National
Qualifications
SPECIMEN ONLY

S847/75/02

Mathematics
Paper 2

Marking Instructions

These marking instructions have been provided to show how SQA would mark this specimen question paper.

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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.

For each question the marking instructions are generally in two sections, namely generic scheme and illustrative scheme. The generic scheme indicates the rationale for which each mark is awarded. The illustrative scheme covers methods which are commonly seen throughout the marking. 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.

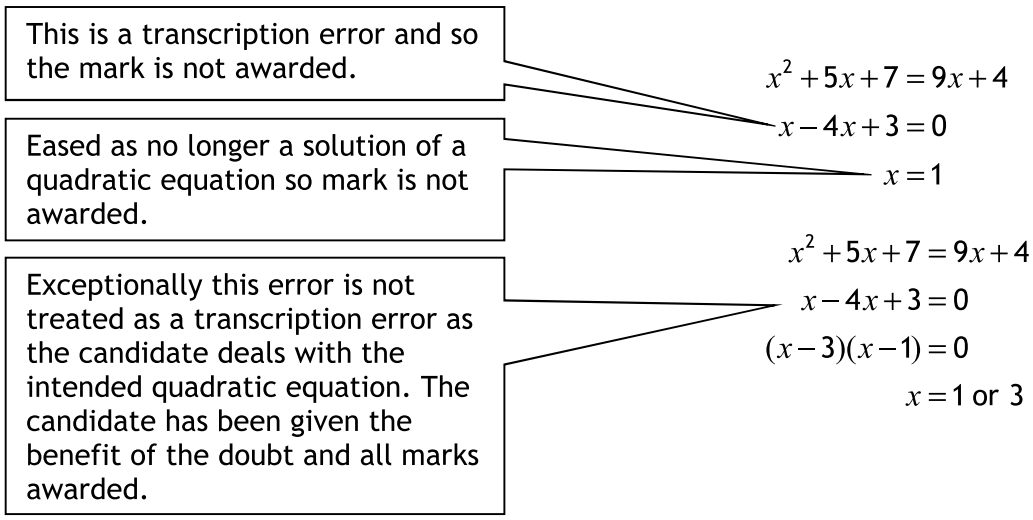
(f) Working subsequent to an error must be **followed through**, with possible credit for the subsequent working, provided that the level of difficulty involved is approximately similar. Where, subsequent to an error, the working for a follow through mark has been eased, the follow through mark cannot 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



(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:

	$\bullet^5$	$\bullet^6$
$\bullet^5$	$x=2$	$x=-4$
$\bullet^6$	$y=5$	$y=-7$

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

$\frac{15}{0{\cdot}3}$ must be simplified to 50 $\frac{4\frac{}{}5}{3}$ must be simplified to $\frac{4}{15}$

$\sqrt{64}$ must be simplified to 8*

*The square root of perfect squares up to and including 100 must be known.

(m) 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

(n) 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.

(o) 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.

(p) 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.

(q) 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. Where a candidate has tried different valid strategies, apply the above ruling to attempts within each strategy and then award the highest resultant 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.

Marking instructions for each question

Question		Generic scheme	Illustrative scheme	Max mark
1		**Ans: 97 miles** •1 know how to increase by 15% •2 know how to calculate the distance after 3 weeks •3 evaluate	•1 $\times 1{\cdot}15$ •2 $64\times 1{\cdot}15^3$ •3 97	3
2		**Ans:** $1{\cdot}65\times 10^9$ •1 correct method •2 answer	•1 $3\times 10^5\times 5{\cdot}5\times 1000$ •2 $1{\cdot}65\times 10^9$	2
3		**Ans:** $2x^3-5x^2-10x+3$ •1 three terms correct •2 remaining terms correct •3 collect like terms	•1 e.g. $2x^3-8x^2+2x\ldots$ •2 e.g. $\ldots 3x^2-12x+3$ •3 $2x^3-5x^2-10x+3$	3
4		**Ans:** $\mathrm{B}(8,4,10)$, $\mathrm{C}(4,0,10)$ •1 state coordinates of B •2 state coordinates of C	•1 $(8,4,10)$ •2 $(4,0,10)$	2
5		**Ans:** 9·8 cm •1 correct substitution into cosine rule •2 calculate PR^2 •3 calculate PR	•1 $(\mathrm{PR}^2=)8^2+3^2-2\times 8\times 3\times\cos 120°$ •2 97 •3 9·8 (488…)	3

Question		Generic scheme	Illustrative scheme	Max mark
6		**Ans:** $870\,\text{cm}^3$		5
		•1 substitute correctly into formula for volume of cone	•1 $\frac{1}{3}\times\pi\times6^2\times11\left(=414\cdot690...\right)$	
		•2 substitute correctly into formula for volume of sphere or hemisphere	•2 $\frac{4}{3}\times\pi\times6^3\left(=904\cdot778...\right)$ or $\frac{1}{2}\times\frac{4}{3}\times\pi\times6^3\left(=452\cdot389...\right)$	
		•3 know to add volume of **hemisphere** to volume of cone	•3 evidence	
		•4 carry out all calculations correctly (must involve sum of two volume calculations)	•4 867·079...	
		•5 round final answer to two significant figures	•5 870	
7		**Ans: 3456 millilitres**		3
		•1 find linear scale factor	•1 $\frac{36}{15}\ \left(=2\cdot4\right)$	
		•2 know to multiply volume by cube of linear scale factor	•2 $\left(\frac{36}{15}\right)^3\times250\left(=2\cdot4^3\times250\right)$	
		•3 calculate volume (calculation must involve a power of linear scale factor)	•3 3456	
8		**Ans:** $5n^4$		3
		•1 simplify powers in numerator	•1 $10n^6$	
		•2 cancel constants	•2 $\frac{5n^6}{n^2}$	
		•3 eliminate n from denominator	•3 $5n^4$	

Question		Generic scheme	Illustrative scheme	Max mark
9	(a)	**Ans: gradient =** $-\frac{4}{3}$ $\bullet^1$ start to rearrange $\bullet^2$ state gradient	 $\bullet^1$ $3y=-4x+12$ $\bullet^2$ $-\frac{4}{3}$	2
9	(b)	**Ans: (0,4)** $\bullet^1$ state coordinates (**must** use brackets)	 $\bullet^1$ (0,4)	1
10		**Ans: 1039·2 cm²** $\bullet^1$ correct angle $\bullet^2$ know how to find area of triangle $\bullet^3$ know how to find area of hexagon $\bullet^4$ correct calculation with correct units	 $\bullet^1$ 60 $\bullet^2$ $\frac{1}{2}\times 20\times 20\times \sin 60$ $\bullet^3$ $\left(\frac{1}{2}\times 20\times 20\times \sin 60\right)\times 6$ $\bullet^4$ 1039·2 cm²	4
11	(a)	**Ans:** 864 cm² $\bullet^1$ appropriate fraction $\bullet^2$ correct substitution into area of sector formula $\bullet^3$ all calculations correct	 $\bullet^1$ $\frac{110}{360}$ $\bullet^2$ $\frac{110}{360}\times \pi \times 30^2$ $\bullet^3$ 863·9...	3
11	(b)	**Ans:** 131 cm $\bullet^1$ appropriate fraction $\bullet^2$ correct substitution into length of arc formula $\bullet^3$ all calculations correct	 $\bullet^1$ $\frac{250}{360}$ $\bullet^2$ $\frac{250}{360}\times \pi \times 60$ $\bullet^3$ 130·8...	3

Question		Generic scheme	Illustrative scheme	Max mark
12		**Ans:** 70·5, 289·5 •1 form equation •2 rearrange equation •3 find one value •4 find second value	•1 $3\cos x - 1 = 0$ •2 $\cos x = \frac{1}{3}$ •3 70·5 •4 289·5	4
13		**Ans:** $\frac{x}{x+5}$ •1 factorise numerator •2 factorise denominator •3 cancel brackets correctly	•1 $x(x-4)$ •2 $(x-4)(x+5)$ •3 $\frac{x}{x+5}$	3
14		**Ans:** $a = \frac{2(s-ut)}{t^2}$ •1 subtract ut •2 multiply by 2 •3 divide by t^2	•1 $s - ut = \frac{1}{2}at^2$ •2 $2(s-ut) = at^2$ •3 $a = \frac{2(s-ut)}{t^2}$	3

Question		Generic scheme	Illustrative scheme	Max mark
15	(a)	**Ans: 29°** •1 calculate angle HCD •2 correct substitution into sine rule •3 rearrange equation •4 find angle CDH	•1 130° •2 $\frac{50}{\sin \text{CDH}} = \frac{79}{\sin 130}$ •3 $\sin \text{CDH} = \frac{50 \sin 130}{79}$ •4 29	4
15	(b)	**Ans: 249°** •1 use angle alternate to given bearing •2 find correct bearing	•1 40 •2 249 $[180 + 40 + 29]$	2
16	(a) (i)	**Ans:** $2x + 13$ •1 correct expression	•1 $2x + 13$	1
16	(a) (ii)	**Ans:** $4x^2 + 44x + 117 = 270$ $\Rightarrow 4x^2 + 44x - 153 = 0$ •1 find expression for area of card and expand pair of brackets •2 construct equation and rearrange into required form	•1 $(2x + 13)(2x + 9) = 4x^2 + 44x + 117$ •2 $4x^2 + 44x + 117 = 270$ $\Rightarrow 4x^2 + 44x - 153 = 0$	2
16	(b)	**Ans:** 2·8 cm •1 correct substitution into quadratic formula •2 evaluate discriminant •3 solve for x •4 select positive value of x, correctly stated to one decimal place	•1 $\frac{-44 \pm \sqrt{44^2 - 4 \times 4 \times (-153)}}{2 \times 4}$ •2 $\frac{-44 \pm \sqrt{4384}}{2 \times 4}$ (stated or implied by •3) •3 2·77... and −13·77... •4 2·8	4

[END OF SPECIMEN MARKING INSTRUCTIONS]