2013 Mathematics

Intermediate 2 Units 1, 2 & Applications Paper 1

Finalised Marking Instructions

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

These principles describe the approach to be taken when marking Intermediate 2 Mathematics papers.
For more detailed guidance please refer to the notes which are included with the Marking Instructions.

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 $\sin x° = 0\cdot5 = 30°$
- 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 s/he has awarded marks, the following should be used:

   (a)   Correct working should be ticked, ✓.

   (b)   Where working subsequent to an error is followed through, if otherwise correct 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 Applications (non-calc)

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
1			**Ans:** $b(6a - 7c)$	**1**	
			•[1] process: factorise correctly		•[1] $b(6a - 7c)$
2			**Ans:** $y = -\dfrac{4}{3}x + 4$	**3**	
			•[1] process: state y-intercept or c in $y = mx + c$		•[1] $c = 4$
			•[2] process: find gradient		•[2] $m = -\dfrac{4}{3}$
			•[3] process: state correct equation of line		•[3] $y = -\dfrac{4}{3}x + 4$

Notes:

1. For a correct answer without working   award 3/3

2. For $y = -\dfrac{4}{3}x$ award 1/3

3. Where m and/or c is calculated incorrectly the working must be
    followed through with a 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 $y = 4x - \dfrac{4}{3}$ award 0/3

Question			Marking Scheme Give 1 mark for each ●	Max Mark	Illustrations of evidence for awarding a mark at each ●
3			**Ans: 6·28 cm**	**3**	
			●[1] strategy: know to express arc as fraction of a circle		●[1] $\dfrac{72}{360}$
			●[2] strategy: know how to find length of arc		●[2] $\dfrac{72}{360} \times 3 \cdot 14 \times 2 \times 5$
			●[3] process: correctly calculate length of arc		●[3] 6·28

Notes:

1. For $\dfrac{72}{360} \times 3 \cdot 14 \times 5^2$ leading to 15·7   award 2/3

2. For the award of the final mark, calculations must involve 3·14 and be of
    equivalent difficulty

Question			Marking Scheme Give 1 mark for each ●	Max Mark	Illustrations of evidence for awarding a mark at each ●
4			**Ans: $x = 4, y = -2$**	**3**	
			●[1] process: scale system of equations		●[1] $10x - 5y = 50$ $4x + 5y = 6$
			●[2] process: solve for one variable		●[2] $x = 4$
			●[3] process: solve for other variable		●[3] $y = -2$

Notes:

1. For a correct answer obtained from 2 tables of values or
    solving 2 equations graphically or trial and improvement   award 0/3

2. For a correct answer without working   award 0/3

3. Where an error occurs in scaling the system of equations, working must
    be followed through with the possibility of awarding 2/3

4. An incorrect answer for the first variable must be followed through with
    the possibility of awarding 2/3

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5			**Ans: 121°**	**3**	

			•[1] process: know that angle
			                       QTV is a right angle
					•[1] angle QTV = 90° **or**
					       angle RTQ = 22°

			•[2] process: know that angle in
			                       a semi-circle is a
			                       right angle
					•[2] angle TPQ = 90° **or**
					       angle TRQ = 90°

			•[3] process: calculate the size of angle PQR		•[3] 121°

Notes:

1.   For correct answer without working   award 3/3

2.   Angle QTV, angle RTQ, angle TPQ and angle TRQ may not be explicitly stated: they
     may be marked in a diagram and can be awarded the first and second
     marks, as appropriate

3.   For the final mark to be awarded the size of the angle PQR must be
     stated explicitly

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6	**a**	**i**	**Ans: $Q_2 = 35$**	**1**	
			•[1] communicate: state median		•[1] 35
6	**a**	**ii**	**Ans: $Q_1 = 22$**	**1**	
			•[1] communicate: state lower quartile		•[1] 22
6	**a**	**iii**	**Ans: $Q_3 = 39$**	**1**	
			•[1] communicate: state upper quartile		•[1] 39

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6	b		**Ans:** $$\begin{array}{l}\text{(boxplot diagram)}\\ 0\quad10\quad20\quad30\quad40\quad50\quad60\end{array}$$ •[1] communicate: correct endpoints •[2] communicate: correct box	2	•[1] endpoints at 10 and 50 •[2] box showing Q_1, Q_2, Q_3

Notes:
1. Incorrect answers in part (a) must be followed through to give the possibility of awarding 2/2
2. The boxplot must be drawn to a reasonable scale

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •

6	c		**Ans: In general, the fourth year
			pupils spend more time on
			homework.**
			
			**There is less variation in the
			times spent on homework in
			fourth year than in first year.**
			
			•[1] communicate: valid
			                        comment
			                        about the
			                        average time
			
			•[2] communicate: valid
			                        comment
			                        about the
			                        spread of
			                        times
				2	•[1] comment
					
					•[2] comment

Notes:
1. Do not accept:
   "The fourth years had a higher median than the first years"
   "There was a longer period of time spent on homework in the second boxplot"

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7	**a**		**Ans:** •[1,2,3] communication: continue and complete tree diagram	**3**	•[1] Given diagram plus any 4 other correct outcomes •[2] Diagram correctly completed for further 3 outcomes •[3] Diagram correctly completed for all 10 outcomes
	b		**Ans:** $\frac{3}{8}$ •[1] process: state probability	**1**	•[1] $\frac{3}{8}$

Notes:
1. Accept variations eg   3 out of 8
                             0·375
                             37·5%
                             3:8, etc					

8			**Ans: 90** •[1] process: substitute correctly into formula •[2] process: calculate area	**2**	•[1] $A = \frac{1}{2}(12 + 18)6$ •[2] $A = 90$

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9	**a**		**Ans: 1400 hours** •[1] communicate: state median	**1**	•[1] 1400 hours
9	**b**		**Ans: 250 hours** •[1] interpret: know how to find Q_1 from the diagram •[2] interpret: know how to find Q_3 from the diagram •[3] process: find SIQR	**3**	•[1] 1100 •[2] 1600 •[3] 250

Notes:
1.   For answers of (a) 14 followed by (b) 2·5, with working   award 0/1 for (a), 3/3 for (b)
2.   For answers of (a) 1400 followed by (b) 2·5, with working   award 1/1 for (a), 2/3 for (b)
3.   Where Q_1 and Q_3 are incorrect the 3rd mark is still available

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TOTAL MARKS FOR PAPER 1
30

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[END OF MARKING INSTRUCTIONS]