

4752

Mark Scheme

June 2005

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## Section A

|          |  |                              |  |    |
|----------|--|------------------------------|--|----|
| <b>1</b> | $1 + \frac{3}{2}x^{\frac{1}{2}}$   | 1+3                          | B2 for $kx^{\frac{1}{2}}$ , or M1 for $x^{\frac{3}{2}}$ seen before differentiation or B1 ft their $x^{\frac{3}{2}}$ correctly differentiated  | 4  |
| <b>2</b> | 1170   | 4                            | B1 for $a = 11$ and B1 for $d = 5$ or $20^{\text{th}}$ term = 106 and<br><br>M1 for $20/2[\text{their (a) + their(106)}]$ or $20/2[2\text{their (a)+ (20-1)} \times \text{their(d)}]$<br><u>OR</u> M1 for $6 \times 20$ and M2 for $5\left(\frac{20}{2}[20+1]\right)$ o.e. | 4  |
| <b>3</b> | $\pm\sqrt{13}/4$   | 3                            | B2 for $(-)\sqrt{13}/4$ or $\pm\sqrt{\frac{13}{16}}$<br><br>or M1 for $\sqrt{13}$ or $\sin^2\theta + \cos^2\theta = 1$ used  | 3  |
| <b>4</b> | $x + x^{-1}$ soi<br>$y' = 1 - 1/x^2$<br>subs $x = 1$ to get $y' = 0$<br>$y'' = 2x^{-3}$ attempted<br>Stating $y'' > 0$ so min cao          | B1<br>B1<br>B1<br>M1ft<br>A1 | $1 - x^{-2}$ is acceptable<br>Or solving $1 - x^{-2} = 0$ to obtain $x = 1$ or checking $y'$ before and after $x = 1$<br>Valid conclusion<br>First quadrant sketch scores B2   | 5  |
| <b>5</b> | (i) 1<br><br>(ii) -2<br><br>(iii) $6\log x$  | 1<br><br>2<br><br>2          | <br><br>M1 for $1/9 = 3^{-2}$ or $\log(1) - \log(3^2)$<br><br>base not reqd; M1 for $5\log x$ or $\log(x^6)$   | 5  |
| <b>6</b> | Correct curve thro' y axis<br>(0, 1) indicated on sketch or table<br><br>5.64  | G1<br>G1<br><br>3            | $y, y'$ & $y''$ all positive independent<br><br>B2 for other versions of 5.64(3....) or B1 for other ans 5.6 to 5.7<br>or M1 for $x \log 2 = \log 50$ and M1 for $x = \log 50 \div \log 2$   | 5  |
| <b>7</b> | $y = 7 - 3/x^2$ oe   | 5                            | B3 for $(y =) -3/x^2 + c$ [B1 for each of $k/x^2, k = -6/2$ and $+c$ ] and M1 for substituting (1, 4) in their attempted integration with $+c$ , the constant of integration   | 5  |
| <b>8</b> | (i) $66^\circ$ or 66.4 or 66.5....<br>293.58 .... to 3 or more sf cao<br><br>(ii) stretch (one way)<br>parallel to the $x$ -axis<br>sf 0.5 | B1<br>B1<br><br>1<br>1<br>1  | Allow 1.16 or 73.8<br>Lost for extras in range. Ignore extras outside the range<br><br>Horizontal, from $y$ axis, in $x$ axis, oe  | 5  |
|          |  |                              |  | 36 |

## Section B

|           |            |  |  |  |   |
|-----------|------------|--|--|--|---|
| <b>9</b>  | <b>i</b>   | $3x^2 - 20x + 12$  | 2  | B1 if one error “+c” is an error   | 2 |
|           | <b>ii</b>  | $y - 64 = -16(x - 2)$ o.e.<br>eg $y = -16x + 96$   | 4  | M1 for subst $x = 2$ in their $y'$<br>A1 for $y' = -16$ and B1 for $y = 64$  | 4 |
|           | <b>iii</b> | Factorising $f(x) \equiv (x + 2)(x - 6)^2$<br><br>OR Expanding $(x + 2)(x - 6)^2$  | B3<br><br>M2<br>E1                                       | or B1 for $f(-2) = -8 - 40 - 24 + 72 = 0$ and<br>B1 for $f'(6) = 0$ and<br>B1 dep for $f(6) = 0$   | 3 |
|           | <b>iv</b>  | $\frac{x^4}{4} - \frac{10x^3}{3} + 6x^2 + 72x$<br>value at $(x = 6) \sim$ value at $(x = -2)$<br>341(.3..) cao   | B2<br><br>M1<br>A1                                       | -1 for each error<br><br>Must have integrated $f(x)$   | 4 |
| <b>10</b> | <b>i</b>   | AB = 7.8(0), 7.798 to 7.799 seen<br><br>area = 52.2 to 52.3  | 2<br><br>2   | M1 for correct use of sine rule<br>For long methods M1A1 for art 7.8<br><br>M1 for $[2 \times][0.5 \times]$ their $AB \times 11.4 \times \sin 36^\circ$  | 4 |
|           | <b>ii</b>  | $\tan 0.91 = ST/12.6$<br>ST = $12.6 \times \tan 0.91$ and<br>completion (16.208...)<br><br>area OSTR = $[2 \times][0.5 \times]12.6 \times$<br>their(16.2) nb 204. ....<br>area of sector = $0.5 \times 12.6^2 \times 1.82$<br>=144.47...<br>Logo = 59.6 to 60.0<br><br>arc = $12.6 \times 1.82 [=22.9...]$<br>perimeter = 55.3 to 55.4 | M1<br>E1<br><br>M1<br><br>M1<br>A1<br>A1<br><br>M1<br>A1 | Accept 16.2 if ST is explicit but for<br>long methods with pa check that their<br>explicit expression = 16.2<br><br>oe using degrees<br>soi by correct ans Accept 144, 144.5<br><br>oe using degrees | 8 |
|           | <b>iii</b> | (GP with) $a = 1$ and $r = 3$<br>clear correct use GP sum formula  | M1<br>M1   | or M1 for $= 1 + 3 + 9 + \dots + 3^{n-1}$  | 2 |
|           | <b>iv</b>  | (A) 6 www<br>(B) 243   | 2<br>1   | M1 for $364 = (3^n - 1)/2$   | 3 |
| <b>11</b> | <b>v</b>   | their (ii) > 900<br>$(y - 1)\log 3 > \log 900$<br>$y - 1 > \log 900 \div \log 3$<br>$y = 8$ cao  | M1ft<br>M1ft<br>M1<br>B1                                 | -1 once for = or < seen: condone<br>wrong letter / missing brackets / no<br>base   | 4 |