

## **2011 Mathematics**

### **Intermediate 1 Units 1, 2 & 3 Paper 2**

## **Finalised Marking Instructions**

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# Part One: General Marking Principles for Mathematics Intermediate 1 Units 1, 2 & 3 Paper 2

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 for each candidate response must <u>always</u> be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. 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 the Principal Assessor. You can do this by posting a question on the Marking Team forum. Alternatively, you can refer the issue directly to the Principal Assessor by completing a Principal Assessor Referral form and returning it with the script in the normal way.
- 2. Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.
- **3.** Award one mark for each 'bullet' point shown in the Marking Instructions.
- 4. Working subsequent to an error must be followed through with the possibility of awarding all remaining marks for the subsequent working, provided the question has not been not simplified as a result of the error. In particular, 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 has not been not simplified.
- 5. 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 marks.
- **6.** 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 Instructions)
  - bad form, eg sin  $x^{\circ} = 0.5 = 30^{\circ}$
  - legitimate variation in numerical values/algebraic expressions
- 7. 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.
- **8.** In general only 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 page one of the question paper states that 'full credit will be given only where the solution contains appropriate working'.
- 9. 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.
- **10.** 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.

- 11. Do not penalise the same error twice in the same question.
- 12. Do not penalise a transcription error unless the question has been simplified as a result.
- Where a solution has been scored out and not replaced then provided the solution is legible marks should be awarded in line with the Marking Instructions for that question.
- 14. Where more than one solution is given, mark them all and award the least mark.
- 15. The symbols  $\checkmark$  and  $\times$  are used in the Marking Instructions to give guidance regarding the awarding of marks for specific candidate responses to some questions, eg 'award  $2/4 \checkmark \times \times \checkmark$ ' indicates that the 1<sup>st</sup> & 4<sup>th</sup> marks should be awarded but the 2<sup>nd</sup> & 3<sup>rd</sup> marks should not.

Part Two: Mathematics Intermediate 1: Paper 2, Units 1, 2 and 3

Question	Expected Answer/s	Max Mark	Additional Guidance
1	Ans: 50 minutes  • 1 find number of calories per minute: $160 \div 20 = 8$ • 2 find time: $400 \div 8 = 50$	2	1. Correct answer without working award 2/2  2. Alternative strategies (a)  •¹ 20 ÷ 160 = 0·125 •² 0·125 × 400 = 50  (b)  •¹ 400 ÷ 160 = 2·5 •² 2·5 × 20 = 50  (c)  •¹•² eg 160 20  160 20  80 10  400 50  [In this case award 1/2 for correct strategy with <b>one</b> error.]
2	Ans: $c < 6$ • 1 collect constants: $7c < 42$ • 2 solve inequality for m: $c < 6$	2	<ol> <li>For answers without valid working award 1/2 eg         <ul> <li>(a) c &lt; 6 without working x√</li> <li>(b) 7 × 6 + 13 &lt; 55 → c &lt; 6 x√</li> <li>(c) 7c = 42 → c &lt; 6 x√</li> </ul> </li> <li>Answers acceptable for partial credit (valid working must be shown) award 1/2         <ul> <li>(a) 7c &lt; 42 → &lt; 6 √ x</li> <li>(b) 7c &lt; 42 → c = 6 √ x</li> <li>(c) 7c = 42 → c = 6 √ x</li> <li>(d) 7c &lt; 68 → c &lt; 9.7() x√</li> </ul> </li> </ol>

Question Expected Answer/s Max Additional Guida	nce
950 × 4000 = 3 800 000  • 2 express answer in standard form: $3.8 \times 10^{n}$ • 3 consistent power of ten: $3.8 \times 10^{6}$ 1 award 3/3  2. Some common (no working (a) $38 \times 10^{5}$ (b) $3.8 \times 10^{6}$ (c) $3 \times 10^{6}$ , 4	necessary) award 2/3 ✓×✓

Que	estior	Expected Answer/s	Max Mark	Additional Guidance
4	a	Ans: 1 hour 15 minutes  • interpret graph: 1 hour 15 minutes (or equivalent)	1	
4	<b>b</b>	Ans: 80 mph  • know how to find speed: $S = {}^{D}/_{T}$ • interpret graph: $D = 300$ , $T = 3h45m$ • calculate speed: $300 \div 3.75 = 80$	3	<ol> <li>Correct answer without working award 3/3</li> <li>Some common answers         <ul> <li>(no working necessary, rounding or truncation is acceptable)</li> <li>(a) 300 ÷ 3·45 = 87, 86(·9)</li></ul></li></ol>

Qu	estion	Expected Answer/s	Max	Additional Guidance
5	a	Ans: 9m + 35  •¹ multiply out bracket: 10m + 35  •² collect like terms: 9m + 35	Mark 2	<ol> <li>Correct answer without working award 2/2</li> <li>2<sup>nd</sup> mark is not available if there is invalid subsequent working eg 9m + 35 → 44m award 1/2 9m + 35 → 35/9 award 1/2</li> <li>10m + 35 - 5m = 5m + 35 ×√award 1/2</li> </ol>
5	b	Ans: 6(4-3k)  •¹ identify highest common factor: 6 or 4-3k  •² factorise: 6(4-3k)	2	1. $2(12-9k)$ , $3(8-6k)$ award $1/2 \times \sqrt{}$
6		<ul> <li>Ans: 18 minutes</li> <li>         •¹ know how to find volume of tank: 90 × 60 × 50     </li> <li>         •² know how to find volume in litres: (90 × 60 × 50) ÷ 1000     </li> <li>         •³ know how to find time: [(90 × 60 × 50) ÷ 1000] ÷ 15     </li> <li>         •⁴ calculate [(volume) ÷ 1000] ÷ 15 = 18     </li> </ul>	4	<ol> <li>Correct answer with no working award 4/4</li> <li>Some common answers         (working must be shown)         <ul> <li>(a) 270000 ÷ 15 ÷ 60 = 300</li> <li>√x√x award 2/4</li> <li>(b) 270000 ÷ 1000 ÷ 60 = 4.5</li> <li>√√xx award 2/4</li> <li>(c) [(90 + 60 + 50) ÷ 1000] ÷ 15 = 0.013</li> <li>x√√√ award 3/4</li> </ul> </li> </ol>

Question	Expected Answer/s	Max Mark	Additional Guidance
7 a	<b>Ans:</b> 3698  •¹ find 'Liberal' angle: 43  •² know how to find number of Liberal votes:  •³/₃₀₀ × 30960  or  •³0960/₃₀₀ × 43  or  43 ÷ (360 ÷ 30960)  •³ find number of Liberal votes: 3698	3	<ol> <li>Correct answer without working award 3/3</li> <li>27262 [317/360 × 30960] award 2/3 ×√√ (no working necessary)</li> <li>A common answer (working must be shown) 43% of 30960 = 13312(·8), 13313 award 1/3 √××</li> <li>Do not award third mark where premature rounding results in wrong answer eg 43/360 × 30960 = 0·12 × 30960 = 3715(·2) award 2/3 √√x</li> </ol>
7 b	Ans: In the by-election more voted SNP fewer voted Labour more voted Liberal  • state any one of the above differences  • state another one of the above differences	2	<ol> <li>Disregard invalid statements.         eg SNP increased ✓         Labour decreased ✓         Liberal decreased ×         award 2/2</li> <li>Disregard incorrect numerical references.         eg SNP gained 70°         Labour lost 90°         award 2/2</li> <li>Some common answers         <ul> <li>(a) Labour lost votes to SNP award 2/2</li> <li>(b) In 2005 Labour had much more than SNP, but in 2008 they were close to each other.</li> </ul> </li> </ol>

Question	Expected Answer/s	Max Mark	Additional Guidance
8	Ans: £994-39 or £994-40	3	
	•¹ calculate $800 \times 1.33$ correctly: 1064		1. Correct answer without working award 3/3
	•² know to calculate 1064 ÷ 1.07  •³ divide correctly and round to nearest (appropriate) penny: 994.39 or 994.40		<ol> <li>The third mark is only available where the answer to the division has to be rounded or truncated to the nearest penny</li> <li>For £994·4</li></ol>
9	Ans: 7.5 m	4	
	• 1 correct form of Pythagoras Theorem: $4.5^2 + 2.4^2$		Correct answer without working award 4/4
	<ul> <li>calculate sum (or difference) of squares: 26.01</li> <li>calculate the square root of a calculated value: 5.1</li> <li>calculate height: 5.1 + 2.4 = 7.5</li> </ul>		<ol> <li>Some common answers (working must be shown)         <ul> <li>(a) 6·2() [√(4·5² - 2·4²) + 2·4)]</li> <li>x√√√ award 3/4</li> <li>(b) 3·8() [√(4·5² - 2·4²)]</li> <li>x√√x award 2/4</li> </ul> </li> <li>Example of alternative strategy involving trigonometry         <ul> <li>a° = tan⁻¹(²⁴/₄·5) = 28.07°</li> <li>cos28·07° = ⁴⁵/x</li> <li>x = ⁴⁵/co28·07° = 5·1</li> <li>height = 5·1 + 2·4 = 7·5</li> </ul> </li> <li>Do not penalise inadvertent use of radians or grads if trigonometry is used</li> <li>Mark 4 can be awarded for adding 2.4 on to a <b>previously calculated</b> value</li> </ol>

Quest	tion	Expe	cted Answer/s	Max Mark	Additional Guidance
10	tion	Ans: •¹•²			<ol> <li>Correct answer without working award 3/3</li> <li>If answer is 1435 [1400 + 35]         <ul> <li>(no working necessary)</li> <li>(a) award 3/3 if candidate states that interest is 35</li> <li>(b) award 2/3 if candidate does not state that interest is 35</li> </ul> </li> <li>Acceptable answers for partial credit (no working necessary)         <ul> <li>(a) 105 [7.5% of 1400] award 1/3</li> <li>(b) 2.5 [⁴/12 × 7.5] award 1/3</li> <li>(c) 466.67 or 466.66 [⁴/12 × 1400] award 1/3</li> <li>(d) 420 [105 × 4] award 1/3</li> </ul> </li> <li>The following common wrong answers illustrate where the 3<sup>rd</sup> mark is available to candidates, working must be shown.         <ul> <li>(a) 1400 × ¹00/7.5 × ⁴/12 = 6222.22× ✓√</li> <li>(note: answer must be rounded or</li> </ul> </li> </ol>
					(note: answer must be rounded or truncated to nearest penny)  (b) $1400 \div 7.5 \times {}^{4}/_{12} = 62.22 \times \checkmark \times$ (c) $1400 \times {}^{7.5}/_{100} \times {}^{12}/_{4} = 315 \times \checkmark \times$ (d) $1400 \times 0.75 \times {}^{12}/_{4} = 3150 \times \times \checkmark$

Question	Expected Answer/s	Max Mark	Additional Guidance
	Ans: 20  •¹ multiply correctly: $2 \times 0.45 = 0.9$ •² divide correctly: $360 \div 0.9 = 400$ •³ find square root correctly: $\sqrt{400} = 20$	3	<ol> <li>Correct answer without working award 3/3</li> <li>Some common answers (no working necessary)         <ul> <li>(a) √(<sup>360</sup>/<sub>2</sub> × 0.45) = 9</li> <li>award 2/3 × √ ×</li> <li>(b) √<sup>360</sup>/<sub>0.9</sub> = 21.081</li> <li>award 2/3 √ √ ×</li> <li>(c) √<sup>360</sup>/<sub>2</sub> × 0.45 = 4.269</li> <li>award 1/3 × √ ×</li> </ul> </li> <li>Some common answers where working must be shown         <ul> <li>(a) √(360 × 2 × 0.45) = 18</li> <li>award 2/3 √ × √</li> <li>(b) √(360) × 2 × 0.45 = 17.076</li> <li>award 1/3 √ × ×</li> <li>(c) √(360 ÷ 0.45²) = 42.16</li> <li>award 2/3 × √ √</li> <li>(d) √(360) ÷ 0.45 = 42.16</li> <li>award 1/3 × √ ×</li> <li>(e) √(360 ÷ 0.45) = 28.28</li> <li>award 2/3 × √ √</li> </ul> </li> <li>Accept answer rounded or truncated to 1 or more decimal places</li> </ol>

Que	stion	Expected Answer/s	Max Mark	Additional Guidance
12		Ans: 6.9 m (or 7m)	4	
		• find base of triangle: $17 - 11 = 6$ • use correct tan ratio: $\tan 49^\circ = \frac{h}{6}$ • know how to solve equation: $h = 6 \times \tan 49^\circ$ • carry out trig. calculation: $6.9(0)$		<ol> <li>Correct answer without working award 3/4         Be aware tan 49 = h/6</li></ol>
				<ul> <li>(b) 6 × sin49° = 4·5(28) award 3/4√x√√</li> <li>4. In awarding the 4<sup>th</sup> mark, the trig. ratio should not be rounded to any less than 2 decimal places eg</li> <li>(a) 6 × tan49° = 6 × 1·15 = 6·9 award 4/4</li> <li>(b) 6 × tan49° = 6 × 1·2 = 7·2 award 3/4 √√√x</li> </ul>

Question	Expected Answer/s	Max Mark	Additional Guidance
13	Ans: 36% (See Note 1)  •¹ find loss: 45  •² know to express loss as a fraction of 125: $^{45}/_{125}$ •³ know to multiply fraction by 100: $^{45}/_{125} \times 100$ •⁴ carry out all calculations correctly: 36	4	1. Correct answer without working award 2/4  Be aware 45/ <sub>100</sub> × 80 = 36  award 2/4 √××√  When the only working is 45 and 36  award 2/4 √××√  2. 4 <sup>th</sup> mark is only available for calculations of the form <sup>a</sup> / <sub>b</sub> × c where a,b,c = calculated loss or 125 or 80 or 100.  3. Some common answers (working must be shown)  (a) (i) 56(·25) [ <sup>45</sup> / <sub>80</sub> × 100] award 3/4 √×√√  (ii) 56(·25) [ <sup>45</sup> / <sub>100</sub> × 125] award 2/4 √××√  When the only working is 45 and 56(.25) award 2/4 √××√  (b) 64 [ <sup>80</sup> / <sub>125</sub> × 100] award 3/4 ×√√√  (c) 178, 177(·7) [ <sup>80</sup> / <sub>45</sub> × 100] award 3/4 √×√√  (d) 156(·25) [ <sup>125</sup> / <sub>80</sub> × 100] award 2/4 ××√√  (e) 100 [ <sup>80</sup> / <sub>100</sub> × 125 or 125/ <sub>100</sub> × 80] award 1/4 ×××√

Question	Expected Answer/s	Max Mark	Additional Guidance
14	<ul> <li>Ans: 5·2 cm²</li> <li>•¹ know to calculate area of semicircle: ½ πr²</li> <li>•² substitute correct radius into formula: ½×π×1·4²</li> <li>•³ know to add area of triangle to area of semi-circle: ½×π×1·4² + ½×2·8×1·5</li> <li>•⁴ carry out all calculations correctly: 3·07 + 2·1 = 5·17 (must include a circle calculation followed by an addition)</li> <li>•⁵ round to one decimal place: 5·2</li> </ul>	5	<ol> <li>Correct answer without working award 0/5</li> <li>Some common answers (working must be shown)         <ul> <li>(a) 8·3 [π × 1·4² + ½ × 2·8 × 1·5] award 4/5 × √ √</li> <li>(b) 7·3 [½ × π × 1·4² + 2·8 × 1·5] award 4/5 √ × √</li> <li>(c) 14·4 [½ × π × 2·8² + ½ × 2·8 × 1·5] award 4/5 √ × √ √</li> <li>(d) 6·5 [½ × π × 2·8 + ½ × 2·8 × 1·5] award 4/5 × √ √</li> <li>(e) 4·3 [½ × π × 1·4 + ½ × 2·8 × 1·5] award 3/5 × √ × √</li> <li>(f) 3·1 [½ × π × 1·4²] award 3/5 √ √ × × √</li> <li>(g) 6·2 [π × 1·4²] award 2/5 × √ × × √</li> <li>(h) 4·4 [½ × π × 2·8] award 2/5 × √ × × √</li> <li>(i) 8·8 [π × 2·8] award 2/5 × √ × × √</li> <li>(j) 2·2 [½ × π × 1·4] award 1/5 × × × × √</li> </ul> </li> <li>3. (a) 5<sup>th</sup> mark is only available where the final answer or answer to circle calculation requires rounding.</li> <li>(b) Where premature rounding leads to incorrect answer, a maximum of 4/5 is available eg triangle = (½ × 1·4 × 1·5) × 2 = 1·05 × 2 = 1·1 × 2 total area = 2·2 + 3·1 = 5·3</li> </ol>

TOTAL MARKS FOR PAPER 2 50

> TOTAL MARKS FOR PAPER 1 & 2 80

[END OF MARKING INSTRUCTIONS]