| Question Number | Scheme | Marks |
|---|---|---|
| **1.** | $4x^2 - 9 = 0 \quad x = (\pm)\dfrac{3}{2} \quad$ or $\dfrac{3}{2}$ seen as upper limit | B1 |
| | $V = \displaystyle\int_0^{\frac{3}{2}} \pi y^2 \mathrm{d}x = \pi \int_0^{\frac{3}{2}} \left(4x^2 - 9\right)^2 \mathrm{d}x$ | M1 |
| | $= \pi \displaystyle\int_0^{\frac{3}{2}} \left(16x^4 - 72x^2 + 81\right) \mathrm{d}x$ | A1 |
| | $= \pi \left[ \dfrac{16}{5}x^5 - 24x^3 + 81x \right]_0^{\frac{3}{2}}$ | M1d |
| | $= 203.57... = 204 \quad$ (units$^3$ ) | A1 |
| | | **[5]** |

<div align="center"><u>**Notes**</u></div>

B1     for $x = \dfrac{3}{2}$ allow $\{ x = \pm \dfrac{3}{2} \}$ . Award when seen anywhere in the question.

M1     for a correct statement for the volume of revolution, which **must** include $\pi$ **and** the function squared. Ignore limits for this mark. Ignore a missing d$x$.

        If $\pi$ is seen at the end of the question, (you will see this) award this mark.

A1     for a fully correct expanded expression as shown for the volume of revolution with **both** correct limits. You may not see this expression. The mark can be awarded as implied by the **correct** integrated expression seen.

M1d    for an attempt at integrating their expression for the volume, which must contain as a minimum, $Ax^4$ as their highest power of $x$, and $\pi$. Award for $x^n \to x^{n+1}$ seen in one term in $x$, or even for their $81 \to 81x$ .

        **Note: this M mark is dependent on the first being awarded.**

A1     204 (units$^3$ ) cao Do **NOT** accept an answer of 204 (units$^3$) with no integration seen. If the volume is left as negative withhold this mark. If they change a negative to a positive (due to limits being wrong way around), then you can award this mark.