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Geometric Progressions | Exam Style Question

In a geometric series the common ratio is r and the sum of the first n terms is given by S_n

$$\text{Given } S_{\infty} = \frac{32}{31} S_5$$

Find the value of r .

$$\therefore \frac{a}{1-r} = \frac{32}{31} \frac{a(1-r^5)}{1-r}$$

$$\therefore 31 = 32 - 32r^5$$

$$\therefore 32r^5 = 1$$

$$\therefore r^5 = \frac{1}{32}$$

$$\therefore r = \sqrt[5]{\frac{1}{32}} = \frac{1}{2}$$

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

$$\text{If } -1 < r < 1$$

$$S_{\infty} = \frac{a}{1-r}$$

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