



Geometric Progressions Ex 20.3 Q 1

2, 6, 18, ... to 7 term

$$a = 2, r = \frac{6}{2} = 3, n = 7$$

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

$$\begin{aligned} S_7 &= 2 \frac{(3^7 - 1)}{3 - 1} = \frac{2}{2} (3^7 - 1) \\ &= 2187 - 1 = 2186 \end{aligned}$$

1, 3, 9, 27, ... to 8 terms

$$a = 1, r = \frac{3}{1} = 3, n = 8$$

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

$$S_8 = 1 \frac{(3^8 - 1)}{3 - 1} = 3280$$

$1, \frac{-1}{2}, \frac{1}{4}, \frac{-1}{8}, \dots, 9$ terms

$$a = 1, r = \frac{\frac{-1}{2}}{1} = \frac{-1}{2}, n = 9$$

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

$$S_9 = 1 \frac{\left(\frac{-1}{2}\right)^9 - 1}{\frac{-1}{2} - 1}$$

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

$$= \frac{-1 - 512}{\frac{-1 - 2}{2}}$$

$$= \frac{-513}{512} \times \frac{2}{-3}$$

$$= \frac{171}{256}$$

$(a^2 - b^2), (a - b), \left(\frac{a - b}{a + b}\right), \dots, n$ terms

$$a = a^2 - b^2, r = \frac{a - b}{a^2 - b^2} = \frac{1}{a + b}, n = n$$

$$S_n = a \frac{(1 - r^n)}{1 - r} \quad [\because r < 1]$$

$$\begin{aligned} S_n &= (a^2 - b^2) \frac{\left(1 - \frac{1}{(a + b)^n}\right)}{1 - \frac{1}{a + b}} \\ &= \frac{(a - b) \left\{ (a + b)^n - 1 \right\}}{\frac{(a + b)^{-1} (a + b)^n (a + b) - 1}{(a + b)}} \\ &= \frac{a - b}{(a + b)^n} \frac{\left\{ (a + b)^n - 1 \right\}}{(a + b) - 1} \end{aligned}$$

$4, 2, 1, \frac{1}{2}, \dots, 10$ terms

$$a = 4, r = \frac{2}{4} = \frac{1}{2}, n = 10$$

$$\begin{aligned} S_n &= a \frac{(1 - r^n)}{1 - r} \\ &= 4 \frac{1 - \left(\frac{1}{2}\right)^{10}}{1 - \frac{1}{2}} \\ &= 8 \left(1 - \frac{1}{2^{10}}\right) \\ &= 8 \left(1 - \frac{1}{1024}\right) \end{aligned}$$

***** END *****