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NCERT Class 11 Mathematics Solutions: Chapter 9 – Sequences and Series Miscellaneous Exercise 9.4 Part 1

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Sum Of A Geometric Series

$$\begin{array}{r}
 S_n = a + ar + ar^2 + \dots + ar^{n-1} \\
 rS_n = \quad ar + ar^2 + ar^3 + \dots + ar^{n-1} + ar^n \\
 \hline
 (r-1)S_n = ar^n - a
 \end{array}$$

$$S_n = \frac{a(r^n - 1)}{r - 1} \quad , \text{ if } |r| > 1$$

OR

$$S_n = \frac{a(1 - r^n)}{1 - r} \quad , \text{ if } |r| < 1$$

Find the sum to infinity in each of the following Geometric Progression.

(1) . $1, \frac{1}{3}, \frac{1}{9} \dots$

Answer:

Consider,

$$a = 1$$

$$r = \frac{1}{3}$$

$$\therefore r = \frac{1}{3} = 0.33$$

Now sum of infinite term

$$S_n = \frac{a}{1 - r}$$

$$= \frac{1}{1 - \frac{1}{3}}$$

$$= \frac{1}{\frac{2}{3}}$$

$$= \frac{3}{2}$$

$$= 1.5$$

(2) . $6, 1.2, 0.24 \dots$

Answer:

Consider,

$$a = 6$$

$$r = \frac{1.2}{6}$$

$$\therefore r = 0.2$$

Now sum of infinite term

$$S_n = \frac{a}{1-r}$$

$$= \frac{6}{1-0.2}$$

$$= \frac{6}{0.8}$$

$$= 7.5$$

$$(3) \cdot 5, \frac{20}{7}, \frac{80}{49}, \dots$$

Answer:

Consider,

$$a = 5$$

$$r = \frac{\frac{20}{7}}{5}$$

$$\therefore r = \frac{20}{35} = 0.57$$

Now sum of infinite term

$$S_n = \frac{a}{1-r}$$

$$= \frac{5}{1-\frac{20}{35}}$$

$$= \frac{35 \times 5}{15}$$

$$= \frac{175}{15}$$

$$= 11.66$$