PERFECT SOLUTION EDUCATION GROUP

JC MATHEMATICS (H2)

STUDY TIPS

SPECIAL TRICKS THAT CAN KEEP VARIABLE SEPARABLE METHOD CLEAN AND SIMPLE

PREPARED BY
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JC_H2Maths_027

- **Type 2:** $\dfrac{\mathrm{d}y}{\mathrm{d}x} = f(x)g(y)$

Example 8

Solve $\dfrac{\mathrm{d}y}{\mathrm{d}x} = x(2y+1)$.

$$\frac{1}{2}\int \frac{2}{2y+1}\,\mathrm{d}y = \int x\,\mathrm{d}x$$

$$\frac{1}{2}\ln|2y+1| = \frac{x^2}{2} + C$$

$$\ln|2y+1| = x^2 + 2C$$

$$|2y+1| = e^{x^2+2C}$$

$$2y+1 = \pm e^{2C}\,e^{x^2}$$

$$y = \frac{1}{2}\left(Ae^{x^2} - 1\right), \quad \text{where } A = \pm e^{2C}$$

Quick Practice

Solve $\dfrac{\mathrm{d}y}{\mathrm{d}x} = x^2(1-2y)$.

$$-\frac{1}{2}\int \frac{-2}{1-2y}\,\mathrm{d}y = \int x^2\,\mathrm{d}x$$

$$-\frac{1}{2}\ln|1-2y| = \frac{x^3}{3} + C$$

$$\ln|1-2y| = -\frac{2x^3}{3} - 2C$$

$$1-2y = \pm e^{-2C}\,e^{-\frac{2x^3}{3}}$$

$$y = \frac{1}{2}\left(1 - Ae^{-\frac{2x^3}{3}}\right), \quad \text{where } A = \pm e^{-2C}$$

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Explanation

When executing the separation of variables method, treat the differential positions as anchors and cross-multiply variable terms toward their matching differentials on either side.

It is highly advantageous to leave numerical coefficients on the right-hand side, as keeping the left-hand side minimal prevents unnecessarily complex integration steps and reduces algebraic errors.

However, care must be taken with composite expressions, as terms bound by addition or subtraction must be moved collectively as a single algebraic unit.

Maintaining this clean separation ensures a streamlined path through the integration phase, ultimately facilitating a more systematic and efficient solution.

SIGN UP NOW BEFORE IT'S TOO LATE

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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
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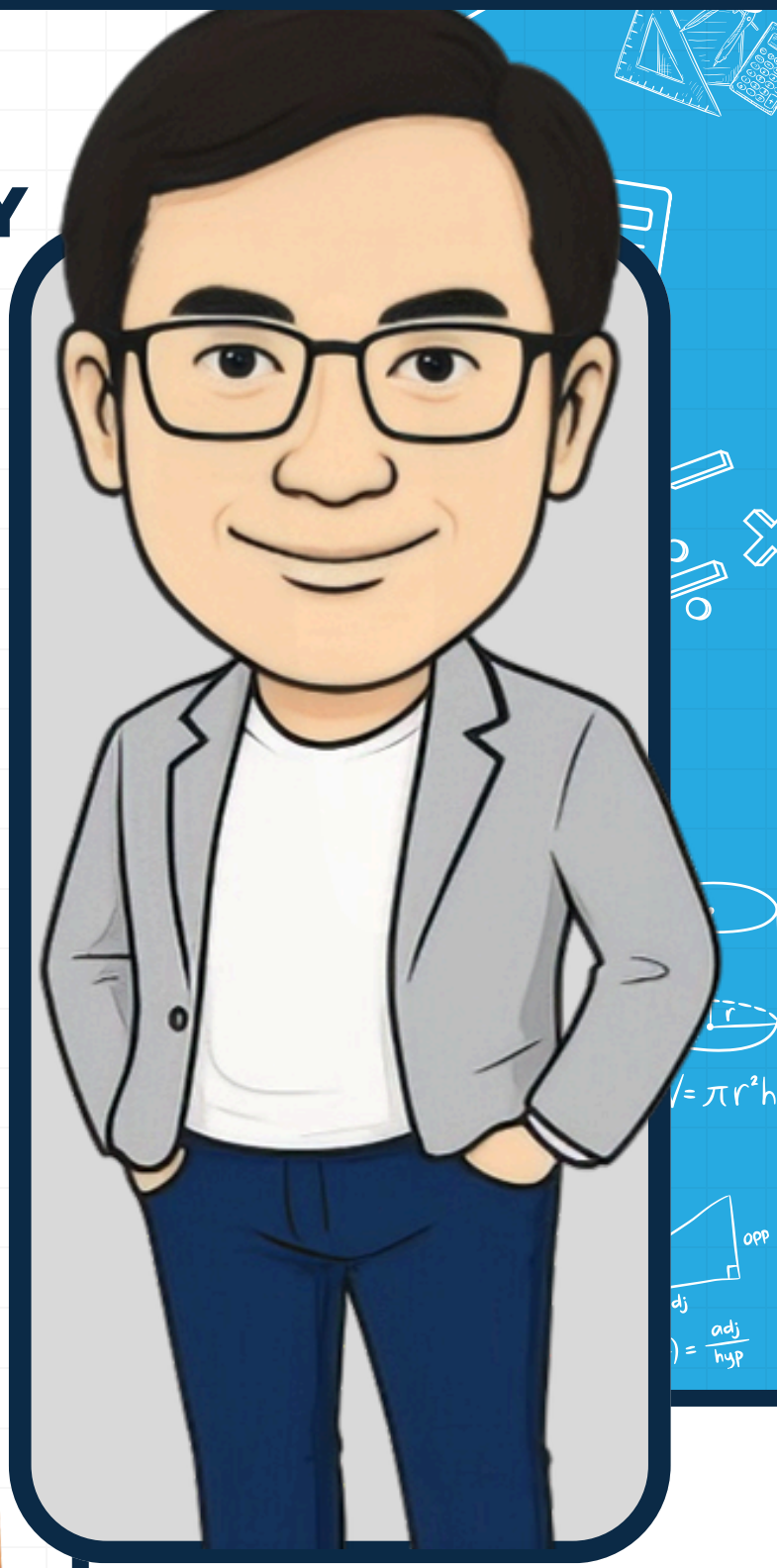

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