| Question Number | Scheme | Notes | Marks |
|---|---|---|---|
| **2(i)** | $3x^2+12x+24=3\left(x^2+4x+8\right)$<br>$=3\left(\left(x+2\right)^2+4\right)$ | Obtains $3\left(\left(x+2\right)^2+...\right)$ or<br>$3\left(x+2\right)^2+...$<br>Must include 3 now or later | M1 |
| | $3\left(\left(x+2\right)^2+4\right)$ or $3\left(x+2\right)^2+12$ | | A1 |
| | $\int \frac{1}{3x^2+12x+24}\,\mathrm{d}x=\frac{1}{3}\int \frac{1}{\left(x+2\right)^2+4}\,\mathrm{d}x=\frac{1}{6}\arctan\frac{x+2}{2}\left(+c\right)$<br>M1: Use of arctan<br>A1: Fully correct expression (condone omission of + $c$) | | M1A1 |
| | | | **(4)** |
| **(ii)** | $27-6x-x^2=-\left(x^2+6x-27\right)$<br>$=-\left(\left(x+3\right)^2-36\right)$ | Obtains $-\left(\left(x+3\right)^2+...\right)$ or<br>$-\left(x+3\right)^2+...$ | M1 |
| | $-\left(\left(x+3\right)^2-36\right)$ or $36-\left(x+3\right)^2$ | | A1 |
| | $\int \frac{1}{\sqrt{27-6x-x^2}}\,\mathrm{d}x=\int \frac{1}{\sqrt{36-\left(x+3\right)^2}}\,\mathrm{d}x=\arcsin\left(\frac{x+3}{6}\right)\left(+c\right)$<br>(Or $=-\arccos\left(\frac{x+3}{6}\right)\left(+c\right)$)<br>M1: Use of arcsin (or – arccos)<br>A1: Fully correct expression (condone omission of + $c$) | | M1A1 |
| | | | **(4)** |
| | | | **Total 8** |