Section 1: Further volumes of revolution

Notes and Examples

These notes contain subsections on

Review: volumes of revolution

In AS Further Mathematics, you learned to use integration to find volumes of revolution. You may now need to apply the new integrals you have learned to these situations.

The volume of the solid of revolution formed when the section of the curve $y = \mathrm{f}(x)$ between $x = a$ and $x = b$ is rotated through 360° about the x−axis is given by

$$V = \int_a^b \pi y^2 \, \mathrm{d}x$$

The volume of the solid of revolution formed when the section of the curve $y = \mathrm{f}(x)$ between $y = c$ and $y = d$ is rotated through 360° about the y−axis is given by

$$V = \int_c^d \pi x^2 \, \mathrm{d}y$$

Using parametric coordinates

If the function is given in parametric form, these formulae can be adapted as follows:

$$V = \int_{t_1}^{t_2} \pi y^2 \, \frac{\mathrm{d}x}{\mathrm{d}t} \mathrm{d}t$$

$$V = \int_{t_1}^{t_2} \pi x^2 \, \frac{\mathrm{d}y}{\mathrm{d}t} \mathrm{d}t$$