



2010 Mathematics

Intermediate 1 Units 1, 2 & Applications Paper 2

Finalised Marking Instructions

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Part One: General Marking Principles for Mathematics Intermediate 1 Units 1, 2 & Applications 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 always 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 your Team Leader/Principal Assessor. You can do this by posting a question on the Marking Team forum or by e-mailing/phoning the emarker Helpline. Alternatively, you can refer the issue directly to your Team Leader by checking the 'Referral' box on the marking screen.
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.
13. 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 ✓ and ✕ 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 ✓✕✕✓’ indicates that the 1st & 4th marks should be awarded but the 2nd & 3rd marks should not.

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

Question			Expected Answer/s	Max Mark	Additional Guidance
1			<p>Ans: 220 km</p> <ul style="list-style-type: none"> •¹ know how to find distance: $80 \times 2\text{h}45\text{m}$ •² calculate distance: $80 \times 2.75 = 220$ 	2	<p>1. Correct answer without working award 2/2</p> <p>2. Answers acceptable for partial credit (no working necessary)</p> <p>(a) 196 [80×2.45] award 1/2 ✓✗</p> <p>(b) 13200 [80×165] award 1/2 ✓✗</p> <p>(c) 29(.09)[$80 \div 2.75$] award 1/2 ✗✓</p>
2			<p>Ans: £702</p> <ul style="list-style-type: none"> •¹ find monthly premium: $1.30 \times 45 = 58.5(0)$ •² find annual premium: $58.5(0) \times 12 = 702$ 	2	<p>1. Correct answer without working award 2/2</p> <p>2. Answer acceptable for partial credit (no working necessary) $15.6(0)$ [1.30×12] award 1/2</p> <p>3. 2nd mark is not available if there is invalid subsequent working 45702 [$702 + 45000$] award 1/2 45058.5 [$58.5 + 45000$] award 1/2</p>

Question			Expected Answer/s	Max Mark	Additional Guidance
3	a		Ans: £396 • ¹ state monthly payment: 396	1	1. $396 \div 12 = 33$ award 0/1
	b		Ans: £14220 • ¹ know how to find extra payment: $(475 - 396) \times 12 \times 15$ • ² find extra payment: 14220	2	1. Correct answer without working award 2/2 2. Award 1/2 for each of the following answers (no working necessary) (a) 85500 [$475 \times 12 \times 15$] (b) 45500 [$85500 - 40000$] (c) 71280 [$396 \times 12 \times 15$] (d) 31280 [$71280 - 40000$] (e) 1185 [$(475 - 396) \times 15$] (f) 1272 [$(475 - 396) \times 12$] 3. Minimum calculation required for award of 2 nd mark: two multiplications or a subtraction and a multiplication.
4			Ans: £2016 • ¹ find total price without surcharge: $240 \times 8 = 1920$ • ² find total price: $1920 + 96 = 2016$	2	1. Correct answer without working award 2/2 2. Alternative strategy • ¹ find price per person with surcharge: $240 + 12 = 252$ • ² find total price: $252 \times 8 = 2016$ 3. Acceptable answer for partial credit (no working necessary) $2100 [250 \times 8 + 100]$ award 1/2

Question			Expected Answer/s	Max Mark	Additional Guidance													
5			Ans: 180 000	3														
			• ¹ complete table: <div><div>1400</div><div>1125</div><div>750</div><div>7200</div></div>		1. Award of 1 st mark: 1400, 1125, 750 and 7200 need not appear in table but must be shown in working													
			• ² know to divide $\sum fx$ by 40: 7200 ÷ 40		2. 2nd mark may only be awarded for attempting $\sum fx \div 40$													
			• ³ divide $\sum fx$ correctly and give answer in full: 180000 or 180 thousand		3. 3 rd mark may only be awarded for correctly dividing $\sum fx$ and giving answer in full													
					4. <table><tr><th><u>Answer</u></th><th><u>With evidence for 1st mark</u></th><th><u>Without evidence for 1st mark</u></th></tr><tr><td>180 000</td><td>3/3 ✓✓✓</td><td>2/3 x✓✓</td></tr><tr><td>180[7200÷40]</td><td>2/3 ✓✓x</td><td>1/3 x✓x</td></tr><tr><td>1 200 000 [7200÷6 = 1200]</td><td>2/3 ✓xx</td><td>1/3 xxx</td></tr><tr><td>1 200 [7200÷6]</td><td>1/3 ✓xx</td><td>0/3</td></tr></table>	<u>Answer</u>	<u>With evidence for 1st mark</u>	<u>Without evidence for 1st mark</u>	180 000	3/3 ✓✓✓	2/3 x✓✓	180[7200÷40]	2/3 ✓✓x	1/3 x✓x	1 200 000 [7200÷6 = 1200]	2/3 ✓xx	1/3 xxx	1 200 [7200÷6]
<u>Answer</u>	<u>With evidence for 1st mark</u>	<u>Without evidence for 1st mark</u>																
180 000	3/3 ✓✓✓	2/3 x✓✓																
180[7200÷40]	2/3 ✓✓x	1/3 x✓x																
1 200 000 [7200÷6 = 1200]	2/3 ✓xx	1/3 xxx																
1 200 [7200÷6]	1/3 ✓xx	0/3																

Question			Expected Answer/s	Max Mark	Additional Guidance
6	a		<p>Ans: £153</p> <ul style="list-style-type: none"> •¹ calculate number of hours worked in week: 22.5 •² calculate weekly wage: 153 	2	<ol style="list-style-type: none"> 1. Correct answer without working award 2/2 2. Some common answers (no working necessary) (a) 30.6(0) [4.5×6.8(0)] award 1/2 (b) 146.2(0) [4.3×5×6.8(0)] award 1/2
	b		<p>Ans: 5</p> <ul style="list-style-type: none"> •¹ start valid method: $1.5 \times 6.8(0) = 10.2(0)$ or $51 \div 6.8(0) = 7.5$ or 7h30m or $51 \div 1.5 = 34$ •² calculate number of hours worked: 5 	2	<ol style="list-style-type: none"> 1. Correct answer without working award 2/2

Question			Expected Answer/s	Max Mark	Additional Guidance
7			<p>Ans: 39 cm</p> <ul style="list-style-type: none"> •¹ find dimensions of screen: 33 and 21 •² correct form of Pythagoras Theorem: $33^2 + 21^2$ •³ calculate sum (or difference) of squares: 1530 •⁴ calculate square root of sum (or difference) of squares: 39(1....) 	4	<ol style="list-style-type: none"> 1. Correct answer without working award 4/4 2. Final answer may be rounded or truncated. 3. Final mark is not available if there is invalid subsequent working e.g. $39 \div 2 = 19.5$ 4. Some common answers (working must be shown) <ol style="list-style-type: none"> (a) $\sqrt{(37^2 + 25^2)} = 45, 44.7, 44.6(\dots)$ award 3/4 ✕✓✓✓ (b) $\sqrt{(35^2 + 23^2)} = 42, 41.9, 41.8(\dots)$ award 3/4 ✕✓✓✓ (c) $\sqrt{(33^2 - 21^2)} = 25, 25.5, 25.4(\dots)$ award 3/4 ✓✕✓✓ (d) $\sqrt{(37^2 - 25^2)} = 27, 27.3, 27.2(\dots)$ award 2/4 ✕✕✓✓ 5. Example of alternative strategy involving trigonometry <ul style="list-style-type: none"> •¹ 33 and 21 •² $a^\circ = \tan^{-1}(21/33) = 32.47^\circ$ •³ $\cos 32.47^\circ \dots \dots = 33/x$ •⁴ $x = 33/\cos 32.47^\circ \dots = 39(1\dots)$ 6. Do not penalise inadvertent use of radians or grads if trigonometry is used.

Question			Expected Answer/s	Max Mark	Additional Guidance
8			<p>Ans: £4.14</p> <ul style="list-style-type: none"> •¹ know how to convert \$50 into sterling: $50 \div 1.62$ •² divide correctly and round or truncate to nearest penny: 30.86 •³ calculate saving: $35 - 30.86 = 4.14$ 	3	<p>1. 4.14 (no working necessary) award 3/3</p> <p>2. Alternative strategy</p> <ul style="list-style-type: none"> •¹ calculate saving in dollars: $35 \times 1.62 - 50 = 6.7(0)$ •² know how to convert saving into sterling: $6.7(0) \div 1.62$ •³ convert saving in sterling: 4.14 or 4.13 <p>3. Some ways of obtaining 4.13 as answer</p> <p>(a) $35 - 30.864... (= 4.136) = 4.13$ award 3/3</p> <p>(b) $35 - 30.87 = 4.13$ award 2/3 ✓ x ✓</p> <p>(c) 4.13 with no working award 2/3</p> <p>4. The 2nd mark is only available where the answer to the division has to be rounded or truncated to the nearest penny eg Do not award the mark for $50 \div 1.6 = 31.25$</p> <p>5. (a) $35 \div 1.62 = 21.60$ award 1/3 x ✓ x</p> <p>(b) $50 - 35 \div 1.62 = 28.40$ award 2/3 ✓ x ✓</p> <p>(c) $35 - 35 \div 1.62 = 13.40$ award 1/3 x ✓ x</p> <p>(d) $50 \times 1.62 = 81$ award 0/3</p> <p>(e) $35 - 50 \times 1.62 = -46$ award 1/3 x x ✓</p> <p>(f) $50 \times 1.62 - 35 = 46$ award 0/3</p> <p>(g) $50 - 50 \times 1.62 = -31$ award 0/3</p>

Question			Expected Answer/s	Max Mark	Additional Guidance
9			<p>Ans: £40.95</p> <p>•¹•² know how to calculate interest: $\frac{1.3}{100} \times 4200 \times \frac{9}{12}$ (award 1 for $\frac{1.3}{100} \times 4200$ or $\frac{9}{12} \times 1.3$ or $\frac{9}{12} \times 4200$)</p> <p>•³ carry out percentage and fraction calculations correctly: 40.95</p>	3	<p>1. Correct answer without working award 3/3</p> <p>2. If answer is 4240.95 [4200 + 40.95] (no working necessary) (a) award 3/3 if candidate states that interest is 40.95 (b) award 2/3 if candidate does not state that interest is 40.95</p> <p>3. Acceptable answers for partial credit (no working necessary) (a) 54.6(0) [1.3% of 4200] award 1/3 (b) 0.975 [$\frac{9}{12} \times 1.3$] award 1/3 (c) 3150 [$\frac{9}{12} \times 4200$] award 1/3 (d) 491.4(0) [54.6(0) × 9] award 1/3</p> <p>4. 3rd mark is not available where premature rounding leads to an incorrect answer e.g. $\frac{9}{12} \times 1.3 = 0.975$ $\rightarrow \frac{0.98}{100} \times 4200 = 41.16$ award 2/3 ✓✓✗</p>

Question			Expected Answer/s	Max Mark	Additional Guidance
10			<p>Ans: 7.4 cm</p> <ul style="list-style-type: none"> •¹ know to divide 1369 by 25: $1369 \div 25$ •² know to find square root of: answer to above: $\sqrt{(1369 \div 25)}$ •³ calculate $\sqrt{(1369 \div 25)}$ correctly: 7.4 [(1369 ÷ 25) ÷ 4 = 13.69 is the only other calculation for which this mark is available] 	3	<ol style="list-style-type: none"> 1. Correct answer without working award 3/3 2. 54.76, 54.8 or 54.7 (no working necessary) award 1/3 3. Some common answers (working must be shown) (a) $54.76 \div 4 = 13.69$ award 2/3 (b) $1369 \div 100 = 13.69$ award 0/3 4. Alternative strategy <ul style="list-style-type: none"> •¹ find $L \times L \times 25$ for any L: eg $4 \times 4 \times 25 = 400$ •² show that $7 < L < 8$: eg $7 \times 7 \times 25 = 1225$ and $8 \times 8 \times 25 = 1600$ •³ find length of base: 7.4
11			<p>Ans: 12%</p> <ul style="list-style-type: none"> •¹ know to express 90 as a fraction of 750: $\frac{90}{750}$ •² know to multiply fraction by 100: $\frac{90}{750} \times 100$ •³ carry out all calculations correctly: 12 	3	<ol style="list-style-type: none"> 1. Correct answer without working award 3/3 2. 3rd mark is only available for calculations of the form $\frac{a}{b} \times c$ where a,b,c = 90 or 750 or 100 or 660 or 840 3. Some common answers (working must be shown) <ul style="list-style-type: none"> (a) $833(.\dot{3}...)$ [$\frac{750}{90} \times 100$] award 2/3 x✓✓ (b) $8.\dot{3}(3...)$ [$\frac{750}{90}$] award 0/3 (c) 675 [$\frac{90}{100} \times 750$ or $\frac{750}{100} \times 90$] award 1/3 x x ✓ (d) 88 [$\frac{(750-90)}{750} \times 100$] award 2/3 x ✓ ✓ (e) 8112 [$\frac{(750+90)}{750} \times 100$] award 2/3 x ✓ ✓

Question			Expected Answer/s	Max Mark	Additional Guidance
12	a		<p>Ans: £23·50</p> <p>•¹ order numbers: 17 18 18 19 20 21 23 24 26 27 27 27 28 31</p> <p>•² find median: 23·5</p>	2	<p>1. Correct answer without working award 2/2</p> <p>2. 21 [numbers not ordered] (a) with valid working award 1/2 (b) without valid working award 0/2</p> <p>3. If “correct” median is found from ordered list with one missing or one extra number award 1/2</p> <p>4. Accept ordered list written in part (a) or part (b)</p>
12	b		<p>Ans: £14</p> <p>•¹ find range: $31 - 17 = 14$</p>	1	
12	c		<p>Ans: 5C collected more on average. Amounts collected by 5M are more varied.</p> <p>•¹ interpret statistics: 5C collected more. (or equivalent)</p> <p>•² interpret statistics: Amounts collected by 5M varied more. (or equivalent)</p>	2	<p>1. Answer must be consistent with answers to parts (a) and (b)</p> <p>2. Do not accept e.g. 5C has a higher median 5M has a higher range</p>

Question			Expected Answer/s	Max Mark	Additional Guidance
13			<p>Ans: 867 cm²</p> <ul style="list-style-type: none"> •¹ know to use curved surface area formula: $2\pi r h$ or $\pi d h$ •² substitute correct radius (or correct diameter) and height into formula involving π : $2 \times \pi \times 6 \times 20$ or $\pi \times 12 \times 20$ •³ know how to find area of bottom: $\pi \times 6^2$ •⁴ find total surface area: 867 (must include a calculation involving π followed by an addition) 	4	<ol style="list-style-type: none"> 1. Correct answer without working award 4/4 2. Disregard premature rounding or truncation 3. Some common answers (working must be shown) <ul style="list-style-type: none"> (a) $\pi \times 6^2 = 113(\dots)$ award 1/4 (b) $\pi \times 6^2 + 240 = 353(\dots)$ award 2/4 (c) $\pi \times 6 \times 20 = 377, 376(\dots)$ award 1/4 (d) $2 \times \pi \times 6 \times 20$ or $\pi \times 12 \times 20 = 754, 753(\dots)$ award 2/4 (e) $2 \times \pi \times 12 \times 20 = 1508, 1507(\dots)$ award 1/4

Question		Expected Answer/s	Max Mark	Additional Guidance
14		<p>Ans: 306 cm</p> <p>•¹•² know how to calculate circumference of semi-circle: $\frac{1}{2} \times \pi \times 80$ (award 1 for $\frac{1}{2} \pi d$ or $\pi \times 80$ or $\frac{1}{2} \times \pi \times 40^2$)</p> <p>•³ know to add $\frac{1}{2} \pi d + 180$: $\frac{1}{2} \times \pi \times 80 + 30 + 50 + 20 + 50 + 30$</p> <p>•⁴ carry out all calculations correctly: $305.6(6\dots)$ (must include a calculation involving π followed by an addition or a subtraction)</p> <p>•⁵ round to nearest centimetre: 306</p>	5	<p>1. 306 without working award 0/5</p> <p>2. (a) 5th mark is only available where the candidate is required to round final answer or answer to circle calculation to nearest whole number.</p> <p>(b) Versions of the answers below which are not rounded, incorrectly rounded or not requiring to be rounded should not be awarded the 5th mark. BEWARE: although $\pi \times 40^2$ needs to be rounded 3.14 $\times 40^2$ does not.</p> <p>3. Some common answers (working must be shown)</p> <p>(a) 256 [$\frac{1}{2} \times \pi \times 80 + 130$] award 4/5 ✓✓×✓✓</p> <p>(b) 431 [$\pi \times 80 + 180$] award 4/5 ×✓✓✓✓</p> <p>(c) 2693 [$\frac{1}{2} \times \pi \times 40^2 + 180$] award 4/5 ×✓✓✓✓</p> <p>(d) 3513 [$\frac{1}{2} \times \pi \times 40^2 + 20 \times 50$] award 4/5 ×✓✓✓✓</p> <p>(e) 5207 [$\pi \times 40^2 + 180$] award 3/5 ××✓✓✓</p> <p>(f) 6027 [$\pi \times 40^2 + 20 \times 50$] award 3/5 ××✓✓✓</p> <p>(g) 1251 [$\pi \times 80 + 20 \times 50$] award 3/5 ×✓×✓✓</p> <p>(i) 126 [$\frac{1}{2} \times \pi \times 80$] award 3/5 ✓✓××✓</p> <p>(j) 251 [$\pi \times 80$] award 2/5 ×✓××✓</p> <p>(k) 2513 [$\frac{1}{2} \times \pi \times 40^2$] award 2/5 ×✓××✓</p> <p>(l) 5027 [$\pi \times 40^2$] award 1/5 ××××✓</p>

Question			Expected Answer/s	Max Mark	Additional Guidance
15	a		<p>Ans: $\frac{1}{5}$</p> <p>•¹ find probability: $\frac{3}{15}$</p> <p>•² simplify fraction: $\frac{1}{5}$</p>	2	<p>1. Correct answer without working award 2/2</p> <p>2. Award 1/2 for 1:5, 3:15, 1 out of 5, 3 out of 15, 1 in 5, 3 in 15, 1-5, 3-15, 0.2(0), 20%</p> <p>3. Award 1/2 (no working necessary) for $\frac{1}{4} \left[\frac{3}{12} \right]$, $\frac{4}{5} \left[\frac{12}{15} \right]$</p>
	b		<p>Ans: 6</p> <p>•¹ begin valid method: eg $\frac{4}{16}$</p> <p>•² continue until correct answer is found: 6</p>	2	<p>1. The only acceptable valid methods are (a) Write down any fraction of the form $\frac{3+n}{15+n}$ e.g. $\frac{4}{16}$ (b) write down any two fractions equivalent to $\frac{1}{3}$ (c) evidence that $\frac{1}{3}$ of any number >15 is more than 5 e.g. $\frac{1}{3}$ of 16 = 5.3..., 5r1, 5.1</p> <p>2. (a) 6 without working award 1/2 (b) 6 with invalid working award 0/2</p> <p>3. $\frac{6}{18}$ (no working necessary) award 1/2</p>

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR
PAPER 1 & 2
80

[END OF MARKING INSTRUCTIONS]