

2014 Mathematics

Intermediate 2 Units 1, 2 & 3 Paper 2

Finalised Marking Instructions

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Part One: General Marking Principles for: Mathematics Intermediate 2 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 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, \checkmark .
 - (b) Where working subsequent to an error is followed through and can be awarded marks, it should be marked with a crossed tick, \aleph .
 - (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.

Marking Scheme Question Max Illustrations of evidence for Mark Give 1 mark for each • awarding a mark at each • 1. Ans: 590 3 \bullet^1 strategy: know how to $\bullet^1 \times 0.85$ decrease by 15% \bullet^2 strategy: know how to •² 964 \times 0 \cdot 85³ calculate roll •³ process: carry out calculations \bullet^3 590 correctly within a valid strategy and round to the nearest ten Notes: $\checkmark \checkmark \checkmark$ 1. For an answer of 590 without working award 3/3 √√x 2. For an answer of 592 or 592.0165 without working award 2/3 3. Where an incorrect percentage has been used, the working must be followed through to give the x√√ possibility of awarding 2/3 4. For an answer of 2460 $(964 \times 0.85 \times 3)$ with working, √xx award 1/3 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 0/3xxx Ans: 1180 cm³ 2. 3 **(a)** •¹ process: substitute correctly •¹ $V = \pi \times 5^2 \times 15$ \bullet^2 process: correct calculation \bullet^2 1178.1 \bullet^3 1180 cm³ \bullet^3 process: round to 3 sig fig 2. **(b)** Ans: 23 cm 3 \bullet^1 strategy: know how to find •¹ $\frac{1}{3} \times \pi \times 7^2 \times h$ expression for volume of a cone •² $\frac{1}{3} \times \pi \times 7^2 \times h = 1180$ \bullet^2 process: know to equate volumes •³ 23 cm •³ process: calculate height

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

Question		Marking Scheme	M	ax	Illustrations of evidence for
		Give 1 mark for each •	Ma	ark	awarding a mark at each •
3.		Ans: $3(x + 4)(x - 1)$	3	3	
		• ¹ process: start to factorise			• $3(x^2 + 3x - 4)$
		• ² process: factorise further			• ² evidence (see notes)
		• ³ process: complete factorisation			• ³ $3(x+4)(x-1)$
Note	es:	1			
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.	2. For the following answers				award 1/3
	$3(x^{2} + 3x - 4)$ $(3x - 12)(x + 1)$ $(3x + 1)(x - 12)$ $(3x + 2)(x - 4)$ $(3x + 6)(x - 2)$ $(3x + 2)(x - 6)$ $(3x - 2)(x + 6)$			(3 (3 (3	(3x + 4)(x - 3) (3x - 4)(x + 3) (3x + 3)(x - 4)

Question		Marking Scheme	Max Mark	Illustrations of evidence for
4.	(a)	Ans: $3x + 2y = 4.73$ • ¹ interpret: interpret the text	1	• $3x + 2y = 4.73$
4.	(b)	Ans: $5x + 3y = 7 \cdot 52$ • ¹ interpret: interpret the text	1	$\bullet^1 5x + 3y = 7 \cdot 52$
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 <i>x</i> and <i>y</i> •³ process: correct value for <i>x</i> and <i>y</i> •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
Not	es:		<u> </u>	

1. Incorrect equations in parts (a) and/or (b) must be followed through to give the possibility of awarding 4/4.

Any valid strategy must involve the use of two equations.
 The final mark is only available where a valid strategy has been used.

Question			Marking Scheme	Max Mark	Illustrations of evidence for	
		[Give 1 mark for each •	IVIAL K	awarung a mark at each •	
5.	(a)	(i)	Ans: $\overline{x} = 56.5$	1	1 - 56.5	
			• process. calculate the mean		• $x = 56 \cdot 5$	
5.	(a)	(ii)	Ans: $s = 2 \cdot 4$	3		
			• ¹ process: calculate $(x - \overline{x})^2$		• ¹ 0·25, 0·25, 2·25, 2·25, 12·25, 12·25, 12·25	
			• ² process: substitute into formula		$\bullet^2 \sqrt{\frac{29\cdot 5}{5}}$	
			• ³ process: calculate standard deviation		• ³ 2·4 (2)	
Note	es:					
1. F	or use	of a	lternative formula in part (a)(ii), award	marks as	follows	
•	^l proc	ess:	calculate Σx and Σx^2	inuino us	• ¹ 339 and 19183	
• ²	² proc	ess:	substitute into formula		• ² $\sqrt{\frac{19183 - \frac{339^2}{6}}{5}}$	
•	³ proc	ess:	calculate standard deviation		• ³ 2·4 (2)	
2. F	or a c	orrec	ct answer without working		award 0/3	
5.	(b)		Ans: No, standard deviation is	1		
			OR No, times are more			
			spread out			
			• ¹ communicate: no, with valid explanation		• ¹ No, because the standard deviation is greater	
Note	es:					
1. A	ccept	"No	, as $3 \cdot 2 > 2 \cdot 4$ "			
2. D	2. Do not accept "No, times are less consistent" without further explanation.					

Question	Marking Scheme	Max	Illustrations of evidence for			
	Give 1 mark for each •	Mark	awarding a mark at each •			
6.	 Ans: 0.15 or 3.35 •¹ strategy: know to use quadratic formula •² process: substitute correctly into quadratic formula •³ process: calculate b² - 4ac •⁴ process: state both values of <i>x</i> correct to two decimal places 	4	• ¹ evidence • ² $\frac{7 \pm \sqrt{((-7)^2 - 4 \times 2 \times 1)}}{2 \sqrt{\times 2}}$ • ³ 41 • ⁴ 0.15 or 3.35			
Notes: 1. Where b^2 – 2. For a correc	Notes: 1. Where $b^2 - 4ac$ is calculated incorrectly, fourth mark is only available if $b^2 - 4ac > 0$ 2. For a correct answer without working award $0/4$					
7.	Ans: $r = \sqrt{\frac{3p}{q}}$ • ¹ process: start to re-arrange the formula • ² process: continue the process • ³ process: make <i>r</i> the subject	3	• ¹ $3p = qr^2$ • ² $r^2 = \frac{3p}{q}$ • ³ $r = \sqrt{\frac{3p}{q}}$			
Notes: 1. For a corre	Notes: 1. For a correct answer without working award 3/3					

Question		Marking Schomo	Mov	Illustrations of avidance for awarding a
Questi)11	Cive 1 more for each	Mark	mustrations of evidence for awarding a
		Give 1 mark for each •		mark at each •
8.		Ans: $4p^2$	3	
		• ¹ process: simplify powers in denominator		$\bullet^1 2p^4$
		• ² process: simplify constants		$\bullet^2 \frac{4p^6}{p^4}$
		• ³ process: simplify powers in fraction		$\bullet^3 4p^2$
9.		Ans: $\frac{7x-20}{x(x-4)}$	3	
		• ¹ process: state a valid common denominator		\bullet^1 any valid common denominator
		• ² process: find correct numerator of equivalent fraction		\bullet^2 both numerators correct
		• ³ process: state answer in simplest form		$\bullet^3 \frac{7x-20}{x(x-4)}$
Notes:		1		1
10000				
1. In th	is ques	tion, working subsequent to a corr	ect answe	er should be ignored.
2. For $\frac{2x+5(x-4)}{x(x-4)} = \frac{7x-20}{x^2-4}$ award 3/3 $\checkmark \checkmark \checkmark$				award $3/3 \checkmark \checkmark \checkmark \checkmark$

For
$$\frac{2x+5(x-4)}{x^2-4} = \frac{7x-20}{x^2-4}$$
 award 2/3 $\times \checkmark \checkmark$

Que	stion		Marking Scheme	Max	Illustrations of evidence for awarding a	
		1	Give 1 mark for each •	Mark	mark at each •	
10.			Ans: because $\frac{25}{20} > 1$	1		
			• ¹ communicate: state answer with reason		• because $\frac{25}{20} > 1$	
					or $\frac{1}{20} > 100\%$	
					or $\frac{25}{20} > \frac{20}{20}$	
Not	es:	1				
1.So "B "B "B	ecause ecause ecause	omm e it is e the e you	on answers: s a top-heavy fraction" numerator cannot be higher than to can't pick 25 five pences out of 2 For all of the abov	the denom 20 coins" 7 e	ninator" award 0/1	
11.	(a)		Ans: 84.8°	3		
			• ¹ process: substitute correctly into cosine rule		• ¹ cosB = $\frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$	
			• ² process: calculate cosB correctly		• ² $\cos B = 0.09$	
			• ³ process: calculate angle ABC correctly		• ³ 85° or 84·8	
Not	es:	1			1	
1. F	for 1.4	8 (us	ses RAD) or 94·3 (uses GRAD). w	ith worki	ng award 3/3	
2. T	1. For 1.48 (uses RAD) or 94.3 (uses GRAD), with workingaward 3/32. The Second mark can be awarded for $\cos^{-1}\left(\frac{16}{176}\right)$					

Que	stion		Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •	
11.	(b)		 Ans: 155·2° •¹ strategy: know how to calculate the angle •² process: correctly calculate the angle within a valid strategy 	2	 ¹ (360 – 120 – answer to (a)) or equivalent ² 155·2° 	
12.			 Ans: 74·3° (accept 74°) •¹ process: substitute correctly •² process: solve equation for sin x° •³ process: find the value of x 	3	• ¹ 320 sin x° + 150 = 458 • ² sin x° = 308/320 • ³ 74·3 (accept 74)	
Note 1. V 2. F av 3. F	 Notes: 1. Where a candidate has two answers for <i>x</i> (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 					

f evidence for awarding a					
(=132.56) $(=21.38)$ $(=18.77)$					
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) (b) Where the use of RAD leads to an answer of $126 \cdot 1 (-6 \cdot 43 + 132 \cdot 56)$ or $138 \cdot 8 (6 \cdot 43 + 132 \cdot 56)$ award 4/5					
10 50					

Question		Marking Scheme	Max	Illustrations of evidence for awarding a				
		Give 1 mark for each •	Mark	mark at each •	_			
Notes: (c	Notes: (continued)							
3. Some common answers (working must be shown):								
56.6	$\left(\frac{31}{36}\right)$	$\frac{0}{0} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^{\circ} \right)$		award 4/5	√√x√√			
40.1	$\left(\frac{50}{36}\right)$	$\frac{0}{0} \times \pi \times 7^2 + \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ$		award 4/5	x√√√√			
2.6	$\left(\frac{50}{36}\right)$	$\frac{0}{0} \times \pi \times 7^2 - \frac{1}{2} \times 7 \times 7 \times \sin 50^\circ$		award 4/5	×√√√√			
24.9	$\left(\frac{50}{36}\right)$	$\frac{0}{0} \times \pi \times 14 + \frac{1}{2} \times 7 \times 7 \times \sin 50^{\circ}$		award 3/5	x√x√√			
132.6	$\left(\frac{31}{36}\right)$	$\frac{0}{0} \times \pi \times 7^2$		award 2/5	x√√xx			
21.4	$\left(\frac{50}{36}\right)$	$\left(\frac{0}{0} \times \pi \times 7^2\right)$		award 2/5	x√√xx			
18.8	$\left(\frac{1}{2}\right)$	$(7 \times 7 \times \sin 50^\circ)$		award 1/5	xxx√x			
153.9	$(\pi \times$	(7^2)		award 0/5				
4. The fit	fth ma	ark is only available when the area	of triang	le MON is calculated using tri	gonometry.			



[END OF MARKING INSTRUCTIONS]