National Qualifications

X844/75/01

Applications of Mathematics
Paper 1 (Non-calculator)

Marking Instructions

Please note that these marking instructions have not been standardised based on candidate responses. You may therefore need to agree within your centre how to consistently mark an item if a candidate response is not covered by the marking instructions.

General marking principles for National Applications of Mathematics

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

For each question, the marking instructions are generally in two sections:

- *generic scheme — this indicates why each mark is awarded*
- *illustrative scheme — this covers methods which are commonly seen throughout the marking*

In general, you should use the illustrative scheme. Only use the generic scheme where a candidate has used a method not covered in the illustrative scheme.

(a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

(b) If you are uncertain how to assess a specific candidate response because it is not covered by the general marking principles or the detailed marking instructions, you must seek guidance from your team leader.

(c) One mark is available for each •. There are no half marks.

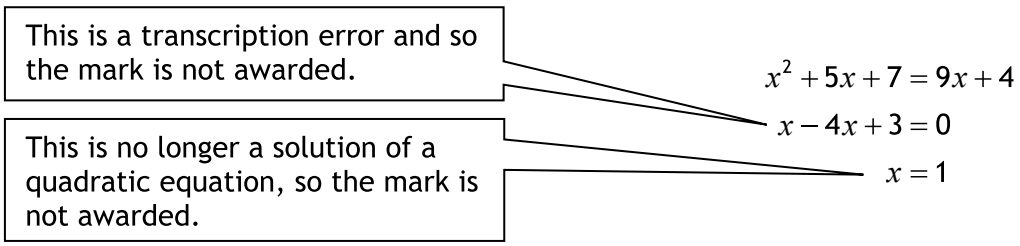
(d) If a candidate's response contains an error, all working subsequent to this error must still be marked. Only award marks if the level of difficulty in their working is similar to the level of difficulty in the illustrative scheme.

(e) Only award full marks where the solution contains appropriate working. A correct answer with no working receives no mark, unless specifically mentioned in the marking instructions.

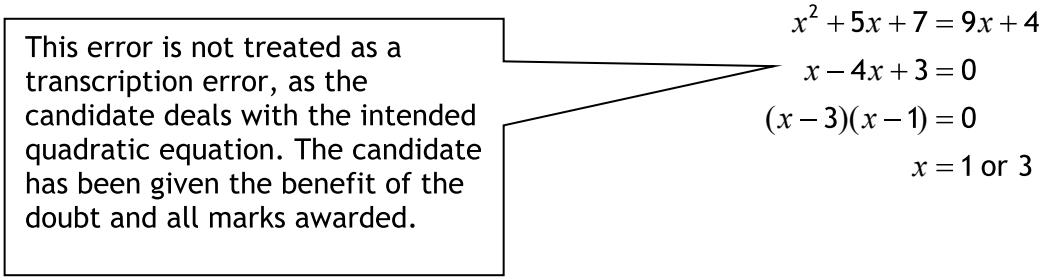
(f) Candidates may use any mathematically correct method to answer questions, except in cases where a particular method is specified or excluded.

(g) If an error is trivial, casual or insignificant, for example 6 x 6 = 12, candidates lose the opportunity to gain a mark, except for instances such as the second example in point (h) overleaf.

(h) If a candidate makes a transcription error (question paper to script or within script), they lose the opportunity to gain the next process mark, for example



The following example is an exception to the above



(i) **Horizontal/vertical marking**
If a question results in two pairs of solutions, apply the following technique, 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 $y = -7$

You must choose whichever method benefits the candidate, **not** a combination of both.

(j) In final answers, candidates should simplify numerical values as far as possible unless specifically mentioned in the detailed marking instruction. For example

$\frac{15}{12}$ 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 $\frac{\frac{4}{5}}{3}$ 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.

(k) Do not penalise candidates for any of the following, unless specifically mentioned in the detailed marking instructions:

- working subsequent to a correct answer
- correct working in the wrong part of a question
- legitimate variations in numerical answers/algebraic expressions, for example angles in degrees rounded to nearest degree
- omission of units
- bad form (bad form only becomes bad form if subsequent working is correct), for example

  $(x^3+2x^2+3x+2)(2x+1)$ written as

  $(x^3+2x^2+3x+2)\times 2x+1$

  $=2x^4+5x^3+8x^2+7x+2$

  gains full credit

- repeated error within a question, but not between questions or papers

(l) In any 'Show that…' question, where candidates have to arrive at a required result, the last mark is not awarded as a follow-through from a previous error, unless specified in the detailed marking instructions.

(m) You must check all working carefully, even where a fundamental misunderstanding is apparent early in a candidate's response. You may still be able to award marks later in the question so you must refer continually to the marking instructions. The appearance of the correct answer does not necessarily indicate that you can award all the available marks to a candidate.

(n) You should mark legible scored-out working that has not been replaced. However, if the scored-out working has been replaced, you must only mark the replacement working.

(o) If candidates make multiple attempts using the same strategy and do not identify their final answer, mark all attempts and award the lowest mark. If candidates try different valid strategies, apply the above rule to attempts within each strategy and then award the highest 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.

Detailed marking instructions for each question

Question			Generic scheme	Illustrative scheme	Max mark
1.			•1 Process: calculate mean •2 Process: calculate pay in pounds	•1 $136800 \div 4 = 34200$ •2 $34200 \div 5 = 6840$	**2**
2.	(a)		•1 Communication: 3 points correct •2 Communication: all 5 points correct	•1 evidence •2 evidence	**2**
	(b)		•3 Strategy: consistent line of best fit	•3 evidence	**1**
	(c)		•4 Communication: answer consistent with line of best fit	•4 evidence	**1**
3.			•1 Strategy/process: calculate 3% of result •2 Process/communication: calculate upper limit and state conclusion	•1 99 •2 since $3399 < 3400$, no	**2**
4.			•1 Strategy: marked between appropriate values •2 Communication: correct pressure indicated on scale	•1 marked between 60 and 90 **psi** •2 correct pressure marked	**2**
5.	(a)		•1 Strategy/process: calculate equivalent normal rate hours •2 Process: calculate hourly rate	•1 $40+10+\frac{1}{2}\times 10=55$ •2 $550 \div 55 = 10$	**2**
	(b)		•3 Strategy: know how to express as a fraction •4 Communication/Process: express as a percentage	•3 $\frac{16}{40\times 5}$ •4 8%	**2**
6.	(a)		•1 Communication: values of Q_1 and Q_3 identified •2 Process: calculate the inter-quartile range	•1 2 and 3·9 •2 1·90	**2**
	(b)		•3 Communication: comment regarding inter-quartile range	•3 eg Mr Kenneth's class lunch expenditure is more varied	**1**

Question			Generic scheme	Illustrative scheme	Max mark
7.			•1 Strategy/process: divide 3 by 7 •2 Communication: round to 3 decimal places	•1 0·4285... •2 0·429	**2**
8.	(a)		•1 Communication: state UK gold medals	•1 27	**1**
	(b)		•2 Communication: read medals from graph •3 Process: find the ratio in its simplest form	•2 10, 18, 14 •3 5:9:7	**2**
9.			•1 Strategy/process: know how to deal with time differences •2 Strategy/process: calculate journey time •3 Strategy/process: calculate time on aircraft	•1 15:30 + 4 = 19:30 •2 13 hours 25 mins •3 12 hours 10 mins	**3**
10.	(a)		•1 Strategy: start to allocate tasks •2 Communication: complete allocation of tasks.	•1 Any 7 boxes correct •2 Remaining 5 boxes correct	**2**
	(b)		•3 Strategy: select critical path •4 Process/communication: state conclusion and time consistent with path chosen	•3 3 + 5 + 2 +6 + 5 + 2 + 35 + 2 •4 No, it will take 60 minutes	**2**

Question			Generic scheme	Illustrative scheme	Max mark
11.			•1 Strategy: know how to find the time for 5 people •2 Process: find time taken for 5 people •3 Process: find total time taken •4 Process/Communication: find finishing time	•1 evidence •2 4·8 hours •3 5 hours 28 mins •4 14:58	**4**
12.			•1 Strategy: know how to add fractions •2 Process: add fractions •3 Process: calculate the fraction of votes that were for Lesley	•1 evidence of attempt to change **both** fractions to a valid common denominator •2 $\frac{2}{5}+\frac{4}{9}=\frac{18}{45}+\frac{20}{45}=\frac{38}{45}$ •3 $\frac{7}{45}$	**3**
13.	(a)		•1 Strategy: know how to find the gradient •2 Process: calculate gradient of ramp in simplest form	•1 $(8\times 22{\cdot}5)\div 960$ •2 $\frac{3}{16}$	**2**
	(b)		•3 Strategy/Process: know how to compare gradients •4 Strategy/communication: consider both gradients and consistent conclusion	•3 $\frac{3}{16}$ and $\frac{3}{15}$ or equivalent •4 $\frac{3}{16}<\frac{3}{15}$ she is correct	**2**
14.			•1 Strategy/Process: evidence of starting a valid strategy •2 Process: calculate the price per kilogram	•1 eg cost of 960g: $4\times 3{\cdot}84=15{\cdot}36$ •2 16	**2**
15.			•1 Process: calculate total money •2 Process: calculate angles •3 Communication: draw and label pie chart consistent with previous working	•1 1200 •2 rent and bills - 198°, food and socialising - 135°, savings - 27° •3 diagram consistent with working	**3**

[END OF MARKING INSTRUCTIONS]