Assignments:

Which term of the following sequence

$(a)\sqrt{3}, 3, 3\sqrt{3}, \ldots$is 729?

Ans) The given sequence is

$$\sqrt{3}, 3, 3\sqrt{3}, \ldots$$

Clearly this sequence is in G.P

with, $a = \sqrt{3}$ and

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

Let the n^{th} term of the given sequence be 729.

$$a_n = ar^{n-1} \Rightarrow ar^{n-1} = 729$$

$$\Rightarrow (\sqrt{3})(\sqrt{3})^{n-1} = 729$$

$$\Rightarrow (3)^{\frac{1}{2}}(3)^{\frac{n-1}{2}} = (3)^6$$

$$\therefore \frac{1}{2} + \frac{n-1}{2} = 6$$

$$\Rightarrow \frac{1+n-1}{2} = 6$$

$$\Rightarrow n = 12$$

Thus, the 12^{th} term of the given sequence is 729.

$(a)\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$ is $\frac{1}{19683}$?

Ans) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$

We know that $a_n = ar^{n-1}$

First term $a = \frac{1}{3}$

Common ratio $r = \frac{\frac{1}{9}}{\frac{1}{3}} = \frac{1}{3}$

n^{th} term $= \frac{1}{19683}$

Substituting these values we have

n^{th} term $= ar^{n-1}$

$$\Rightarrow \frac{1}{19683} = \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)^{n-1}$$

$$\Rightarrow \frac{1}{19683} = \left(\frac{1}{3}\right)^{1+n-1}$$

$$\Rightarrow \frac{1}{19683} = \left(\frac{1}{3}\right)^{n}$$

$$\Rightarrow \frac{1}{3^9} = \left(\frac{1}{3}\right)^{n}$$

Comparing the powers,we get

$n = 9$

Hence 9^{th} term of G.P is $\frac{1}{19683}$