Assignment 1

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QUESTION 6(B). ICSE 2019 PAPER

The first and last term of a Geometrical Progression (G.P.) are 3 and 96 respectively. If the common ratio is 2, find:
(i) 'n' the number of terms of the G.P.
(ii) Sum of the n terms.

ANSWER-

Let given GP is $a, ar, ar^2, ar^3, ...$
where a is first term and r is common ratio,
we can right i^{th} term of GP = ar^{i-1}
If there are n terms then last term = ar^{n-1}

Given :
First term, $a = 3$
Last term, $l = 96$
Common ratio, $r = 2$

(i)-

$$l = ar^{n-1}$$
$$=> r^{n-1} = \frac{l}{a}$$
$$=> \log(r^{n-1}) = \log\left(\frac{l}{a}\right)$$
$$=> (n-1)\log(r) = \log\left(\frac{l}{a}\right)$$
$$=> n - 1 = \frac{\log\left(\frac{l}{a}\right)}{\log(r)}$$
$$=> n = \left(\frac{\log\left(\frac{l}{a}\right)}{\log(r)}\right) + 1$$
$$=> n = \left(\log_r\left(\frac{l}{a}\right)\right) + 1$$

Now, putting values,
we got,

$$=> n = \left(\log_2\left(\frac{96}{3}\right)\right) + 1$$
$$=> n = \log_2(32) + 1$$
$$=> n = 5 + 1$$
$$=> n = 6$$

Hence, total number of terms in given GP is 6.

(ii)-
Let s is sum of all n terms of GP.

$$s = a + ar + ar^2 + ... + ar^{n-1}$$

$$s = \sum_{i=1}^{i=n} ar^{i-1}$$

So, we have formula for is

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

Now, putting values,
we got,

$$s = \frac{3\left(2^6 - 1\right)}{(2-1)}$$
$$s = 3 * (64 - 1)$$
$$s = 3 * 63$$
$$s = 189$$

Hence, sum of all numbers in GP is 189.