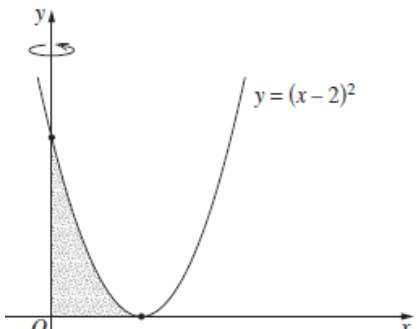


13	15 b	<p>The region bounded by the x-axis, the y-axis and the parabola $y = (x - 2)^2$ is rotated about the y-axis to form a solid.</p> <p>Find the volume of the solid.</p>		4
-----------	-----------------------	--	--	----------

State Mean:
1.57/4

$$y = (x - 2)^2$$

$$(x - 2)^2 = y$$

$$x - 2 = \pm \sqrt{y}$$

$$x = 2 \pm \sqrt{y}$$

But, subs $x = 0$ and $y = 4$ in $x = 2 \pm \sqrt{y}$:

$$0 = 2 \pm \sqrt{4}$$

$$\therefore \text{ must be } x = 2 - \sqrt{y}$$

$$V = \pi \int_0^4 (2 - \sqrt{y})^2 dx$$

$$= \pi \int_0^4 (4 - 4y^{\frac{1}{2}} + y) dx$$

$$= \pi \left[4y - \frac{8y^{\frac{3}{2}}}{3} + \frac{y^2}{2} \right]_0^4$$

$$= \pi \left(16 - \frac{64}{3} + 8 - 0 \right)$$

$$= \frac{8\pi}{3}$$

$$\therefore \frac{8\pi}{3} \text{ units}^3$$

* 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

Common problems were:

- finding the volume of the solid of revolution around the x -axis, not the y -axis
- not correctly making x the subject
- not breaking the parabola up into 2 branches
- after making x the subject, incorrectly stating that $x^2 = 4 + y$ or $x^2 = 4 \pm 2\sqrt{y} + y$
- using the right-hand branch $x = \sqrt{y} + 2$ instead of the left hand branch $x = 2 - \sqrt{y}$

- expanding a perfect square incorrectly
- not being able to identify and use limits
- mixing the two variables of x and y together in the integrand
- omitting π
- not squaring the function
- giving decimal approximations instead of exact answers.

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