National
Qualifications
2015

2015 Mathematics

National 5 Paper 1

Finalised Marking Instructions

General Marking Principles for National 5 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) Where a candidate has made multiple attempts, mark all attempts and award the lowest mark.

(j) 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.	**Ans:** $3\frac{13}{15}$ **or** $\frac{58}{15}$ •[1] correct common denominator •[2] correct answer	**2**	•[1] e.g. $6\frac{3}{15}-2\frac{5}{15}$ or $\frac{93}{15}-\frac{35}{15}$ •[2] $3\frac{13}{15}$ or $\frac{58}{15}$

Notes:

1. Correct answer without working award 0/2
2. Do not penalise incorrect conversion of $\frac{58}{15}$ to a mixed number

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.	**Ans:** $x>-5$ •[1] multiply out bracket •[2] collect like terms •[3] solve for x	**3**	•[1] $11-2-6x<39$ •[2] $-6x<30$ or $-30<6x$ •[3] $x>-5$ or $-5<x$

Notes:

1. Correct answer without working award 1/3
2. (a) For $11-2-6x<39 \rightarrow 6x<30 \rightarrow x<5$ award 1/3 ✓××
   (b) For $11-2+6x<39 \rightarrow 6x<30 \rightarrow x<5$ award 1/3 ×✓×
3. For $9(1+3x)<39 \rightarrow 9+27x<39 \rightarrow 27x<30 \rightarrow x<\frac{30}{27}$ award 1/3 ×✓×

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.			**Ans: 39°** •[1] calculate the size of angle OBD •[2] calculate the size of angle EDF •[3] calculate the size of angle BDF	**3**	 •[1] angle OBD = 13° •[2] angle EDF = 26° •[3] angle BDF = 39°

Notes:

1. The first two marks may be awarded for information marked on the diagram
2. An answer of 39° must be stated outwith the diagram for the third mark to be awarded
3. Third mark is only available where angle ODB = angle OBD
4. For an answer of 39° with no relevant working award 0/3

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.			**Ans:** x^3-3x^2-6x+8 •[1] start to multiply out brackets •[2] complete multiplying out brackets •[3] collect like terms which must include a term in x^3	**3**	 •[1] evidence of 3 correct terms eg x^3+x^2-2x •[2] $x^3+x^2-2x-4x^2-4x+8$ •[3] x^3-3x^2-6x+8

Notes:

1. Correct answer with no working award 3/3

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.			**Ans:** $\boldsymbol{a = 8}$ •[1] find $\bar{x}$ and $(x-\bar{x})^2$ •[2] substitute into formula for a •[3] calculate value of a	**3**	 •[1] 3 and 4, 1, 1, 1, 25 •[2] $\frac{32}{5-1}$ •[3] 8

Notes:

1. Where a candidate has worked out the standard deviation award marks as follows:

•[1] find $\bar{x}$ and $(x-\bar{x})^2$	•[1] 3 and 4, 1, 1, 1, 25
•[2] substitute into formula	•[2] $\sqrt{\frac{32}{5-1}}$
•[3] calculate standard deviation	•[3] $\sqrt{8}$

2. For use of alternative formula award marks as follows:

•[1] find $\sum x$ and $\sum x^2$	•[1] 15 and 77
•[2] substitute into formula for a	•[2] $\frac{77-\frac{15^2}{5}}{5-1}$
•[3] calculate value of a	•[3] 8

3. For a final answer of $a = \sqrt{8}$ award 2/3
4. Disregard any attempt to simplify $\sqrt{8}$
5. 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 •
6.			**Ans:** $\boldsymbol{a=4, b=3}$ •[1] state the value of a •[2] state the value of b	**2**	 •[1] 4 •[2] 3
Notes: 1. For an answer of $y=4\sin 3x$ award 2/2 2. For an answer $a=3, b=4$ or $y=3\sin 4x$ award 1/2					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7.	(a)	(i)	**Ans:** $\boldsymbol{-2}$ •[1] state value of a	**1**	 •[1] -2
		(ii)	**Ans:** $\boldsymbol{-4}$ •[1] state value of b	**1**	 •[1] -4
Notes: 1. Where a candidate has answers of (i) -4 and (ii) -2 award 0/1 for (i) and 0/1 for (ii)					
	(b)		**Ans:** $\boldsymbol{x=2}$ •[1] state equation of axis of symmetry	**1**	 •[1] $x=2$
Notes: 1. For answers of 2 or axis of symmetry = 2 award 0/1					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	**Ans:** $y = 2x + 9$ •[1] find gradient •[2] substitute gradient and a point into $y - b = m(x - a)$ or $y = mx + c$ •[3] state equation of the line in terms of y and x in its simplest form.	**3**	•[1] $\frac{10}{5}$ •[2] e.g. $y - 15 = \frac{10}{5}(x - 3)$ or $15 = \frac{10}{5} \times 3 + c$ •[3] $y = 2x + 9$

Notes:

1. Correct answer without working award 3/3
2. For a final answer of $y = \frac{2}{1}x + 9$ award 2/3 ✓✓×

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9.	**Ans:** **cos100°, cos 90°, cos300°;** **with justification** •[1] state correct order •[2] justification stated explicitly	**2**	•[1] cos100, cos90, cos300 •[2] cos100 is negative, cos90 is zero and cos300 is positive (or similar)

Notes:

1. Where 2 out of the 3 values are in the correct position relative to each other, with valid reason award 1/2
   e.g. For "cos90° is positive, cos100° is negative, cos300° is positive;
   so cos100°, cos300°, cos90°" award 1/2
2. Accept positions of cos90° , cos100° and cos300° indicated on a cosine curve for award of the second mark

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.	(a)		**Ans: median = 19·5, SIQR = 4·5** •[1] find median •[2] find quartiles •[3] calculate semi-interquartile range	**3**	•[1] 19·5 •[2] 17 and 26 •[3] 4·5
Notes: 1. An incorrect answer for the median must be followed through with the possibility of awarding marks 2 and 3 2. If 'correct' SIQR is found from an (a) ordered list with one missing or one extra number award 2/3 ×✓✓ (b) unordered list award 1/3 ××✓					
	(b)		**Ans: valid comments** •[1] compare medians •[2] compare semi-interquartile ranges	**2**	•[1] On average the second round's scores are higher •[2] The second round's scores are more consistent.
Notes: 1. Answers must be consistent with answer to part (a) 2. Statements must show understanding of the concepts e.g. (a) "In general the second round's scores were higher" is acceptable <u>but</u> "The median of the second round was higher" or "The second round's scores were higher" are not acceptable. (b) "The spread of scores in the second round was lower" is acceptable <u>but</u> "the range of scores in the second round was lower" is not acceptable.					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11.	**Ans:** $x=7,\quad y=-2$ • [1] evidence of scaling • [2] follow a valid strategy through to produce values x and y • [3] calculate correct values for x and y	**3**	• [1] $6x+4y=34$ $6x+15y=12$ • [2] values for x and y • [3] $x=7$ and $y=-2$

Notes:

1. For a solution obtained by guess and check award 0/3

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
12.	**Ans:** $\dfrac{x}{x+5}$ • [1] factorise numerator • [2] factorise denominator • [3] cancel brackets correctly	**3**	• [1] $x(x-4)$ • [2] $(x-4)(x+5)$ • [3] $\dfrac{x}{x+5}$

Notes:

1. Correct answer without working award 3/3
2. For subsequent incorrect working, the final mark is not available

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13.	**Ans:** $\sqrt{2}$ •[1] express as equivalent fraction with rational denominator •[2] manipulate surds •[3] consistent answer	**3**	•[1] $\frac{4\sqrt{8}}{8}$ •[2] $\frac{4\times 2\sqrt{2}}{8}$ •[3] $\sqrt{2}$

Notes:

1. Alternative strategy:

   •[1] manipulate surds •[1] $\frac{4}{2\sqrt{2}}$

   •[2] express as equivalent fraction with rational denominator •[2] $\frac{4\sqrt{2}}{2\times 2}$

   •[3] consistent answer •[3] $\sqrt{2}$

2. For an answer of $\frac{4\sqrt{8}}{8}\rightarrow\frac{\sqrt{8}}{2}$ award 1/3
3. Correct answer with no working award 0/3
4. All steps must be shown

   e.g. For $\frac{4}{2\sqrt{2}}=\sqrt{2}$ with no intermediate steps shown award 1/3

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
14.	**Ans: 32** •[1] interpret index •[2] complete evaluation	**2**	•[1] $\sqrt[3]{8^5}$ •[2] 32

Notes:

1. Correct answer without working award 2/2
2. For $\sqrt[3]{8}=2$ or $8^5=32768$ award 1/2

[END OF MARKING INSTRUCTIONS]