



2014 Mathematics

Intermediate 2 Units 1, 2 and 3

Paper 1 (Non-Calculator)

Finalised Marking Instructions

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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 $\sin x^\circ = 0.5 = 30^\circ$
 - 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

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 - (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)

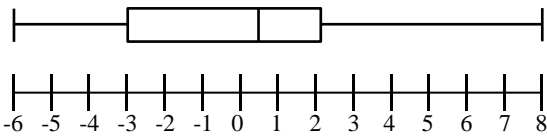
Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
1.	<p>Ans: $y = \frac{3}{4}x + 3$</p> <ul style="list-style-type: none"> •¹ process: find gradient •² process: state y-intercept or c in $y = mx + c$ •³ communicate: state correct equation of straight line 	3	<ul style="list-style-type: none"> •¹ $m = \frac{3}{4}$ (or equivalent) •² $c = 3$ •³ $y = \frac{3}{4}x + 3$
<p>Notes:</p> <ol style="list-style-type: none"> 1. For a correct answer without working award 3/3 2. For $y = \frac{3}{4}x$ award 1/3 3. Where m and/or c are incorrect the working must be followed through to give the possibility of awarding 1/3 or 2/3 4. If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct y-intercept 5. For an incorrect equation (ie both m and c incorrect) without working eg $y = 3x + \frac{3}{4}$ award 0/3 			

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.		<p>Ans: $3x^2 - 5x - 10$</p> <ul style="list-style-type: none"> •¹ process: start to multiply out brackets •² process: complete process of multiplying out brackets •³ process: collect like terms which must include x^2 term 	3	<ul style="list-style-type: none"> •¹ evidence of 2 correct terms (eg $3x^2 - 15x$) •² $3x^2 - 15x + 2x - 10$ •³ $3x^2 - 5x - 10$
<p>Notes:</p> <p>1. The 3rd mark can only be awarded for a calculation involving positive and negative terms, eg for $3x^2 - 15x - 10 + 8x$ leading to $3x^2 - 7x - 10$, award 2/3 ✓×✓ for $3x^2 + 2x - 10 + 8x$ leading to $3x^2 + 10x - 10$, award 1/3 ✓××</p>				
3.		<p>Ans: $\sqrt{60}$ centimetres</p> <ul style="list-style-type: none"> •¹ process: substitute correctly into cosine rule •² process: start to evaluate cosine rule •³ process: calculate PR correctly 	3	<ul style="list-style-type: none"> •¹ $q^2 = 7^2 + 5^2 - 2 \times 7 \times 5 \times \frac{1}{5}$ •² any 2 correct terms from $49 + 25 - 14$ •³ $\sqrt{60}$
<p>Notes:</p> <p>1. For $q^2 = 7^2 + 5^2 - 2 \times 7 \times 5 \times \cos \frac{1}{5}$ leading to an answer of $\sqrt{60}$ award 2/3 ×✓✓ 2. For use of Pythagoras' Theorem leading to $\sqrt{74}$ award 0/3</p>				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)	Ans: (i) 0.5°C (ii) -3°C (iii) 2°C • ¹ communicate: state median • ² communicate: state lower quartile • ³ communicate: state upper quartile	3	• ¹ 0.5 • ² -3 • ³ 2

Notes:

1. An incorrect answer for the median must be followed through with the possibility of awarding 2/3

4	(b)	Ans:  • ¹ communicate: correct endpoints • ² communicate: correct box	2	• ¹ endpoints at -6 and 8 • ² box showing Q_2 , Q_1 and Q_3
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Notes:

1. The boxplot must be drawn to a reasonable scale.

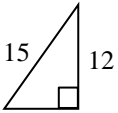
4	(c)	Ans: (In general) the temperatures were higher in 2014 and temperatures in 2014 were less varied. • ¹ communicate: one valid statement • ² communicate: second valid statement	2	• ¹ valid statement • ² valid statement
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Notes:

1. **Do not accept:**

- “The median/mean/average was higher in 2014”
- “There was a smaller range of temperature in 2014”
- “The first boxplot was more spread out”

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.			Ans: $9\sqrt{10}$ • ¹ process: simplify $\sqrt{40}$ • ² process: simplify $\sqrt{90}$ • ³ process: state answer in simplest form	3	• ¹ $2\sqrt{10}$ • ² $3\sqrt{10}$ • ³ $9\sqrt{10}$
Notes: 1. For a correct answer without working award 0/3 2. For subsequent incorrect working, the final mark is not available.					
6.			Ans: $a = 5$ • ¹ strategy: know to substitute $(-3, 45)$ into $y = ax^2$ • ² process: solve equation for a	2	• ¹ $45 = a(-3)^2$ • ² $a = 5$
Notes: 1. For a correct answer without working award 2/2					
7.			Ans: $a = 3, b = 1$ • ¹ communicate: state value of a • ² communicate: state value of b	2	• ¹ $a = 3$ • ² $b = 1$
Notes: 1. For an answer of $y = 3\sin x^\circ$ award 2/2 2. For an answer of $a = 1, b = 3$ award 1/2					

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	(a)	Ans: (2, -5) • ¹ process: state first coordinate of TP • ² process: state second coordinate of TP	2	• ¹ (2, ...) • ² (... , -5)
Notes: 1. For an answer of $x = 2, y = -5$ award 1/2 2. For an answer of 2, -5 award 1/2 3. For an answer of (-5, 2) award 0/2				
8.	(b)	Ans: Minimum turning point • ¹ process: state nature of turning point	1	• ¹ minimum
9.		Ans: 18 centimetres • ¹ strategy: marshall facts and recognise right angle • ² strategy: know how to use Pythagoras • ³ process: correct calculation of PA^2 • ⁴ process: find length of PQ	4	• ¹  • ² $15^2 - 12^2 (= PA^2)$ • ³ 81 • ⁴ 18

TOTAL MARKS FOR PAPER 1 30

[END OF MARKING INSTRUCTIONS]



2014 Mathematics

Intermediate 2 Units 1, 2 and Applications

Paper 1 (Non-calculator)

Finalised Marking Instructions

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Part Two:

Mathematics Intermediate 2: Paper 1, Units 1, 2 and Applications Paper 1 (Non-calculator)

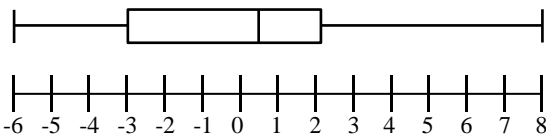
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1.		<p>Ans: $y = \frac{3}{4}x + 3$</p> <ul style="list-style-type: none"> •¹ process: find gradient •² process: state y-intercept or in $y = mx + c$ •³ communicate: state correct equation of straight line 	3	<ul style="list-style-type: none"> •¹ $m = \frac{3}{4}$ (or equivalent) •² $c = 3$ •³ $y = \frac{3}{4}x + 3$
<p>Notes:</p> <ol style="list-style-type: none"> 1. For a correct answer without working award 3/3 2. For $y = \frac{3}{4}x$ award 1/3 3. Where m and/or c are incorrect the working must be followed through to give the possibility of awarding 1/3 or 2/3 4. If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct y-intercept 5. For an incorrect equation (ie both m and c are incorrect), without working eg $y = 3x + \frac{3}{4}$ award 0/3 				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.		Ans: $3x^2 - 5x - 10$ • ¹ process: start to multiply out brackets • ² process: complete process of multiplying out brackets • ³ process: collect like terms which must include x^2 term	3	• ¹ evidence of 2 correct terms (eg $3x^2 - 15x$) • ² $3x^2 - 15x + 2x - 10$ • ³ $3x^2 - 5x - 10$
Notes: 1. The 3rd mark can only be awarded for a calculation involving positive and negative terms, eg for $3x^2 - 15x - 10 + 8x$ leading to $3x^2 - 7x - 10$, award 2/3 ✓x✓ for $3x^2 + 2x - 10 + 8x$ leading to $3x^2 + 10x - 10$, award 1/3 ✓xx				
3.	(a)	Ans: E or F • ¹ process: state odd node	1	• ¹ either E or F
3.	(b)	Ans: 9 • ¹ process: state number of arcs	1	• ¹ 9
4.		Ans: A • ¹ process: state correct answer	1	• ¹ A or =SUM(B3:F3)

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	(a)	Ans: (i) 0.5°C (ii) -3°C (iii) 2°C • ¹ communicate: state median • ² communicate: state lower quartile • ³ communicate: state upper quartile	3	• ¹ 0.5 • ² -3 • ³ 2

Notes:

1. An incorrect answer for the median must be followed through with the possibility of awarding 2/3

5.	(b)	Ans:  • ¹ communicate: correct endpoints • ² communicate: correct box	2	• ¹ endpoints at -6 and 8 • ² box showing Q_2 , Q_1 and Q_3
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Notes:

1. The boxplot must be drawn to a reasonable scale.

5.	(c)	Ans: (In general) the temperatures were higher in 2014 and temperatures in 2014 were less varied. • ¹ communicate: one valid statement • ² communicate: second valid statement	2	• ¹ valid statement • ² valid statement
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Notes:

1. Do not accept:

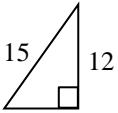
- “The median/mean/average was higher in 2014”
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Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.		Ans: £42.73 • ¹ interpret: minimum payment • ² process: find minimum payment	2	• ¹ 5% of 854.60 • ² 42.73
Notes: 1. For £42.73, with or without working, award 2/2				
7.		Ans: $\sqrt{60}$ centimetres • ¹ process: substitute correctly into cosine rule • ² process: start to evaluate cosine rule • ³ process: calculate PR correctly	3	• ¹ $q^2 = 7^2 + 5^2 - 2 \times 7 \times 5 \times \frac{1}{5}$ • ² any 2 correct terms from $49 + 25 - 14$ • ³ $\sqrt{60}$
Notes: 1. For $q^2 = 7^2 + 5^2 - 2 \times 7 \times 5 \times \cos \frac{1}{5}$ leading to an answer of $\sqrt{60}$ award 2/3 x✓✓ 2. For use of Pythagoras' Theorem leading to $\sqrt{74}$ award 0/3				
8.		Ans: 31.4 • ¹ process: substitute correctly into formula • ² process: carry out calculation correctly	2	• ¹ $A = 3 \cdot 14 \times 5 \times 2$ • ² 31.4

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9.	(a)	<p>Ans: histogram</p> <p>•¹ process: choose suitable scales and label both axes</p> <p>•² process: correctly draw histogram</p>	2	<p>•¹ evidence</p> <p>•² evidence</p>
9	(b)	<p>Ans: £6.40 – £6.60</p> <p>•¹ communicate: state mode</p>	1	<p>•¹ 6.40 – 6.60</p>

Notes:

1. Where a candidate has answered Q9 in the unlined answer book, all marks are available.

Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.	<p>Ans: 18 centimetres</p> <ul style="list-style-type: none"> •¹ strategy: marshal facts and recognise right angle •² strategy: know how to use Pythagoras •³ process: correct calculation of PA^2 •⁴ process: find length of PQ 	4	<ul style="list-style-type: none"> •¹  •² $15^2 - 12^2$ (PA^2) •³ 81 •⁴ 18

**TOTAL MARKS FOR
PAPER 1
30**

[END OF MARKING INSTRUCTIONS]



2014 Mathematics

Intermediate 2 Units 1, 2 & 3 Paper 2

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

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •																		
1.		<p>Ans: 590</p> <ul style="list-style-type: none"> •¹ strategy: know how to decrease by 15% •² strategy: know how to calculate roll •³ process: carry out calculations correctly within a valid strategy and round to the nearest ten 	3	<ul style="list-style-type: none"> •¹ $\times 0.85$ •² 964×0.85^3 •³ 590 																		
<p>Notes:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">1. For an answer of 590 without working</td> <td style="width: 20%;">award 3/3</td> <td style="width: 20%; text-align: right;">✓✓✓</td> </tr> <tr> <td>2. For an answer of 592 or 592.0165 without working</td> <td>award 2/3</td> <td style="text-align: right;">✓✓x</td> </tr> <tr> <td>3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3</td> <td></td> <td style="text-align: right;">x✓✓</td> </tr> <tr> <td>4. For an answer of 2460 ($964 \times 0.85 \times 3$) with working,</td> <td>award 1/3</td> <td style="text-align: right;">✓xx</td> </tr> <tr> <td>5. For an answer of 530 ($964 - 964 \times 0.15 \times 3$) with working,</td> <td>award 1/3</td> <td style="text-align: right;">✓xx</td> </tr> <tr> <td>6. For an answer of 430 ($964 \times 0.15 \times 3$)</td> <td>award 0/3</td> <td style="text-align: right;">xxx</td> </tr> </table>					1. For an answer of 590 without working	award 3/3	✓✓✓	2. For an answer of 592 or 592.0165 without working	award 2/3	✓✓x	3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3		x✓✓	4. For an answer of 2460 ($964 \times 0.85 \times 3$) with working,	award 1/3	✓xx	5. For an answer of 530 ($964 - 964 \times 0.15 \times 3$) with working,	award 1/3	✓xx	6. For an answer of 430 ($964 \times 0.15 \times 3$)	award 0/3	xxx
1. For an answer of 590 without working	award 3/3	✓✓✓																				
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6. For an answer of 430 ($964 \times 0.15 \times 3$)	award 0/3	xxx																				
2.	(a)	<p>Ans: 1180 cm³</p> <ul style="list-style-type: none"> •¹ process: substitute correctly •² process: correct calculation •³ process: round to 3 sig fig 	3	<ul style="list-style-type: none"> •¹ $V = \pi \times 5^2 \times 15$ •² 1178.1 •³ 1180 cm³ 																		
2.	(b)	<p>Ans: 23 cm</p> <ul style="list-style-type: none"> •¹ strategy: know how to find expression for volume of a cone •² process: know to equate volumes •³ process: calculate height 	3	<ul style="list-style-type: none"> •¹ $\frac{1}{3} \times \pi \times 7^2 \times h$ •² $\frac{1}{3} \times \pi \times 7^2 \times h = 1180$ •³ 23 cm 																		

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.		<p>Ans: $3(x + 4)(x - 1)$</p> <ul style="list-style-type: none"> •¹ process: start to factorise •² process: factorise further •³ process: complete factorisation 	3	<ul style="list-style-type: none"> •¹ $3(x^2 + 3x - 4)$ •² evidence (see notes) •³ $3(x + 4)(x - 1)$

Notes:

1. For the following answers award 2/3

$$(3x + 12)(x - 1)$$

$$(x + 4)(3x - 3)$$

$$3(x - 4)(x + 1)$$

$$3(x - 2)(x + 2)$$

2. For the following answers award 1/3

$$3(x^2 + 3x - 4)$$

$$(3x - 12)(x + 1)$$

$$(3x + 1)(x - 12)$$

$$(3x - 1)(x + 12)$$

$$(3x - 6)(x + 2)$$

$$(3x + 6)(x - 2)$$

$$(3x + 2)(x - 6)$$

$$(3x - 2)(x + 6)$$

$$(3x + 4)(x - 3)$$

$$(3x - 4)(x + 3)$$

$$(3x + 3)(x - 4)$$

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)	Ans: $3x + 2y = 4.73$ • ¹ interpret: interpret the text	1	• ¹ $3x + 2y = 4.73$
4.	(b)	Ans: $5x + 3y = 7.52$ • ¹ interpret: interpret the text	1	• ¹ $5x + 3y = 7.52$
4.	(c)	Ans: a loaf costs £0.85, a packet of butter costs £1.09 • ¹ strategy: know to solve system of equations • ² process: follow a valid strategy through to produce a value for x and y • ³ process: correct value for x and y • ⁴ communicate: state result	4	• ¹ evidence of scaling • ² a value for x and y • ³ $x = 0.85, y = 1.09$ • ⁴ a loaf costs £0.85, a packet of butter costs £1.09

Notes:

1. Incorrect equations in parts (a) and/or (b) must be followed through to give the possibility of awarding 4/4.
2. Any valid strategy must involve the use of two equations.
3. The final mark is only available where a valid strategy has been used.

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	(a)	(i)	Ans: $\bar{x} = 56.5$ <ul style="list-style-type: none"> •¹ process: calculate the mean 	1	<ul style="list-style-type: none"> •¹ $\bar{x} = 56.5$
5.	(a)	(ii)	Ans: $s = 2.4$ <ul style="list-style-type: none"> •¹ process: calculate $(x - \bar{x})^2$ •² process: substitute into formula •³ process: calculate standard deviation 	3	<ul style="list-style-type: none"> •¹ 0.25, 0.25, 2.25, 2.25, 12.25, 12.25 •² $\sqrt{\frac{29.5}{5}}$ •³ 2.4 (2...)
Notes: 1. For use of alternative formula in part (a)(ii), award marks as follows <ul style="list-style-type: none"> •¹ process: calculate Σx and Σx^2 <ul style="list-style-type: none"> •¹ 339 and 19183 •² process: substitute into formula <ul style="list-style-type: none"> •² $\sqrt{\frac{19183 - \frac{339^2}{6}}{5}}$ •³ process: calculate standard deviation <ul style="list-style-type: none"> •³ 2.4 (2...) 2. For a correct answer without working award 0/3					
5.	(b)		Ans: No, standard deviation is greater OR No, times are more spread out <ul style="list-style-type: none"> •¹ communicate: no, with valid explanation 	1	<ul style="list-style-type: none"> •¹ No, because the standard deviation is greater
Notes: 1. Accept “No, as $3.2 > 2.4$ ” 2. Do not accept “No, times are less consistent” without further explanation.					

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.		<p>Ans: 0.15 or 3.35</p> <ul style="list-style-type: none"> •¹ strategy: know to use quadratic formula •² process: substitute correctly into quadratic formula •³ process: calculate $b^2 - 4ac$ •⁴ process: state both values of x correct to two decimal places 	4	<ul style="list-style-type: none"> •¹ evidence •² $\frac{7 \pm \sqrt{((-7)^2 - 4 \times 2 \times 1)}}{2 \times 2}$ •³ 41 •⁴ 0.15 or 3.35
<p>Notes:</p> <p>1. Where $b^2 - 4ac$ is calculated incorrectly, fourth mark is only available if $b^2 - 4ac > 0$</p> <p>2. For a correct answer without working award 0/4</p>				
7.		<p>Ans: $r = \sqrt{\frac{3p}{q}}$</p> <ul style="list-style-type: none"> •¹ process: start to re-arrange the formula •² process: continue the process •³ process: make r the subject 	3	<ul style="list-style-type: none"> •¹ $3p = qr^2$ •² $r^2 = \frac{3p}{q}$ •³ $r = \sqrt{\frac{3p}{q}}$
<p>Notes:</p> <p>1. For a correct answer without working award 3/3</p>				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.		<p>Ans: $4p^2$</p> <ul style="list-style-type: none"> •¹ process: simplify powers in denominator •² process: simplify constants •³ process: simplify powers in fraction 	3	<ul style="list-style-type: none"> •¹ $2p^4$ •² $\frac{4p^6}{p^4}$ •³ $4p^2$
9.		<p>Ans: $\frac{7x-20}{x(x-4)}$</p> <ul style="list-style-type: none"> •¹ process: state a valid common denominator •² process: find correct numerator of equivalent fraction •³ process: state answer in simplest form 	3	<ul style="list-style-type: none"> •¹ any valid common denominator •² both numerators correct •³ $\frac{7x-20}{x(x-4)}$
<p>Notes:</p> <p>1. In this question, working subsequent to a correct answer should be ignored.</p> <p>2. For $\frac{2x+5(x-4)}{x(x-4)} = \frac{7x-20}{x^2-4}$ award 3/3 ✓✓✓</p> <p>For $\frac{2x+5(x-4)}{x^2-4} = \frac{7x-20}{x^2-4}$ award 2/3 x✓✓</p>				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.		<p>Ans: because $\frac{25}{20} > 1$</p> <p>•¹ communicate: state answer with reason</p>	1	<p>•¹ because $\frac{25}{20} > 1$</p> <p>or $\frac{25}{20} > 100\%$</p> <p>or $\frac{25}{20} > \frac{20}{20}$</p>
<p>Notes:</p> <p>1. Some common answers: “Because it is a top-heavy fraction” “Because the numerator cannot be higher than the denominator” “Because you can’t pick 25 five pences out of 20 coins”</p> <p style="text-align: center;">For all of the above award 0/1</p>				
11.	(a)	<p>Ans: 84.8°</p> <p>•¹ process: substitute correctly into cosine rule</p> <p>•² process: calculate cosB correctly</p> <p>•³ process: calculate angle ABC correctly</p>	3	<p>•¹ $\cos B = \frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$</p> <p>•² $\cos B = 0.09\dots$</p> <p>•³ 85° or $84.8\dots$</p>
<p>Notes:</p> <p>1. For 1.48 (uses RAD) or 94.3 (uses GRAD), with working award 3/3</p> <p>2. The Second mark can be awarded for $\cos^{-1}\left(\frac{16}{176}\right)$</p>				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11.	(b)	<p>Ans: 155.2°</p> <ul style="list-style-type: none"> •¹ strategy: know how to calculate the angle •² process: correctly calculate the angle within a valid strategy 	2	<ul style="list-style-type: none"> •¹ $(360 - 120 - \text{answer to (a)})$ or equivalent •² 155.2°
12.		<p>Ans: 74.3° (accept 74°)</p> <ul style="list-style-type: none"> •¹ process: substitute correctly •² process: solve equation for $\sin x^\circ$ •³ process: find the value of x 	3	<ul style="list-style-type: none"> •¹ $320 \sin x^\circ + 150 = 458$ •² $\sin x^\circ = 308/320$ •³ 74.3 (accept 74)
<p>Notes:</p> <ol style="list-style-type: none"> 1. Where a candidate has two answers for x (74 and 106) with working award 2/3 2. For a correct answer arrived at by trial and improvement, only the first and third marks are available. 3. For a correct answer, without working award 0/3 				

Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13.	<p>Ans: 151.3 m²</p> <ul style="list-style-type: none"> •¹ strategy: know how to find area of segment •² strategy: know to express sector as a fraction of a circle •³ strategy: know how to find area of a sector •⁴ strategy: know how to calculate area of triangle •⁵ process: carry out all calculations correctly within a valid strategy 	5	<ul style="list-style-type: none"> •¹ evidence eg major sector + triangle or circle – minor sector + triangle •² $\frac{310}{360}$ or $\frac{50}{360}$ •³ $\frac{310}{360} \times \pi \times 7^2 (= 132.56)$ or $\frac{50}{360} \times \pi \times 7^2 (= 21.38)$ •⁴ $\frac{1}{2} \times 7 \times 7 \times \sin 50^\circ (= 18.77)$ •⁵ 151.3 m²

Notes:

1. Accept variations in π ; disregard premature or incorrect rounding of $\frac{310}{360}$.

2. Use of RAD or GRAD (working must be shown):

(a) For 149.9 (uses GRAD) award 5/5

(b) Where the use of RAD leads to an answer of 126.1 ($-6.43 + 132.56$)
or 138.8 ($6.43 + 132.56$) award 4/5

(continued overleaf)

Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
Notes: (continued)			
3. Some common answers (working must be shown):			
56.6	$\left(\frac{310}{360} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	✓✓x✓✓
40.1	$\left(\frac{50}{360} \times \pi \times 7^2 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	x✓✓✓✓
2.6	$\left(\frac{50}{360} \times \pi \times 7^2 - \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	x✓✓✓✓
24.9	$\left(\frac{50}{360} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 3/5	x✓x✓✓
132.6	$\left(\frac{310}{360} \times \pi \times 7^2\right)$	award 2/5	x✓✓xx
21.4	$\left(\frac{50}{360} \times \pi \times 7^2\right)$	award 2/5	x✓✓xx
18.8	$\left(\frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 1/5	xxx✓x
153.9	$(\pi \times 7^2)$	award 0/5	
4. The fifth mark is only available when the area of triangle MON is calculated using trigonometry.			

**TOTAL MARKS FOR
PAPER 2
50**

**TOTAL MARKS FOR
PAPER 1 & 2
80**

[END OF MARKING INSTRUCTIONS]



2014 Mathematics

Intermediate 2 Units 1, 2 and Applications

Paper 2

Finalised Marking Instructions

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Part One: General Marking Principles for: Mathematics Intermediate 2 Units 1, 2 and 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 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 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: Units 1, 2 and Applications Paper 2

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •																		
1.		<p>Ans: 590</p> <ul style="list-style-type: none"> •¹ strategy: know how to decrease by 15% •² strategy: know how to calculate roll •³ process: carry out calculations correctly within a valid strategy and round to the nearest ten 	3	<ul style="list-style-type: none"> •¹ $\times 0.85$ •² 964×0.85^3 •³ 590 																		
<p>Notes:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 60%;">1. For an answer of 590 without working</td> <td style="width: 20%;">award 3/3</td> <td style="width: 20%; text-align: right;">✓✓✓</td> </tr> <tr> <td>2. For an answer of 592 or 59.20165 without working</td> <td>award 2/3</td> <td style="text-align: right;">✓✓x</td> </tr> <tr> <td>3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3</td> <td></td> <td style="text-align: right;">x✓✓</td> </tr> <tr> <td>4. For an answer of 2460 ($964 \times 0.85 \times 3$) with working,</td> <td>award 1/3</td> <td style="text-align: right;">✓xx</td> </tr> <tr> <td>5. For an answer of 530 ($964 - 964 \times 0.15 \times 3$) with working,</td> <td>award 1/3</td> <td style="text-align: right;">✓xx</td> </tr> <tr> <td>6. For an answer of 430 ($964 \times 0.15 \times 3$)</td> <td>award 0/3</td> <td style="text-align: right;">xxx</td> </tr> </table>					1. For an answer of 590 without working	award 3/3	✓✓✓	2. For an answer of 592 or 59.20165 without working	award 2/3	✓✓x	3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3		x✓✓	4. For an answer of 2460 ($964 \times 0.85 \times 3$) with working,	award 1/3	✓xx	5. For an answer of 530 ($964 - 964 \times 0.15 \times 3$) with working,	award 1/3	✓xx	6. For an answer of 430 ($964 \times 0.15 \times 3$)	award 0/3	xxx
1. For an answer of 590 without working	award 3/3	✓✓✓																				
2. For an answer of 592 or 59.20165 without working	award 2/3	✓✓x																				
3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3		x✓✓																				
4. For an answer of 2460 ($964 \times 0.85 \times 3$) with working,	award 1/3	✓xx																				
5. For an answer of 530 ($964 - 964 \times 0.15 \times 3$) with working,	award 1/3	✓xx																				
6. For an answer of 430 ($964 \times 0.15 \times 3$)	award 0/3	xxx																				
2.	(a)	<p>Ans: 1180 cm³</p> <ul style="list-style-type: none"> •¹ process: substitute correctly •² process: correct calculation •³ process: round to 3 sig fig 	3	<ul style="list-style-type: none"> •¹ $V = \pi \times 5^2 \times 15$ •² 1178.1 •³ 1180 cm³ 																		
2.	(b)	<p>Ans: 23 cm</p> <ul style="list-style-type: none"> •¹ strategy: know how to find expression for volume of a cone •² process: know to equate volumes •³ process: calculate height 	3	<ul style="list-style-type: none"> •¹ $\frac{1}{3} \times \pi \times 7^2 \times h$ •² $\frac{1}{3} \times \pi \times 7^2 \times h = 1180$ •³ 23 cm 																		

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.		<p>Ans: $3(x + 4)(x - 1)$</p> <ul style="list-style-type: none"> •¹ process: start to factorise •² process: factorise further •³ process: complete factorisation 	3	<ul style="list-style-type: none"> •¹ $3(x^2 + 3x - 4)$ •² evidence (see notes) •³ $3(x + 4)(x - 1)$

Notes:

1. For the following answers

award 2/3

$(3x + 12)(x - 1)$
 $(x + 4)(3x - 3)$
 $3(x - 4)(x + 1)$
 $3(x - 2)(x + 2)$

2. For the following answers

award 1/3

$3(x^2 + 3x - 4)$
 $(3x - 12)(x + 1)$ $(3x - 6)(x + 2)$ $(3x + 4)(x - 3)$
 $(3x + 1)(x - 12)$ $(3x + 6)(x - 2)$ $(3x - 4)(x + 3)$
 $(3x - 1)(x + 12)$ $(3x + 2)(x - 6)$ $(3x + 3)(x - 4)$
 $(3x - 2)(x + 6)$

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)	Ans: $3x + 2y = 4.73$ • ¹ interpret: interpret the text	1	• ¹ $3x + 2y = 4.73$
4.	(b)	Ans: $5x + 3y = 7.52$ • ¹ interpret: interpret the text	1	• ¹ $5x + 3y = 7.52$
4.	(c)	Ans: a loaf costs £0.85, a packet of butter costs £1.09 • ¹ strategy: know to solve system of equations • ² process: follow a valid strategy through to produce a value for x and y • ³ process: correct value for x and y • ⁴ communicate: state result	4	• ¹ evidence of scaling • ² a value for x and y • ³ $x = 0.85, y = 1.09$ • ⁴ a loaf costs £0.85, a packet of butter costs £1.09

Notes:

1. Incorrect equations in parts (a) and/or (b) must be followed through to give the possibility of awarding 4/4.
2. Any valid strategy must involve the use of two equations.
3. The final mark is only available where a valid strategy has been used.

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	(a)	(i)	Ans: $\bar{x} = 56.5$ <ul style="list-style-type: none"> •¹ process: calculate the mean 	1	<ul style="list-style-type: none"> •¹ $\bar{x} = 56.5$
5.	(a)	(ii)	Ans: $s = 2.4$ <ul style="list-style-type: none"> •¹ process: calculate $(x - \bar{x})^2$ •² process: substitute into formula •³ process: calculate standard deviation 	3	<ul style="list-style-type: none"> •¹ 0.25, 0.25, 2.25, 2.25, 12.25, 12.25 •² $\sqrt{\frac{29.5}{5}}$ •³ 2.4 (2...)
Notes: 1. For use of alternative formula in part (a)(ii), award marks as follows <ul style="list-style-type: none"> •¹ process: calculate Σx and Σx^2 <ul style="list-style-type: none"> •¹ 339 and 19183 •² process: substitute into formula <ul style="list-style-type: none"> •² $\sqrt{\frac{19183 - \frac{339^2}{6}}{5}}$ •³ process: calculate standard deviation <ul style="list-style-type: none"> •³ 2.4 (2...) 2. For a correct answer without working <p style="text-align: right;">award 0/3</p>					
5.	(b)		Ans: No, standard deviation is greater OR No, times are more spread out <ul style="list-style-type: none"> •¹ communicate: no, with explanation 	1	<ul style="list-style-type: none"> •¹ No, because the standard deviation is greater
Notes: 1. Accept “No, as $3.2 > 2.4$ ” 2. Do not accept “No, times are less consistent” without further explanation.					

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.		<p>Ans: because $\frac{25}{20} > 1$</p> <p>•¹ communicate: state answer with reason</p>	1	<p>•¹ because $\frac{25}{10} > 1$</p> <p>or $\frac{25}{20} > 100\%$</p> <p>or $\frac{25}{20} > \frac{20}{20}$</p>

Notes:

1. Some common answers:

“Because it is a top-heavy fraction”

“Because the numerator cannot be higher than the denominator”

“Because you can’t pick 25 five pences out of 20 coins”

For all of the above

award 0/1

7.		<p>Ans: £2323.75</p> <p>•¹ interpret: identify rate</p> <p>•² process: calculate interest correctly</p> <p>•³ interpret: evidence of correct path</p> <p>•⁴ process: calculate interest correctly</p>	4	<p>•¹ 3.25%</p> <p>•² £2112.5(0)</p> <p>•³ $\times 1.1$</p> <p>•⁴ £2323.75</p>
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Notes:

1. Some common answers, with or without working

2323.75	(NNY)	award 4/4
2145	(NYY)	award 3/4
1966.25	(YY)	award 3/4
2112.5(0)	(NNN)	award 2/4
1950	(NYN)	award 1/4
1787.5(0)	(YN)	award 1/4

2. Working subsequent to a correct answer loses the final mark

3. For an answer of 3.575 (3.25×1.1) award 2/4

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	(a)	<p>Ans: 84.8°</p> <ul style="list-style-type: none"> •¹ process: substitute correctly into cosine rule •² process: calculate cosB correctly •³ process: calculate angle ABC correctly 	3	<ul style="list-style-type: none"> •¹ $\cos B = \frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$ •² $\cos B = 0.09\dots$ •³ 85° or 84.8...
<p>Notes:</p> <p>1. For 1.48 (uses RAD) or 94.3 (uses GRAD), with working award 3/3</p> <p>2. The second mark can be awarded for $\cos^{-1}\left(\frac{16}{176}\right)$</p>				
8.	(b)	<p>Ans: 155.2°</p> <ul style="list-style-type: none"> •¹ strategy: know how to calculate the angle •² process: correctly calculate the angle within a valid strategy 	2	<ul style="list-style-type: none"> •¹ (360 – 120 – answer to (a)) or equivalent •² 155.2°
9.		<p>Ans: CENTRAL BANK</p> <ul style="list-style-type: none"> •¹ strategy: know to add cost to amount borrowed •² strategy: know to divide by 60 •³ process: calculate monthly payment correctly and state corresponding interest rate 	3	<ul style="list-style-type: none"> •¹ 5000 + 1702.60 •² (5000 + 1702.60) ÷ 60 •³ CENTRAL BANK (from 111.71)
<p>Notes:</p> <p>1. For the correct answer, without working award 0/3</p> <p>2. For $111.71 \times 60 = 6702.6$, leading to an answer of “Central Bank” award 3/3</p> <p>3. Evidence for the 2nd and 3rd marks must include $6702.6 \div 60$ or 111.71×60.</p>				

Question		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.		<p>Ans: £9350</p> <ul style="list-style-type: none"> •¹ strategy: know how to calculate Gross pay •² strategy: know how to calculate commission •³ strategy: know how to calculate sales •⁴ process: carry out all calculations correctly 	4	<ul style="list-style-type: none"> •¹ $352.02 + 27.86 + 65.59 + 27.53$ (472.00) •² Gross Pay – 191.50 (280.50) •³ Commission \div 0.03 •⁴ 9350

Notes:

11.		<p>Ans: £33.05</p> <ul style="list-style-type: none"> •¹ process: know to calculate mid-values •² process: know to calculate mid-value $\times f$ •³ process: know to calculate $\sum f$ and $\sum fx$ •⁴ process: know how to calculate mean •⁵ process: calculate mean 	5	<ul style="list-style-type: none"> •¹ 4.5, 14.5, 24.5, 34.5, 44.5, 54.5, 64.5, 74.5 •² 90, 580, 882, 1518, 578.5, 1199, 645, 1117.5 •³ 200 and 6610 •⁴ $\frac{\sum fx}{\sum f}$ •⁵ 33.05
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Notes:

1. An arithmetic error must be followed through with the possibility of awarding 4/5.

Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
12.	<p>Ans: 151.3 m²</p> <ul style="list-style-type: none"> •¹ strategy: know how to find area of segment •² strategy: know to express sector as a fraction of a circle •³ strategy: know how to find area of a sector •⁴ strategy: know how to calculate area of triangle •⁵ process: carry out all calculations correctly within a valid strategy 	5	<ul style="list-style-type: none"> •¹ evidence eg major sector + triangle or circle – minor sector + triangle •² $\frac{310}{360}$ or $\frac{50}{360}$ •³ $\frac{310}{360} \times \pi \times 7^2 (= 132.56)$ or $\frac{50}{360} \times \pi \times 7^2 (= 21.38)$ •⁴ $\frac{1}{2} \times 7 \times 7 \times \sin 50^\circ (= 18.77)$ •⁵ 151.3 m²

Notes:

1. Accept variations in π ; disregard premature or incorrect rounding of $\frac{310}{360}$.

2. Use of RAD or GRAD (working must be shown):

(a) For 149.9 (uses GRAD)

award 5/5

(b) Where the use of RAD leads to an answer of 126.1 ($-6.43 + 132.56$)

or 138.8 ($6.43 + 132.56$)

award 4/5

(continued overleaf)

Question	Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
Notes: (continued)			
3. Some common answers (working must be shown):			
56.6	$\left(\frac{310}{360} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	✓✓x✓✓
40.1	$\left(\frac{50}{360} \times \pi \times 7^2 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	x✓✓✓✓
2.6	$\left(\frac{50}{360} \times \pi \times 7^2 - \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 4/5	x✓✓✓✓
24.9	$\left(\frac{50}{360} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 3/5	x✓x✓✓
132.6	$\left(\frac{310}{360} \times \pi \times 7^2\right)$	award 2/5	x✓✓xx
21.4	$\left(\frac{50}{360} \times \pi \times 7^2\right)$	award 2/5	x✓✓xx
18.8	$\left(\frac{1}{2} \times 7 \times 7 \times \sin 50^\circ\right)$	award 1/5	xxx✓x
153.9	$(\pi \times 7^2)$	award 0/5	
4. The fifth mark is only available when the area of triangle MON is calculated using trigonometry.			

**TOTAL MARKS FOR
PAPER 2
50**

**TOTAL MARKS FOR
PAPER 1 & 2
80**

[END OF MARKING INSTRUCTIONS]