $6 \times 6 = 12$ candidates lose the opportunity of gaining a mark. However, note the second example in comment **(j)**.

(j) Where a transcription error (paper to script or within script) occurs, the candidate should normally lose the opportunity to be awarded the next process mark, eg

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

$$x^2 + 5x + 7 = 9x + 4$$
$$x - 4x + 3 = 0$$

Eased as no longer a solution of a quadratic equation so mark is not awarded.

$$x = 1$$

Exceptionally 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.

$$x^2 + 5x + 7 = 9x + 4$$
$$x - 4x + 3 = 0$$
$$(x - 3)(x - 1) = 0$$
$$x = 1 \text{ or } 3$$

(k) **Horizontal/vertical marking**

Where a question results in two pairs of solutions, this technique should be applied, 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 $y = -7$

Markers should choose whichever method benefits the candidate, but **not** a combination of both.

(l) In final answers, unless specifically mentioned in the detailed marking instructions, numerical values should be simplified as far as possible, eg:

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

$\dfrac{15}{0\cdot3}$ 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 100 must be known.

(m) 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.

(n) Unless specifically mentioned in the marking instructions, the following should not be penalised:

- Working subsequent to a correct answer
- Correct working in the wrong part of a question
- Legitimate variations in numerical answers/algebraic expressions, eg angles in degrees rounded to nearest degree
- Omission of units
- Bad form (bad form only becomes bad form if subsequent working is correct), eg $(x^3 + 2x^2 + 3x + 2)(2x + 1)$ written as $(x^3 + 2x^2 + 3x + 2) \times 2x + 1$

  $2x^4 + 4x^3 + 6x^2 + 4x + x^3 + 2x^2 + 3x + 2$ written as $2x^4 + 5x^3 + 8x^2 + 7x + 2$ gains full credit

- Repeated error within a question, but not between questions or papers

(o) In any 'Show that…' question, where the candidate has to arrive at a required result, the last mark of that part is not available as a follow-through from a previous error unless specified in the detailed marking instructions.

(p) All working should be carefully checked, even where a fundamental misunderstanding is apparent early in the candidate's response. Marks may still be available later in the question so reference must be made continually to the marking instructions. The appearance of the correct answer does not necessarily indicate that the candidate has gained all the available marks.

(q) Scored-out working which has not been replaced should be marked where still legible. However, if the scored out working has been replaced, only the work which has not been scored out should be marked.

(r) Where a candidate has made multiple attempts using the same strategy and not identified their final answer, mark all attempts and award the lowest mark.

Where a candidate has tried different valid strategies, apply the above ruling to attempts within each strategy and then award the highest resultant 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.

Detailed marking instructions for each question

Question			Generic scheme	Illustrative scheme	Max mark
1.			**Ans: 9600 (mm)** $\bullet^1$ Strategy: know to calculate minimum length of brick x 50 $\bullet^2$ Process/communication: answer	$\bullet^1$ (194 – 2) $\times$ 50 $\bullet^2$ 9600	2

Notes:
1. Any attempted unit conversions must be correct for award of $\bullet^2$

Commonly Observed Responses :

1. For $(194 \times 50) - 2$ leading to 9698. award 1/2 $\times\checkmark$

2. For $(194 + 2) \times 50$ leading to 9800. award 1/2 $\times\checkmark$

3. For 194×50 leading to 9700. award 0/2 $\times\times$

Question			Generic scheme	Illustrative scheme	Max mark
2.	(a)		**Ans: (£)2600** •[1] Strategy: know to calculate 2·5% of £6000 •[2] Process: calculate 2·5% of £6000 •[3] Strategy/process: add commission to basic salary	•[1] evidence •[2] 150 •[3] 2600	**3**

Notes:

1. Accept $6000 \div 2 \cdot 5$ as evidence of knowing to calculate 2·5%.

2. •[3] is only available for adding commission to £2450.

Commonly Observed Responses:

1.   For 2·5% of £9000=£225 leading to a final answer of £2675.

    award 2/3 ×✓✓

2.   For 2·5% of £2450=£61·25 leading to a final answer of £2511·25.

    award 2/3 ×✓✓

3.   For 2·5% of £3000=£75 leading to a final answer of £2525.

    award 2/3 ×✓✓

4.   For 2·5% of £(9000-2450)=£163·75 leading to a final answer of £2613·75.

    award 2/3 ×✓✓

Question			Generic scheme	Illustrative scheme	Max mark
2.	(b)		**Ans: (£)1870·39** •¹ Strategy: attempt to calculate gross pay – total deductions •² Process: calculate net pay	•¹ evidence •² 1870·39	**2**

Notes:

1. For reference: total deductions = 729·61

Commonly Observed Responses:

1. For candidates who calculate a gross salary in part (a) of £2675 leading to a net pay of £1945·39. award 2/2 ✓✓

2. For candidates who calculate a gross salary in part (a) of £2511·25 leading to a net pay of £1781·64. award 2/2 ✓✓

3. For candidates who calculate a gross salary in part (a) of £2525 leading to a net pay of £1795·39. award 2/2 ✓✓

4. For candidates who calculate a gross salary in part (a) of £2613·75 leading to a net pay of £1884·14. award 2/2 ✓✓

	Question		Generic scheme	Illustrative scheme	Max mark
3.	(a)		**Ans: Points plotted correctly** •¹ Communication: 4 points correct •² Communication: all 6 points correct	D 0 60 120 160 200 260 W 40 110 130 175 220 275	**2**

Notes:
1. If candidate inverts **all** coordinates   award 1/2

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
	(b)		**Ans: Line of best fit** •¹Strategy: consistent line of best fit	•¹	**1**

Notes:

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
	(c)		**Ans: (days)** •¹ Communication: answer consistent with line of best fit	•¹	**1**

Notes:
1. Accept answer rounded to the nearest 10 days.

Commonly Observed Responses:

Weight of Calf

Question			Generic scheme	Illustrative scheme	Max mark
4.			**Ans: No, supported by working.**		3
			•[1] Strategy: know how to calculate gradient	•[1] 1·6/8	
			•[2] Process: know how to compare gradients of new trail and blue trail	•[2] 4/20 (3/20 does not need to be explicitly stated) or 8/40 and 6/40 or 0·2 and 0·15 or equivalent	
			•[3] Strategy/ communication: consider the blue gradient and consistent conclusion	•[3] No, supported by working	

Notes:

1.   For 1·6/8 followed by "No" with no other working.   award 1/3

2.   For 1·6/8 =5 followed by blue gradient 6·666… leading to "Yes".   award 2/3

3.   •[2] can only be awarded for two gradients with the same denominator, or the same numerator, or for two decimal fractions.

4.   •[3] can only be awarded where two gradients with the same denominator, or the same numerator, or for two decimal fractions have been compared.

5.   **Special case:** If a candidate's answer for new trail is a top heavy fraction only •[3] is available. This mark is only available if reference is made to a gradient from the table.

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
5.	(a)		**Ans: Bands D and A** •¹ Communication: state bands required	•¹ $10 \times 14 + 1 = 141$, she needs bands D and A	**1**

Notes:
1. Bands D and A without working   award 1/1
2. For 140 lbs leading to bands D and A   award 1/1
3. D and A circled on the table   award 1/1
4. Accept $10 \times 14 = 141$ bands D and A (treat as bad form)   award 1/1
5. For any incorrect calculation leading to bands D and A   award 0/1

Commonly Observed Responses:

	(b)		**Ans: Shop 2** •¹ Process: calculate cost for shop 1 •² Process: calculate cost for shop 2 •³ Communication: conclusion consistent with working	•¹ 49·50 •² 45·48 •³ Shop 2	**3**
			Alternative Strategy: •¹ Process: calculate discount for 1 shop •² Process: calculate discount for other two shops •³ Communication: conclusion consistent with working	•¹ 26·30 or 30·32 or 27·81 •² remaining two •³ Shop 2	

Notes:
1. •³ can only be awarded for comparing 3 costs or 3 discounts.

Commonly Observed Responses:

1. Shop 1 £49·50, Shop 2 £30·32, Shop 3 £47·99 leading to conclusion Shop 2

                                               award 1/3 ✓××

Question			Generic scheme	Illustrative scheme	Max mark
6.			**Ans: (£)6 286 500**		**3**
			•[1] Strategy/process: calculate one (£1) share	•[1] 2 794 000 ÷ 4 = 698 500	
			•[2] Process: calculate total number of shares	•[2] 2·50 + 2·00 + 4·00 + 0·50 = 9	
			•[3] Process: calculate total amount	•[3] 9 × 698 500 = 6 286 500	
			Alternative Strategy 1		
			•[1] Strategy/process: calculate one (50p) share	•[1] 2 794 000 ÷ 8 = 349 250	
			•[2] Process: calculate total number of shares	•[2] 1 + 4 + 5 + 8 = 18	
			•[3] Process: calculate total amount	•[3] 18 × 349 250 = 6 286 500	
			Alternative Strategy 2		
			•[1] Strategy/process: calculate the amount for any teacher other than Mr Young	•[1] Miss Smith 1 397 000 or Mr Jones 349 250 or Mr Ross 1 746 250	
			•[2] Process: calculate the amount for another teacher	•[2] either of remaining two	
			•[3] Process: calculate amount for final teacher and total amount	•[3] 1 397 000 + 349 250 + 1 746 250 + 2 794 000 = 6 286 500	

Notes:

1. •[2] can be implied by subsequent working.

Commonly Observed Responses:

1.   For 2 7940 00 ÷ 9 = 310444·44
     310444·44 × 4 = 1241777·76.   award 2/3 ×✓✓

page 11

Question			Generic scheme	Illustrative scheme	Max mark
7.	(a)		**Ans: 20 (cm^2)** •^{1} Strategy: know how to calculate composite area •^{2} Process: calculate area	•^{1} Evidence of any valid strategy •^{2} eg $24 - 4 = 20$	**2**

Notes:

1. Accept $8 + 2 \times 2 = 20$ as bad form.

Commonly Observed Responses:

1. For $2 \times 8 + 1 \times 4 + 1 \times 4 = 24$. **award 1/2 ✓✗**

2. For calculation of two rectangles eg $4 \times 3 + 4 \times 2 = 20$ **award 1/2 ✗✓**

	(b)		**Ans: (£)30** •^{1} Process: calculate the number of badges per pack •^{2} Process: calculate the cost of enamel for 1 badge •^{3} Process: calculate selling price	•^{1} $180 \div 20 = 9$ •^{2} $90 \div 9 = 10$ •^{3} $10 + 3 + 17 = 30$	**3**
			Alternative Strategy: •^{1} Process: calculate the number of badges per pack •^{2} Process: calculate the total cost of 9 badges •^{3} Process: calculate selling price	•^{1} $180 \div 20 = 9$ •^{2} $9 \times 3 + 9 \times 17 + 90 = 270$ •^{3} $270 \div 9 = 30$	

Notes:

1. If the cost of the enamel is not considered then only •^{1} is available.

2. In the alternative strategy, if the candidates answer to •^{2} is not divisible by 9, •^{3} is only available for an answer rounded or truncated to 2 decimal places.

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
8.			**Ans:** $\dfrac{12}{100}\left(=\dfrac{3}{25}\right)$ •[1] Strategy: evidence of identifying the blood groups that B+ can help •[2] Communication: interpret stacked bar chart •[3] Process: calculate fraction	•[1] eg AB+ and B+ •[2] 3 people AB+ and 9 people B+ •[3] $\dfrac{3+9}{100}=\dfrac{12}{100}\left(=\dfrac{3}{25}\right)$	**3**

Notes:

1. Correct answer with no working. award 3/3

2. Accept 0·12, 12% or any fraction equivalent to $\dfrac{12}{100}$

3. For any answer **other** than $\dfrac{12}{100}$, $\dfrac{62}{100}$, $\dfrac{15}{100}$, $\dfrac{9}{100}$ & $\dfrac{3}{100}$, with no working award 0/3

Commonly Observed Responses:

1. For an answer of $\dfrac{62}{100}$ (B+ row is taken from the chart instead of the B+ column) (with no working) award 2/3 ×✓✓

2. For an answer of $\dfrac{15}{100}$ (the complete bars for AB and B are taken from the chart) (with no working) award 2/3 ×✓✓

3. For an answer of $\dfrac{9}{100}$ (B+ only) award 1/3

4. For an answer of $\dfrac{3}{100}$ (AB+ only) award 1/3

Question			Generic scheme	Illustrative scheme	Max mark
9.	(a)		**Ans: 27·42 (cm)**		**4**
			$\bullet^1$ Strategy: correct substitution in Pythagoras' Theorem	$\bullet^1$ eg $10^2 - 6^2$	
			$\bullet^2$ Process: calculate the missing side	$\bullet^2$ $x = 8$	
			$\bullet^3$ Process: calculate length of the semi-circle	$\bullet^3$ $3\cdot14 \times 6 \div 2 = 9\cdot42$	
			$\bullet^4$ Process: calculate the perimeter of the shape	$\bullet^4$ $10 + 8 + 9\cdot42 = 27\cdot42$	

Notes:

1. $\bullet^1$ and $\bullet^2$ are available for correct answer without working (Pythagorean triple).

2. $\bullet^1$ cannot be awarded if candidate writes $6^2 - 10^2$.

3. $\bullet^2$ can be awarded if candidate writes $6^2 - 10^2$ leading to x = 8.

4. $\bullet^4$ is only available for adding 10 to two previously **calculated lengths**.

5. $\bullet^4$ is not available if the candidate states that they are adding calculated **areas**.

Commonly Observed Responses:

1. For $3\cdot14 \times 6 + 10 + 8$ leading to a final answer of $36\cdot84$.   award 3/4 ✓✓✗✓

2. For $\frac{1}{2} \times 3\cdot14 \times 3^2 + 10 + 8$ leading to a final answer of $32\cdot31$. award 3/4 ✓✓✗✓

3. For $3\cdot14 \times 3^2 + 10 + 8$ leading to a final answer of $46\cdot26$.   award 3/4 ✓✓✗✓

4. For $\frac{1}{2} \times 3\cdot14 \times 6 + 10 + 8 + 6 + 6$ leading to a final answer of $39\cdot42$ award 3/4 ✓✓✓✗

Question			Generic scheme	Illustrative scheme	Max mark
9.	(b)		**Ans: 13·56 (cm^2)** •^{1} Strategy: know how to calculate area of rectangular strip •^{2} Process: calculate the area of the strip	•^{1} evidence •^{2} $(27\cdot42 - 0\cdot3) \times \dfrac{1}{2}$ = 13·56	2

Notes:

1. •^{1} is available for evidence of subtracting 0·3 and then multiplying by 0·5

Commonly Observed Responses:

1. For $27\cdot42 \times \dfrac{1}{2}$ = 13·71   award 1/2 ×✓

2. For $0\cdot3 \times 0\cdot5 = 0\cdot15$ award 0/2 ××

[END OF MARKING INSTRUCTIONS]

N5

National Qualifications 2017

2017 Lifeskills Mathematics

National 5 Paper 2

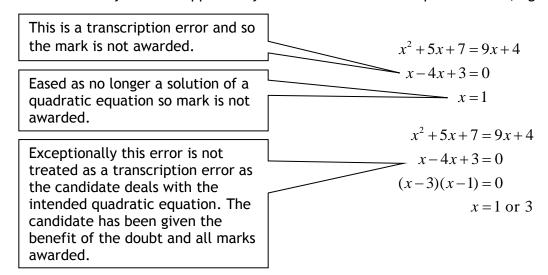# Finalised Marking Instructions

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

Eased as no longer a solution of a quadratic equation so mark is not awarded.

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

$x - 4x + 3 = 0$

$x = 1$

Exceptionally 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.

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

$x - 4x + 3 = 0$

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

$x = 1 \text{ or } 3$

(k) Horizontal/vertical marking
Where a question results in two pairs of solutions, this technique should be applied, 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 $y = -7$

Markers should choose whichever method benefits the candidate, but **not** a combination of both.

(l) In final answers, unless specifically mentioned in the detailed marking instructions, numerical values should be simplified as far as possible, eg:

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

$\dfrac{15}{0\cdot3}$ must be simplified to 50 $\dfrac{4/5}{3}$ must be simplified to $\dfrac{4}{15}$

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Where a candidate has tried different valid strategies, apply the above ruling to attempts within each strategy and then award the highest resultant 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.

Detailed marking instructions for each question

Question			Generic scheme	Illustrative scheme	Max mark
1.			**Ans: 2309 cm^3 or 2309 ml or 2·309 l** $\bullet^1$ Strategy: know how to calculate the volume of half a cylinder $\bullet^2$ Strategy: substitute into formula $\bullet^3$ Process: calculate the volume and state units	$\bullet^1$ evidence $\bullet^2$ $\dfrac{1}{2}\times\pi\times 7^2\times 30$ $\bullet^3$ $2309\cdot 07\ldots$ cm^3	**3**
			Alternative Strategy: $\bullet^1$ Strategy: know to calculate the area of the semi-circle and multiply it by 30 $\bullet^2$ Strategy: substitute into semi-circle formula $\bullet^3$ Process: calculate the volume and state units	$\bullet^1$ evidence $\bullet^2$ $\dfrac{1}{2}\times\pi\times 7^2$ $\bullet^3$ $76\cdot 96\ldots\times 30 = 2309\cdot 07\ldots$ cm^3	

Question	Generic scheme	Illustrative scheme	Max mark

Notes:

1. $\bullet^2$ only available when 7 is used as radius.

2. Accept legitimate variations of π .

3. For the final answer accept any legitimate rounding or truncation to at least 2 significant figures.

4. Correct answer with no working   award 0/3

5. $V = Ah$ on its own is not sufficient evidence for $\bullet^1$.

6. $\bullet^3$ is only available for calculations involving π, a power and at least one other number to find a volume.

7. If formula does not involve π then   award 0/3

8. If $V = \dfrac{1}{3}\pi r^2 h \div 2$ is used, approximations of $\dfrac{1}{3}$ must be expressed to at least 2 decimal places. $\bullet^2$ and $\bullet^3$ are available.

9. If $V = \dfrac{4}{3}\pi r^3 \div 2$ is used, approximations of $\dfrac{4}{3}$ must be expressed to at least 2 decimal places. $\bullet^2$ and $\bullet^3$ are available.

Question	Generic scheme	Illustrative scheme	Max mark

Commonly Observed Responses:

Working must be shown

1. For $\frac{1}{2} \times 3 \cdot 14 \times 7^2 \times 30 = 2307 \cdot 9$ cm^3 award 3/3 ✓✓✓

2. For $\frac{1}{2} \times \pi \times 7^2 \times 14 = 1077 \cdot 56...$ cm^3 award 2/3 ✗✓✓

3. For $\frac{1}{2} \times \pi \times 7^2 \times 30 \times 14 = 32326 \cdot 99...$ cm^3 award 2/3 ✗✓✓

4. For $\pi \times 7^2 \times 30 = 4618 \cdot 14...$ cm^3 award 2/3 ✗✓✓

5. For $3 \cdot 14 \times 7^2 \times 30 = 4615 \cdot 8$ cm^3 award 2/3 ✗✓✓

6. For $\frac{1}{2} \times \pi \times 14^2 \times 30 = 9236 \cdot 28...$ cm^3 award 2/3 ✓✗✓

7. For $\frac{1}{2} \times 3 \cdot 14 \times 14^2 \times 30 = 9231 \cdot 6$ cm^3 award 2/3 ✓✗✓

8. For $\pi \times 7^2 = 153 \cdot 9...$ cm^3 award 1/3 ✗✓✗

9. For $\pi \times 14^2 \times 30 = 18472 \cdot 56...$ cm^3 award 1/3 ✗✗✓

10. For $3 \cdot 14 \times 14^2 \times 30 = 18463 \cdot 2$ cm^3 award 1/3 ✗✗✓

11. For $14 \times 7 \times 30 = 2940$ cm^3 award 0/3 ✗✗✗

Question			Generic scheme	Illustrative scheme	Max mark
2.	(a)		**Ans: (£)6150·64** •^{1} Process: work out the cost of 8000 shares •^{2} Strategy: know how to calculate percentage decrease •^{3} Strategy: know how to calculate percentage increase •^{4} Strategy: identify power •^{5} Process: calculate the value of the shares	•^{1} 8000 × 0·73 = 5840 •^{2} Evidence of 0·97 •^{3} Evidence of 1·042 •^{4} ...^{2} •^{5} 6150·64	**5**
			Alternative Strategy 1: •^{1} Strategy: know how to calculate percentage decrease •^{2} Strategy: know how to calculate percentage increase •^{3} Strategy: identify power •^{4} Process: calculate value of 1 share •^{5} Process: calculate the value of 8000 shares	•^{1} Evidence of 0·97 •^{2} Evidence of 1·042 •^{3} ...^{2} •^{4} 0·768... •^{5} 6150·64	

Notes:
1. When working in pounds, where rounding or truncation has taken place, working must be given to at least 2 decimal places.
2. Final answer must be given to 2 decimal places where necessary.

Commonly Observed Responses:

1. For 6150·63 supported by working.   award 5/5 ✓✓✓✓✓

2. For 6160 (percentage calculations on individual share price, rounded to nearest penny at each step) supported by working.   award 5/5 ✓✓✓✓✓

3. For $1·054 \times 5840 = 6155·36$ award 2/5 ✓✗✗✓

4. For $5840 \times 0·97 \times 1·042 = 5902·72$ award 4/5 ✓✓✓✗✓

5. For $5664·80 + 5664·80 \times (0·042 \times 2) = 6140·64$ award 3/5 ✓✓✓✗✗

Question			Generic scheme	Illustrative scheme	Max mark
2.	(b)		**Ans: (£)4087·05** $\bullet^1$ Strategy: know to calculate $\dfrac{5}{8}$ of 6560 and subtract commission $\bullet^2$ Process: calculate amount received	$\bullet^1$ evidence $\bullet^2$ 4087·05	2

Notes:

1. Where $\bullet^1$ is not awarded $\bullet^2$ can be awarded for a calculation of the form $\dfrac{a}{b} \times \ldots \pm 12 \cdot 95$, where $\dfrac{a}{b}$ is equivalent to either $\dfrac{5}{8}$ or $\dfrac{8}{5}$.

Commonly Observed Responses:

1. $\dfrac{5}{8}$ of $6560 + 12 \cdot 95 = 4112 \cdot 95$ award 1/2×✓

Question			Generic scheme	Illustrative scheme	Max mark
3.			**Ans: (£)92·60**		**4**
			$\bullet^1$ Process: calculate new price	$\bullet^1$ 1260+151·20 = 1411·20	
			$\bullet^2$ Process: calculate the deposit	$\bullet^2$ $\frac{1}{3}$ of 1411·20 = 470·40	
			$\bullet^3$ Process: calculate amount still payable	$\bullet^3$ 470·40+200=670·40 1411·20-670·40 = 740·80	
			$\bullet^4$ Communication: state how much each monthly payment is	$\bullet^4$ 740·80÷8= 92·60	

Notes:
1. Must have 0 at the end of 92·60 to gain final mark.
2. $\bullet^4$ is not available where candidate has divided their deposit by 8 – see COR 9 and 10

Commonly Observed Responses:

1. For $\frac{1}{3}$ of 1260 leading to 98·90   award 3/4 ✓×✓✓

2. Not subtracting 200 leading to 117·60   award 3/4 ✓✓×✓

3. Not subtracting deposit leading to 151·40   award 3/4 ✓✓×✓

4. 1411·20 leading to 1211·20 leading to $\frac{1}{3}$ of 1211·20 leading to 807·46

   $807·46 \div 8 = 100·93$ award 3/4 ✓×✓✓

5. For $\frac{1}{3}$ of 1260 leading to $(1260 - 420 - 200) \div 8 = 80$ award 2/4 ××✓✓

6. 12% of 1260 leading to 1411·20

   $\frac{1}{3}$ of 1260 = 420
   $1260 - 620 = 640$
   $640 \div 8 = 80$ award 2/4 ✓××✓

7. $1411·20 \div 8 = 176·40$ award 2/4 ✓××✓

8. $1260 \div 8 = 157·50$ award 1/4 ×××✓

9. $470·40 \div 8 = 58·80$ award 2/4 ✓✓××

10. $420 \div 8 = 52·50$ award 0/4 ××××

Question			Generic scheme	Illustrative scheme	Max mark
4.	(a)		**Ans: 71** •^{1} Communication: calculate the most common heart rate	•^{1} 71	**1**

Notes:

Commonly Observed Responses:

| | (b) | | **Ans: 10**

•^{1} Communication: calculate either median

•^{2} Communication/process: calculate other median and difference | •^{1} 61 or 71

•^{2} calculate other median and difference $71-61=10$ | **2** |

Notes:
1. •^{2} can be awarded if difference is found using incorrect medians.
2. Correct answer with no working.   award 2/2

Commonly Observed Responses:

1. $71-66=5$ (incorrect median for "before")   award 1/2✓✗

2. $74\cdot73-62\cdot6=12\cdot13$ (difference of means)   award 1/2✗✓

3. $71-66=5$ (difference of modes)   award 1/2✗✓

4. $36-29=7$ (difference of ranges)   award 1/2✗✓

Question			Generic scheme	Illustrative scheme	Max mark
	(c)		**Ans: correct boxplot** $\bullet^1$ Process: calculate lower quartile $\bullet^2$ Process: calculate upper quartile $\bullet^3$ Communication: correct end points drawn $\bullet^4$ Communication: consistent box drawn	$\bullet^1$ $Q_1 = 67$ $\bullet^2$ $Q_3 = 84$ $\bullet^3$ 59 and 95 $\bullet^4$ Box showing Q_1, Q_2 and Q_3	4

Notes:
1. The boxplot must be drawn to a reasonable scale.
2. If an unsuitable scale is used a maximum of 3/4 is available.
3. If the boxplot is drawn for "before exercise" a maximum of 3/4 is available.
4. If no working is shown and the boxplot is correct award 4/4.
5. If no working is shown and Q_1 and Q_3 are both incorrect, $\bullet^4$ is still available if consistent median is shown on boxplot.
6. If no working is shown and only one of Q_1 or Q_3 is correct, award $\bullet^1$.
   $\bullet^4$ is still available if consistent median is shown on boxplot.

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
5.	(a)		**Ans: 240(km)**		**2**
			•¹ Process: calculate the distance from a scale drawing	•¹ $8 \times 3000000 = 24000000$	
			•² Process/communication: give answer in kilometres	•² $24000000 \div 100 \div 1000 = 240$	

Notes:

1. Tolerance ±1mm on candidate measurement

Commonly Observed Responses:

1. For 2·4, 24, 2400, 24000 etc…, with or without working   award 1/2✓✗

	(b)		**Ans: 17 (knots)**		**3**
			•¹ Strategy: know how to calculate average speed and to change hours and minutes to hours	•¹ $\dfrac{240}{7 \cdot 5} = \ldots$	
			•² Strategy: know how to convert average speed into knots	•² $\ldots \times 0 \cdot 54 = \ldots$	
			•³ Process/communication: calculate average speed to **2 significant figures**	•³ $17 \cdot 28 = 17$ (2 sig fig)	

Notes:

1. Candidates must work to at least 3 significant figures throughout where appropriate.
2. •² can only be awarded for multiplying an average speed by 0·54 or equivalent.
3. •³ can only be awarded for a two-step calculation and rounding.

Commonly Observed Responses:

1. For $\dfrac{240}{450} \times 0 \cdot 54 = 0 \cdot 288 = 0 \cdot 29$ award 2/3✗✓✓

2. For $\dfrac{240}{7 \cdot 3} \times 0 \cdot 54 = 17 \cdot 75\ldots = 18$ award 2/3✗✓✓

Question			Generic scheme	Illustrative scheme	Max mark
5.	(c)		**Ans: 139 (euro)** $\bullet^1$ Strategy: know how to calculate amount of euro $\bullet^2$ Process: calculate remaining euro	$\bullet^1$ 55% of 2400×1·15... $\bullet^2$ $1518 - 1379 = 139$	**2**

Notes:

1. Where $\bullet^1$ is lost $\bullet^2$ is still available for a 3 step process.

Commonly Observed Responses:

	(d)	(i)	**Ans: 7/32** $\bullet^1$ Communication: state probability	$\bullet^1$ 7/32	**1**

Notes:

1. 7:32 is not acceptable for $\bullet^1$

Commonly Observed Responses:

		(ii)	**Ans: 1/28** $\bullet^2$ Strategy/process: calculate denominator $\bullet^3$ Communication: state probability	$\bullet^2$ denominator of 28 $\bullet^3$ 1/28	**2**

Notes:

1. If the answer to part (d)(i) is written as a ratio then 1:28 is acceptable for $\bullet^3$.

Commonly Observed Responses:

1. For $\dfrac{1}{27}$ award 1/2   ×✓

2. For $\dfrac{28}{1}$ award 0/2   ××

Question			Generic scheme	Illustrative scheme	Max mark
6.	(a)		**Ans: 102 (cages)**		**3**
			$\bullet^1$ Strategy: know to calculate two arrangements	$\bullet^1$ Evidence	
			$\bullet^2$ Process: calculate one arrangement.	$\bullet^2$ 2·25m ÷ 0·75 = 3 cages 15m ÷ 0.85 = 17 cages Total = 3 x 17 × 2 = 102 cages	
			$\bullet^3$ Process/communication: calculate second arrangement and make consistent conclusion	$\bullet^3$ 2·25m ÷ 0·85 = 2 cages 15m ÷ 0.75 = 20 cages exactly Total = 20 x 2 ×2 = 80	

Notes:

1. When a candidate calculates two versions for one level and only doubles the larger, all three marks are still available.
2. Where a candidate considers more than two arrangements do not award $\bullet^1$.

Commonly Observed Responses:

1. For volume of truck ÷ volume of cage =109   award 0/3×××

	Question		Generic scheme	Illustrative scheme	Max mark
6.	(b)		**Ans: (£) 1026**		**3**
			•^{1} Process: calculate basic pay	•^{1} $1\frac{1}{2} \times 14\cdot40 = 21\cdot60$	
			•^{2} Process: calculate overtime Pay	•^{2} $8\frac{1}{2}$ x 14·40 x 1·5 = 183·60	
			•^{3} Process: calculate weekly gross pay	•^{3} (183·60 + 21·60) $\times$ 5 = 205·20 $\times$ 5 = 1026	
			Alternative Strategy 1:		
			•^{1} Process: calculate 10 hours basic pay	•^{1} $10 \times 14\cdot40 = 144$	
			•^{2} Process :calculate $8\frac{1}{2}$ hours at $\frac{1}{2}$ time	•^{2} $8\frac{1}{2} \times 7\cdot20 = 61\cdot20$	
			•^{3} Process: calculate weekly gross pay	•^{3} $(144 + 61\cdot20) \times 5 = 1026$	

Notes:

1. •^{3} is available for adding basic pay, overtime pay and multiplying them by 5

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
7.	(a)	(i)	**Ans: 19·5(°)** $\bullet^1$ Process: calculate mean	$\bullet^1$ (24+22+19+18+17+17)÷6 = 19·5	**1**

Notes:
1. Correct answer with no working.   award 1/1

Commonly Observed Responses:

1. 24+22+19+18+17+17 = 19·5   award 0/1

		(ii)	**Ans: 2·88** $\bullet^2$ Process: calculate $(x - \bar{x})^2$ $\bullet^3$ Strategy: substitute into formula $\bullet^4$ Process: calculate standard deviation	$\bullet^2$ 20·25,6·25,0·25,2·25,6·25,6·25 $\bullet^3$ $\sqrt{(41\cdot5 \div 5)}$ $\bullet^4$ 2·88	**3**

Notes:
1. Alternative method

    Mark 2 - $\sum x = 117$ and $\sum x^2 = 2323$
2. Where rounding or truncation has taken place, working must be given to at least 2 decimal places.
3. Accept rounding or truncation to at least one decimal place for the final answer.
4. Mark 4 can only be awarded when a 2 step calculation has taken place.

Commonly Observed Responses:

	(b)		**Ans: two valid comments** $\bullet^1$ Communication: comment regarding mean $\bullet^2$ Communication: comment regarding standard deviation	$\bullet^1$ eg on average Durban's temperatures are higher $\bullet^2$ eg Durban's temperatures are less consistent	**2**

Notes:
1. Examples of unacceptable comments:

    The weather is warmer in Durban compared to Cape Town (no mention of average)

    The weather varies more in Durban compared to Cape Town (no mention of temperature)

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
7.	(c)		**Ans: New York and London** •[1] Strategy/process : calculate one local time •[2] Strategy/process: calculate the other two local times •[3] Communication: state offices which can take part	•[1] Mumbai 9:00pm London 1:30pm New York 8:30am •[2] calculate remaining two local times •[3] New York and London	**3**
			Alternative Strategy 1: •[1] Strategy/process: calculate one time difference •[2] Strategy/process :calculate remaining two time differences •[3] Communication: state offices which can take part	•[1] Mumbai $+5$ hrs 30 mins London -2 hrs New York -7 hrs •[2] calculate remaining two differences •[3] New York and London	
			Alternative Strategy 2: •[1] Strategy/process: calculate how long until 3:30pm •[2] Strategy/process :calculate all three of the local times •[3] Communication: state offices which can take part	•[1] 22 hours 5 minutes •[2] Mumbai 9:00pm London 1:30pm New York 8:30am •[3] New York and London	

Notes:

1. Correct answer with no working award 0/3.
2. Converting between 12 and 24 hour time with no other working and the correct conclusion award 0/3.

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
8.	(a)		Ans: 707 (mm) •^{1} Strategy: calculate short sides of triangle •^{2} Strategy: evidence of the correct form of Pythagoras' theorem •^{3} Process: calculate length of hypotenuse of triangle	•^{1} 500 •^{2} $500^2 + 500^2$ •^{3} 707·1068...	3

Notes:

Commonly Observed Responses:

	Question		Generic scheme	Illustrative scheme	Max mark
	(b)		Ans: 685000(mm^2) •^{1} Strategy: evidence of calculating the area of the square encasing pentagonal shower base and subtract area of missing triangle •^{2} Process: calculate area of pentagonal base	•^{1} $900^2 - \dfrac{1}{2} \times 500 \times 500$ •^{2} $810000 - 125000 = 685000$	2

Notes:

1. If the candidate converts units incorrectly do no award •^{2}.

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
8.	(c)		**Ans: Zuzanna should pick the offset quadrant (since 732743 mm^2 > 685000 mm^2)**		**4**
			•^{1} Strategy: evidence of quarter circle added to rectangles	•^{1} Evidence	
			•^{2} Process: calculate the area of the quarter circle	•^{2} $\frac{1}{4} \times \pi \times 600 \times 600 = 282743$	
			•^{3} Process: calculate area of shower tray	•^{3} $282743 + 450000 = 732743$	
			•^{4} Communication: conclusion consistent with working	•^{4} Zuzanna should pick the offset quadrant (since 732743 mm^2 > 685000 mm^2)	
			Alternative Strategy 1:		
			•^{1} Strategy: evidence of whole square minus area that is not part of the base.	•^{1} Evidence	
			•^{2} Process: calculate the area of the quarter circle	•^{2} $\frac{1}{4} \times \pi \times 600 \times 600 = 282743$	
			•^{3} Process: calculate area of shower tray	•^{3} $810000 - (360000 - 282743)$ $= 732743$	
			•^{4} Communication: conclusion consistent with working	•^{4} Zuzanna should pick the offset quadrant (since 732743 mm^2 > 685000 mm^2)	

Question	Generic scheme	Illustrative scheme	Max mark

Notes:

1. $\bullet^2$ is available for finding area of a whole circle or any fraction of a circle with radius 600.

2. If the candidate uses the same incorrect unit conversion in part (c) as in part (b) do not penalise again.

3. $\bullet^3$ is only available for adding to 450000 (does not apply to the alternative strategy).

4. In **alternative strategy**, $\bullet^3$ is only available for subtracting from 810000.

5. Disregard incorrect numerical comparison in conclusion.

Commonly Observed Responses:

   In the following cases: $\bullet^4$ is also available for consistent conclusion.

1. For $\frac{1}{4} \times 3 \cdot 14 \times 600 \times 600 = 282600$ leading to answer of **732600** award $\bullet^1$, $\bullet^2$ and $\bullet^3$.

2. For $\frac{1}{4} \times 3 \cdot 14 \times 300 \times 300 = 70650$ leading to answer of **520650** award $\bullet^1$ and $\bullet^3$.

3. For $810000 - 282743 = 527257$ award $\bullet^2$ and $\bullet^3$. (Whole square minus quarter circle).

[END OF MARKING INSTRUCTIONS]