National Qualifications
SPECIMEN ONLY

S844/75/01

Applications of Mathematics
Paper 1 (Non-Calculator)

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 Applications of 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 <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) One mark is available for each •. There are no half marks.

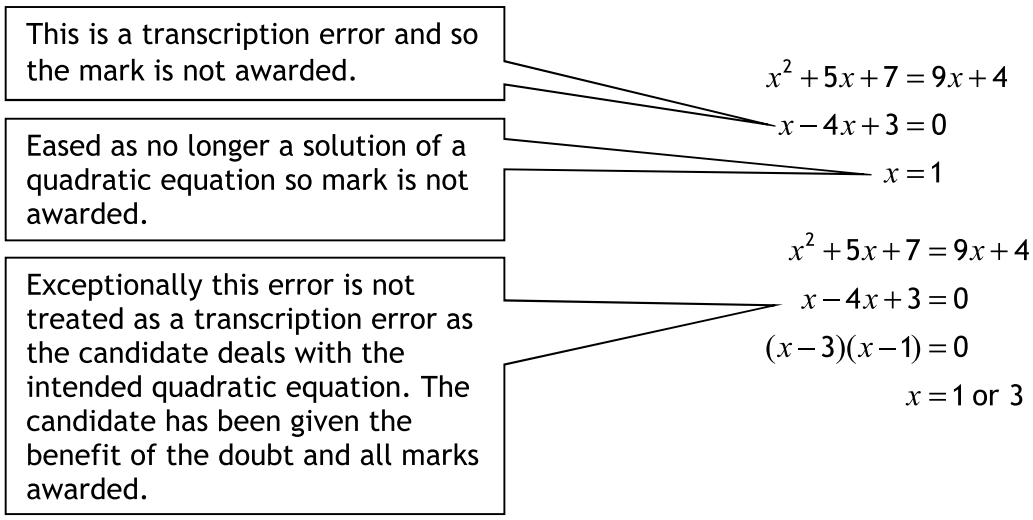
(f) Working subsequent to an error must be **followed through**, with possible credit for the subsequent working, provided that the level of difficulty involved is approximately similar. Where, subsequent to an error, the working for a follow through mark has been eased, the follow through mark cannot 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 $\frac{4/5}{3}$ 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:

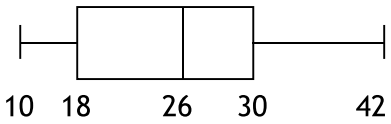
Strategy 1 attempt 1 is worth 3 marks.	Strategy 2 attempt 1 is worth 1 mark.
Strategy 1 attempt 2 is worth 4 marks.	Strategy 2 attempt 2 is worth 5 marks.
From the attempts using strategy 1, the resultant mark would be 3.	From the attempts using strategy 2, the resultant mark would be 1.

In this case, award 3 marks.

Marking instructions for each question

Question			Generic scheme	Illustrative scheme	Max mark
1			**Ans: 7:30pm** •[1] Strategy: Know how to deal with flight time and time zone •[2] Process/communication: state time	•[1] Evidence of adding flight time and time zone •[2] 7:30pm	2
2			**Ans:** $\frac{3}{22}$ •[1] Identify correct values •[2] Process/communication: express as a fraction in its simplest form	•[1] Identify 9 and 66 •[2] $\frac{3}{22}$	2

Question			Generic scheme	Illustrative scheme	Max mark
3			**Ans: No, supported by working**		3
			•[1] Strategy: know to use upper/lower limits	•[1] Evidence of 2·35 and 2·45 (may be implied in [2])	
			•[2] Process: calculate % outwith tolerance	•[2] 17/20 = 85%	
			•[3] Communication: state conclusion	•[3] No, as 85% < 88%	
			Alternative Strategy 1:		
			•[1] Strategy: know to use upper/lower limits	•[1] Evidence of 2·35 and 2·45 (may be implied in [2])	
			•[2] Process: calculate % outwith tolerance	•[2] 3/20 = 15%	
			•[3] Communication: state conclusion	•[3] No, as 15% > 12%	
			Alternative Strategy 2:		
			•[1] Strategy: know to use upper/lower limits	•[1] Evidence of 2·35 and 2·45 (may be implied in [2])	
			•[2] Process: calculate minimum number needed for batch to be accepted	•[2] 88% of 20 = 17·6, ie need 18	
			•[3] Communication: state conclusion	•[3] No, as only 17 in tolerance, so batch fails	
4			**Ans: (£)7·26**		3
			•[1] Strategy: pick correct band	•[1] band F (could be implied by subsequent working)	
			•[2] Communication: pick consistent values from table	•[2] 76·13 and 145	
			•[3] Process/Communication: conclusion	•[3] $2 \times 76{\cdot}13 - 145 = 7{\cdot}26$	

Question			Generic scheme	Illustrative scheme	Max mark
5	(a)		**Ans: boys with valid reason**		**1**
	(b)		**Ans: 26, 18, 30** •[1] Process: state the median •[2] Process: state the quartiles	•[1] 26 •[2] 18, 30	**2**
	(c)		**Ans:**  •[1] Strategy: correct end points •[2] Strategy: correct box	•[1] end points at 10 and 42 •[2] box showing Q_1, Q_2, Q_3	**2**
6			**Ans: (£)764·40** •[1] Process: calculate basic and overtime hours •[2] Process: calculate overtime •[3] Process: calculate gross weekly pay	•[1] 40 and 6 •[2] $6 \times 1{\cdot}5 \times 15{\cdot}60 = 140{\cdot}40$ •[3] $15{\cdot}60 \times 40 + 140{\cdot}40 = 764{\cdot}40$	**3**
7			**Ans: 248 (Zloty)** •[1] Strategy: know to divide by 30 then multiply by 4·96 •[2] Process: all calculations correct	•[1] Evidence •[2] $1500 \div 30 = 50$ $50 \times 4{\cdot}96 = 248$	**2**
8			**Ans:** $\frac{13}{30}$ •[1] Strategy: know to add fractions •[2] Process: add fractions •[3] Strategy/process: calculate fraction who walked to school	•[1] evidence •[2] $\frac{1}{6}+\frac{2}{5}=\frac{5}{30}+\frac{12}{30}=\frac{17}{30}$ •[3] $\frac{13}{30}$ or equivalent	**3**

Question			Generic scheme	Illustrative scheme	Max mark
9			**Ans: 3 hours 45 minutes** •1 Strategy: know how to find the time for 4 bakers •2 Process: calculate time taken for 4 bakers •3 Communication: state time in hours and minutes	 •1 evidence •2 $3\times5\div4=3{\cdot}75$ •3 3 hours 45 minutes	3
10	(a)	(i)	**Ans: Points marked** •1 Strategy: four points plotted correctly •2 Strategy: remaining three points plotted correctly	 •1 Evidence •2 Evidence	2
		(ii)	**Ans: Acceptable line of best fit drawn** •1 Communication: line of best fit drawn	 •1 Evidence	1
	(b)		**Ans: No, with justification** •1 Strategy: extend line of best fit and read graph •2 Communication: give reason	 •1 Evidence •2 No, as the height will only be 2·36 metres at 0830	2
11			**Ans: £163·75** •1 Calculate selling price of the shares •2 Calculates 2½% of selling price •3 Calculates amount she receives •4 Calculates loss	 •1 $200\times2{\cdot}75=550$ •2 £13·75 •3 $550-13{\cdot}75=536{\cdot}25$ •4 $700-536{\cdot}25=163{\cdot}75$	4

Question			Generic scheme	Illustrative scheme	Max mark
12			**Ans: Yes, supported by working** •[1] Process: calculate gradient •[2] Strategy: know how to compare gradients •[3] Communication: state conclusion consistent with working	•[1] 15/200 •[2] $15/200 = 0{\cdot}075$ •[3] yes, $0{\cdot}06 < 0{\cdot}075 < 0{\cdot}08$	**3**
13	(a)		**Ans: (£)1011** •[1] Strategy: know to add semi-circle and 3 straight edges •[2] Process: calculate perimeter •[3] Process: calculate cost	•[1] Evidence •[2] $\frac{1}{2}\times 3{\cdot}14\times 20+20+8+8=67{\cdot}4$ •[3] $67{\cdot}4\times 5\times 3 = 1011$	**3**
	(b)		**Ans: task letters and times inserted into chart** •[1] Strategy: start to allocate tasks •[2] Strategy: complete allocation of tasks	•[1] Any 7 boxes correct •[2] Remaining 4 boxes correct	**2**
	(c)		**Ans: no with reason** •[1] Strategy: select critical path •[2] Communication: state conclusion with reason	•[1] $2+4+2+1+2+1$ •[2] No, because it will take 12 hours	**2**

[END OF SPECIMEN MARKING INSTRUCTIONS]