2012 Mathematics

Intermediate 1 Units 1, 2 & 3 Paper 2

Finalised Marking Instructions

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

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

1. Marks for each candidate response must 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. 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 2012 training course: Section 4 - A guide to e-marking for markers: Scoris Assessor online marking training: Section 7 - Communications.

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 $x° = 0{\cdot}5 = 30°$
- 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: Paper 2, Units 1, 2 and 3

Question			Expected Answer/s	Max Mark	Additional Guidance
1			**Ans: 10.35 am** •[1] subtract 3h40m from 2.15: 10.35	**1**	1. Accept 10.35, but do **not** accept 10.35pm
2			**Ans: 1575 grams** •[1] find number of grams per portion: 700 ÷ 4 = 175 •[2] find number of grams for 9 portions: 175 × 9 = 1575	**2**	1. Correct answer without working award 2/2 2. Alternative strategies (a) •[1] 9 ÷ 4 = 2·25 •[2] 700 × 2·25 = 1575 (b) •[1] 9 ÷ (4 ÷ 700) •[2] 1575 [4 ÷ 700 is not enough for the 1st mark] (c) •[1]•[2] 4 700 4 700 1 175 9 1575 [In this case award 1/2 for correct method with **one** error] 3. For 700 × 9 = 6300 award 0/2

Question			Expected Answer/s	Max Mark	Additional Guidance
3			**Ans: 13 + 8*x* or equivalent** •[1] multiply out one bracket : $8 - 12x$ or $20x + 5$ •[2] multiply out both brackets and know to add: $8 - 12x + 20x + 5$ •[3] collect like terms: $13 + 8x$ or equivalent	**3**	1. Correct answer without working award 3/3 2. **Special case**: only first term in each bracket is multiplied (working must be shown) $8 - 3x + 20x + 1 = 9 + 17x$ or $17x + 9$ award 2/3 3. Some common answers (a) $13 + 32x$ award 2/3 ✓✓× (b) $8 - 12x = 20x + 5$ award 1/3 ✓×× (c) 3rd mark is not available if there is invalid subsequent working e.g. $13 + 8x \rightarrow 21x$ award 2/3 $13 + 8x \rightarrow 13/8$ award 2/3
4			**Ans: 3(5a + 4)** •[1] identify common factor: 3 or 5a + 4 •[2] factorise: 3(5a + 4)	**2**	

Question	Expected Answer/s	Max Mark	Additional Guidance
5	**Ans:**	**3**	

Aerobics	Yoga	Jogging	Toning	Tums & Hips	Total Time
✓	✓		✓		70
✓	✓			✓	67
✓		✓	✓		65
✓		✓		✓	62
	✓	✓	✓		60

- •[1] one correct row:
- •[2] two more correct rows:
- •[3] final two correct rows:

1. Where there are missing totals a maximum of 2 marks is available
   (a) 5 rows otherwise "correct" award 2/3
   (b) 2 rows otherwise "correct" award 1/2

2. Where candidate misinterprets minimum as **maximum**
   (a) 5 rows "correct" for total ≤ 60 award 2/3
   (b) 2 rows "correct" for total ≤ 60 award 1/3

Question			Expected Answer/s	Max Mark	Additional Guidance
6	**a**		**Ans: 147 cm** •[1] interpret stem and leaf diagram: 147	**1**	1. For 14|7 award 0/1
6	**b**		**Ans: 131 cm** •[1] find median: 131	**1**	1. For 13|1 award 0/1
6	**c**		**Ans: eg girls are taller** or **boys are shorter** •[1] make valid comparison: any indication that girls are taller	**1**	1. Answer must imply **comparison** of girls with boys. (a) Examples of **acceptable** answers (i) There are more taller girls than boys. (ii) There are more boys with short heights than girls. (b) Examples of **unacceptable** answers (i)More boys are in the 110's and 120's. More girls are in the 130's and 140's. (ii) There are more smaller boys than taller. There are more taller girls than smaller. 2. Disregard subsequent statements unless they clearly contradict a correct comparison.

Question			Expected Answer/s	Max Mark	Additional Guidance
7			**Ans: y = 6** •[1] start to collect like terms: 7y **or** 42 •[2] collect like terms **and** equate: 7y = 42 •[3] solve equation for y: y = 6	**3**	1. For answers without valid working award 1/3 eg (i) y = 6 without working (ii) $5 \times 6 + 19 = 61 - 2 \times 6 \rightarrow y = 6$ 2. For the award of the 3rd mark an answer of the form 'y = ' is required 3. Answers acceptable for partial credit (valid working must be shown) (a) $7y = 42 \rightarrow 6$ award 2/3 ✓✓× (b) $7y = 80 \rightarrow y = 11{\cdot}4(\ldots)$ award 2/3 ✓✓× (c) $3y = 42 \rightarrow y = 14$ award 2/3 ✓×✓ (d) $3y = 80 \rightarrow y = 26{\cdot}7$ or $y = 26{\cdot}6(\ldots)$ award 1/3 ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
8			**Ans: 72°** •[1] use correct cosine ratio: $\cos x° = {}^{1\cdot6}/_{5\cdot2}$ •[2] know how to find x: $\cos^{-1}({}^{1\cdot6}/_{5\cdot2})$ or $\cos^{-1}0\cdot307\ldots$ •[3] carry out inverse trig. calculation: 72(·07….)	**3**	1. Correct answer without working award 2/3 2. Do not penalise inadvertent use of radians or grads 1·3 or 1·2(5…) (radians used) award 3/3 80·1 or 80·08(…) (grads used) award 3/3 3. Where an incorrect trig ratio is used, working should be followed through with the possibility of awarding 2/3. (a) $\sin^{-1}({}^{1\cdot6}/_{5\cdot2})$ = 18 or 17·9(…) award 2/3 ×✓✓ (b) $\tan^{-1}({}^{1\cdot6}/_{5\cdot2})$ = 17·1(0…) award 2/3×✓✓ (c) $\tan^{-1}({}^{5\cdot2}/_{1\cdot6})$ = 73 or 72·9 or 72·8(9…) award 2/3×✓✓ 4. In awarding the 3rd mark, ${}^{1\cdot6}/_{5\cdot2}$ should not be rounded or truncated to any less than two decimal places (a) $\cos^{-1}0\cdot31$ = 72 or 71·9(…) award 3/3 (b) $\cos^{-1}0\cdot3(0)$ = 73 or 72·5(…) award 2/3✓✓× 5. Do **not** award 3rd mark if there is invalid subsequent working e.g. $\cos^{-1}({}^{1\cdot6}/_{5\cdot2}) = 72 \rightarrow \sqrt{72} = 8\cdot485\ldots$ award 2/3✓✓×

Question	Expected Answer/s	Max Mark	Additional Guidance
9	**Ans: 24·8 m/s** •[1] know how to find speed: $S = {}^{D}/_{T}$ •[2] express D **or** T in correct units: D = 3100(m) **or** T = 125(s) •[3] express D **and** T in correct units and calculate speed in m/s: 3100 ÷ 125 = 24·8	**3**	1. Correct answer without working award 3/3 2. **Some** common answers (no working necessary, rounding or truncation is acceptable) (a) 3100 ÷ 2·05 = 1512(·1….) award 2/3 ✓✓× (b) 3·1 ÷ 125 = 0·02(48) award 2/3 ✓✓× (c) 3·1 ÷ 2·05 = 1·5(1….) award 1/3 ✓×× (d) 3·1 ÷ 2·5 = 1·24 award 1/3 ✓×× (e) 3100 × 125 = 387500 award 2/3 ×✓✓ (f) 3100 × 2·05 = 6355 award 1/3 ×✓× (g) 3·1 × 125 = 387(·5), 388 award 1/3 ×✓× (h) 3·1 × 2·05 = 6·3(55), 6·4 award 0/3 3. Special case (working must be shown) (**km/m(in) must be shown**) 3·1 ÷ 2·08(…) = 1·49...**km/m** or 1·5 **km/m** award 2/3
10	**Ans:** •[1] use suitable scales on axes: •[2] two points plotted correctly: •[3] another two points plotted correctly: •[4] final two points plotted and line graph completed correctly:	**4**	1. If a bar graph is drawn, then a maximum of 3 marks is available •[1] use suitable scales on axes •[2] two bars correct height •[3] all bars correct height and bar graph completed correctly (each bar same width and equally spaced; accept no space between bars) 2. The 4th mark is not available if the line extends beyond (April, 2000) and/or (September, 5400) by more than two boxes each

Question			Expected Answer/s	Max Mark	Additional Guidance
11			**Ans: £294** •^{1} calculate gross premium: $^{105\,000}/_{1\,000} \times 3{\cdot}20 = 336$ •^{2} calculate discount: $^1/_8 \times 336 = 42$ •^{3} calculate net premium: $336 - 42 = 294$	**3**	1. Correct answer without working award 3/3 2. Common answers (no working necessary) (a) 42000 [$^1/_8$ of $(105000 \times 3{\cdot}20)$] award 1/3 ×✓× (b) 294000 [336000 – 42000] award 2/3 ×✓✓ 3. Alternative Strategy •^{1} $^1/_8 \times 3{\cdot}20 = 0{\cdot}4(0)$ •^{2} $3{\cdot}20 - 0{\cdot}4(0) = 2{\cdot}8(0)$ •^{3} $^{105\,000}/_{1\,000} \times 2{\cdot}80 = 294$ 4. Do **not** award the 3rd mark if there is invalid subsequent working e.g. 105000– 294 = 104706 award 2/3 ✓✓ ×

Question	Expected Answer/s	Max Mark	Additional Guidance
12	**Ans: £216·95**	**4**	1. Correct answer without working award 4/4 2. (a) The 4th mark is only available where the answer has to be rounded to the nearest penny. (b) The 4th mark should **not be awarded** where premature rounding results in an incorrect answer.
	<u>METHOD 1</u> •1 calculate tax in dollars: $^{17}/_{100} \times 280 = 47{\cdot}6(0)$ •2 calculate total cost in dollars: $280 + 47{\cdot}6(0) = 327{\cdot}6(0)$ •3 convert cost to sterling: $327{\cdot}6(0) \div 1{\cdot}51 = 216{\cdot}(95\ldots)$ •4 round to nearest penny: 216·95		<u>METHOD 1</u> 1. Acceptable answers for partial credit (no working necessary) (i) 494·68 [327·6 × 1·51] award 3/4 ✓✓×✓ (ii) 494·676 [327·6 × 1·51] award 2/4 ✓✓××
	<u>METHOD 2</u> •1 convert cost to sterling: $280 \div 1{\cdot}51 = 185(\cdot 43\ldots)$ •2 calculate tax in sterling: $^{17}/_{100} \times 185{\cdot}43(0\ldots) = 31(\cdot 52\ldots)$ •3 calculate total cost in sterling: 216(·95…) •4 round to nearest penny: 216·95		<u>METHOD 2</u> 1. Acceptable answers for partial credit (no working necessary) (a)(i) 185·43 award 2/4 ✓××✓ (ii) 185(·4) award 1/4 ✓××× (b)(i) 31·52 award 3/4 ✓✓×✓ (ii) 31(·5) award 2/4 ✓✓×× 2. Answers obtained from 280 × 1·51 (no working necessary) (a) 422·8(0) award 0/4 (b)(i) 71·88 award 2/4 ×✓×✓ (ii) 71·876 award 1/4 ×✓×× (c)(i) 494·68 award 3/4 ×✓✓✓ (ii) 494·676 award 2/4 ××✓✓ 3. **Special cases** (combination of methods 1 and 2) (a) 185·43 + 47·6(0) = 233·03 award 2/4 (b) 47·6(0) + 422·8(0) = 470·4(0) award 1/4

Question			Expected Answer/s	Max Mark	Additional Guidance
13			**Ans: 13·5** •[1] evaluate 6^2 correctly: $6^2 = 36$ •[2] evaluate numerator correctly: $6^2 + 3 \times 6 = 54$ •[3] divide by 4 correctly: $(6^2 + 3 \times 6) \div 4 = 13{\cdot}5$	**3**	1. Correct answer without working award 3/3 2. **Some** common answers (working must be shown) (a) $(12 + 3 \times 6) \div 4 = 7{\cdot}5$ award 2/3 ×✓✓ (b) $(6^2 + 3) \times 6 \div 4 = 58{\cdot}5$ award 2/3 ✓×✓ (c) $(12 + 3) \times 6 \div 4 = 22{\cdot}5$ award 1/3 ××✓ (d) $6^2 + 3 \times 6 \div 4 = 40{\cdot}5$ award 2/3 ✓×✓ (e) $12 + 3 \times 6 \div 4 = 16{\cdot}5$ award 1/3 ××✓ 3. 1st mark may be awarded for numerator = $n (n + 3) = 6 \times 9$

Question	Expected Answer/s	Max Mark	Additional Guidance
14	**Ans: 10·7 m** •[1] correct form of Pythagoras' Theorem: $6{\cdot}8^2 - 6^2$ •[2] calculate difference (or sum) of two squares: 10·24 •[3] calculate the square root of a calculated value: 3·2 •[4] correctly add 7·5 to **previously calculated** height of triangle (see additional guidance 3-5): 3·2 + 7·5 = 10·7	**4**	1. Correct answer without working award 4/4 2. Accept e.g. $x^2 + 6^2 = 6{\cdot}8^2$ as evidence for award of 1st mark 3. **Some** common answers (working must be shown) (a) $\sqrt{(6{\cdot}8^2 + 6^2)} + 7{\cdot}5) = 16{\cdot}6$, 16·5(6…) award 3/4 ×✓✓✓ (b) $\sqrt{(6{\cdot}8^2 + 6^2)} = 9{\cdot}1$, 9·0(6…) award 2/4 ×✓✓× 4. The 4th mark may be awarded for e.g. (a) ½×12×6·8 + 7·5 = 48·3 award 1/4×××✓ (b) ½×(12+6·8) + 7·5 = 16·9 award 1/4×××✓ 5. Do **not** award the 4th mark for 12 + 6·8 + 7·5 = 26·3 award 0/4 6. Do **not** award the 4th mark if there is invalid subsequent working after finding the height of the triangle or after finding the height of the house e.g. (a) ½(3·2) + 7·5 = 9·1 award 3/4 ✓✓✓× (b) $\sqrt{(6{\cdot}8^2 + 6^2)} + 7{\cdot}5 + 6{\cdot}8 = 23{\cdot}4$ award 2/4 ×✓✓× 7. Example of alternative strategy involving trigonometry •[1] $a° = \cos^{-1}(^6/_{6{\cdot}8}) = 28{\cdot}07°$…… •[2] $\tan 28{\cdot}07° \ldots\ldots = {}^x/_6$ •[3] $x = 6\tan 28{\cdot}07° = 3{\cdot}2$ •[4] height = 3·2 + 7·5 = 10·7 8. Do not penalise inadvertent use of radians or grads if trigonometry is used

Question			Expected Answer/s	Max Mark	Additional Guidance
15	**a**		**Ans: £28** •[1] calculate profit: $12 \times 9 - 80 = 28$	**1**	
15	**b**		**Ans: 35%** •[1] know to express profit as a fraction of 80: $^{28}/_{80}$ •[2] know to multiply fraction by 100: $^{28}/_{80} \times 100$ •[3] carry out all calculations correctly: 35	**3**	1. Correct answer without working award 3/3 2. 3rd mark is only available for calculations of the form $^{a}/_{b} \times c$ where a,b,c = answer to (a) or 80 or 100 or 108. 3. **Some** common answers (working must be shown) (a) 286, 285(·7…) $[^{80}/_{28} \times 100]$ award 2/3 ××✓✓ (b) 22(·4) $[^{28}/_{100} \times 80$ or $^{80}/_{100} \times 28]$ award 1/3 ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
16			**Ans: 1123 cm^2** •^{1} know how to calculate area of semi-circle: $\frac{1}{2}\pi r^2$ •^{2} substitute correct radius into formula: $\frac{1}{2} \times \pi \times 6^2$ •^{3} know to add area of semi-circles and area of rectangle: (5 × area of semi-circle) + (60 × 14) •^{4} carry out all calculations correctly: $\pi \rightarrow 282{\cdot}7\ldots + 840 = 1122{\cdot}7\ldots$. $3.14 \rightarrow 282{\cdot}6\ldots + 840 = 1122{\cdot}6\ldots$. (must include a circle calculation **followed by** an addition) •^{5} round to nearest whole number: 1123	**5**	1. Correct answer without working award 0/5 2. **Some** common answers (working must be shown) (a) 1405 [$\pi \times 6^2 \times 5 + 60 \times 14$] award 4/5 ×✓✓✓✓ (b) 897 [$\frac{1}{2} \times \pi \times 6^2 + 60 \times 14$] award 4/5 ✓✓×✓✓ (c) 371 [$\frac{1}{2} \times \pi \times 6^2 \times 5 + 14 + 60 + 14$] award 4/5 ✓✓×✓✓ (d) 1971 [$\frac{1}{2} \times \pi \times 12^2 \times 5 + 60 \times 14$] award 4/5 ✓×✓✓✓ (e) 934 [$\frac{1}{2} \times \pi \times 12 \times 5 + 60 \times 14$] award 4/5 ×✓✓✓✓ (f) 283 [$\frac{1}{2} \times \pi \times 6^2 \times 5$] award 3/5 ✓✓××✓ (g) 565 [$\pi \times 6^2 \times 5$] award 2/5 ×✓××✓ (h) 94 [$\frac{1}{2} \times \pi \times 12 \times 5$] award 2/5 ×✓××✓ (i) 188 [$\pi \times 12 \times 5$] 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.

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR PAPER 1 & 2
80

[END OF MARKING INSTRUCTIONS]