

# Mark Scheme (Results)

June 2011

International GCSE  
Mathematics (4MB0) Paper 02

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## 4MB0 Summer 2011 - Paper 2

| Question number | Scheme  | Marks  |   |   |
|-----------------|---|--------|---|---|
| <b>1.</b>       | (a) 2500/625  | M1     |   |   |
|                 | 4 hrs   | A1     | 2 |   |
|                 | (b) (2500 + 2500)/("4" + "3.5")                                 | M1     |   |   |
|                 | 667 km/h  | A1 ft  | 2 | 4 |
| <b>2.</b>       | (a) factor of $x$   | M1     |   |   |
|                 | Attempt to factorise $x^2 - 5x + 6$ or orig. cubic              | M1     |   |   |
|                 | $x(x - 3)(x - 2)$   | A1     | 3 |   |
|                 | (b) attempt to factorise $2x^2 + 2x - 24$ into two linear terms | M1     |   |   |
|                 | One pair of factors cancelled                                   | M1 dep |   |   |
|                 | $\frac{x(x-2)}{2(x+4)}$ OR $\frac{x^2 - 2x}{2x + 8}$            | A1     | 3 | 6 |

| Question number | Scheme  | Marks  |   |   |
|-----------------|---|--|---|---|
| 3.              | <p>for</p> <p>Note: First three marks for angles, final mark reasoning</p> <p>Method 1: (using angle at centre)</p> <p><math>\angle AOC(\text{reflex}) = 236^\circ</math> (<math>\angle</math> at a point) or</p> <p><math>\angle ADC = 62^\circ</math> (<math>\angle</math> at centre)</p> <p><math>\angle ABC = 118^\circ</math> (<math>\angle</math> at centre/opp angles cyclic quad)</p> <p><math>\angle BCO = 62^\circ</math> (<math>\angle</math> between // lines)</p> <p>at least <b>two</b> valid reasons consistent with their <math>\angle</math></p> <p>Method 2: (using isosceles triangles)</p> <p><math>\angle CAO</math> (or <math>\angle ACO</math> or <math>\angle BAC</math>) = <math>28^\circ</math></p> <p><math>\angle ABO</math> (or <math>\angle BOC</math>) = <math>56^\circ</math></p> <p><math>\angle BCO = 62^\circ</math></p> <p>at least <b>two</b> valid reasons consistent with their <math>\angle</math> (isosceles triangle, alt angles between // lines.....)</p> | B1<br>B1ft<br>B1ft<br>B1<br>B1<br>B1ft<br>B1ft<br>B1 | 4 | 4 |
| 4.              | <p>height of cone = <math>\sqrt{(39^2 - 15^2)}</math></p> <p>= 36 cm</p> <p>volume = <math>\frac{1}{3}\pi \cdot 36 \cdot 15^2 + \frac{2}{3}\pi 15^3</math></p> <p>either volume correctly stated and with values substituted</p> <p>2<sup>nd</sup> volume correctly stated with values substituted and added</p> <p>Conclusion</p>  | M1<br>A1<br>M1<br>M1 dep<br>A1                       | 5 | 5 |

| Question number | Scheme  | Marks       |   |   |
|-----------------|---|-------------|---|---|
| 5.              | (a) $35 - 27, 8$<br>(b) $17 - c's(8), 9$<br>SC: $27 - (x + y)$ M1<br>(c) $3y = 35 - c's(a) - c's(b)$ (o.e.)<br>$y = 6, x = 12$  | M1, A1      | 2 |   |
|                 |   | M1, A1 ft   | 2 |   |
|                 |   | M1          |   |   |
|                 |   | A1, A1      | 3 | 7 |
| 6.              | (a) trapezium <i>B</i><br>(b) trapezium <i>C</i><br>(c) trapezium <i>D</i><br>A rotation of $90^\circ$ anticlockwise about <b>any</b> point<br>Correctly placed trapezium (cao)<br>(d) reflection, $y = -x$   | B2(-1ee)    | 2 |   |
|                 |   | B2(-1ee) ft | 2 |   |
|                 |   | M1          |   |   |
|                 |   | A1          | 2 |   |
|                 |   | M1, A1      | 2 | 8 |
| 7.              | (a) (i) $\frac{1}{(x+2)^2 - 9}$<br>$\frac{1}{x^2 + 4x - 5}$ or $\frac{1}{(x+5)(x-1)}$<br>(ii) $y(x+23)=1$ OR $x+23=1/y$<br>$\frac{1-23x}{x}$ OR $\frac{1}{x} - 23$<br>(b) $x + 23 = "x^2 + 4x - 5"$<br>$x^2 + 3x - 28 (= 0)$<br>attempt to factorise their trinomial quadratic<br><b>OR</b> correct substitution into a correctly quoted formula<br>$-7, 4$ | M1          |   |   |
|                 |   | A1          |   |   |
|                 |   | M1          |   |   |
|                 |   | A1          | 4 |   |
|                 |   | M1          |   |   |
|                 |   | A1          |   |   |
|                 |   | M1          |   |   |
|                 |   | A1, A1      | 5 | 9 |

| Question number | Scheme  | Marks  |                                     |           |
|-----------------|---|--|-------------------------------------|-----------|
| <b>8.</b>       | <p>Accept fractional or percentage equivalents throughout.</p> <p>(a) 0.25 (o.e.)</p> <p>(b) for each correct pair</p> <p>(c) (i) “0.75” x 0.8, 0.6 (3/5)</p> <p>(ii) “0.25” x “0.9”</p> <p>“0.6” + “0.25” x “0.9”</p> <p>0.83 (or better) (33/40)</p> <p>(d) any probability ÷ (“0.825”)</p> <p>“0.6”/”0.825”</p> <p>0.73 (or better) (8/11)</p> | <p>B1</p> <p>B1ft,B1,B1</p> <p>M1, A1 ft</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>A1</p> | <p>1</p> <p>3</p> <p>5</p> <p>3</p> | <p>12</p> |

| Question number | Scheme   | Marks  |   |    |
|-----------------|--|--------|---|----|
| <b>9.</b>       | <p>(a) (i) <math>\frac{1}{2}\mathbf{a}</math> (ii) <math>\mathbf{b} - \mathbf{a}</math></p> <p>(b) <math>\mathbf{a} + \frac{1}{3}(\mathbf{b} - \mathbf{a})</math>, <math>\frac{1}{3}\mathbf{b} + \frac{2}{3}\mathbf{a}</math> (o.e.)</p> <p>(c) <math>-\frac{1}{2}\mathbf{a} + \mathbf{b} + \frac{1}{3}(\mathbf{a} - \mathbf{b})</math>, <math>\frac{2}{3}\mathbf{b} - \frac{1}{6}\mathbf{a}</math> (o.e.)</p> <p>(d) <math>\lambda(\frac{1}{3}\mathbf{b} + \frac{2}{3}\mathbf{a})</math></p> <p>(e) <math>\frac{1}{2}\mathbf{a} + \mu(\frac{2}{3}\mathbf{b} - \frac{1}{6}\mathbf{a})</math></p> <p>Correct expression (unsimplified)</p> <p>(f) Attempt at equating either coefficients of <math>\mathbf{a}</math> or coefficients of <math>\mathbf{b}</math>.</p> <p>One correct equation: <math>\frac{1}{2} - \frac{1}{6}\mu = \frac{2}{3}\lambda</math> or <math>\frac{1}{3}\lambda = \frac{2}{3}\mu</math></p> <p><math>\mu = 1/3, \lambda = 2/3</math></p> | B1, B1 | 2 |    |
|                 |  | M1, A1 | 2 |    |
|                 |  | M1, A1 | 2 |    |
|                 |  | B1ft   | 1 |    |
|                 |  | M1     |   |    |
|                 |  | A1     | 2 |    |
|                 |  | M1     |   |    |
|                 |  | A1     |   |    |
|                 |  | A1, A1 | 4 | 13 |

| Question number | Scheme   | Marks                |   |    |
|-----------------|--|----------------------|---|----|
| <b>10.</b>      | (a) $2x^2$ or $4xy$ , $(S =) 2x^2 + 4xy$   | B1, B1               | 2 |    |
|                 | (b) $y = \frac{50 - 2x^2}{4x}$ (o.e.)  | B1                   | 1 |    |
|                 | (c) $\frac{50 - 2x^2}{4x} \cdot x^2 + \text{conclusion}$   | B1                   | 1 |    |
|                 | (d) one term correctly differentiated  | M1                   |   |    |
|                 | $\frac{25}{2} - \frac{3x^2}{2}$  | A1                   |   |    |
|                 | $c's \left( \frac{25}{2} - \frac{3x^2}{2} \right) = 0$   | M1 dep               |   |    |
|                 | 2.89   | A1                   | 4 |    |
|                 | (e) 23.4, 24   | B1, B1               | 2 |    |
|                 | (f) graph penalties (-1)<br>straight line segments<br>each point missed ( $\pm \frac{1}{2}$ small square)<br>each missed segment<br>each point not plotted<br>each point incorrectly plotted ( $\pm \frac{1}{2}$ small square)<br>tramlines<br>very poor curve i.e. line too thick | B3                   | 3 |    |
|                 | (g) line drawn or two points marked on their graph consistent with the line drawn<br><br>1.8 or 1.9, 3.8<br><br>SC: No indication on the graph of any line or points identified but both points correct then<br><br>M1, A1, A0   | M1<br><br>A1ft, A1ft | 3 | 16 |



| Question number | Scheme   | Marks  |   |    |
|-----------------|--|--------|---|----|
| <b>11.</b>      | (a) $(AC^2 =) 54^2 + 35^2 - 2 \times 54 \times 35 \times \cos 100^\circ$ | M1     |   |    |
|                 | 2916 + 1225 + 656.4..... (o.e.)  | M1 dep |   |    |
|                 | 69.3 m   | A1     | 3 |    |
|                 | (b) Use of sine rule with correct values substituted                     | M1     |   |    |
|                 | $\sin \angle CAB = \frac{35 \times \sin 100}{69.3}$                      | M1 dep |   |    |
|                 | 29.8°/29.9°  | A1     | 3 |    |
|                 | (c) $DB/54 = \sin ("29.8")$  | M1     |   |    |
|                 | 26.8 m/26.9 m  | A1 ft  | 2 |    |
|                 | (d) $AD/54 = \cos ("29.8")$  | M1     |   |    |
|                 | 46.9 m (awrt)  | A1     |   |    |
|                 | "69.3" – "46.9"  | B1 ft  |   |    |
|                 | Seeing "26.8"/2  | B1 ft  |   |    |
|                 | $\sqrt{(("22.4")^2 + ("13.4")^2)}$                                       | M1     |   |    |
|                 | 26.1/26.2 m  | A1     | 6 |    |
|                 | (e) $h/ ("26.1") = \tan 40$  | M1     |   |    |
|                 | 21.9 m (Accept 22 or 22.0 m)   | A1ft   | 2 | 16 |



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