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JC MATHEMATICS (H2) STUDY TIPS

**A GOLDEN RULE OF LINEAR
REGRESSION: THE MEAN VALUES
HOLD THE KEY**

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JC_H2Maths_012



Don't Do This

In general, regression line may not necessarily contain any given data point.

The only point that both regression lines must pass through is $(\bar{x}, \bar{y})$.



(b) It is given the following data,

x	2.1	3.5	4.7	5.4	6.2	7.8
y	15.4	13.6	11.1	p	7.2	5.0

Regression line of y on x: $y = 19.834 - 1.926x$

Product-Moment Correlation Coefficient: $r = -0.9932$

Find the value of p and the equation of the regression line of x on y.

$$\Sigma x = 29.7 \Rightarrow \bar{x} = \frac{29.7}{6} = 4.95$$

$$\Sigma y = 52.3 + p \Rightarrow \bar{y} = \frac{52.3 + p}{6}$$

$$\bar{y} = 19.834 - 1.926\bar{x} \quad \leftarrow \text{passes through } (\bar{x}, \bar{y})$$

$$\begin{aligned} \frac{52.3 + p}{6} &= 19.834 - 1.926(4.95) \\ &= 10.3003 \end{aligned} \Rightarrow p = 9.5 \text{ (1 dp)}$$

$$a = 19.834, \quad b = -1.926, \quad r = -0.9932$$

$$r^2 = bd \Rightarrow d = \frac{r^2}{b} = \frac{(-0.9932)^2}{-1.926} = -0.512173541 \dots$$

Regression Line x on y: $x = c + dy$

$$\Rightarrow \bar{x} = c + d\bar{y}$$

$$\Rightarrow c = \bar{x} - d\bar{y}$$

$$= 4.95 - (-0.512173541)(10.3003)$$

$$= 10.22554112 \dots$$

c

d

$$\therefore x = 10.226 - 0.512y$$



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Explanation

When working with regression lines, a common trap is assuming that the line must cross through the actual data points listed in your chart.

Keep in mind that a regression line rarely touches individual data points directly. Instead, your golden rule is that the line will always pass through the average point of the entire dataset. You can use this special property as a shortcut to find missing values in a problem.

Simply calculate the average of the complete set of numbers, substitute that average value into your given line formula to find the corresponding average for the other set of numbers, and then use that total average to easily solve for the unknown entry in your data table.

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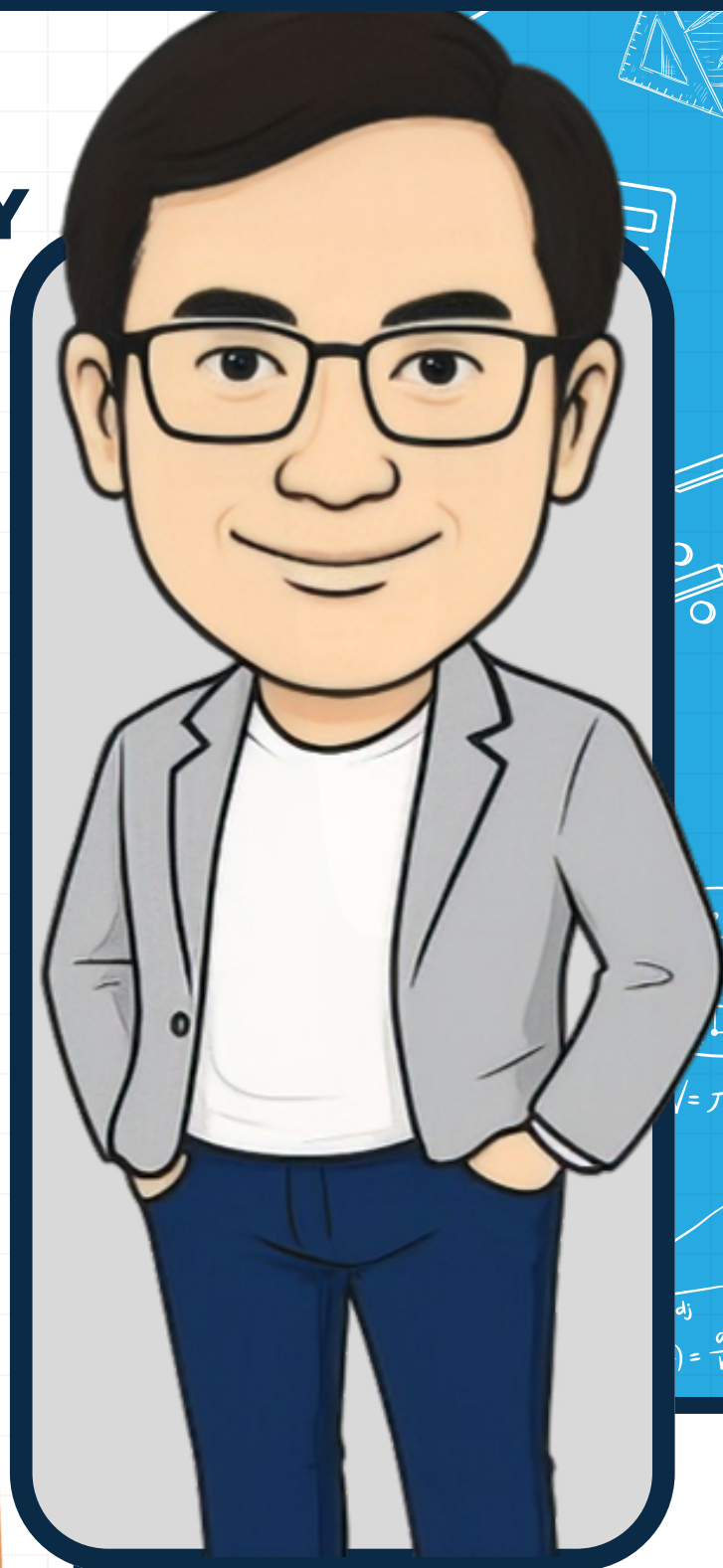
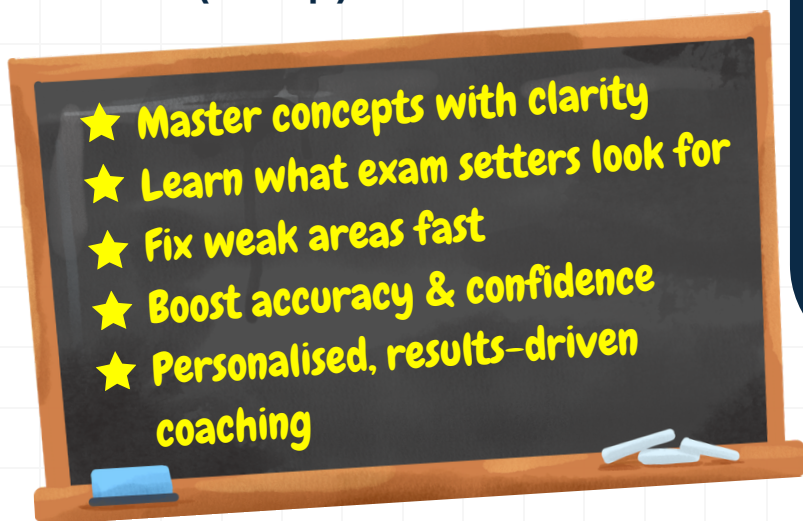
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