| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 11 | Full, complete and actioned method to find the first area:<br>$A$ or $\frac{1}{2}A$ or $B$ or $\frac{1}{2}B$ | **5** | **B1 for** $\left[\mathrm{F}(x)=\right]\int (1+\cos x)\,\mathrm{d}x = x+\sin x$ oe<br>**B1** for the area of an appropriate rectangle or rectangles soi<br>**M1** for correct use of correct limits to find an appropriate area under the curve<br>**A1** for the accurate area under the curve<br>**B1** for area $A$ or $\frac{1}{2}A$ or $B$ or $\frac{1}{2}B$<br>OR<br>**M1** for attempting to integrate sin$x$ or $\pm\cos x$<br>**M1** dep for using correct limits<br>**A1** for a correctly integrated expression with correct limits<br>**M1** for correct use of correct limits<br>**A1** for exact value $A = 2$<br>OR<br>equivalent correct plan |
| | Full, complete and actioned method to find the second, corresponding area | **3** | **B1** for Area($A + B$) or $\frac{1}{2}$Area($A + B$) oe<br>**M1** for using Area($A + B$) to find $A$ or $B$ or for using $\frac{1}{2}$Area($A + B$) to find $\frac{1}{2}A$ or $\frac{1}{2}B$ oe<br>**A1** for exact value<br>OR<br>**B1** for $4\pi - \left(2\int_0^{\frac{\pi}{2}}(1+\cos x)\mathrm{d}x + \left(\frac{3\pi}{2}-\frac{\pi}{2}\right)\right)$ oe<br>**M1** for correct use of correct limits<br>**A1** for exact value $B = 2\pi - 2$<br>OR<br>equivalent correct plan |
| | $k = \pi - 1$ cao | **B1** | **dep** on all previous marks; allow $k = \frac{2\pi - 2}{2}$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 12 | $x^{\frac{1}{2}} + 2 + x^{-\frac{1}{2}}$ | **B2** | **B1** for $(x^{\frac{1}{4}} + x^{-\frac{1}{4}})^2$ or $\frac{x + 2\sqrt{x} + 1}{\sqrt{x}}$ oe seen<br>or for two terms correct in $x^{\frac{1}{2}} + 2 + x^{-\frac{1}{2}}$ |
| | At least two terms correct in *their* $\left[\frac{dy}{dx} =\right] \frac{2}{3}x^{\frac{3}{2}} + 2x + 2x^{\frac{1}{2}} (+c)$ | **M1** | **FT** *their* $x^{\frac{1}{2}} + 2 + x^{-\frac{1}{2}}$ providing at least two terms correct and no extra spurious terms |
| | $\frac{4}{3} = \frac{2}{3}\left[1^{\frac{3}{2}}\right] + 2[1] + 2\left[1^{\frac{1}{2}}\right] + c$ | **M1** | **dep** on previous **M1** and having an arbitrary constant; condone one sign or arithmetic slip |
| | $\int\left(\frac{2}{3}x^{\frac{3}{2}} + 2x + 2x^{\frac{1}{2}} - \frac{10}{3}\right)dx$<br>$= \frac{4}{15}x^{\frac{5}{2}} + x^2 + \frac{4}{3}x^{\frac{3}{2}} - \frac{10}{3}x + A$ | **A1** | **FT** *their* $-\frac{10}{3}$ |
| | $-1 = \frac{4}{15}\left[1^{\frac{5}{2}}\right] + 1^{[2]} + \frac{4}{3}\left[1^{\frac{3}{2}}\right] - \frac{10}{3}[1] + A$ | **M1** | **dep** on previous **A1**; condone one sign or arithmetic slip |
| | $y = \frac{4}{15}x^{\frac{5}{2}} + x^2 + \frac{4}{3}x^{\frac{3}{2}} - \frac{10}{3}x - \frac{4}{15}$ oe | **A1** | |