Geometric Progression

1. The 4th, 6th and the last term of a geometric progression are 10, 40 and 640 respectively. If the common ratio is positive, find the first term, common ratio and the number of terms of the series. [2020]

Solution: first term = 1.25, common ratio = 2, no. of terms = 10

Step-by-step Explanation:

$$4th\ term = ar^3 = 10 \ldots . (i)$$
$$6th\ term = ar^5 = 40 \ldots . (2)$$
$$last\ term = 640$$
$$Dividing\ (2)\ by\ (1),\ we\ get$$

$$\frac{ar^5}{ar^3} = \frac{40}{10}$$
$$r^2 = 4$$
$$r = \pm 2$$

as common ratio is positive,

therefore r = 2

Putting r = 2 in (1)

$$a \times 2^3 = 10$$
$$a = \frac{10}{8}$$

a = 1.25

let nth term be the last term.

$$\therefore ar^{n-1} = 640$$
$$1.25 \times 2^{n-1} = 640$$
$$2^{n-1} = \frac{640}{1.25}$$
$$2^{n-1} = 512$$
$$2^{n-1} = 2^9$$

n – 1 = 9

n = 10

2. The first and last trem of a Geometric 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 n terms [2019]

Solution: (i) 6 (ii) 189

Step-by-step Explanation:

$$1st\ term = a = 3$$
$$common\ ratio = r = 2$$
$$last\ term = 96$$
$$(i)\ Let\ the\ nth\ term\ be\ the\ last\ term.$$
$$\therefore ar^{n-1} = 96$$
$$3 \times 2^{n-1} = 96$$
$$2^{n-1} = 32$$
$$2^{n-1} = 2^5$$
$$n - 1 = 5$$
$$n = 6$$
$$(ii)\ S_n = \frac{a(r^n - 1)}{r - 1}$$
$$= \frac{3\,(2^6 - 1)}{2 - 1}$$
$$= 3 \times 63$$
$$= 189$$

3. The 4th term of a G.P. is 16 and the 7th term is 128. Find the first term and common ratio of the series. [2018]

Solution: first term = 2, common ratio = 2

Step-by-step Explanation:

$$4th\ term\ =\ ar^3 = 16\ \ldots(1)$$
$$7th\ term\ =\ ar^6 = 128\ \ldots(2)$$
$$Dividing\ (2)\ by\ (1),\ we\ get,$$
$$\frac{ar^6}{ar^3} = \frac{128}{16}$$
$$r^3\ =\ 8$$
$$r = \sqrt[3]{8}$$
$$r = 2$$
$$Putting\ r = 2\ in\ (1)$$
$$a \times 2^3 = 16$$
$$a = \frac{16}{8}$$
$$a = 2$$