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 <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) 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] $22 \times 16 = 352$ $\frac{1}{2} \times 7 \times 8 = 28$ •[3] $28 \div 352 \times 100 = 7 \cdot 9545\ldots$ •[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] $22 \times 16 = 352$, Height $= \sqrt{(8^2 - 3 \cdot 5^2)} = 7 \cdot 19\ldots$ $\frac{1}{2} \times 7 \times 7 \cdot 2 = 25 \cdot 2$ •[3] $25 \cdot 2 \div 352 \times 100 = 7 \cdot 159\ldots$ •[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] $77 \times 56 = 4312$ $\frac{1}{2} \times 24 \cdot 5 \times 28 = 343$ •[3] $343 \div 4312 \times 100 = 7 \cdot 9545\ldots$ •[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] $22 \times 16 = 352$ $\frac{1}{2} \times 7 \times 8 = 28$ •[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] $77 \times 56 = 4312$ $\frac{1}{2} \times 24·5 \times 28 = 343$ •[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

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.	(a)		**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	3	•[1,2] $(5 \times 3) \times 2 \times 2 \times 16 \times 1 \cdot 15 \times 0 \cdot 97 = 1070 \cdot 88$ •[3] 1100

Notes:
- Correct answer with no working   award 0/3
- Unrounded answer need not be shown

	(b)		**Ans: £836** •[1] Strategy: know how to calculate total •[2] Process: calculate labour costs	2	•[1] $(8 \times 22)+(15 \times 2 \times 22)$ •[2] 836

Notes:
- 2nd mark is only available if there is **clear** evidence that 'strip and clean' **and** 'replace slates' have been considered
- $8 \times 22 = £176$ award 0/2
- $8 \times 22 + 1 \times 22 = 198$ (only 1 hour to replace the tiles)   award 0/2

	(c)		**Ans: Yes, supported by working** •[1] Process: complete estimate •[2] Communication: yes, supported by working	2	•[1] | Slates	1100
Labour	836
Sub-total	1936
VAT	387·20
Total	2323·20 | •[2] Yes, supported by working
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Notes:

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] $170 \times 0.6 = 102$ $170 \times 1.2 = 204$ •[2] $102 \div 20$ rep by 5.1 cm $204 \div 20$ rep by 10.2 cm •[3] Bearing of $050^0(\pm2^0)$ measured correctly and $51(\pm2)$mm line drawn •[4] Bearing of $190^0 (\pm2^0)$ measured correctly and $102(\pm2)$ 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] $170 \times 0.6 = 102 \rightarrow 102 \div 20$ rep by 5.1 cm •[2] $170 \times 1.2 = 204 \rightarrow 204 \div 20$ rep by 10.2 cm •[3] Both bearings of $050^0 (\pm2^0)$ and $190^0 (\pm2^0)$ measured correctly •[4] Both distances of $51(\pm2)$ mm and $102(\pm2)$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

Question			Expected Answer(s)	Max Mark	Illustrations of evidence
	(b)	(i)	Ans: $\bar{x}$ = (£)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] $\sqrt{\dfrac{50}{5}}$ •[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] $\sqrt{\dfrac{2450 - \dfrac{(120)^2}{6}}{5}}$ •[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] $20 - 16\cdot25 = 3\cdot75$ $\frac{3\cdot75}{16\cdot25} \times 100 = 23\%$ •[2] No, as 23% < 25%
			Alternative Strategy: **Ans: No, as £20·31 > £20** •[1] Process: calculate 25% increase in mean •[2] Communication: conclusion		•[1] $16\cdot25 \times 1\cdot25 = 20\cdot31$ •[2] No, as 20·31 > 20
Notes					

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

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(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

Question			Expected Answer(s)	Max Mark	Illustrations of evidence
	(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 6·75m³ •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 (42·78m²)
  4th mark can be awarded for valid comparison of the calculated area and 7m³

[END OF MARKING INSTRUCTIONS]