# Mark Scheme 4752
# January 2007

Section A

| | | | | |
|---|---|---|---|---|
| **1** | $\frac{5}{2}\times 6x^{\frac{3}{2}}$ | 1+1 | - 1 if extra term | 2 |
| **2** | $-0.2$ | 3 | M1 for $5=\frac{6}{1-r}$ and M1 dep for correct constructive step | 3 |
| **3** | $\sqrt{8}$ or $2\sqrt{2}$ not $\pm\sqrt{8}$ | 3 | M1 for use of $\sin^2\theta+(1/3)^2=1$<br>and M1for $\sin\theta=\sqrt{8}/3$ (ignore ±)<br>Diag.: hypot = 3, one side =1 M1<br>3rd side $\sqrt{8}$ M1 | 3 |
| **4** | (i) C<br>(ii) B<br>(iii) $2^{n-1}$ | 1<br>1<br>1 | | 3 |
| **5** | (i) −0.93, -0.930, -0.9297…<br><br>(ii) answer strictly between 1.91 and 2 or 2 and 2.1<br><br>(iii) $y' = -8/x^3$ , gradient = −1 | 2<br><br>B1<br><br>M1A1 | M1 for grad = (1 – their $y_B$)/(2 − 2.1)<br>if M0, SC1 for 0.93<br>don't allow 1.9 recurring | 5 |
| **6** | At least one cycle from (0, 0) amplitude 1 and period 360[°] indicated<br><br>222.8 to 223 and 317 to 317.2 [°] | G1<br><br>G1dep<br><br>2 | 1 each, ignore extras | 4 |
| **7** | $x < 0$ and $x > 6$ | 3 | B2 for one of these or for 0 and 6 identified or M1 for $x^2 - 6x > 0$ seen<br>(M1 if y found correctly and sketch drawn) | 3 |
| **8** | $a + 6d = 6$ correct<br>$30=\frac{10}{2}(2a+9d)$ correct o.e.<br>elimination using their equations<br>$a = -6$ and $d = 2$<br>5th term = 2 | M1<br><br>M1<br>M1f.t.<br>A1<br>A1 | Two equations in a and d | 5 |
| **9** | $(y =) 2x^3 + 4x^2 - 1$<br><br>accept $2x^3 + 4x^2 + c$ and $c = -1$ | 4 | M2 for $(y =) 2x^3 + 4x^2 + c$ (M1 if one error) and M1 for subst of (1, 5) dep on their y =, +c, integration attempt. | 4 |
| **10** | (i) $3\log_a x$<br>ii) $b=\frac{1000}{c}$ | 2<br><br>2 | M1 for $4\log_a x$ or $-\log_a x$; or $\log x^3$<br><br>M1 for 1000 or $10^3$ seen | 4 |

Section B

| | | | | | |
|---|---|---|---|---|---|
| **11** | **i** | Correct attempt at cos rule<br>correct full method for C<br>C = 141.1…<br>bearing = [0]38.8 cao | M1<br>M1<br>A1<br>A1 | any vertex, any letter<br><br><br>or B4 | 4 |
| | **ii** | ½ × 118 × 82 × sin their C or supp.<br>3030 to 3050 [$m^2$] | M1<br>A1 | or correct use of angle A or angle B | 2 |
| | **iiiA** | sin (θ/2) = ( ½ × 189)/130<br><br>1.6276 → 1.63 | M1<br><br>A1 | or cosθ = ($130^2$+$130^2$-$189^2$)/(2x130x130)<br>In all methods, the more accurate number to be seen. | 2 |
| | **iiiB** | 0.5 × $130^2$ × sin 1.63<br>0.5 × $130^2$ × 1.63<br>their sector – their triangle AOB<br>5315 to 5340 | M1<br>M1<br>M1<br>A1 | condone their θ (8435)<br>condone their θ in radians (13770)<br>dep on sector > triangle | 4 |
| **12** | **i** | (2*x* − 3)(*x* − 4)<br>*x* = 4 or 1.5 | M1<br>A1A1 | or (11 ±√(121 – 96))/4<br>if M0, then B1 for showing *y* = 0 when *x* = 4 and B2 for x = 1.5 | 3 |
| | **ii** | *y*′ = 4*x* − 11<br>= 5 when *x* = 4 c.a.o.<br>grad of normal = −1/their *y*′<br>*y*[ − 0 ]=<u>their</u> −0.2 (*x* − 4)<br><br>y-intercept for <u>their</u> normal<br>area = ½ × 4 × 0.8 c.a.o. | M1<br>A1<br>M1f.t.<br>M1<br><br>B1f.t.<br>A1 | condone one error<br><br><br>or 0 = their (-0.2)x4 + c dep on normal attempt<br>s.o.i. normal must be linear or<br>integrating <u>their</u> f(x) from 0 to 4 M1 | 6 |
| | **iii** | $\frac{2}{3}x^3 - \frac{11}{2}x^2 + 12x$<br>attempt difference between value at 4 and value at 1.5<br>[−]$5\frac{5}{24}$ o.e. or [−]5.2(083..) | M1<br>M1<br><br>A1 | condone one error, ignore + c<br>ft their (i), dep on integration attempt. c.a.o. | 3 |
| **13** | **i** | $\log_{10} y = \log_{10} k + \log_{10} 10^{ax}$<br>$\log_{10} y = ax + \log_{10} k$ compared to y = mx+c | M1<br>M1 | | 2 |
| | **ii** | 2.9(0), 3.08, 3.28, 3.48, 3.68<br>plots [tol 1 mm]<br>ruled line of best fit drawn | T1<br>P1f.t<br>L1f.t. | condone one error | 3 |
| | **iii** | intercept = 2.5 approx<br>gradient = 0.2 approx<br>y = their 300x $10^{x(\text{their } 0.2)}$<br>or y = $10^{(\text{their } 2.5 + \text{their } 0.2x)}$ | M1<br>M1<br>M1f.t. | or y – 2.7 = m(x – 1) | 3 |
| | **iv** | subst 75000 in any x/y eqn<br>subst in a correct form of the relationship<br>11,12 or 13 | M1<br>M1<br><br>A1 | B3 with evidence of valid working | 3 |
| | **v** | "Profits change" or any reason for this. | R1 | too big, too soon | 1 |