# Mark Scheme 4752
# June 2005

**Section A**

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|---|---|---|---|---|
| **1** | $1+\frac{3}{2}x^{\frac{1}{2}}$ | 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 |
| **2** | 1170 | 4 | B1 for $a$ = 11 and B1 for $d$ = 5 or 20th term = 106 and<br>M1 for 20/2[their (a) + their(106)] or 20/2[2their (a)+ (20-1)×their(d)]<br>OR M1 for 6×20 and M2 for $5\left(\frac{20}{2}[20+1]\right)$ o.e. | 4 |
| **3** | ±√13/4 | 3 | B2 for (-) √13/4 or $\pm\sqrt{\frac{13}{16}}$<br>or M1 for √13 or $\sin^2\theta+\cos^2\theta=1$ used | 3 |
| **4** | $x + x^{-1}$ 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 | <br>$1 - x^{-2}$ is acceptable<br>Or solving $1 - x^{-2} = 0$ to obtain $x$ = 1<br>or checking $y'$ before and after $x$ = 1<br>Valid conclusion<br>First quadrant sketch scores B2 | 5 |
| **5** | (i) 1<br>(ii) –2<br>(iii) 6log $x$ | 1<br>2<br>2 | <br>M1 for $1/9=3^{-2}$ or log(1) – log($3^2$)<br>base not requd; M1 for 5 log $x$ or log($x^6$) | 5 |
| **6** | Correct curve thro' y axis<br>(0, 1) indicated on sketch or table<br>5.64 | G1<br>G1<br>3 | y, $y'$ & $y''$ all positive<br>independent<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 ÷ log 2 | 5 |
| **7** | $y = 7 - 3/x^2$ 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 |
| **8** | (i) 66° or 66.4 or 66.5….<br>293.58 …. to 3 or more sf cao<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**

| | | | | | |
|---|---|---|---|---|---|
| **9** | **i** | $3x^2 - 20x + 12$ | 2 | B1 if one error "+c" is an error | 2 |
| | **ii** | $y - 64 = -16(x - 2)$ 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 |
| | **iii** | Factorising $f(x) \equiv (x+2)(x-6)^2$<br>OR Expanding $(x+2)(x-6)^2$ | B3<br>M2<br>E1 | or B1 for $f(-2) = -8-40-24+72 = 0$ and B1 for $f'(6) = 0$ and<br>B1dep for $f(6)=0$ | 3 |
| | **iv** | $\frac{x^4}{4} - \frac{10x^3}{3} + 6x^2 + 72x$<br>value at ($x = 6$) ~ value at ($x = -2$)<br>341(.3..) cao | B2<br>M1<br>A1 | -1 for each error<br>Must have integrated $f(x)$ | 4 |
| **10** | **i** | AB = 7.8(0), 7.798 to 7.799 seen | 2 | M1 for correct use of sine rule<br>For long methods M1A1 for art 7.8 | |
| | | area = 52.2 to 52.3 | 2 | M1 for [2×][0.5 ×] their AB × 11.4 × sin 36° | 4 |
| | **ii** | tan 0.91 = ST/12.6<br>ST = 12.6 × tan 0.91 and completion (16.208...) | M1<br>E1 | Accept 16.2 if ST is explicit but for long methods with pa check that their explicit expression = 16.2 | |
| | | area OSTR = [2×][0.5 ×]12.6 × their(16.2) nb 204. ….<br>area of sector = $0.5 \times 12.6^2 \times 1.82$ =144.47…<br>Logo = 59.6 to 60.0 | M1<br>M1<br>A1<br>A1 | oe using degrees<br>soi by correct ans Accept 144, 144.5 | |
| | | arc = 12.6 × 1.82 [=22.9...]<br>perimeter = 55.3 to 55.4 | M1<br>A1 | oe using degrees | 8 |
| **11** | **i** | 81 | 1 | | 1 |
| | **ii** | $(1x)3^{n-1}$ | 1 | | 1 |
| | **iii** | (GP with) $a = 1$ and $r = 3$<br>clear correct use GP sum formula | M1<br>M1 | or M1 for = $1+3+9+ \ldots +3^{n-1}$ | 2 |
| | **iv** | (A) 6 www<br>(B) 243 | 2<br>1 | M1 for $364 = (3^n - 1)/2$ | 3 |
| | **v** | 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 wrong letter / missing brackets / no base | 4 |