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Geometric Series / Sequence : Example (1)

If the 6th term of a geometric series is 972 and the 9th term is 26244. Find the 1st term, the common ratio and the sum of the first 10 terms.

$$\therefore ar^5 = 972 \quad \textcircled{1}$$

$$\text{also } ar^8 = 26244 \quad \textcircled{2}$$

$$\frac{\textcircled{2}}{\textcircled{1}} \quad \frac{ar^8}{ar^5} = \frac{26244}{972}$$

$$\therefore r^3 = 27$$

$$\therefore r = \sqrt[3]{27}$$

$$\therefore r = 3$$

Sub $r=3$ into $\textcircled{1}$

$$a(3)^5 = 972$$

$$\therefore a = \frac{972}{3^5}$$

$$\therefore a = 4$$

$$S_{10} = \frac{4(3^{10}-1)}{3-1}$$

$$= 118096$$

$$n^{\text{th}} \text{ term} = ar^{n-1}$$

$$S_n = \frac{a(r^n-1)}{r-1}$$

$$= \frac{a(1-r^n)}{1-r}$$



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