N5

National Qualifications 2014

2014 Mathematics Paper 1 (Non-calculator)

National 5

Finalised Marking Instructions

SQA

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

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

(e) 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.

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

(g) 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.

(h) Where a candidate has made multiple attempts, mark all attempts and award the lowest mark.

(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.	Ans: $\dfrac{25}{27}$ •^{1} start to multiply fractions •^{2} consistent answer in simplest form	**2**	•^{1} $\dfrac{5}{12} \times \dfrac{20}{9}$ or $2 \times \dfrac{5}{12} + \dfrac{2}{9} \times \dfrac{5}{12}$ •^{2} $\dfrac{25}{27}$

Notes:

1. Correct answer without working   award 2/2.
2. $\dfrac{100}{108}$ (no working necessary)   award 1/2.
3. 2nd mark only available where simplifying is required.
4. For subsequent incorrect working, the final mark is not available

   eg $\dfrac{25}{27} = 1\dfrac{2}{27}$ award 1/2.

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.	Ans: $6x^2 - 13x - 5$ •^{1} any three terms correct •^{2} fourth term correct and collect like terms	**2**	•^{1} eg $6x^2 + 2x - 15x$ •^{2} $6x^2 - 13x - 5$

Notes:

1. Correct answer without working   award 2/2

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.	Ans: $(x-7)^2 - 5$ •^{1} correct bracket with square •^{2} complete process	**2**	•^{1} $(x-7)^2$ •^{2} $(x.....)^2 - 5$

Notes:
1. For $(x-7)^2 + (-5)$, $(x-7)(x-7) - 5$ award 2/2
2. For $(x-7) - 5$, $(x^2-7) - 5$, $(x^2-7)^2 - 5$, $(x-7x)^2 - 5$ award 1/2 ✗✓

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.			**Ans:** $\begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$ •^{1} calculate 2**u** •^{2} solution	**2**	•^{1} $\begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix}$ •^{2} $\begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$

Notes:
1. Correct answer without working   award 2/2.
2. Brackets not required
3. For $(-4, 10, 3)$ award 1/2
4. For subsequent invalid working, the final mark is not available.

   eg $9(-4+10+3)$, $\sqrt{125}$ (magnitude)   award 1/2

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.			**Ans:** 8 cm •^{1} correct substitution into sine rule •^{2} know how to solve •^{3} correct calculation	**3**	•^{1} $\dfrac{LM}{0\cdot4} = \dfrac{18}{0\cdot9}$ •^{2} $(LM =)\ \dfrac{0\cdot4\times18}{0\cdot9}$ •^{3} $(LM =)\ 8$

Notes:

1. For $\dfrac{LM}{\sin0\cdot4} = \dfrac{18}{\sin0\cdot9} \quad \rightarrow \quad \dfrac{18\sin0\cdot4}{\sin0\cdot9} = 8$ award 2/3   ✗✓✓

2. For $\dfrac{LM}{\sin0\cdot4} = \dfrac{18}{\sin0\cdot9} \quad \rightarrow \quad \dfrac{LM}{0\cdot4} = \dfrac{18}{0\cdot9} \quad \rightarrow \quad \dfrac{18\times0\cdot4}{0\cdot9} = 8$ award 2/3   ✗✓✓

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.	(a)		**Ans: _C_ = 15_F_ + 125**	3	
			Method 1: $y = mx + c$		
			•^{1} find gradient		•^{1} $\dfrac{300}{20}$
			•^{2} substitute gradient and a point into $y = mx + c$		•^{2} e.g. $200 = \dfrac{300}{20} \times 5 + c$
			•^{3} calculate c ,then state equation in simplest form in terms of F and C		•^{3} _C_ = 15_F_ + 125 or equivalent
			Method 2: $y - b = m(x - a)$		
			•^{1} find gradient		•^{1} $\dfrac{300}{20}$
			•^{2} substitute gradient and a point into $y - b = m(x - a)$		•^{2} e.g. $y - 200 = \dfrac{300}{20}(x - 5)$
			•^{3} expand brackets and rearrange equation into simplest form in terms of F and C		•^{3} _C_ = 15_F_ + 125 or equivalent

Notes:
1. For correct answer without working,   award 3/3
2. For $y = 15x + 125$ award 2/3
3. For $y = 15x$ award 1/3
4. Where m and/or c are incorrect the working must be followed through to give the possibility of awarding 1/3 or 2/3
5. If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct y-intercept
6. For an incorrect equation (ie both m and c incorrect), without working,
   eg _C_ = 125_F_ + 15   award 0/3

	(b)		**Ans: 725 calories**	1	
			•^{1} calculate value using the equation		•^{1} $C = 15 \times 40 + 125 = 725$

Notes:
1. For a correct answer without working award 0/1
2. Follow through mark from part (a) is only available if the calculation involves a multiplication or division and an addition or subtraction

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7.	Ans: $a = 5$ •^{1} know to substitute $(-3, 45)$ into $y = ax^2$ •^{2} solve equation for a	2	•^{1} $45 = a(-3)^2$ or equivalent •^{2} $a = 5$

Notes:

1. For a correct answer without working   award 2/2
2. For $45 = a \times (-3) \rightarrow a = -15$ award 0/2

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	Ans: $9\sqrt{10}$ •^{1} simplify $\sqrt{40}$ •^{2} simplify $\sqrt{90}$ •^{3} state answer in simplest form	3	•^{1} $2\sqrt{10}$ •^{2} $3\sqrt{10}$ •^{3} $9\sqrt{10}$

Notes:

1. For a correct answer without working   award 0/3
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 •
9.	Ans: **600 000** •^{1} know that 80% = 480 000 •^{2} begin valid strategy •^{3} answer	3	•^{1} 80% = 480 000 •^{2} 10% = 60 000 or equivalent •^{3} 600 000

Notes:
1. For 600 000 with or without working   award 3/3
2. For 384 000 (80% of 480 000) or 576000 (120% of 480000)
     (i) and evidence of 80% = 480 000   award 1/3
     (ii) otherwise   award 0/3

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.			**Ans:** a = 3, b = −40	**2**	
			•^{1} state value of a		•^{1} a = 3
			•^{2} state value of b		•^{2} b = −40
Notes:					
1. For $y = 3\sin(x - 40)$					award 2/2
2. Accept b = 320					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11. (a)	**Ans: gradient** $= -\dfrac{4}{3}$ •¹ start to rearrange •² state gradient	**2**	•¹ $3y = -4x + 12$ •² $-\dfrac{4}{3}$

Notes:
1. Correct answer without working   award 2/2
2. Some common answers (no working necessary)

    (a) $-1 \cdot \dot{3},\ -1 \cdot 33$ award 2/2

    (b) $-1 \cdot 3$ award 1/2

    (c) $-\dfrac{4}{3}x$ award 1/2

    (d) $\dfrac{4}{3}$ award 1/2
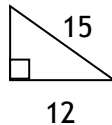
    (e) $\dfrac{4}{3}x$ award 0/2

(b)	**Ans: (3,0)** •¹ know how to find x-coordinate •² state coordinates (**must** use brackets)	**2**	•¹ $4x + 3(0) = 12$ or equivalent •² (3,0)

Notes:
1. For (3,0) without working   award 2/2
2. For $x=3$ with or without working   award 1/2
3. For (0,4) with or without working   award 1/2

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
12.	**Ans: 18 centimetres** •¹ marshal facts and recognise right angle •² know how to use Pythagoras •³ correct calculation of PA² •⁴ find length of PQ	**4**	•¹ (diagram: right-angled triangle with hypotenuse 15 and base 12) •² $x^2 = 15^2 - 12^2$ •³ 81 •⁴ 18

Notes:
1. For 18 without valid working   award 0/4

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13. (a)	**Ans: 6 seconds** •^{1} construct an equation •^{2} rearrange and equate to zero •^{3} correct factorisation •^{4} solve equation and select correct value	**4**	 •^{1} $16t - t^2 = 60$ •^{2} eg $t^2 - 16t + 60 = 0$ •^{3} $(t - 6)(t - 10)$ •^{4} $(t =)$ 6

Notes:

1. Equating to zero **must** appear prior to solving equation
   e.g. $t^2 - 16t + 60 \rightarrow (t - 6)(t - 10) \rightarrow (t =)$ 6   award 3/4
2. For the case in Note 1, if 6 is not stated explicitly   award 1/4
3. For an answer of 6 without working   award 0/4
4. Where a candidate substitutes into the formula
   (a) h(6)=60 and h(10)=60 $\rightarrow$ 6   award 4/4
   (b) h(6)=60 $\rightarrow$ 6   award 2/4
   (c) h(6)=60   award 1/4
   (d) h(10)=60 $\rightarrow$ 10   award 1/4

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13.	(b)		**Ans: No, because its maximum height is 64 metres.** **Method 1** •^{1} know that turning point is at 8 seconds •^{2} calculate maximum height •^{3} communicate conclusion **Method 2** •^{1} calculate h(8) •^{2} demonstrate that h(8) is maximum height •^{3} communicate conclusion **Method 3** •^{1} evidence of using b^2-4ac in $16t-t^2=70$ •^{2} demonstrate that $b^2-4ac<0$ •^{3} communicate conclusion	3	 •^{1} $t=8$ (stated or implied) •^{2} $16(8)-8^2=64$ •^{3} no, it only reaches 64 metres. •^{1} 64 •^{2} e.g. h(7)=63 and h(9)=63 •^{3} no, it only reaches 64 metres. •^{1} evidence •^{2} e.g. $256-280<0$ •^{3} no, as equation has no real roots.

Notes:
1. For final mark (Methods 1 and 2), answer must include valid comparison or an implied comparison eg 'only' or 'less than'.

   eg   No, it reaches 64 metres   award 2/3

          No, it reaches 64 metres, 64<70   award 3/3
2. Where a trial and improvement method is used
   - (i)   accept trials appearing in parts (a) and (b)
   - (ii)   accept scored out working as evidence of rejected trials

[END OF MARKING INSTRUCTIONS]