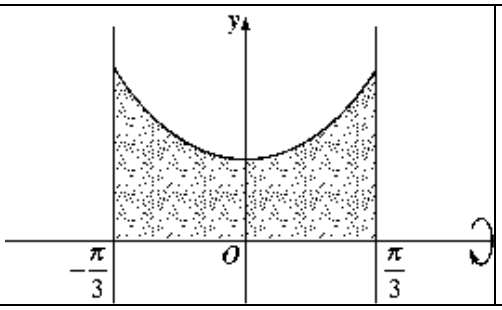
09	6a	The diagram shows the region bounded by the curve $y = \sec x$, the lines $x = \frac{\pi}{3}$ and $x = -\frac{\pi}{3}$, and the x-axis. The region is rotated about the x-axis. Find the volume of the solid of revolution formed.		2

Volume $= \pi\int y^2\ dx$. As $y = \sec x$, then $y^2 = \sec^2 x$. Also, $y = \sec x$ is even function.

$$= 2\pi\int_0^{\frac{\pi}{3}} \sec^2 x\ dx$$

$$= 2\pi\ [\tan x]_0^{\frac{\pi}{3}}$$

$$= 2\pi[\tan\tfrac{\pi}{3} - \tan 0]$$

$$= 2\pi\ [\sqrt{3} - 0]$$

$$= 2\pi\sqrt{3}$$

$\therefore$ volume is $2\pi\sqrt{3}$ units^3

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

This part of the question was generally done well, with most candidates beginning with $\pi\int y^2 dx$ and almost all of these successfully progressing to the correct answer. About half the candidates utilised the fact that the area required was symmetrical about the y-axis.

Those candidates who attempted this part but did not score full marks often did not correctly evaluate $\tan\frac{\pi}{3}$ or were careless with negative signs in the evaluation of either $\tan\left(-\frac{\pi}{3}\right)$ or $\left[\sqrt{3} - -\sqrt{3}\right]$.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/