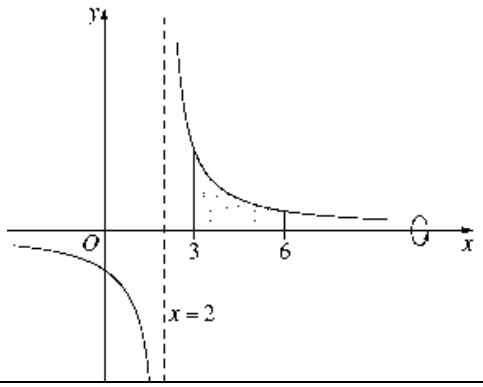
08	6c		3

The graph of $y = \frac{5}{x-2}$ is shown. The shaded region in the diagram is bounded by the curve $y = \frac{5}{x-2}$, the x-axis, and the lines $x = 3$ and $x = 6$.
Find the volume of the solid of revolution formed when the shaded region is rotated about the x-axis.



$$y = \frac{5}{x-2}$$

$$y^2 = \frac{25}{(x-2)^2}$$

$$\text{Volume} = \pi\int y^2\ dx$$

$$= \pi\int_3^6 \frac{25}{(x-2)^2}\ dx$$

$$= 25\pi\int_3^6 (x-2)^{-2}\ dx$$

$$= 25\pi\left[\frac{(x-2)^{-1}}{-1}\right]_3^6$$

$$= -25\pi\left[\frac{1}{x-2}\right]_3^6$$

$$= -25\pi\left[\left(\frac{1}{6-2} - \frac{1}{3-2}\right)\right]$$

$$= -25\pi\left[\frac{1}{4} - 1\right]$$

$$= -25\pi\left[\frac{-3}{4}\right]$$

$$= \frac{75\pi}{4}$$

$\therefore$ volume of $\frac{75\pi}{4}$ unit^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

In this part, mid-range responses demonstrated that they understood the method for finding the volume of a solid of revolution but many subsequently had difficulty in finding a primitive of $\frac{25}{(x-2)^2}$. There were many algebraic mistakes such as assuming that $\frac{25}{x^2-4x+4} = \frac{25}{x^2} - \frac{25}{4x} + \frac{25}{4}$. Some candidates did not find the square of y and hence changed it into a logarithmic integral or were overly keen to use logs simply because the function had a fraction.

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