# 2007 Mathematics

# Intermediate 2 – Units 1, 2 and Applications Paper 1

# Finalised Marking Instructions

**General Marking Principles**

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° = 0.5 = 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   Do not penalise a transcription error unless 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.

**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.**

**Mathematics Intermediate 2:  Paper 1, Units 1, 2 and Applications (non-calc)**

| Question No | Marking Scheme<br>Give 1 mark for each • | Illustrations of evidence for awarding a mark at each • |
|---|---|---|
| 1 | **Ans:   29/100 (or equivalent)**<br><br>•$^1$  process:        calculate probability | •$^1$   29/100 (or equivalent)<br><br>**1 mark** |

**NOTES:**

Accept variations eg     29 : 100
                                      0·29
                                      29%
                                      29 out of 100, etc

| | | |
|---|---|---|
| 2 | **Ans:    $y = 4x - 3$**<br><br>•$^1$  process:        find gradient<br><br>•$^2$  process:        state $y$ intercept or c in $y = mx + c$<br><br>•$^3$  communicate:   state correct equation of straight line | •$^1$   m = 4 (or equivalent)<br><br>•$^2$   c = −3<br><br>•$^3$   $y = 4x - 3$<br><br>**3 marks** |

**NOTES:**

| | | |
|---|---|---|
| 1 | For a correct answer without working | award 3/3 |
| 2 | For $y = 4x$ | 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 $y = -3x + 4$ | award 0/3 |

| | | |
|---|---|---|
| 3 | **Ans:  314 cubic cm**<br><br>•$^1$  process:   substitute correctly into the formula for the volume of a cylinder<br><br>•$^2$  process:   correct calculation | •$^1$   $V = 3 \cdot 14 \times 5^2 \times 4$<br><br><br>•$^2$   $V = 314 cm^3$<br><br>**2 marks** |

**NOTES:**

The second mark is available for a multiplication involving 3·14 and squaring
eg V = 3·14 × 10$^2$ × 4 = 1256                                                    award 1/2

| Question No | Marking Scheme<br>Give 1 mark for each • | | | Illustrations of evidence for awarding<br>a mark at each • |
|---|---|---|---|---|
| 4 | **Ans:** | **(3, − 4)** | | |
| | •¹ strategy: | know to solve system of equations | | •¹ evidence of valid strategy |
| | •² process: | scale system of equations | | •² $x + 2y = -5$<br>$6x - 2y = 26$ or equivalent |
| | •³ process: | solve for one variable | | •³ $x = 3$ or $y = -4$ |
| | •⁴ process: | solve for other variable **and** communicate point of intersection | | •³ $(3, -4)$ |
| | | | | **4 marks** |

**NOTES:**

1. A valid strategy **must** involve the use of 2 equations, 2 tables of values or 2 straight lines

2. <u>Alternative methods</u>

   Where the point of intersection is obtained from 2 tables of values or solving 2 equations graphically, the criteria for awarding the second, third and fourth mark are as follows:

   •² strategy: set up table of values correctly or draw correctly the line $x + 2y = -5$

   •² table of values or straight line graph of $x + 2y = -5$

   •³ process: set up table of values correctly or draw correctly the line $3x - y = 13$

   •³ table of values or straight line graph of $3x - y = 13$

   •⁴ process: identify and communicate point of intersection

   •⁴ $(3, -4)$

3. Where an error occurs in scaling the system of equations, marking must be followed through with the possibility of awarding 3/4 or 2/4

4. Where one or both tables of values are set up incorrectly, marking must be followed through with the possibility of awarding 3/4 or 2/4

5. Where one or both straight line graphs are drawn incorrectly, marking must be followed through with the possibility of awarding 3/4 or 2/4

6. For correct answer without working, award 0/4

| Question No | Marking Scheme Give 1 mark for each • | | Illustrations of evidence for awarding a mark at each • |
|---|---|---|---|
| 5 | **Ans:** $x^3 + 7x^2 - 36$ | | |
| | •$^1$ process: | start to multiply out brackets | •$^1$ evidence of 3 correct terms (eg $x^3 + 4x^2 - 12x$) |
| | •$^2$ process: | complete the process of multiplying out brackets correctly | •$^2$ $x^3 + 4x^2 - 12x + 3x^2 + 12x - 36$ |
| | •$^3$ process: | collect like terms which must include $x^3$ | •$^3$ $x^3 + 7x^2 - 36$ **3 marks** |

**NOTES:**

| Question No | Marking Scheme Give 1 mark for each • | | Illustrations of evidence for awarding a mark at each • |
|---|---|---|---|
| 6 (a) | **Ans: Proof** | | |
| | •$^1$ strategy: | know how to find $\bar{x}$ and $(x - \bar{x})^2$ | •$^1$ evidence (2 and 1, 1, 1, 0, 9) |
| | •$^2$ process: | substitute into formula | •$^2$ evidence $\left(\sqrt{\dfrac{12}{5-1}}\right)$ |
| | •$^3$ process: | complete proof with all calculations correct | •$^3$ leading to $\sqrt{3}$ **3 marks** |

**NOTES:**

For use of alternative formula award marks as follows

•$^1$ strategy:   known how to find $\Sigma x$ and $\Sigma x^2$     •$^1$     evidence (10 and 32)

| Question No | Marking Scheme Give 1 mark for each • | | Illustrations of evidence for awarding a mark at each • |
|---|---|---|---|
| (b) | **Ans:** $\sqrt{3}$ | | |
| | •$^1$ communicate: | state standard deviation | •$^1$ $\sqrt{3}$ **1 mark** |

**NOTES:**

| Question No | Marking Scheme Give 1 mark for each • | | | Illustrations of evidence for awarding a mark at each • | |
|---|---|---|---|---|---|
| 7 | **Ans: 9** | | | | |
| | $\bullet^1$ | interpret: | know how to find $Q_1$ from diagram | $\bullet^1$ | 44 |
| | $\bullet^2$ | interpret: | know how to find $Q_3$ from diagram | $\bullet^2$ | 76 |
| | $\bullet^3$ | process: | find SIQR | $\bullet^3$ | 16 |
| | | | | | **3 marks** |

**NOTES:**

Where $Q_1$ and $Q_3$ have been misinterpreted the third mark is still available

| Question No | Marking Scheme | | | Illustrations | |
|---|---|---|---|---|---|
| 8 | **Ans: £646** | | | | |
| | $\bullet^1$ | process: | calculate basic cost | $\bullet^1$ | £760 |
| | $\bullet^2$ | interpret: | follow correct path | $\bullet^2$ | discount = 15% |
| | $\bullet^3$ | process: | complete calculation | $\bullet^3$ | £646 |
| | | | | | **3 marks** |

**NOTES:**

Common answers (with or without working)

646                              award 3/3

722 (5% discount)             award 2/3

684 (10% discount)           award 2/3

| Question No | Marking Scheme | | | Illustrations | |
|---|---|---|---|---|---|
| 9 | **Ans: − 0.5** | | | | |
| | $\bullet^1$ | process: | calculate cos 240° | $\bullet^1$ | − 0.5 |
| | | | | | **1 mark** |

**NOTES:**

| Question No | Marking Scheme<br>Give 1 mark for each • | Illustrations of evidence for awarding a mark at each • |
|---|---|---|
| 10 (a) | **Ans: 8**<br><br>•¹  process:    calculate *s* correctly | •¹    8<br><br>**1 mark** |

**NOTES:**

| | | |
|---|---|---|
| (b) | **Ans: 9**<br><br>•¹  process:    substitute correctly into formula<br><br>•²  process:    start to evaluate formula<br><br>•³  process:    round square root to nearest whole number | •¹    $\sqrt{[8(8-3)(8-6)(8-7)]}$<br><br>•²    $\sqrt{80}$<br><br>•³    9<br><br>**3 marks** |

**NOTES:**

1. For a final answer of 80 arising from $8(8-3)(8-6)(8-7)$                    award 1/3 (× ✓ ×)

2. The final mark is not available for calculating the square root of a perfect square

| | | |
|---|---|---|
| 11 | **Ans:**<br><br><br><br>•¹  interpret:    realise a = 0 represents a horizontal line<br><br>•²  interpret:    realise b > 0 represents a *y*-intercept above origin | •¹    horizontal line drawn on graph<br><br>•²    line drawn with *y*-intercept above origin<br><br>**2 marks** |

**NOTES:**

**TOTAL MARKS FOR PAPER 1**
**30**

[END OF MARKING INSTRUCTIONS]