



National
Qualifications
2016

2016 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 always 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.	$x^2 + 5x + 7 = 9x + 4$
Eased as no longer a solution of a quadratic equation so mark is not awarded.	$x - 4x + 3 = 0$ $x = 1$
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:

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

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

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:

$$\begin{array}{ll} \frac{15}{12} \text{ must be simplified to } \frac{5}{4} \text{ or } 1\frac{1}{4} & \frac{43}{1} \text{ must be simplified to } 43 \\ \frac{15}{0.3} \text{ must be simplified to } 50 & \frac{4}{3} \text{ must be simplified to } \frac{4}{15} \\ \sqrt{64} \text{ must be simplified to } 8^* & \end{array}$$

*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.

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.	<p>Ans: 9 kg bag supported by working</p> <ul style="list-style-type: none"> •¹ Strategy: attempt to find price of 1kg of each •² Process: finds price of one kg of each. •³ Communication: select best value <p>Alternative strategies:</p> <p>Alternative 1</p> <ul style="list-style-type: none"> •¹ Strategy: attempt to find price of 1kg then multiply by 20 •² Process: calculates correctly •³ Communication: select best value <p>Alternative 2</p> <ul style="list-style-type: none"> •¹ Strategy: attempts to multiply and add on additional weight •² Process: calculates correctly •³ Communication: select best value <p>Alternative 3</p> <ul style="list-style-type: none"> •¹ Strategy: attempt to find price of 180kg of each •² Process: calculates correctly •³ Communication: select best value 	<ul style="list-style-type: none"> •¹ $£25.65 \div 9$ and $£57.20 \div 20$ •² £2.85 and £2.86 •³ 9 kg bag better value <ul style="list-style-type: none"> •¹ $£25.65 \div 9 \times 20$ •² £57 •³ 9 kg bag better value <ul style="list-style-type: none"> •¹ $2 \times 9 \text{ kg} + 2 \text{ kg}$ 2×25.65 and attempt of $2/9$ of 25.65 •² 57 •³ 9 kg bag better value <ul style="list-style-type: none"> •¹ 20×25.65 and 9×57.20 •² 513 and 514.80 •³ 9 kg bag better value 	3

Question	Generic Scheme	Illustrative Scheme	Max Mark
Notes:			
Commonly Observed Responses:			

Question		Generic Scheme	Illustrative Scheme	Max Mark
2.		<p>Ans: 6/36 (1/6)</p> <ul style="list-style-type: none"> •¹ Strategy: know to find total combinations •² Process: find all combinations totalling 10 or more •³ Communication: state fraction 	<ul style="list-style-type: none"> •¹ evidence of the 36 combinations •² 6 combinations •³ 6/36 (= 1/6) 	3

Notes:

1. The combinations need not be listed for award of •¹ and •².
2. •³ can only be awarded if clear evidence of where numerator & denominator came from.
3. a) $\frac{6}{36} = \left(\frac{1}{6}\right)$ no working award 3/3 ✓✓✓
- b) $\frac{1}{6}$ or $\left(\frac{2}{12}\right)$ no working award 0/3 x x x
4. a) $\frac{3}{36}$ no working award 2/3 ✓ x ✓
- b) $\frac{6}{12}$ no working award 1/3 x ✓ x
- c) $\frac{4}{12}$ or $\frac{3}{12}$ no working award 0/3 x x x

Commonly Observed Responses:

Question		Generic Scheme	Illustrative Scheme	Max Mark
3.		<p>Ans: 0853 (from Biggar)</p> <ul style="list-style-type: none"> •¹ Strategy: evidence of working back from 11.30am •² Communication: choose the correct bus 	<ul style="list-style-type: none"> •¹ evidence •² 0853 from Biggar 	2
<p>Notes:</p> <p>1. Correct answer with no working award 2/2</p>				
<p>Commonly Observed Responses:</p>				

Question		Generic Scheme	Illustrative Scheme	
4.		<p>Ans: 7 weeks</p> <ul style="list-style-type: none"> •¹ Strategy: knows how to find left over money •² Process: finds left over money •³ Process/Communication: find number of weeks, rounded appropriately 	<ul style="list-style-type: none"> •¹ $(7 \cdot 30 \times 30) - (5 \cdot 32 + 7 \cdot 68 + 86)$ •² 120 •³ $(388 \div 60 = 6 \cdot 46 \dots) \rightarrow 7$ weeks 	3
<p>Notes:</p> <ol style="list-style-type: none"> 1. Correct answer with no working award 0/3 2. If candidate writes 6.44 •³ is not available 				
<p>Commonly Observed Responses:</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
5.	(a)	<p>Ans: task letters and times inserted correctly</p> <ul style="list-style-type: none"> •¹ Strategy: start to allocate tasks •² Strategy: complete allocation of tasks 	<ul style="list-style-type: none"> •¹ any 5 boxes •² remaining 4 boxes 	2
<pre> graph LR A["A 12"] --- C["C 3"] A --- D["D 4"] A --- E["E 1"] B["B 2"] --- E B --- H["H 2"] C --- G["G 3"] D --- F["F 5"] E --- H G --- J["J 1"] F --- J H --- I["I 1"] I --- J </pre>				
<p>Notes:</p> <p>1. If candidate puts only correct letter and no number in boxes award 1/2</p>				
<p>Commonly Observed Responses:</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
	(b)	<p>Ans: Yes supported with working</p> <ul style="list-style-type: none"> •¹ Strategy: select critical path •² Communication: yes as it only takes 22 months 	<ul style="list-style-type: none"> •¹ $12 + 4 + 5 + 1$ •² yes, it takes 22 months 	2
<p>Notes:</p>				
<p>Commonly Observed Responses (No working necessary)</p> <ol style="list-style-type: none"> 1. 34 → no not possible award 1/2 2. 19 → yes it is possible award 1/2 3. 17 → yes it is possible award 1/2 4. 6 → yes it is possible award 1/2 				

Question		Generic Scheme	Illustrative Scheme	Max Mark
6.		<p>Ans: (£)369.95</p> <ul style="list-style-type: none"> •¹ Strategy: use correct form of Pythagoras Theorem including 30 •² Process: correct length of 4th side •³ Strategy: know how to calculate number of rolls •⁴ Process/Communication: correctly rounded answer •⁵ Process: calculate cost 	<ul style="list-style-type: none"> •¹ $x^2 = 30^2 + 40^2$ •² $\sqrt{2500} = 50$ •³ $(50 + 130 + 40 + 160) \div 80$ •⁴ $4 \cdot 75 = 5$ rolls •⁵ $5 \times 73.99 = 369.95$ 	5
<p>Notes:</p> <ol style="list-style-type: none"> 1. •² is only available if Pythagoras has been attempted. 2. •³ is only available if 4 sides have been considered. 3. If only 3 sides are considered only marks •⁴ and •⁵ are available. 4. •⁴ is available for counting up in 80s to 400 leading to 5 rolls needed. 5. If dividing by 80 •⁴ is only available if rounding is necessary. 				
<p>Commonly Observed Responses:</p> <p>$(l \times b \times h) \div 80 = 832000 \div 80 = 10400$ rolls. •⁴ is not available as no rounding is necessary. •⁵ is still available for calculating cost</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
7.		<p>Ans: (£)7.26</p> <ul style="list-style-type: none"> •¹ Strategy: pick correct band •² Communication: pick consistent values from table •³ Process/Communication: conclusion 	<ul style="list-style-type: none"> •¹ band F (could be implied by subsequent working) •² 76.13 and 145 •³ $2 \times 76.13 - 145 = 7.26$ 	3
<p>Notes:</p> <p>1. •¹ and •² may be highlighted on the table</p>				
<p>Commonly Observed Responses:</p> <p>1. For $152.25 - 145 = 7.25$ award 2/3 ✓x✓</p> <p>2. For $2 \times 79.75 - 145 = 14.50$ award 2/3 ✓x✓</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
8.		<p>Ans: 138 m²</p> <ul style="list-style-type: none"> •¹ Strategy: rectangle – ½ circle •² Process: find the area of the sandpit •³ Process: find area to be covered in rubber tiles •⁴ Communication: round correctly and use appropriate units. 	<ul style="list-style-type: none"> •¹ evidence •² $\frac{1}{2} \times 3 \cdot 14 \times 3 \times 3 = 14 \cdot 13$ •³ $8 \times 19 - 14 \cdot 13 = 137 \cdot 87$ •⁴ 138 m² 	4
<p>Notes:</p> <ol style="list-style-type: none"> 1. •² is available for finding area of a whole circle with radius 3 but •¹ is not available in this case. 2. •³ is only available for subtracting from 152. 3. If candidate does $152 - 14 = 138$ •⁴ is not available as premature rounding is not appropriate. 				
<p>Commonly Observed Responses</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
9.		<p>Ans: 8 (cm)</p> <ul style="list-style-type: none"> •¹ Strategy: knows how to use scale factor to find area of card •² Strategy: knows to divide scaled area of card by 7 •³ Process: find missing length 	<ul style="list-style-type: none"> •¹ $4 \times 5 \times 2 \cdot 8$ •² $\dots \div 7$ •³ 8 cm 	3
<p>Notes:</p> <ol style="list-style-type: none"> 1. Correct answer with no working 0/3 2. •² is only available for dividing the scaled area by 7. 3. •³ is not available to candidates who have not considered the scale factor. 4. For $(4 \times 5 + 2 \cdot 8) \div 7$ award mark •² 5. •³ can be awarded for 3.2571... rounded or truncated to at least 1 decimal place. NB do not award •³ for 3.24 6. •³ is not available if the candidate treats scaled area as the perimeter. 7. eg $(56 - 7 \times 2) \div 2 = 21$ 				
<p>Commonly Observed Responses:</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
10.	(a)	<p>Ans: 1/18</p> <ul style="list-style-type: none"> •¹ Process: find the correct vertical difference •² Process: consistent units between the two values •³ Strategy/Process: calculate gradient in its simplest form 	<ul style="list-style-type: none"> •¹ 250 (m) •² 4.5 km = 4500 m or 250 m = 0.25 km •³ 250/4500 = 1/18 	3
Notes:				
Commonly Observed Responses:				
320/4500 = 16/225 award marks • ² and • ³				

Question		Generic Scheme	Illustrative Scheme	Max Mark
	(b)	<p>Ans: Yes, supported by working</p> <ul style="list-style-type: none"> •¹ Strategy: know how to compare gradients •² Communication: state conclusion consistent with working 	<ul style="list-style-type: none"> •¹ Convert $1/18$ to $2/36$ or convert $2/25$ to $1/12.5$ or convert both fractions to $25/450$ & $36/450$ •² Yes, $2/25 > 2/36$ 	2
<p>Notes:</p> <p>1. If the candidate's answer to (a) is an improper fraction then only the communication mark is available.</p>				
<p>Commonly Observed Responses:</p>				

[END OF MARKING INSTRUCTIONS]



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- (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.	$x^2 + 5x + 7 = 9x + 4$
Eased as no longer a solution of a quadratic equation so mark is not awarded.	$x - 4x + 3 = 0$ $x = 1$
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:

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

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

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:

$\frac{15}{12}$ 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	$\frac{4}{3}$ must be simplified to $\frac{4}{3}$
$\sqrt{64}$ 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:

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- 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.
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- (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.

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.	(a)	<p>Ans: proof</p> <ul style="list-style-type: none"> •¹ Strategy: know how to calculate percentage difference in population •² Process: calculate percentage growth <p>Alternative Strategy:</p> <ul style="list-style-type: none"> •¹ Strategy: know to find 0.4% and add it on •² Process: Calculate population in 2015 and round to the nearest hundred. 	<ul style="list-style-type: none"> •¹ $\frac{21400}{5347600} \times 100 = \dots$ •² 0.4 <ul style="list-style-type: none"> •¹ Finding 0.4% of 5347600 and adding it on •² $5347600 \div 100 \times 0.4 + 5347600 = 5369000$ 	2
<p>Notes:</p>				
<p>Commonly Observed Responses:</p> <p>1. $21400/5369000 \times 100 = 0.39 = 0.4$ award 1/2 ✕✓</p>				

Question		Generic Scheme	Illustrative Scheme	Max Mark
	(b)	<p>Ans: 5 433 700</p> <ul style="list-style-type: none"> •¹ Strategy: identify multiplier •² Strategy: identify power •³ Process/Communication: calculate population 	<ul style="list-style-type: none"> •¹ 1.004 •² ...³ •³ 5 433 700 	3

Notes:

1. For an answer of 5 433 700 without working award 3/3 ✓✓✓
2. If candidate calculates 3 annual increase accept rounding to nearest hundred for each year. ie (2016): 5 390 500, (2017): 5 4121 00, (2018): 5 433 700 award 3/3 ✓✓✓
3. Accept $5437600 \times 1.004^4 = 543370$ award 3/3 ✓✓✓
4. If candidate does $5347600 \times 1.004^3 = 5412000$ award 2/3 ✓x✓
5. Where an incorrect percentage is used, the working must be followed through to give the possibility of awarding 2/3 x✓✓
eg for an answer of 6 039 400 ($5\ 369\ 000 \times 1.04^3$), with working award 2/3 x✓✓
6. For an answer of 5 390 500 ($5\ 369\ 000 \times 1.004$), no working necessary award 1/3 ✓xx
7. For an answer of 16 171 400 ($5\ 369\ 000 \times 1.004 \times 3$), with working award 1/3 ✓xx
8. For an answer of 5 433 400 ($5\ 369\ 000 + 21\ 476 \times 3$), with working award 1/3 ✓xx
9. For an answer of 64 400 ($5\ 369\ 000 \times 0.004 \times 3$) award 0/3 xxx
10. For an answer of 5 433 200 ($5\ 369\ 000 + 21400 \times 3$) award 0/3 xxx

Commonly Observed Responses:

Question		Generic Scheme	Illustrative Scheme	Max Mark
2.		<p>Ans: 01:30 (on Sunday 10th)</p> <ul style="list-style-type: none"> •¹ Strategy: knows how to deal with time zone and flight time •² Process/Communication: state time 	<ul style="list-style-type: none"> •¹ evidence of adding flight time and subtracting time difference •² 01:30 (on Sunday 10th) 	2

Notes:

For the following answers no working is necessary

1. For an arrival time of 17:30 (add flight time and adds time difference)
award 1/2
2. For an arrival time of 08:40 (subtracts flight time then subtracting time difference)
award 1/2
3. For an arrival time of 00:40 (subtracts flight time and adds time difference)
award 1/2

Commonly Observed Responses:

Question	Generic Scheme	Illustrative Scheme	Max Mark
3.	<p>Ans:</p> <ul style="list-style-type: none"> •¹ Strategy/Process: find any one of the three angles for the April poll. •² Strategy/Process: find the other two angles. •³ Communication: make one valid comment. <p>Alternative strategy:</p> <ul style="list-style-type: none"> •¹ Strategy/Process: find all three percentages for December 2013 Poll. •² Strategy/Process: find all three percentages for April 2014 Poll. •³ Communication: make one valid comment. 	<ul style="list-style-type: none"> •^{1,2} Yes - 133° No - 184° Undecided - 43° •³ eg similar proportion chose 'yes' in survey 2. larger proportion chose 'no' in survey 2. smaller proportion chose 'undecided' in survey 2. •¹ December 2013 Poll: Yes 37%, No 39% and Undecided 24% •² April 2014 Poll: Yes 37%, No 51% and Undecided 12% •³ eg similar proportion chose 'yes' in survey 2. larger proportion chose 'no' in survey 2. smaller proportion chose 'undecided' in survey 2. 	3
<p>Notes:</p> <ol style="list-style-type: none"> 1. If no calculations are attempted all comments are invalid 0/3 2. All comments must refer to percentages, fractions, proportion etc 3. If candidate assumes that there are the same number of people in each poll then •¹ is not available but •² can be awarded for Yes 442, No 469, Undecided 295. In this case only, if they refer to the number of people •³ can be awarded comparing the number of people in each category. 4. If only one category has been considered in both opinion polls, then all three marks are available. 			
<p>Commonly Observed Responses:</p>			

Question			Generic Scheme	Illustrative Scheme	Max Mark
4.	(a)	(i)	Ans: 1:100 000 • ¹ Communication: find the scale	• ¹ 1:100 000	1
		(ii)	Ans: 074°, 9.6 km • ² Communication: correct bearing • ³ Communication: distance in kilometres	• ² 074° • ³ 9.6 km	2
Notes: 1. For 1cm=1km award 1/1 treat the = as bad form 2. Allow a tolerance of +/- 1° for angle 3. Allow a tolerance of +/- 0.1 km for length 4. For • ¹ the leading 0 must be present in the bearing 5. Candidates must use the scale that they have found in part (a) for part (b)					
Commonly Observed Responses: 1. For 1 cm : 1 km award 1/1 ✓ 2. For 9.8 cm: 9.8 km award 0/1 ×					

Question		Generic Scheme	Illustrative Scheme
	(b)	<p>Ans: 23 (minutes)</p> <ul style="list-style-type: none"> •¹ Strategy: use correct speed •² Process: find time in hours to 3 decimal places •³ Communication: find the time in minutes, and round <p>Alternative strategy</p> <ul style="list-style-type: none"> •¹ Strategy: Compare time needed for 21 km/h and 27 km/h •² Process: find time in hours for both speeds to 3 decimal places •³ Communication: select shortest time, convert to minutes and round 	<p>3</p> <ul style="list-style-type: none"> •¹ use 27 km/hr •² $10.2 \div 27 = 0.377\dots$ (hours) •³ $0.377\dots \times 60 = 22.66 \dots \rightarrow 23$ <ul style="list-style-type: none"> •¹ use 27 km/hr and 21 km/hr •² $10.2 \div 27 = 0.377\dots$ (hours) and $10.2 \div 21 = 0.845\dots$ (hours) •³ $0.377\dots \times 60 = 22.66 \dots \rightarrow 23$
<p>Notes:</p> <ol style="list-style-type: none"> 1. If candidate only uses 21 or 24 km/hr •² and •³ are available. 2. For •² time in hours must be to at least 3 decimal places rounded or truncated. 3. In the alternative strategy, only the shortest time needs to be converted to minutes. 			
<p>Commonly Observed Responses:</p>			

Question			Generic Scheme	Illustrative Scheme	Max Mark
5.	(a)	(i)	Ans: (\$183 <ul style="list-style-type: none"> •¹ Strategy: identify the costs not included •² Process: calculate the cost for card 1 	<ul style="list-style-type: none"> •¹ \$32 and \$37 •² $\\$114 + 32 + 37 = \\183 	2
		(ii)	Ans: \$157 supported by working <ul style="list-style-type: none"> •³ Strategy: identify the “missing” attraction and the two cheapest attractions •⁴ Process: calculate the cost for card 2 •⁵ Process: state cost of card 3 •⁶ Communication: state the cheapest price 	<ul style="list-style-type: none"> •³ \$24, \$32 and \$30 •⁴ $\\$71 + \\$24 + \\$32 + \\$30 = \\$157$ •⁵ \$180 •⁶ (\$157 	4
Notes: 1. If candidate chooses to buy two of card 2 and buys a one world observatory separately = \$174 do not award • ³ , • ⁴ is still available. 2. • ⁴ is available for adding at least 2 out of the 3 missing attractions to card 2 price.					
Commonly Observed Responses:					

Question		Generic Scheme	Illustrative Scheme	Max Mark
	(b)	<p>Ans: £1 gives \$1.555 or \$1 gives £0.643</p> <ul style="list-style-type: none"> •¹ Strategy: evidence of knowing to divide •² Process: state rounded answer 	<ul style="list-style-type: none"> •¹ $157 \div 100.96$ or $100.96 \div 157$ •² £1 gives \$1.555 or \$1 gives £0.643 	2
<p>Notes:</p> <p>1. For •² units are essential</p>				
<p>Commonly Observed Responses:</p>				

Question			Generic Scheme	Illustrative Scheme	Max Mark
6.	(a)	(i)	Ans: 81.1 • ¹ Process: calculate mean	• ¹ $(81.8 + 81.7 + 81.6 + 81.0 + 80.3 + 80.2) \div 6 = 81.1$	1
		(ii)	Ans: 0.72 • ² Process: calculate $(x - \bar{x})^2$ • ³ Strategy: substitute into formula • ⁴ Process: calculate standard deviation	• ² 0.49, 0.36, 0.25, 0.01, 0.64, 0.81 • ³ $\sqrt{(2.56 \div 5)}$ • ⁴ 0.72	3
Notes: 1. Alternative method • ² $\sum x = 486.6$ and $\sum x^2 = 39465.82$ 2. Accept rounding or truncation to at least one decimal place for final answer 3. The mark • ⁴ can only be awarded when a two-step calculation has taken place.					
Commonly Observed Responses:					

Question		Generic Scheme	Illustrative Scheme
	(b)	<p>Ans: two valid comments</p> <ul style="list-style-type: none"> •¹ Communication: comment regarding the mean •² Communication: comment regarding standard deviation 	<p>2</p> <ul style="list-style-type: none"> •¹ eg on average Goodhold give a faster lap time •² eg lap times with Goodhold are less consistent
<p>Notes:</p> <ol style="list-style-type: none"> 1. Comments must refer to the context of the question. 2. Example of an unacceptable comment eg his results were more spread out with goodhold (has not mentioned lap time) eg On average the data for goodhold is lower(does not refer to context) 			
<p>Commonly Observed Responses:</p>			

Question		Generic Scheme	Illustrative Scheme												
	(c)	<p>Ans: 160 (km/hr)</p> <ul style="list-style-type: none"> •¹ Strategy: correct substitution into $S = D/T$ •² Strategy: know how to change km/sec to km/hr •³ Process: find speed in km/hr 	<ul style="list-style-type: none"> •¹ $S = 3.6/81$ •² $\dots \times 60 \times 60$ •³ 160 	3											
		<p>Alternative Strategy</p> <ul style="list-style-type: none"> •¹ Strategy: knows how to find the time in hours •² Strategy: consistent substitution into $S = D/T$ •³ Process: find speed in km/hr 	<ul style="list-style-type: none"> •¹ $81 \div 60 \div 60$ •² $3.6 \div \dots$ •³ 160 	3											
<p>Notes</p> <ol style="list-style-type: none"> 1. Candidates are expected to work to at least 3 significant figures throughout. 2. •³ is only available for candidates who attempt to multiply or divide by 3600 (60×60) 															
<p>Commonly Observed Responses:</p> <table style="width: 100%; border: none;"> <tbody> <tr> <td style="width: 60%;">1. $81 \div 60 \div 60 = 0.0225 \div 3.6 = 0.00625$</td> <td style="width: 40%;">award 2/3 ✓x✓</td> </tr> <tr> <td>2. $81 \div 3.6 = 22.5 \longrightarrow 22.5 \times 60 \times 60 = 81000$</td> <td>award 2/3 x✓✓</td> </tr> <tr> <td>3. $81 \div 3.6 = 22.5 \longrightarrow 22.5 \div 60 \div 60 = 0.00625$</td> <td>award 1/3 xx✓</td> </tr> <tr> <td>4. $3.6 \times 81 = 291.6 \longrightarrow 291.6 \times 60 \times 60 = 1049760$</td> <td>award 2/3 x✓✓</td> </tr> <tr> <td>5. $3.6 \times 81 = 291.6 \longrightarrow 291.6 \div 60 \div 60 = 0.81$</td> <td>award 1/3 xx✓</td> </tr> <tr> <td>6. $3.6 \div 1.35 = 2.66\dots$</td> <td>award 1/3 ✓xx</td> </tr> </tbody> </table>				1. $81 \div 60 \div 60 = 0.0225 \div 3.6 = 0.00625$	award 2/3 ✓x✓	2. $81 \div 3.6 = 22.5 \longrightarrow 22.5 \times 60 \times 60 = 81000$	award 2/3 x✓✓	3. $81 \div 3.6 = 22.5 \longrightarrow 22.5 \div 60 \div 60 = 0.00625$	award 1/3 xx✓	4. $3.6 \times 81 = 291.6 \longrightarrow 291.6 \times 60 \times 60 = 1049760$	award 2/3 x✓✓	5. $3.6 \times 81 = 291.6 \longrightarrow 291.6 \div 60 \div 60 = 0.81$	award 1/3 xx✓	6. $3.6 \div 1.35 = 2.66\dots$	award 1/3 ✓xx
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6. $3.6 \div 1.35 = 2.66\dots$	award 1/3 ✓xx														

Question		Generic Scheme	Illustrative Scheme	Max Mark
7.	(a)	<p>Ans: (£)1100</p> <ul style="list-style-type: none"> •¹ Process: calculate 5% of £15,000 •² Communicate: find gross pay •³ Process :calculate 12% of £1250 •⁴ Communicate: find net pay 	<ul style="list-style-type: none"> •¹ £750 •² 750 + 500 = £1250 •³ 12% of 1250 = £150 •⁴ 1250 – 150 = 1100 	4
<p>Notes:</p> <ol style="list-style-type: none"> 1. For an answer of £418 (working must be shown) award 4/4 if candidate states net pay is £1100. 2. For an answer of £418 (working must be shown) award 3/4 if candidate does not state net pay is £1100. 				
<p>Commonly Observed Responses:</p> <ol style="list-style-type: none"> 1. For net pay = 750 + 440 = 1190 Candidate has found 12% of basic pay only, instead of 12% of gross pay. award 3/4 2. For net pay of £1452 (commission = 5% of £23000) award 3/4 				

Question		Generic Scheme	Illustrative Scheme
	(b) (i)	Ans: (£) 418 • ¹ Process: net pay - monthly bills	• ¹ $1100 - 682 = 418$ 1
	(ii)	Ans: 6.1(%) • ² Strategy: know how to find percentage increase • ³ Process: calculate percentage increase	• ² $15 \div 245 \times 100$ • ³ 6.1 2

Notes:

- ² is available for calculations of the form $a/b \times 100$ where a, b = 15 or 245 or 260 or 505.
- Both marks are available for a trial an improvement strategy leading to an answer between 5.9% and 6.3% inclusive. Working must be shown

Commonly Observed Responses:

(b)(i)

1. £770 (from net pay calculated as £1452) award 1/1 ✓

(b)(ii)

- $245 \div 260 \times 100 = 94.2\%$ leading to $100 - 94.2 = 5.8\%$ award 1/2×✓
- $260 \div 245 \times 100 = 106.1\%$ award 1/2×✓
- $15 \div 260 \times 100 = 5.8\%$ award 1/2×✓

Question		Generic Scheme	Illustrative Scheme	
	(c)	<p>Ans: Premier bank, 24 months</p> <ul style="list-style-type: none"> •¹ Process: find the new monthly surplus •² Communicate: correct choice of lender 	<ul style="list-style-type: none"> •¹ 403 •² Premier Bank, 24 months 	2
<p>Notes: If candidate calculates new monthly surplus that is less than £150·60 •² is available for "she can't afford any of the loans"</p>				
<p>Commonly Observed Responses:</p> <p>1. New monthly surplus of £755 so choose Tasko bank over 12 months (from surplus of £770) award 2/2 ✓✓</p>				

Question		Generic Scheme	Illustrative Scheme	
	(b) (i)	Ans: (£) 418 • ¹ Process: net pay - monthly bills	$\bullet^1 1100 - 682 = 418$ $\bullet^2 15 \div 245 \times 100$ $\bullet^3 6.1$	1
	(ii)	Ans: 6.1(%) • ² Strategy: know how to find percentage increase • ³ Process: calculate percentage increase	$\bullet^2 15 \div 245 \times 100$ $\bullet^3 6.1$	2

Notes:

- ² is available for calculations of the form $a/b \times 100$ where a, b = 15 or 245 or 260 or 505.
- Both marks are available for a trial an improvement strategy leading to an answer between 5.9% and 6.3% inclusive. Working must be shown

Commonly Observed Responses:

(b)(i)

1. £770 (from net pay calculated as £1452)

award 1/1 ✓

(b)(ii)

2. $245 \div 260 \times 100 = 94.2\%$ leading to $100 - 94.2 = 5.8\%$

award 1/2×✓

3. $260 \div 245 \times 100 = 106.1\%$

award 1/2×✓

4. $15 \div 260 \times 100 = 5.8\%$

award 1/2×✓

Question		Generic Scheme	Illustrative Scheme
	(c)	<p>Ans: Premier bank, 24 months</p> <ul style="list-style-type: none"> •¹ Process: find the new monthly surplus •² Communicate: correct choice of lender 	<ul style="list-style-type: none"> •¹ 403 •² Premier Bank, 24 months <p style="text-align: right;">2</p>
<p>Notes: If candidate calculates new monthly surplus that is less than £150·60 •² is available for "she can't afford any of the loans"</p>			
<p>Commonly Observed Responses:</p> <p>2. New monthly surplus of £755 so choose Tasko bank over 12 months (from surplus of £770) award 2/2 ✓✓</p>			

Question		Generic Scheme	Illustrative Scheme	Max Mark
8.	(a)	<p>Ans: 32 candles</p> <ul style="list-style-type: none"> •¹ Strategy: know how to use ratio •² Process: find total amount of wax used •³ Process: find number of candles <p>Alternative Strategy:</p> <ul style="list-style-type: none"> •¹ Strategy: know how to use ratio •² Process: finds volume of red wax available and volume of red wax in candle •³ Process: find number of candles 	<ul style="list-style-type: none"> •¹ evidence of knowing how to scale up the ratio •² $12000 + 4000 + 8000 = 24000 \text{ cm}^3$ •³ $24000 \div 729 = 32.92\dots = 32$ <p>•¹ evidence of 3/6 of 729</p> <ul style="list-style-type: none"> •² 12000cm^3 & 364.5 •³ $12000 \div 364.5 = 32.92$ rounded to 32 	3
<p>Notes:</p> <p>1. $36000 \div 729 = 49.38 = 49$ candles award 1/3 xx✓</p> <p>2. For an answer of 48 candles (16x3) award 0/3 xxx</p> <p>3. $12000 \div 729 = 16.46 = 16$ award 0/3 xxx</p>				
<p>Commonly Observed Responses:</p>				

Question		Generic Scheme	Illustrative Scheme
	(b)	<p>Ans: (£)2·43 or 2·42</p> <ul style="list-style-type: none"> •¹ Process: find cost of wax plus wicks •² Process: add 65% •³ Process: find selling price of 1 candle 	<p>•¹ $3 \times 13.75 + 32 \times 0.18 = 47.01$</p> <p>•² $47.01 \times 1.65 = 77.57$</p> <p>•³ $77.57 \div 32 = 2.424\dots = 2.43$</p>
<p>Notes:</p> <p>1. Accept 2·42 or 2·43</p> <p>2. Any rounding or truncation within the calculations must be at least to two decimal places.</p>			
<p>Commonly Observed Responses:</p>			

Question		Generic Scheme	Illustrative Scheme	Max Mark
	(c)	<p>Ans: no supported by working</p> <ul style="list-style-type: none"> •¹ Strategy: knows how to find compound volume •² Strategy: substitute into cylinder formula •³ Process: find volume of cylinder •⁴ Strategy: substitute into cone formula •⁵ Process: find volume of cone •⁶ Process: find the number of candles that can be made •⁷ Communication: valid conclusion 	<ul style="list-style-type: none"> •¹ evidence •² $V = \pi \times 3.5 \times 3.5 \times 12$ •³ 461.8 (or 461.58) •⁴ $V = \frac{1}{3} \times 3.5 \times 3.5 \times 4$ •⁵ 51.3 •⁶ $461.8 + 51.3 = 513.1$, $12000 \div 513.1 = 23.38$ •⁷ no he can't make 25 candles 	7
<p>Notes:</p> <ol style="list-style-type: none"> 1. If candidate uses 7 for the radius at •² mark •⁴ can be awarded for radius of 7 or 3.5 2. If candidate calculates that more than 25 candles can be made •⁷ can be awarded for either yes he can make 25 or no he can't make (exactly) 25. 3. •⁶ is also available for $12000 \div 25 = 480$ or $513.1 \times 25 = 12827.5$ 				
<p>Commonly Observed Responses:</p> <p>Where a radius of 7 is used leading to an answer of 5.8... so no. award 6/7(•² lost)</p>				

[END OF MARKING INSTRUCTIONS]