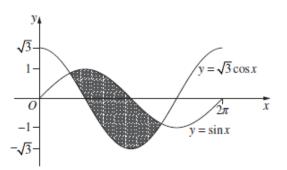**MA SP** | **35** Band 3-6 | The diagram shows the curves $y = \sin x$ and $y = \sqrt{3}\,\cos x$. | **4**

Find the area of the shaded region.

Firstly, points of intersection:

$$\sin x = \sqrt{3}\,\cos x$$

$$\tan x = \sqrt{3}$$

$$x = \frac{\pi}{3},\ \frac{4\pi}{3}$$

$$\text{Area} = \int_{\frac{\pi}{3}}^{\frac{4\pi}{3}} \left(\sin x - \sqrt{3}\,\cos x\right)dx$$

$$= \left[-\cos x - \sqrt{3}\,\sin x\right]_{\frac{\pi}{3}}^{\frac{4\pi}{3}}$$

$$= -\cos\frac{4\pi}{3} - \sqrt{3}\,\sin\frac{4\pi}{3} - \left(-\cos\frac{\pi}{3} - \sqrt{3}\,\sin\frac{\pi}{3}\right)$$

$$= \frac{1}{2} + \frac{3}{2} + \frac{1}{2} + \frac{3}{2}$$

$$= 4 \qquad\qquad \therefore\ \text{area is 4 units}^2.$$

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by NESA.

Looking for **Mathematics Advanced** Topic Revision?

Go to our *MathsFit* page for downloads @ $2.95 each