2015 Mathematics

Intermediate 2 Units 1, 2 and 3
Paper 1 (Non-Calculator)

Finalised Marking Instructions

Part One: General Marking Principles for Mathematics Intermediate 2 Units 1, 2 and 3 Paper 1 (Non-calculator)

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 specific Marking Instructions for each question.

1. Marks must be assigned in accordance with the Marking Instructions. The main principle in marking scripts is to give credit for the skills demonstrated and the criteria met. Failure to have the correct method may not preclude a candidate gaining credit for the calculations involved or for the communication of the answer.

2. The answer to one part of a question, even if incorrect, must be accepted as a basis for subsequent dependent parts of the question. Full marks in the dependent part(s) may be awarded provided the question is not simplified.

3. The following should not be penalised:

- working subsequent to a correct answer (unless it provides firm evidence that the requirements of the question have not been met)
- omission or misuse of units (unless marks have been specifically allocated for the purpose in the marking scheme)
- bad form, eg $\sin x^\circ = 0{\cdot}5 = 30^\circ$
- legitimate variation in numerical values/algebraic expressions

4. Solutions which seem unlikely to include anything of relevance must nevertheless be followed through. Candidates still have the opportunity of gaining one mark or more provided the solution satisfies the criteria for the mark(s).

5. Full credit should only be given where the solution contains appropriate working. Where the correct answer may be obtained by inspection or mentally, credit may be given, but reference to this will be made in the Marking Instructions.

6. In general markers will only be able to give credit for answers if working is shown. A wrong answer without working receives no credit unless specifically mentioned in the Marking Instructions. The rubric on the outside of the question papers emphasises that working must be shown.

7. Sometimes the method to be used in a particular question is explicitly stated; no credit should be given where a candidate obtains the correct answer by an alternative method.

8. Where the method to be used in a particular question is not explicitly stated, full credit must be given for alternative methods which produce the correct answer.

9. Do not penalise the same error twice in the same question.

10. A transcription error is taken to be the case where the candidate transcribes incorrectly from the examination paper to the answer book. This is not normally penalised except where the question has been simplified as a result.

11. Do not penalise inadvertent use of radians in trigonometry questions, provided their use is consistent within the question.

12. When multiple solutions are presented by the candidate **and** it is not clear which is intended to be the final one, mark all attempts and award the lowest mark.

Practical Details

The Marking Instructions should be regarded as a working document and have been developed and expanded on the basis of candidates' responses to a particular paper. While the guiding principles of assessment remain constant, details can change depending on the content of a particular examination paper in a given year.

1. Each mark awarded in a question is referenced to one criterion in the marking scheme by means of a bullet point.

2 Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer in the place in the margin.

3 Where a marker wishes to indicate how the marks have been awarded, the following should be used:

(a) Correct working should be ticked, ✓.

(b) Where working subsequent to an error is followed through and can be awarded marks, it should be marked with a crossed tick, ✗

(c) Each error should be underlined at the point in the working where it first occurs.

4 Do not write any comments, words or acronyms on the scripts.

Part Two: Mathematics Intermediate 2: Paper 1, Units 1, 2 and 3 (Non-calculator)

Question			Marking Scheme	Max Mark	Illustrations of evidence
1.			**Ans: $10x^2 + 33x - 18$** •[1] process: start to multiply out brackets •[2] process: complete the process of multiplying out brackets •[3] process: collect like terms, which must include a term in x^2.	**3**	•[1] evidence of any 2 correct terms, (eg $10x^2 - 6x$) •[2] $10x^2 - 6x + 30x - 18$ •[3] $10x^2 + 33x - 18$
Notes:					
2.			**Ans: 1884 cm^3** •[1] process: substitute correctly into the formula for volume of a cone •[2] process: correct calculation	**2**	•[1] $V = 1/3 \times 3{\cdot}14 \times 10^2 \times 18$ •[2] 1884
Notes: 1. Alternative correct answers: 1890 ($1{\cdot}05 \times 10^2 \times 18$) 1882·116 ($0{\cdot}333 \times 3{\cdot}14 \times 10^2 \times 18$) 2. The second mark is available for a calculation involving 4 values including a fraction and 3·14					

Question	Marking Scheme	Max Mark	Illustrations of
3.	**Ans: 39°**	**3**	
	$\bullet^1$ process: know that angle OBA is a right angle		$\bullet^1$ angle OBA = 90° or angle OBC = 90° or angle OBD = 13°
	$\bullet^2$ process: know that angle DFE is a right angle		$\bullet^2$ angle DFE = 90° or angle FDE = 26°
	$\bullet^3$ process: calculate the size of angle BDF		$\bullet^3$ 39°

Notes:

1. The first two marks may be awarded for information marked on a diagram.
2. An answer of 39^o must be stated outwith the diagram for the third mark to be awarded
3. For an answer of 39^o with no relevant working award 0/3

4.	**Ans: $k = 3$**	**2**	
	$\bullet^1$ process: substitute correctly into formula		$\bullet^1$ $48 = k \times 4^2$
	$\bullet^2$ process: find k		$\bullet^2$ $k = 3$

Notes:

1. For a correct answer without working award 2/2

Question			Marking Scheme	Max Mark	Illustrations of evidence
5.			**Ans: a = 8** $\bullet^1$ process: find $\bar{x}$ and $(x-\bar{x})^2$ $\bullet^2$ process: substitute into formula for a $\bullet^3$ process: calculate the value of a	**3**	$\bullet^1$ 3 and 4, 1, 1, 1, 25 $\bullet^2$ $\frac{32}{5-1}$ $\bullet^3$ 8

Notes:

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

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

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

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

3. For a final answer of $a=\sqrt{8}$ award 2/3
4. Disregard any attempt to simplify $\sqrt{8}$
5. For a correct answer without working award 0/3

Question			Marking Scheme	Max Mark	Illustrations of evidence
6.			**Ans: $a = 4, b = 3$** $\bullet^1$ communication: state the value of a $\bullet^2$ communication: state the value of b	**2**	 $\bullet^1$ 4 $\bullet^2$ 3
Notes: 1. For an answer of $y = 4 \sin 3x$ award 2/2 2. For answer $a = 3$, $b = 4$ or $y = 3 \sin 4x$ award 1/2					
7.	**(a)**	 **(i)** **(ii)**	**Ans: $a = -2, b = -4$** $\bullet^1$ communication: state the value of a $\bullet^2$ communication: state the value of b	**2**	 $\bullet^1$ -2 $\bullet^2$ -4
7.	**(b)**		**Ans: $x = 2$** $\bullet^1$ communication: state equation of axis of symmetry	**1**	 $\bullet^1$ $x = 2$
Notes: 1. Where a candidate has answers of (i) -4 and (ii) -2, award 0/1 for (i) award 0/1 for (ii)					

Question	Marking Scheme	Max Mark	Illustrations of evidence
8.	**Ans: $x = -1, y = 3$**	**3**	
	$\bullet^1$ process: correctly draw the graph of one of the given equations		$\bullet^1$ evidence from graph
	$\bullet^2$ strategy: correctly draw on the same diagram the graph of the other equation		$\bullet^2$ evidence from graph
	$\bullet^3$ communication: state solution		$\bullet^3$ $x = -1, y = 3$

Notes:

1. For an answer of $(-1,3)$ with appropriate working — award 3/3
2. For a correct answer obtained from 2 tables of values or solving 2 equations algebraically or trial and improvement — award 0/3
3. For a correct answer without working — award 0/3

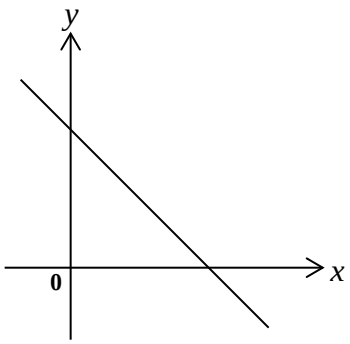
Question	Marking Scheme	Max Mark	Illustrations of evidence
9.	**Ans: cos 100°, cos 90°, cos 300°, with reason**	**2**	
	$\bullet^1$ communicate: state correct order		$\bullet^1$ cos 100°, cos 90°, cos 300°
	$\bullet^2$ communicate: state reason		$\bullet^2$ cos 100° is negative, cos 90° is zero and cos 300° is positive (or similar)

Notes:

1. Where 2 out of the 3 values are in the correct position relative to each other, with a valid reason — award 1/2

   eg, For "cos 90° is positive, cos 100° is negative, cos 300° is positive so cos 100°, cos 300°, cos 90°" — award 1/2

2. Accept positions of cos 90°, cos 100°, cos 300° indicated on a cos curve for award of mark 2

Question			Marking Scheme	Max Mark	Illustrations of evidence
10.			**Ans: $7\sqrt{5}$** •[1] process: simplify surd $\sqrt{45}$ •[2] process: simplify surd $\sqrt{20}$ •[3] process: state answer in simplest form	**3**	•[1] $3\sqrt{5}$ •[2] $2\sqrt{5}$ •[3] $7\sqrt{5}$
Notes:					
11.			**Ans: Straight line drawn sloping down from left to right, crossing the *y* axis above the origin.** •[1] interpret: realise $m < 0$ represents a downward sloping line •[2] interpret: realise $c > 0$ represents a *y*-intercept above the origin	**2**	 •[1] line with downward slope drawn on graph •[2] line drawn with *y*-intercept above origin
Notes: 1. Where a candidate has omitted *x*, *y*, 0 from perpendicular axes, full marks are still available					

Question			Marking Scheme	Max Mark	Illustrations of evidence
12.			**Ans: 34** •[1] strategy: start to solve problem •[2] process: find age of eighth member	**2**	 •[1] evidence (see note 1) •[2] 34

Notes:

1. Candidate may attempt to list the ages of the 7 original members
   eg 17, 20, ?, 24, ?, 32, 37
2. For a correct answer without working award 0/2

TOTAL MARKS FOR PAPER 1
30

[END OF MARKING INSTRUCTIONS]