National
Qualifications
2015

2015 Lifeskills Mathematics

National 5 Paper 2

Finalised Marking Instructions

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.

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

(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 is easier, candidates lose the opportunity to gain credit.

(g) Where transcription errors occur, candidates would normally lose the opportunity to gain a processing mark.

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

(i) Unless specifically mentioned in the specific assessment guidelines, do not penalise:

- Working subsequent to a correct answer
- Correct working in the wrong part of a question
- Legitimate variations in solutions
- Bad form
- Repeated error within a question

Detailed Marking Instructions for each question

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
1.	(a)		**Ans: Logo is 24·5/28(cm) base/ height** •[1] Strategy: interprets ratio and attempts to find dimensions of the logo •[2] Process: calculate both dimensions of the logo	**2**	•[1] Evidence eg 8 × 7 ÷ 2 •[2] 24·5cm by 28cm

Notes:

- **Where candidates have used Pythagoras' Theorem to find the height, the correct scaled dimensions are 24·5cm and 25·2cm**
- Correct answer without working award 2/2
- If the ratio is correctly applied to the dimensions of the rectangle, giving an answer of 77cm by 56cm award 1/2
- Ratio calculation must include multiply **and** divide for award of mark 2
- When candidate calculates 8 ÷ 7 × 2 = 2·28... and 7 ÷ 7 × 2 = 2 award 1/2

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(b)		**When 8cm is taken as the height of the triangle.** **Ans: No, supported by working** • [1] Strategy: attempt to express area of logo as a percentage of area of rectangle • [2] Process: calculate areas of rectangle and triangle • [3] Process: calculation of percentage • [4] Communication: conclusion consistent with working	**4**	• [1] Evidence • [2] 22 × 16 = 352 ½ × 7 × 8 = 28 • [3] 28 ÷ 352 × 100 = 7·9545… • [4] No, logo is 8% which is less than the necessary 9%
			When 8cm is taken as the sloping side of triangle **Ans: No, supported by working** • [1] Strategy: attempt to express area of logo as a percentage of area of rectangle • [2] Process: calculate areas of rectangle and triangle • [3] Process: calculation of percentage • [4] Communication: conclusion consistent with working		• [1] Evidence • [2] 22 × 16 = 352, Height = $\sqrt{(8^2 - 3{\cdot}5^2)}$ = 7·19… ½ × 7 × 7·2 = 25·2 • [3] 25·2 ÷ 352 × 100 = 7·159… • [4] No, logo is 7% which is less than the necessary 9%
			Alternative Strategy 1: **Dimensions of poster are used instead of the flier:** • [1] Strategy: attempt to express area of logo as a percentage of area of rectangle • [2] Process: calculate areas of rectangle and triangle • [3] Process: calculation of percentage • [4] Communication: conclusion consistent with working		• [1] Evidence • [2] 77 × 56 = 4312 ½ × 24·5 × 28 = 343 • [3] 343 ÷ 4312 × 100 = 7·9545… • [4] No, logo is 8% which is less than the necessary 9%

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
			Alternative Strategy 2: **Comparing areas on flier:** • [1] Strategy: attempt to compare area of logo with required limits • [2] Process: calculate areas of rectangle and triangle • [3] Process: calculation of percentage • [4] Communication: conclusion consistent with working		• [1] Evidence • [2] 22 × 16 = 352 ½ × 7 × 8 = 28 • [3] 12% of 352 = 42·24 9% of 352 = 31·68 • [4] No, as area is 28cm^2, which is less than 9% of the total area.
			Alternative Strategy 3: **Comparing areas on poster:** • [1] Strategy: attempt to compare area of logos with required limits • [2] Process: calculate areas of rectangle and triangle • [3] Process: calculation of percentage • [4] Communication: consistent conclusion		• [1] Evidence • [2] 77 × 56 = 4312 ½ × 24·5 × 28 = 343 • [3] 12% of 4312 = 517·44 9% of 4312 = 388·08 • [4] No, as area is 343cm^2, which is less than 9% of the total area.
Notes: • In alternative strategies 2 & 3, the value of 12% of the area need not be stated explicitly					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.	(a)		**Ans: Answer consistent with working eg add 4 (psi) or lose 5kg in weight or add more air so it reads 109psi** • [1] Communication: reading from gauge • [2] Communication: identify correct psi from graph • [3] Communication: state conclusion	**3**	• [1] 105 • [2] 109 • [3] Add 4 or add more air so it reads 109(psi)
			Alternative strategy: • [1] Communication: reading from gauge • [2] Communication: identify weight for 105psi from graph • [3] Communication: state conclusion		• [1] 105 • [2] 68kg • [3] Lose 5kg weight

Notes:

- For 2nd mark, accept any reading from 106psi to 112psi
- For 3rd mark, air added must be consistent with reading given in 2nd mark
- Accept a clear line drawn onto the graph as indication of required pressure

Alternative strategy:

- For 2nd mark accept any reading from 66kg to 71kg
- For 3rd mark, weight loss must be consistent with reading given in 2nd mark

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(b)		**Ans: 2099 (mm)** •[1] Strategy/process: calculate the diameter •[2] Process: calculate circumference •[3] Communication: round to nearest millimetre	**3**	 •[1] 23 + 622 + 23 = 668 •[2] C = π × 668 = 2098·58…. •[3] 2099

Notes:

- Accept legitimate variations for value of π
- Unrounded answer need not be stated
- 2099mm with no working — award 3/3
- 2098mm with no working — award 2/3
- 2097mm with no working — award 2/3

Some common answers: (incorrect diameter used)
Working must be shown

- d = 645 (only one tyre width added) → C = 2026mm — award 2/3
- d = 622 (no tyre width added) → C = 1954mm — award 2/3
- d = 334 (radius of wheel plus tyre) → C = 1049mm — award 2/3
- d = 311 (radius of wheel only) → C = 977mm — award 1/3

<table>
<tr><th colspan="3">Question</th><th>Expected Answer(s)
Give one mark for each •</th><th>Max Mark</th><th>Illustrations of evidence for awarding a mark at each •</th></tr>
<tr><td>3.</td><td>(a)</td><td></td><td>Ans:£1100

• 1,2 Strategy/Process: extract information and calculate cost of slates
(Award 1/2 if there is 1 missing or incorrect step)

• 3 Communication: round to nearest £100</td><td>3</td><td>

• 1,2 (5 × 3) × 2 × 2 × 16 × 1·15 × 0·97 = 1070·88

• 3 1100</td></tr>
<tr><td colspan="6">Notes:
• Correct answer with no working award 0/3
• Unrounded answer need not be shown</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Ans: £836

• 1 Strategy: know how to calculate total

• 2 Process: calculate labour costs</td><td>2</td><td>

• 1 (8 × 22)+(15 × 2 × 22)

• 2 836</td></tr>
<tr><td colspan="6">Notes:
• 2nd mark is only available if there is clear evidence that ‘strip and clean’ and ‘replace slates’ have been considered
• 8 × 22 = £176 award 0/2
• 8 × 22 + 1 × 22 = 198 (only 1 hour to replace the tiles) award 0/2</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Ans: Yes, supported by working

• 1 Process: complete estimate

• 2 Communication: yes, supported by working</td><td>2</td><td>
• 1
<table><tr><td>Slates</td><td>1100</td></tr><tr><td>Labour</td><td>836</td></tr><tr><td>Sub-total</td><td>1936</td></tr><tr><td>VAT</td><td>387·20</td></tr><tr><td>Total</td><td>2323·20</td></tr></table>• 2 Yes, supported by working</td></tr>
<tr><td colspan="6">Notes:</td></tr>
</table>

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)		**Ans: Route correctly drawn** • [1] Process: calculate distance for legs • [2] Process: calculate scale distance • [3] Process/communication: correct bearing measured & correct length drawn • [4] Process/communication: 2nd bearing and length correctly drawn	**4**	• [1] 170 × 0·6 = 102 170 × 1·2 = 204 • [2] 102 ÷ 20 rep by 5·1 cm 204 ÷ 20 rep by 10·2 cm • [3] Bearing of $050^0(\pm 2^0)$ measured correctly and 51(±2)mm line drawn • [4] Bearing of 190^0 $(\pm 2^0)$ measured correctly and 102(±2) mm line drawn
			Alternative award of marks • [1] Process: calculate distance and scaled distance for first leg • [2] Process: calculate distance and scaled distance for second leg • [3] Process/communication: both bearings drawn correctly • [4] Process/communication: 2nd bearing and length correctly drawn		• [1] 170 × 0·6 = 102 → 102 ÷ 20 rep by 5·1 cm • [2] 170 × 1·2 = 204 → 204 ÷ 20 rep by 10·2 cm • [3] Both bearings of 050^0 $(\pm 2^0)$ and 190^0 $(\pm 2^0)$ measured correctly • [4] Both distances of 51(±2) mm and 102(±2)mm drawn correctly
Notes: • The third leg of the journey need not be actually drawn					
	(b)		**Ans: 342^0 ,142 miles** • [1] Process: correct bearing • [2] Process: correct distance in miles	**2**	• [1] 342^0 • [2] 142 miles
Notes: • It must be **clear** from the diagram which line represents the third leg of the journey					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(c)		**Ans: £172·03** •[1] Process: calculates total distance •[2] Process: calculates total time taken as a decimal •[3] Strategy: knows how to find total cost of fuel used •[4] Process: calculates fuel cost	**4**	•[1] 102 + 204 + 142= 448 miles •[2] 448 ÷ 170 = 2·6352… hours •[3] evidence of time × 32 × £2·04 •[4] 2·6352… × 32 × 2·04 = 172·03
			Alternative Strategy: •[1] Process: calculates time for final leg •[2] Process: calculates total time taken as a decimal •[3] Strategy: knows how to find total cost of fuel used •[4] Process: calculates fuel cost		•[1] 142 ÷ 170 = 0·8352…hours •[2] 0·6 + 1·2 + 0·8235… = 2·6352… hours •[3] evidence of time × 32 × £2·04 •[4] 2·6352… × 32 × 2·04 = 172·03

Notes:

- Where a candidate rounds their time to fewer than 2 decimal places, the final mark is not available
- **Special case:** Where the candidate's answer to (b) leads to a decimal time that is **exact** to 1 decimal place, all 4 marks are still available

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	(a)	(i)	**Ans: Q_2 = (£)17·50** **Q_1 = (£)9·50, Q_3 = (£)21** •[1] Communication: correct median •[2] Communication: upper and lower quartiles	**2**	 •[1] Q_2 = 17·50 •[2] Q_1 = 9·50, Q_3 = 21
		(ii)	**Ans: Boxplot drawn correctly showing 5-fig summary** •[1] Communication: correct end points •[2] Communication: correct box	**2**	 •[1] end points at 5 and 34 •[2] box showing Q_1, Q_2, Q_3
Notes: • The box plot must be drawn to a consistent scale					
	(b)	(i)	**Ans: $\bar{x} = (£)\mathbf{20}$** •[1] Process: calculate mean	**1**	 •[1] $\bar{x} = 20$
		(ii)	**Ans: s = (£)3·16** •[1] Process: calculate $(x - \bar{x})^2$ •[2] Process: substitute into formula •[3] Process: calculate standard deviation	**3**	 •[1] 4,16,25,1,4,0 •[2] $\sqrt{\frac{50}{5}}$ •[3] 3·16
			Use of alternative formula: •[1] Process: calculate Σx and Σx^2 •[2] Process: substitute into formula •[3] Process: calculate standard deviation		 •[1] 120 and 2450 •[2] $\sqrt{\frac{2450-\frac{(120)^2}{6}}{5}}$ •[3] 3·16
Notes • For correct answer without working award 0/3					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(c)		**Ans: 2 valid comments** • [1] Communication: comment regarding the mean • [2] Communication: comment regarding the s.d.	**2**	• [1] On average there is more profit being made this year • [2] There is more variation in profit this year
Notes					
	(d)		**Ans: No, as 23% < 25%** • [1] Process: calculate percentage change • [2] Communication: state increase	**2**	• [1] 20 – 16·25 = 3·75 $\frac{3\cdot75}{16\cdot25} \times 100 = 23\%$ • [2] No, as 23% < 25%
			Alternative Strategy: **Ans: No, as £20·31 > £20** • [1] Process: calculate 25% increase in mean • [2] Communication: conclusion		• [1] 16·25 × 1·25 = 20·31 • [2] No, as 20·31 > 20
Notes • If the candidate incorrectly finds that the mean has increased by more than 25% and makes the conclusion 'no as it is more than 25% increase' award 1/2					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.	(a)		**Ans: It is higher (16·8>16·5)** •[1] Strategy: selects correct row and discards highest and lowest scores •[2] Process: calculate mean •[3] Process: calculate final score •[4] Communication: compare	**4**	 •[1] Evidence •[2] 43 ÷ 5 = 8·6 •[3] 8.6 × 3/5 × 3·2=16·5 •[4] 16·8>16·5
Notes: • If candidate uses the scores in the bottom row of the table 'correctly' and concludes that both divers have equal final scores award 3/4					
	(b)	(i)	**Ans: 3·3** •[1] Strategy: know to divide by 8·6 •[2] Strategy: know to divide by 3/5 •[3] Communication: state level of difficulty	**3**	 •[1] 16·9 ÷ 8·6 •[2] …..÷ 3/5 •[3] 3·3
			Alternative Strategy: **Trial and improvement:** •[1] Strategy: consider at least 2 possible values •[2] Process: consider at least 2 more possible values •[3] Communication: state level of difficulty		 •[1] evidence of any 2 attempts to find difficulty •[2] evidence of at least 2 further attempts to find difficulty which are better than the first 2 •[3] Find correct difficulty of 3·3
Notes: • For final answer of 3·27 or 3·275 award 3/3 • When a trial and improvement method has been used and the candidate finds the correct answer at the first attempt eg 8·6 × 3/5 × 3·3 = 17·028 leading to 3·3 with no further 'trials' award 3/3					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
		(ii)	**Ans: 8·3** •[1] Strategy: know order of calculations •[2] Process: calculate score before difficulty factor •[3] Process: find the mean score	**3**	 •[1] evidence of ÷ 3·4 × 5/3 •[2] 16·9 ÷ 3·4 = 4·97… •[3] 4·97 × 5/3 = 8·3
			Alternative Strategy: **Trial and improvement:** •[1] Strategy: consider at least 2 possible values •[2] Process: consider at least 2 more possible values •[3] Communication: state level of difficulty		 •[1] evidence of any 2 attempts to find mean •[2] evidence of at least 2 further attempts to find difficulty which are better than the first 2 •[3] Find correct mean of 8·3
Notes: • When a trial and improvement method has been used and the candidate finds the correct answer at the first attempt eg 8·3 × 3/5 × 3·4 = 16·932 leading to 8·3 with no further 'trials' award 3/3 • If candidate chooses any mean from 8·3 to 10 inclusive and demonstrates that this would give Cheryl a winning score eg 3 ÷ 5 × 8·5 × 3·4 =17·34, so 8·5 is enough award 3/3					
	(c)		**Ans: Yes as 7>6·75** •[1] Strategy: attempt to calculate the volume of a prism •[2] Process: set up calculation •[3] Process: calculate volume •[4] Communication: state conclusion	**4**	 •[1] evidence of cuboid + prism or Ah •[2] 3 × 6 ×·25 + ½ × 6 × 0·25 ×3 or (½ × 6 × 0·25 + 6 × 0·25) ×3 •[3] 6·75m^3 •[4] Yes as 7>6·75
Notes: • **If total surface area is calculated:** 2nd mark can be awarded for correct areas of any 4 faces 3rd mark can be awarded for the correct areas of the remaining 2 faces and the total (42·78m^2) 4th mark can be awarded for valid comparison of the calculated area and 7m^3					

[END OF MARKING INSTRUCTIONS]