

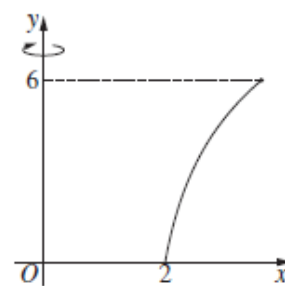


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- 2015 16** A bowl is formed by rotating the curve $y = 8 \log_e(x - 1)$
b about the y -axis for $0 \leq y \leq 6$.

Find the volume of the bowl.
 Give your answer correct to 1 decimal place.

Not to scale



3

$$y = 8 \log_e(x - 1)$$

$$\frac{y}{8} = \log_e(x - 1)$$

$$x - 1 = e^{\frac{y}{8}}$$

$$x = e^{\frac{y}{8}} + 1$$

$$x^2 = (e^{\frac{y}{8}} + 1)^2$$

$$= e^{\frac{y}{4}} + 2e^{\frac{y}{8}} + 1$$

$$V = \pi \int_0^6 x^2 dy$$

$$= \pi \int_0^6 \left(e^{\frac{y}{4}} + 2e^{\frac{y}{8}} + 1 \right) dy$$

$$= \pi \left[4e^{\frac{y}{4}} + 16e^{\frac{y}{8}} + y \right]_0^6$$

$$= \pi (4e^{1.5} + 16e^{0.75} + 6 - (4e^0 + 16e^0 + 0))$$

$$= 118.7482959\dots$$

$$= 118.7 \text{ (1 dec pl)}$$

\therefore the volume is 118.7 units³.

State Mean:
1.14

* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by BOSTES.

Board of Studies: Notes from the Marking Centre

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