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JC MATHEMATICS (H2) STUDY TIPS

**MASTERING THE TRANSITION
FROM ARITHMETIC
DIFFERENCES TO GEOMETRIC
RATIOS**

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JC_H2Maths_039



6. Questions involving both AP and GP

	AP	GP
sequence	$a, a+d, a+2d, \dots$	$a, ar, ar^2, \dots$
u_n	$a + (n-1)d$	ar^{n-1}
S_n	$\frac{n}{2}(a + l)$ $\frac{n}{2}[2a + (n-1)d]$	$\frac{a(1-r^n)}{1-r}$ $\frac{a(r^n-1)}{r-1}$
S_∞	$\times$	$\frac{a}{1-r}, r < 1$
$S_n \rightarrow u_n$	$u_n = S_n - S_{n-1}$	
If a, b, c are consecutive terms, then	$b - a = c - b$	$\frac{b}{a} = \frac{c}{b}$

Example 10 u_3 u_5 u_8 AP

Given the third, the fifth and the eighth terms of an arithmetic progression are in a geometric progression, form an equation relating these three terms.

$$\begin{aligned} \text{AP: } u_3 &= a+2d & \Rightarrow & \text{GP: } \frac{u_5}{u_3} = \frac{u_8}{u_5} \Rightarrow \frac{a+4d}{a+2d} = \frac{a+7d}{a+4d} \\ u_5 &= a+4d \\ u_8 &= a+7d \end{aligned}$$

Quick Practice

Given the fourth, the sixth and the ninth terms of an arithmetic progression are in a geometric progression, form an equation relating these three terms.

$$\begin{aligned} \text{AP: } u_4 &= a+3d & \Rightarrow & \text{GP: } \frac{u_6}{u_4} = \frac{u_9}{u_6} \Rightarrow \frac{a+5d}{a+3d} = \frac{a+8d}{a+5d} \\ u_6 &= a+5d \\ u_9 &= a+8d \end{aligned}$$



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Explanation

To solve a problem where specific terms of an arithmetic progression form consecutive terms of a geometric progression, you must connect the core rules of both sequences using plain language.

First, express each relevant arithmetic term by combining the first term with a specific multiple of the common difference. For example, the third term equals the first term plus two times the common difference, the fifth term equals the first term plus four times the common difference, and the eighth term equals the first term plus seven times the common difference.

Next, apply the fundamental property of geometric progressions, which states that dividing any term by the term immediately before it always yields the exact same ratio. By setting the fifth term divided by the third term equal to the eighth term divided by the fifth term, you can substitute your verbal descriptions into this relationship to form the final required equation.

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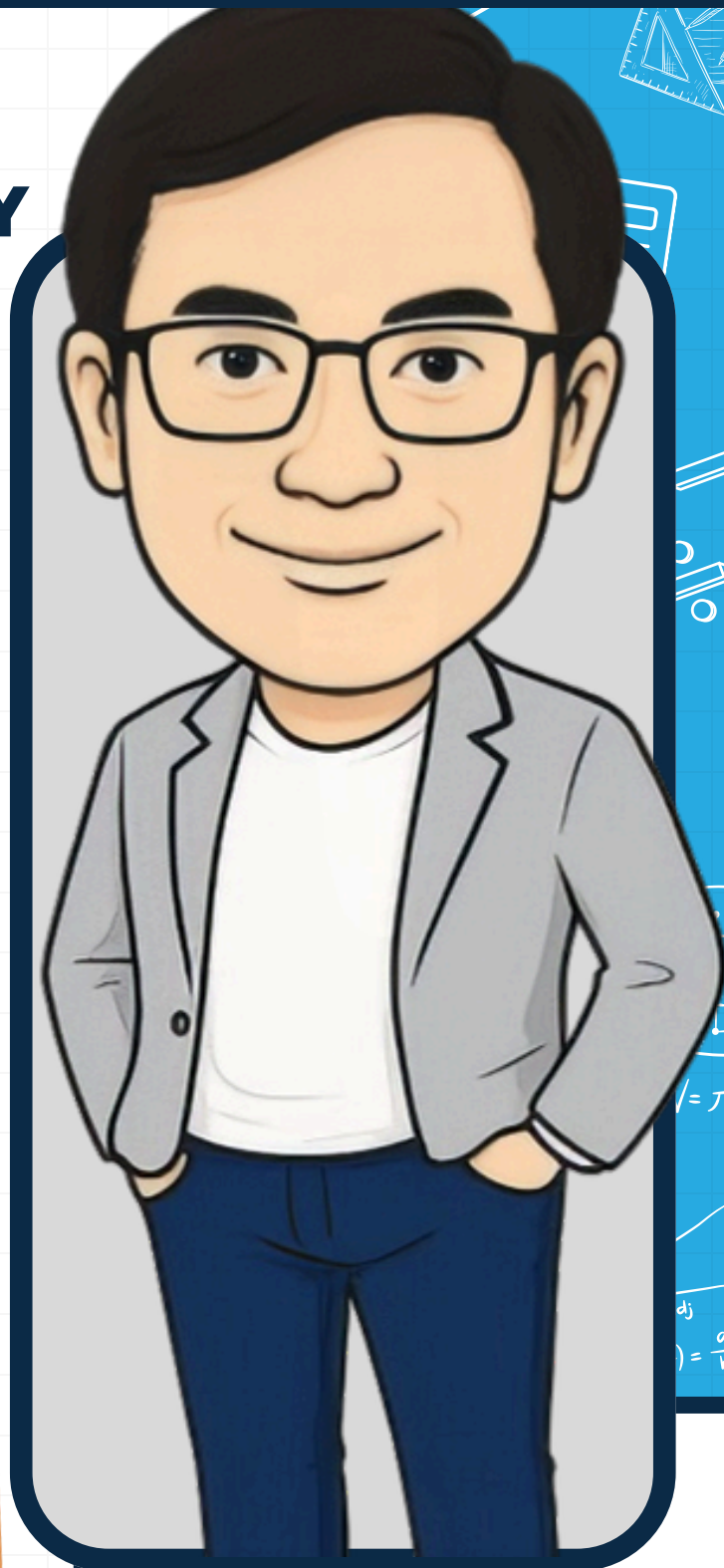
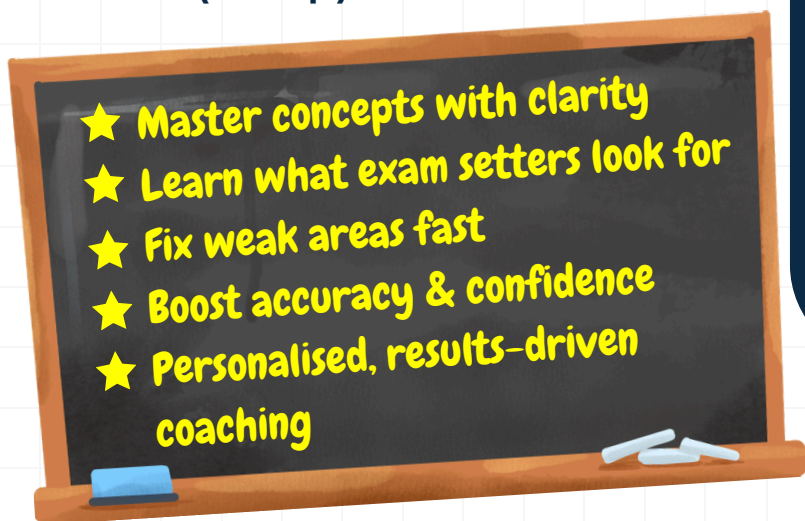
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