

## **2010 Mathematics**

# **Intermediate 2 – Units 1, 2 and Applications Paper 1**

## **Finalised Marking Instructions**

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#### **General Marking Principles**

These principles describe the approach to be taken when marking Intermediate 2 Mathematics papers. For more detailed guidance please refer to the notes which are included with the Marking Instructions.

- 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  $x^\circ = 0.5 = 30^\circ$
  - 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 a 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 <u>and</u> 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 s/he has awarded marks, the following should be used:
  - (a) Correct working should be ticked,  $\checkmark$ .
  - (b) Where working subsequent to an error is followed through, if otherwise correct and can be awarded marks, it should be marked with a crossed tick, X.
  - (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.

### Mathematics Intermediate 2: Paper 1, Units 1, 2 and Applications (non-calc)

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1.	Ans: $y = -\frac{4}{3}x + 8$	
	• <sup>1</sup> process: find gradient	• <sup>1</sup> $m = -\frac{4}{3}$ (or equivalent)
	• <sup>2</sup> process: state <i>y</i> -intercept or c in $y = mx + c$	$\bullet^2$ c = 8
	• <sup>3</sup> process: state correct equation of the line	$\bullet^3 \qquad y = -\frac{4}{3}x + 8$
		3 marks
NOTES:		
1. H	For correct answer without working	award 3/3
2. 1	For $y = -\frac{4}{3}x$	award 1/3
3. V	Where m and/or c are incorrect the working must b he possibility of awarding 1/3 or 2/3	be followed through to give
4. 1 1	4. If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct <i>y</i> -intercept	
5. 1	For an incorrect equation (ie both m and c incorrect) without working,	
6	$eg  y = 8x - \frac{4}{3}$	award 0/3
6. 1	Where a candidate has written the gradient correctl	y and gone on to 'simplify' it incorrectly,
	do not penalise eg for $m = -\frac{\delta}{6} = -1 \cdot 2$	
	$y = -1 \cdot 2x + 8$	award 3/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2. (a)	Ans: Shoe size frequency cumulative frequency 5 $3$ $36$ $4$ $7$	
	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
	• <sup>1</sup> communicate: table with frequency column (must include 10 in 'shoe size')	• <sup>1</sup> 3, 4, 7, 3, 2, 0, 1 or correct tally marks
	• <sup>2</sup> communicate: table with cumulative frequency column	• <sup>2</sup> 3, 7, 14, 17, 19, 19, 20
		2 marks
NOTES:		
(b)	Ans: (i) 7 (ii) 6 (iii) 8	
	(i)	
	• <sup>1</sup> process: state median	• <sup>1</sup> 7
	(ii)	
	• <sup>1</sup> process: state lower quartile	• <sup>1</sup> 6
	(iii)	
	• <sup>1</sup> process: state upper quartile	• <sup>1</sup> 8 <b>3 marks</b>
NOTES:		
1. V	Where the quartiles have been obtained from (a) 'Shoe size' leading to $Q_2 = 8$ , $Q_1 = 6$ , $Q_3 = 10$	)
c c	br (b) 'Cumulative frequency' leading to $Q_2 = 17$ , $Q_2 = 10$ ,	$Q_1 = 7, Q_3 = 19$ award 0/3

Question	Marking Scheme	Illustrations of evidence for awarding
No	Give 1 mark for each •	a mark at each •
(c)	Ans: 4ns: 567891011 1 communicate: correct end points 2 communicate: correct box	<ul> <li>•<sup>1</sup> end points at 5 and 11</li> <li>•<sup>2</sup> box showing Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>3</sub></li> <li><b>2 marks</b></li> </ul>
<b>NOTES:</b> 1. V r	Where the 5 figure summary is written <u>on</u> the boxple reasonable scale.	ot, the diagram must be drawn to a
3	<ul> <li>Ans: 113-04 cubic centimetres</li> <li><sup>1</sup> process: substitute correctly into the formula for the volume of a sphere</li> <li><sup>2</sup> process: correct calculation</li> </ul>	• $V = \frac{4}{3} \times 3 \cdot 14 \times 3^{3}$ • 113.04 2 marks
<b>NOTES:</b> 1. 4	Alternative correct answers with working: 113.4 cm 113.01 c	$m^{3} (4 \times 1.05 \times 3 \times 3 \times 3)$ $cm^{3} (1.333 \times 3.14 \times 3 \times 3 \times 3)$
2. T	The 2 <sup>nd</sup> mark is for a calculation involving a fraction eg for $\frac{4}{3} \times 3.14 \times 3^2 = 37.68$	n, 3.14 and a power, award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4. (a)	<b>Ans:</b> $(x+3)(x-2)$	
	• <sup>1</sup> process: start to factorise the trinomial	• <sup>1</sup> one correct factor
	• <sup>2</sup> process: complete factorisation	• <sup>2</sup> $(x+3)(x-2)$ <b>2</b> marks
		2 mar ks
NOTES:		
1. F	For the following answers	award 1/2
(	(x-3)(x+2)	
	(x+6)(x-1) (x-6)(x+1)	
		Γ
(b)	Ans: $3x^3 + 17x^2 + 7x - 2$	
	• <sup>1</sup> process: start to multiply out brackets	• evidence of 3 correct terms (eg $3x^3 + 15x^2 - 3x$ )
	• <sup>2</sup> process: complete the process of multiplying out brackets	• <sup>2</sup> $3x^3 + 15x^2 - 3x + 2x^2 + 10x - 2$
	• <sup>3</sup> process: collect like terms which must include a term in $x^3$	• $3x^3 + 17x^2 + 7x - 2$
		3 marks
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5.	Ans: Yes, with valid explanation	
	• <sup>1</sup> communicate:	• <sup>1</sup> evidence
	• <sup>2</sup> communicate:	• <sup>2</sup> evidence <b>2 marks</b>
NOTES:		
1. <u>P</u> (; (;	<ul> <li>i) Yes, because the route has only 2 odd vertices</li> <li>ii) Yes, with any correct route.</li> </ul>	s / nodes (museum and church).
2. <u>P</u> ((	<ul> <li>An incomplete route (only one omission allow</li> <li>A route where only one part of the network is</li> </ul>	ved) with a decision of yes or no. travelled twice.
3. <u>R</u>	Response which gains 0 marks i) Yes, with all landmarks listed once.	
4. F	For a possible route with wrong conclusion	award 1/2
6.	Ans: 8 centimetres	
	• <sup>1</sup> strategy: know to use the sine rule	• <sup>1</sup> $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
	• <sup>2</sup> process: correct substitution into sine rule	$\bullet^2 \qquad \frac{b}{\frac{1}{3}} = \frac{12}{\frac{1}{2}}$
	• <sup>3</sup> process: correct calculation of AC	• <sup>3</sup> 8 <b>3 marks</b>
<b>NOTES:</b> 1. F	For $\frac{b}{\sin\frac{1}{3}} = \frac{12}{\sin\frac{1}{2}}$ leading to an answer of 8 cm	award 2/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7. (a)	<ul> <li>Ans: a = 144</li> <li>•<sup>1</sup> process: substitute correctly into formula</li> <li>•<sup>2</sup> process: correctly calculate a</li> </ul>	• $a = 180 - \frac{360}{10}$ • $144$ <b>2 marks</b>
NOTES:		
(b)	<ul> <li>Ans: n = 9</li> <li>•<sup>1</sup> process: substitute correctly into formula</li> </ul>	• $140 = 180 - \frac{360}{n}$

NOTES:1. Where a candidate has changed the subject of the formula incorrectly, has then substituted correctly and followed through correctly, a maximum of 1/3 can be awarded.

 $\bullet^2 \quad \frac{360}{n} = 40$ 

*n* = 9

3 marks

•<sup>3</sup>

process: start to solve equation

•<sup>3</sup> process: complete process

•<sup>2</sup>

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8.	Ans: £1952	
	• <sup>1</sup> interpret: interpret loan repayment table	• <sup>1</sup> 244
	• <sup>2</sup> strategy: know how to calculate remaining payments	• <sup>2</sup> $(36-28) \times 244$
	• <sup>3</sup> process: carry out all calculations correctly	• <sup>3</sup> 1952 <b>3 marks</b>
NOTES:		
1.	Common Answers For 1168, with working $(8000 - 28 \times 244)$ For 784, with working $(36 \times 244 - 8000)$	award 2/3 award 2/3
2.	For working subsequent to a correct answer, the fina	al mark cannot be awarded.

TOTAL MARKS FOR PAPER 1 30

[END OF MARKING INSTRUCTIONS]