



PERFECT
SOLUTION
EDUCATION
GROUP

JC MATHEMATICS (H2) STUDY TIPS

**WHY INTEGRATE? USING
STANDARD FORMULAS FOR
ROTATED SOLIDS**

PREPARED BY
Mr Jackie Lee



www.h2maths.com

JC_H2Maths_016

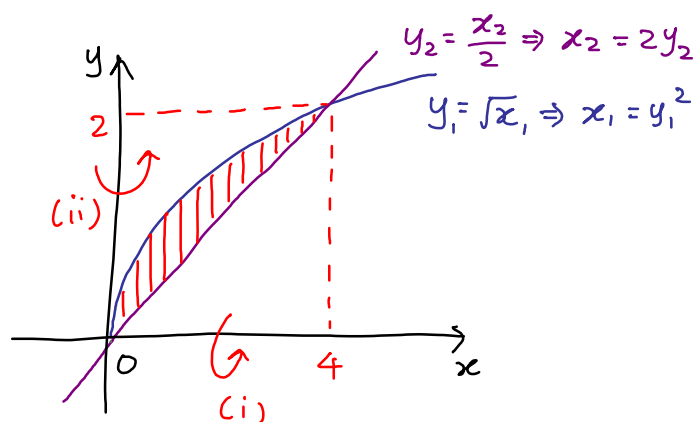


• Volume of Revolution generated by the region between 2 curves

		$\pi \int_{x_1}^{x_2} (y_1^2 - y_2^2) dx$
		$\pi \int_{y_1}^{y_2} (x_1^2 - x_2^2) dy$

Example 34

The region R is bounded by the curve $y = \sqrt{x}$ and the line $y = \frac{x}{2}$. Find the exact volumes of the solids of revolution obtained when the region R is rotated through 2π radians about (i) the x -axis and (ii) the y -axis respectively.



(i) Required Volume

$$\begin{aligned}
 &= \pi \int_0^4 y_1^2 dx - \pi \int_0^4 y_2^2 dx \\
 &= \pi \int_0^4 x dx - \frac{1}{3} \pi (2)^2 (4) \\
 &= \pi \left[\frac{x^2}{2} \right]_0^4 - \frac{16\pi}{3} \\
 &= \frac{\pi}{2} (16 - 0) - \frac{16\pi}{3} = \frac{8\pi}{3} \text{ units}^3
 \end{aligned}$$

(ii) Required Volume

$$\begin{aligned}
 &= \pi \int_0^2 x_2^2 dy - \pi \int_0^2 x_1^2 dy \\
 &= \frac{1}{3} \pi (4)^2 (2) - \pi \int_0^2 (y^2)^2 dy = \frac{32\pi}{3} - \pi \left[\frac{y^5}{5} \right]_0^2 = \frac{32\pi}{3} - \frac{32\pi}{5} = \frac{64\pi}{15} \text{ units}^3
 \end{aligned}$$



PERFECT
SOLUTION
EDUCATION
GROUP

JC MATHEMATICS (H2)

STUDY TIPS

Explanation

You can easily spot these shortcut opportunities by looking closely at the axis of rotation. Whenever your shaded region is bordered by a horizontal, vertical, or slanted line, rotating it will always form a standard geometric solid.

Instead of integrating that specific section, you can simply calculate the volume of the resulting cylinder or cone using your basic school formulas and subtract it from the total volume.

This trick is especially useful for handling the blank gaps or outer boundaries in washer-method problems.

Always check the shape of your boundaries first to see if you can skip the calculus entirely.

This content is extracted from our lesson resources. Welcome to contact us for more tailor-made and in-depth learning.



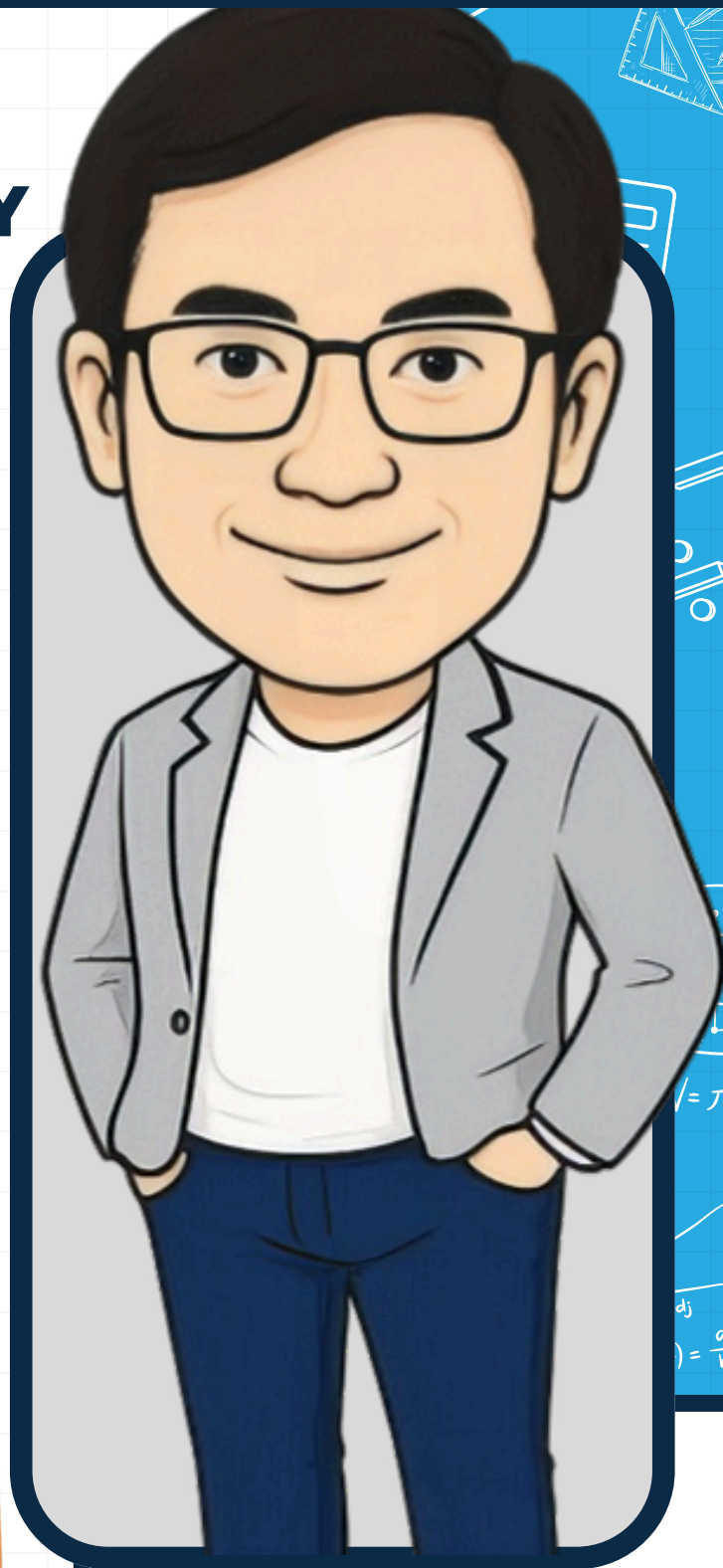
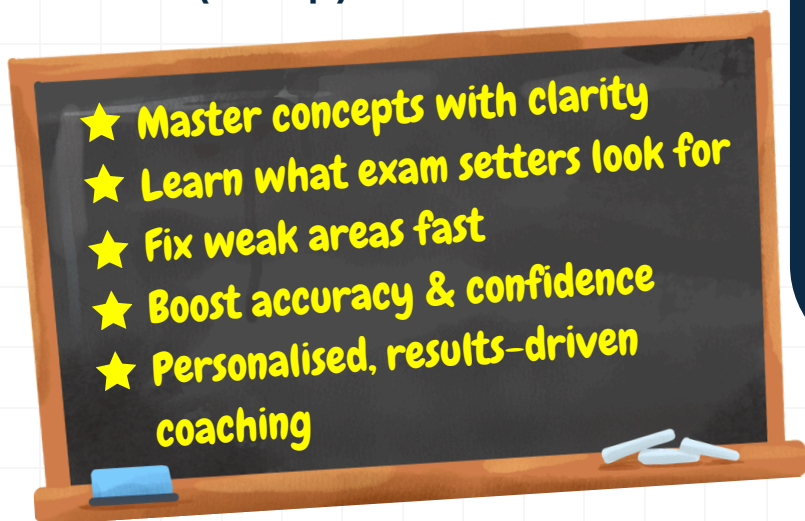
SIGN UP NOW BEFORE IT'S TOO LATE



MATHS TUITION BY MR JACKIE LEE

Online • Face-to-Face • 1-to-1 • Group

- ✓ Former MOE Scholar
- ✓ Winner of International Mathematics Competitions
- ✓ PGDE Qualification (NIE) with **Distinction in Mathematics**
- ✓ Former **School Maths Teacher** in
 - Nan Hua High School
 - Raffles Institution
 - Anglo Chinese School (Indep)



Find out more about our
classes and courses at
www.h2maths.com



Scan to
WhatsApp



90705626