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Geometric Progression | Past Paper Question | P1 CIE June 2013 Q4

The third term of a geometric progression is -108 and the sixth term is 32 . Find

- (i) the common ratio, [3]
- (ii) the first term, [1]
- (iii) the sum to infinity. [2]

$$a, ar, ar^2, ar^3, \dots$$

$$u_n = ar^{n-1}$$

(i) Given $u_6 = 32 \Rightarrow ar^5 = 32$ ①
and $u_3 = -108 \Rightarrow ar^2 = -108$ ②

$$r^3 = -\frac{32 \cdot 8}{108 \cdot 27}$$
$$\therefore r = \sqrt[3]{-\frac{8}{27}} = -\frac{2}{3}$$

(ii) Sub $r = -\frac{2}{3}$ into ② $a\left(-\frac{2}{3}\right)^2 = -108$

$$\therefore \frac{4a}{9} = -108$$
$$\therefore a = \frac{-108(9)}{4} = -243$$

(iii) $S_\infty = \frac{a}{1-r}, -1 < r < 1$

$$= \frac{-243}{1 + \frac{2}{3}}$$
$$= -145.8$$

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