2013 Mathematics

Intermediate 1 Units 1,2 & Applications Paper 2

Finalised Marking Instructions

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 <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 your Team Leader. You can ask for support within Scoris Assessor by using the messaging system or by raising an exception.
     Instructions on how to use the message system and raise an exception are on SQA Academy: e-marking 2013 training course.

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 $\sin x° = 0.5 = 30°$
     • 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 Units 1, 2 & Applications

Paper 2

Question			Expected Answer/s	Max Mark	Additional Guidance

1			**Ans: £114**
			
			•¹ find price per gram:
			     $95 \div 20 = 4 \cdot 75$
			
			•² find price for 24 grams:
			     $4 \cdot 75 \times 24 = 114$
				2	1. Correct answer without working award 2/2
					
					2. Alternative strategies
					
					    (a) •¹ $95 \div 20 = 4 \cdot 75$
					          •² $95 + 4 \times 4 \cdot 75 = 114$
					
					    (b) •¹ $24 \div 20 = 1 \cdot 2$
					          •² $1 \cdot 2 \times 95 = 114$
					
					    (c) •¹ $95 \div 5 = 19$ [price for 4g]
					          •² $19 \times 6 = 114$
					
					    (d) •¹ $24 \div (20 \div 95)$
					          •² 114
					       [$20 \div 95$ is not enough for the 1ˢᵗ mark]
					
					3. A common answer (no working necessary)
					    $99 \cdot 75$ [$95 + 4 \cdot 75$] award 1/2 ✓✗

2	**a**		**Ans: 2250** •¹ evaluate formula: 2250	**1**	

2	**b**		**Ans: =AVERAGE(E2..E8)**
			
			•¹ state formula:
			    AVERAGE(E2..E8) or equivalent
				1	1. Accept any punctuation mark or space between E2 and E8
					
					2. Accept abbreviations for AVERAGE eg AV(E2..E8)
					
					3. Accept
					    (E2+E3 +E4+E5+E6+E7+E8)/7 or
					    SUM(E2..E8)/7 [must be / **not** ÷]

Question			Expected Answer/s	Max Mark	Additional Guidance
3	**a**		**Ans: 2006** •¹ interpret bar graph: 2006	**1**	
3	**b**		**Ans: 7** •¹ interpret bar graph: 7	**1**	
4	**a**		**Ans: £268·92** •¹ find monthly payment: 268·92	**1**	
4	**b**		**Ans: £300** •¹ start correct method: $268\cdot92 - 262\cdot67$ or $262\cdot67 \times 48$ •² find extra payment: $(268\cdot92 - 262\cdot67) \times 48 = 300$	**2**	1. Correct answer without working award 2/2 2. Some common answers(no working necessary) award 1/2 ✓✗ (a) $268\cdot92 - 262\cdot67 = 6\cdot25$ (b) $262\cdot67 \times 48 = 12608\cdot16$ 3. A common answer (working must be shown) 25 [$(268\cdot92 - 262\cdot67) \times 4$] award 1/2 ✓✗ 4. If part (a) is incorrect allow follow through in part (b) e.g. if (a) = 224·79, then award 2/2 for any of the following answers to (b) (i) correct answer (ii) $(224\cdot79 - 219\cdot17) \times 180 = 1011\cdot6(0)$ (iii) $(224\cdot79 - 219\cdot17) \times 48 = 269\cdot76$

Question			Expected Answer/s	Max Mark	Additional Guidance
5			**Ans: 12·5 m/s**	**3**	
			$\bullet^1$ know how to find speed: $S = {}^D/_T$		1. Correct answer without working award 3/3
			$\bullet^2$ Use D = 3000 **or** T = 240 in speed calculation: ${}^{3000}/_T$ **or** ${}^D/_{240}$		2. **Some** common answers (no working necessary, rounding or truncation is acceptable)
			$\bullet^3$ correctly calculate speed in m/s: $3000 \div 240 = 12\cdot5$		(a) 750 [3000 ÷ 4] award 2/3 ✓✓✗
					(b) 2·1, 2·08… [500 ÷ 240] award 2/3 ✓✓✗
					(c) 125 [500 ÷ 4] award 1/3 ✓✗✗
					(d) 1·5 [6 ÷ 4] award 1/3 ✓✗✗
					(e) 20·83… [(500 ÷ 6) ÷ 4] award 1/3 ✓✗✗
					(f) 720000 [3000 × 240] award 2/3 ✗✓✓
					(g) 12000 [3000 × 4] award 1/3 ✗✓✗
					(h) 2000 [500 × 4] award 0/3

Question			Expected Answer/s	Max Mark	Additional Guidance
6			**Ans:** $\quad$ **min = 32, Q_2 = 50, Q_3 = 59**	**4**	
			$\bullet^1 \quad$ arrange numbers in order: 32 41 44 44 47 48 50 53 55 56 62 70 77		1. The only acceptable answer for the minimum is 32, even where candidate does not order list.
			$\bullet^2 \quad$ show minimum in correct place: 32		2. Where there is no working but answers appear in the boxplot and (a) Q_2 = 50 or Q_3 = 59 [evidence of ordered list] maximum available mark is 4/4 (b) Q_2 = 48 or Q_3 = 51 [evidence of unordered list] 1st mark is not available e.g. (i) $\quad$ min = 32, Q_2 = 48, Q_3 = 51 $\quad\quad\quad$ award 3/4 (ii) $\quad$ min = 44, Q_2 = 48, Q_3 = 51 $\quad\quad\quad$ award 2/4
			$\bullet^3 \quad$ show median in correct place: 50		
			$\bullet^4 \quad$ show upper quartile in correct place: 59		
					3. If minimum, Q_2 and Q_3 are not shown on boxplot a maximum of 3/4 is available
					4. Where there are missing or extra numbers in an ordered list follow through working with the possibility of awarding (a) a maximum of 3 marks (2nd, 3rd & 4th) is available where there is one missing or extra number (b) a maximum of 2 marks (2nd & 3rd) is available where there are two missing or extra numbers
					5. If Q_2 is incorrect, working should be followed through with the possibility of awarding the 4th mark.

Question	Expected Answer/s	Max Mark	Additional Guidance

7	**Ans: £126**
	
	•^{1} know to multiply $l \times b \times h$: evidence of $l \times b \times h$ involving 7, 3 and 10
	
	•^{2} find volume in m^3:
	$7 \times 3 \times 0 \cdot 1 = 2 \cdot 1$
	
	•^{3} find total cost:
	$2 \cdot 1 \times 60 = 126$
		3	1. Correct answer without working award 2/3
			
			2. **BEWARE**: mixed units in volume calculation and incorrect volume conversion factor
			$7 \times 3 \times 10 = (210 \div 100) = 2 \cdot 1$
			$2 \cdot 1 \times 60 = 126$ award 2/3 ✓✗✓
			
			3. Some common answers
			[working must be shown]
			(a) 12 600 [$(7 \times 3 \times 10) \times 60$]
			                  award 2/3 ✓✗✓
			(b) 1 260 000 [$(70 \times 30 \times 10) \times 60$]
			                  award 2/3 ✓✗✓
			(c) 126 000 000 [$(700 \times 300 \times 10) \times 60$]
			                  award 2/3 ✓✗✓
			(c) 1260 [$(7 \times 3) \times 60$, area of patio]
			                  award 1/3 ✗✗✓
			
			4. **Special cases**: $V = l + b + h$
			[working must be shown]
			(a) 606 [$10 \cdot 1 \times 60$] = 606
			                  award 2/3 ✗✓✓
			(b) 1200 [20×60] = 1200
			                  award 1/3 ✗✗✓

Question			Expected Answer/s	Max Mark	Additional Guidance

8	**a**		**Ans: 41**
			
			•¹ order numbers:
			      19 21 22 39 43 45 46 53
			
			•² find median: 41
				2	1. Correct answer without working
					                                award 2/2
					
					2. 49 [numbers not ordered]
					                                  award 1/2
					
					3. If 'correct' median is found from ordered list with one missing or one extra number award 1/2

8	**b**		**Ans: 34** •¹ find range: $53 - 19 = 34$	**1**	1. 34 is the **only** acceptable answer, even with an unordered list.

8	**c**		**Ans: On average Steven scored less than John. Steven's scores varied less than John's.**
			
			•¹ interpret statistics:
			    Steven scored less or equivalent
			
			•² interpret statistics:
			    Steven's scores varied less or equivalent
				2	1. Answer must be consistent with answers to parts (a) and (b)
					
					2. Do not accept
					    eg Steven has a lower median
					        Steven has a lower range
					
					3. A common answer:
					    John scored more than Steven as his median and range were higher.
					                   award 1/2 ✓✗

Question			Expected Answer/s	Max Mark	Additional Guidance
9			**Ans: £65·52**	**3**	
			Method 1		
			•^{1} find price per person excluding service charge: 9·75		1. Correct answer without working award 3/3
			•^{2} know how to find service charge per person: $12/100 \times 9\cdot75 \ (= 1\cdot17)$		
			•^{3} find total cost: $6 \times (9\cdot75 + 1\cdot17) = 65\cdot52$		
			Method 2		
			•^{1} find price per person excluding service charge: 9·75		
			•^{2} know how to find total cost excluding service charge: $6 \times 9\cdot75 \ (= 58\cdot5(0))$		
			•^{3} find total cost: $58\cdot5 + 12\%$ of $58\cdot5 = 65\cdot52$		

Question			Expected Answer/s	Max Mark	Additional Guidance
10	**a**		**Ans: 26 (±0·4) km** $\bullet^1$ find distance: $13(\pm 0 \cdot 2) \times 2 = 26(\pm 0 \cdot 4)$	**1**	

10	**b**		**Ans: see diagram**
			
			 $\bullet^1$ one bearing shown correctly $(\pm 2^o)$:
			
			 $\bullet^2$ second bearing shown correctly $(\pm 2^o)$:
			
			 $\bullet^3$ find point of intersection of two bearings:
				3	1. Diagram below shows the acceptable limits for the position of Ruthven Law
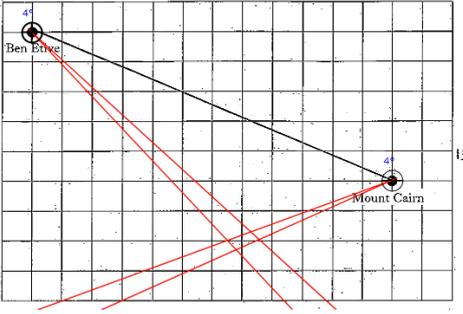					
					 2. If the bearings are not drawn on the diagram:
					    (i) point of intersection in correct position award 3/3
					    (ii) point on correct bearing from either Ben Etive or Mount Cairn award 1/3
					
					 3. Where two incorrect lines are drawn the 3rd mark is only available if one line originates at Ben Etive and the other originates at Mount Cairn.

Question			Expected Answer/s	Max Mark	Additional Guidance
11			**Ans: £76** $\bullet^1\bullet^2$ know how to calculate interest: $\frac{2\cdot4}{100} \times 4750 \times \frac{8}{12}$ (award 1 for $\frac{2\cdot4}{100} \times 4750$ or $\frac{8}{12} \times \frac{2\cdot4}{100}$ or $\frac{8}{12} \times 4750$) $\bullet^3$ carry out percentage and fraction calculations correctly: 76	**3**	1. Correct answer without working award 3/3 2. If answer is 4826 [4750 + 76] (no working necessary) (a) award 3/3 if candidate **states** that interest is 76 (b) award 2/3 if candidate does **not state** that interest is 76 3. Acceptable answers for partial credit (no working necessary) (a) 114 [2·4% of 4750] award 1/3 (b) 1·6 [$\frac{8}{12} \times 2\cdot4$] award 1/3 (c) 3166·67 or 3166·66 [$\frac{8}{12} \times 4750$] award 1/3 (d) 912 [114 × 8] award 1/3 4. The following common wrong answers illustrate where the 3rd mark is/is not available to candidates, working must be shown. (note: answer must be rounded or truncated to nearest penny) (a) 131944·44 [$4750 \times \frac{100}{2\cdot4} \times \frac{8}{12}$] ✗✓✓ (b) 1319·44 [$4750 \div 2\cdot4 \times \frac{8}{12}$] ✗✓✗ (c) 171 [$4750 \times \frac{2\cdot4}{100} \times \frac{12}{8}$] ✓✗✓ (d) 1710 [$4750 \times 0\cdot24 \times \frac{12}{8}$] ✗✗✓

Question	Expected Answer/s	Max Mark	Additional Guidance

12	**Ans: 122 cm**
	
	•^{1} find dimensions of triangle: 100 and 70
	
	•^{2} correct form of Pythagoras' Theorem: $100^2 + 70^2$
	
	•^{3} calculate sum (or difference) of two squares: 14900
	
	•^{4} calculate the square root of a calculated value: $122\,(\cdot06...)$
		4	1. Correct answer without working award 4/4
			
			2. 2nd mark can only be awarded for using Pythagoras in a right-angled triangle Some examples (working must be shown)
			  (a) $71(\cdot41...)$ $[\sqrt{100^2-70^2}\,]$
			    award 3/4 ✓✗✓✓
			  (b) $131(\cdot24...)$ $[\sqrt{100^2+85^2}\,]$
			    award 3/4 ✗✓✓✓
			  (c) $217(\cdot31...)$ $[\sqrt{200^2+85^2}\,]$
			    award 3/4 ✗✓✓✓
			  (d) $86(\cdot31...)$ $[\sqrt{15^2+85^2}\,]$
			    award 2/4 ✗✗✓✓
			  (e) $141(\cdot42...)$ $[\sqrt{100^2+100^2}\,]$
			    award 2/4 ✗✗✓✓
			
			3. Final mark is not available if there is invalid subsequent working e.g. $122 - 30 = 92$ award 3/4 ✓✓✓✗
			
			4. Example of alternative strategy involving trigonometry
			  •^{1} dimensions of triangle = 100 and 70
			  •^{2} $a° = \tan^{-1}(^{100}/_{70}) = 55°$ …..
			  •^{3} $\cos55°$ ……. $= {}^{70}/_{length}$
			  •^{4} length $= 70 \div \cos55° = 122$
			
			5. Do not penalise inadvertent use of radians or grads if trigonometry is used

Question			Expected Answer/s	Max Mark	Additional Guidance
13			**Ans: 6%** •¹ find delivery charge: 21 •² know to express delivery charge as a fraction of 350: $^{21}/_{350}$ •³ know to multiply fraction by 100: $^{21}/_{350} \times 100$ •⁴ carry out all calculations correctly: 6	**4**	1. Correct answer without working award 2/4 2. 4th mark is only available for calculations of the form $^{a}/_{b} \times c$ where a, b, c = delivery charge or 350 or 371 or 100. 3. Some common answers (working must be shown) (a) 5·7, 5·6(6…) [$^{21}/_{371} \times 100$] award 3/4 ✓✗✓✓ (b) 106 [$^{371}/_{350} \times 100$] award 3/4 ✗✓✓✓ (c) 94(·3…) [$^{350}/_{371} \times 100$] award 2/4 ✗✗✓✓ (d) 73·5 [$^{21}/_{100} \times 350$] award 2/4 ✓✗✗✓ (e) 1298·5 [$^{350}/_{100} \times 371$ or $^{371}/_{100} \times 350$] award 1/4 ✗✗✗✓
14			**Ans: 150 cm²** <u>Method 1</u> •¹ find base of triangle: $80 \div 4 = 20$ •² find height of triangle: $45 \div 3 = 15$ •³ find area of triangle: $½ \times 20 \times 15 = 150$ <u>Method 2</u> •¹ find area of rectangle: $80 \times 45 = 3600$ •² find number of triangles: 24 •³ find area of triangle: $3600 \div 24 = 150$	**3**	1. Correct answer without working award 1/3 2. A common answer (no working necessary) 1800 [$½ \times 80 \times 45$] award 1/3 3. Award 2/3 for correctly calculating $3600 \div t$, $t \neq 2$ or 24 [incorrect number of triangles] (working must be shown) e.g. $3600 \div 21 = 171(·…)$ (Do not penalise incorrect rounding)

Question	Expected Answer/s	Max Mark	Additional Guidance
15	**Ans:** **42 cm** $\bullet^1$ know how to calculate length of semi-circle: ½πd or πr $\bullet^2$ substitute correct diameter into formula: $\frac{1}{2} \times \pi \times 10$ or $\pi \times 5$ $\bullet^3$ know to add lengths of straight edges to previously calculated value: previously calculated value $+ 10 + 6 + 10$ $\bullet^4$ carry out all calculations correctly: $15 \cdot 7 \ldots + 26 = 41 \cdot 7 \ldots$ (must include a circle calculation **followed by** an addition) $\bullet^5$ round to nearest whole number: 42	5	1. Correct answer without working award 0/5 2. Where no formula is stated accept (a) $\frac{1}{2} \times \pi \times 10$ or $15 \cdot 7 \ldots$ as evidence of ½ πd being used (b) $\frac{1}{2} \times \pi \times 5^2$ or $39 \cdot 2 \ldots$ as evidence of ½ πr² being used 3. **Some** common answers (working must be shown) (a) 32 $[\frac{1}{2} \times \pi \times 10 + 16]$ award 4/5 ✓✓✗✓ (b) 57 $[\pi \times 10 + 26]$ award 4/5 ✗✓✓✓ (c) 65 $[\frac{1}{2} \times \pi \times 5^2 + 26]$ award 4/5 ✗✓✓✓ (d) 99 $[\frac{1}{2} \times \pi \times 5^2 + 60]$ award 3/5 ✗✓✗✓ (e) 183 $[\frac{1}{2} \times \pi \times 10^2 + 26]$ award 3/5 ✗✗✓✓✓ (f) 34 $[\frac{1}{2} \times \pi \times 5 + 26]$ award 4/5 ✓✗✓✓ (g) 16 $[\frac{1}{2} \times \pi \times 10]$ award 3/5 ✓✓✗✗✓ (h) 31 $[\pi \times 10]$ award 2/5 ✗✓✗✗✓ (i) 39 $[\frac{1}{2} \times \pi \times 5^2]$ award 2/5 ✗✓✗✗✓ (j) 39 $[\frac{1}{2} \times 5^2 + 26]$ award 2/5 ✗✗✓✗✓ (k) 79 $[\pi \times 5^2]$ award 2/5 ✗✓✗✗✓ 3. (a) 5th mark is only available where the answer to circle calculation requires rounding (b) Where premature rounding leads to incorrect answer, a maximum of 4/5 is available.

<div style="text-align:center">

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR PAPER 1&2
80

[END OF MARKING INSTRUCTIONS]

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