

Geometric Progressions Ex 20.3 Q 5

Here,

3,
$$\frac{3}{2}$$
, $\frac{3}{4}$, ... is a G.P.

and
$$S_n = \frac{3069}{512}, a = 3, r = \frac{1}{2}$$

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

$$\frac{3069}{512} = \frac{3\left(1 - \left(\frac{1}{2}\right)^n\right)}{1 - \frac{1}{2}}$$

$$\frac{3069}{512} = \frac{3\left(2^n - 1\right)}{2^n \times \frac{1}{2}}$$

$$\frac{1023}{512} = \frac{2\left(2^n - 1\right)}{2^n}$$

$$10232^n = 1024.2^n - 1024$$

$$1024 = 2^n$$

$$\Rightarrow n = 10$$

Geometric Progressions Ex 20.3 Q 6 2+6+18+...

$$S_{n} = 728$$
Now,
$$S_{n} = \frac{a(r^{n} - 1)}{r - 1}$$

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

$$728 = \frac{2(3^{n} - 1)}{3 - 1}$$

$$728 = \frac{2(3^{n} - 1)}{2} = (3^{n} - 1)$$

$$728 + 1 = 3^{n}$$

$$729 = 3^{n}$$

$$(3)^{6} = 3^{n}$$

√3,3,3√3,...

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

$$a = \sqrt{3}, \ r = \frac{3}{\sqrt{3}} = \sqrt{3}, \ S_n = 39 + 13\sqrt{3}$$

Putting into formula

$$39 + 13\sqrt{3} = \frac{\sqrt{3}\left(\left(\sqrt{3}\right)^{n} - 1\right)}{\sqrt{3} - 1}$$

$$39 + 13\sqrt{3} = \frac{\left(\sqrt{3}\right)^{n+1} - \sqrt{3}}{\sqrt{3} - 1}$$

$$\left(39 + 13\sqrt{3}\right)\left(\sqrt{3} - 1\right) = \left(\sqrt{3}\right)^{n+1} - \sqrt{3}$$

$$39\sqrt{3} - 39 + 39 - 13\sqrt{3} = \left(\sqrt{3}\right)^{n+1} - \sqrt{3}$$

$$26\sqrt{3} + \sqrt{3} = \left(\sqrt{3}\right)^{n+1}$$

$$\left(27\sqrt{3}\right)^{1} = \left(\sqrt{3}\right)^{n+1}$$

$$\left(\sqrt{3}\right)^{6} \left(\sqrt{3}\right)^{1} = \left(\sqrt{3}\right)^{n+1}$$

$$7 = n + 1$$

$$9 = 6$$

Geometric Progressions Ex 20.3 Q 8 3, 6, 12, ... n 381

$$a = 3$$
, $r = \frac{6}{3} = 2$, $n = ?$ $S_n = 381$

We know that

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

$$381 = \frac{3(2)^n - 1}{2 - 1}$$

$$\frac{381}{3} = 2^n - 1$$

$$127 = 2^n - 1$$

$$128 = 2^n$$

$$2^7 = 2^n$$

$$n = 7$$

Geometric Progressions Ex 20.3 Q 9

r = 3, last term is 486

Sum of terms = $S_n = 728$, a = ?

We know that

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

$$728 = \frac{a\left(3^n - 1\right)}{3 - 1}$$

Also,
$$t_n = ar^{n-1}$$

 $t_n = 486$
 $\therefore 486 = a(3)^{n-1}$
 $a(3^{n-1}) = 3^5 \times 2$
 $3^{n-1} = 3^5$
 $n = 6$
and $a = 2$

Geometric Progressions Ex 20.3 Q 10

Let Sum of first three terms $=a + ar + ar^2$

The ratio =
$$\frac{a + ar + ar^2}{a + ar + ar^2 + ar^3 + ar^4 + ar^5}$$
=
$$\frac{1 + r + r^2}{1 + r + r^2 + r^3 + r^4 + r^5}$$
=
$$\frac{1 + r + r^2}{1 + r + r^2 + r^3 (1 + r + r^2)}$$
.....(1)
Let A=1+r+r²(2)
$$Ratio = \frac{A}{A + r^3 A} = \frac{125}{152}$$

$$\frac{1}{1 + r^3} = \frac{125}{152}$$

$$152 = 125 + 125 r^3$$

$$r^3 = \frac{27}{125}$$

$$r = \frac{3}{5}$$

********* END *******