| Question Number | Scheme | Notes | Marks |
|---|---|---|---|
| **5(i)** | $x^2-3x+5=\left(x-\frac{3}{2}\right)^2+\frac{11}{4}$ | Correct completion of the square | B1 |
| | $\int \frac{1}{\sqrt{x^2-3x+5}}\,\mathrm{d}x=\int \frac{1}{\sqrt{\left(x-\frac{3}{2}\right)^2+\frac{11}{4}}}\,\mathrm{d}x=\sinh^{-1}\frac{2x-3}{\sqrt{11}}(+c)$<br>M1: Use of $\sinh^{-1}$<br>A1: Fully correct expression (condone omission of $+c$)<br>Allow equivalent correct expressions e.g. $\sinh^{-1}\frac{x-\frac{3}{2}}{\sqrt{\frac{11}{4}}}(+c)$, $\sinh^{-1}\frac{x-\frac{3}{2}}{\frac{\sqrt{11}}{2}}(+c)$<br>Allow equivalents for $\sinh^{-1}$ e.g. arsinh, arcsinh but **not** arsin or arcsin | | M1A1 |
| | You may see logarithmic forms for the answer:<br>e.g. $\ln\left(\frac{2x-3}{\sqrt{11}}+\sqrt{\left(\frac{2x-3}{\sqrt{11}}\right)^2+1}\right)$, $\ln\left(x-\frac{3}{2}+\sqrt{\left(x-\frac{3}{2}\right)^2+\frac{11}{4}}\right)$<br>but apply isw once a correct answer is seen. | | |
| | | | **(3)** |
| **(ii)** | $63+4x-4x^2=-4\left(x^2-x-\frac{63}{4}\right)$<br>$=-4\left(\left(x-\frac{1}{2}\right)^2-\frac{64}{4}\right)$ | Obtains $-4\left(\left(x-\frac{1}{2}\right)^2\pm\ldots\right)$ or<br>$-4\left(x-\frac{1}{2}\right)^2\pm\ldots$ or $\ldots-(2x-1)^2$ | M1 |
| | $-4\left(\left(x-\frac{1}{2}\right)^2-16\right)$ or $64-4\left(x-\frac{1}{2}\right)^2$<br>or<br>$64-(2x-1)^2$ | Correct completion of the square | A1 |
| | $\int \frac{1}{\sqrt{63+4x-4x^2}}\,\mathrm{d}x=\frac{1}{2}\sin^{-1}\left(\frac{2x-1}{8}\right)(+c)$<br>M1: Use of $\sin^{-1}$<br>A1: Fully correct expression (condone omission of $+c$)<br>Allow equivalent correct expressions e.g. $\frac{1}{2}\sin^{-1}\frac{x-\frac{1}{2}}{4}(+c)$, $-\frac{1}{2}\sin^{-1}\frac{\frac{1}{2}-x}{4}(+c)$<br>Allow equivalents for $\sin^{-1}$ e.g. arsin, arcsin but not arsinh or arcsinh | | M1A1 |
| | | | **(4)** |
| | In (ii) there are no marks for using $\int \frac{1}{\sqrt{63+4x-4x^2}}\,\mathrm{d}x=-\int \frac{1}{\sqrt{4x^2-63-4x}}\,\mathrm{d}x$<br>But if completion of square attempted first allow M1A1 e.g. for<br>$\int \frac{1}{\sqrt{63+4x-4x^2}}\,\mathrm{d}x=\int \frac{1}{\sqrt{64-(2x-1)^2}}\,\mathrm{d}x$ but then M0 for $=\int \frac{-1}{\sqrt{(2x-1)^2-64}}\,\mathrm{d}x$ | | |
| | | | **Total 7** |