

Exercise 11(B)

$-10, \frac{5}{\sqrt{3}}, -\frac{5}{6}, \dots, is -\frac{5}{72}?$

Solution:

In the given G.P.

First term, $a = -10$

Common ratio, $r = (5/\sqrt{3}) / (-10) = 1/(-2\sqrt{3})$

We know that, the general term is

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

So,

$$t_n = (-10) \left(\frac{1}{-2\sqrt{3}} \right)^{n-1} = -5/72$$

$$-\frac{5}{72} = -10 \times \left(\frac{1}{-2\sqrt{3}} \right)^{n-1}$$

$$\frac{1}{144} = \left(\frac{-1}{2\sqrt{3}} \right)^{n-1}$$

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

$$\left(\frac{-1}{2\sqrt{3}} \right)^4 = \left(\frac{-1}{2\sqrt{3}} \right)^{n-1}$$

Now, equating the exponents we have

$$n - 1 = 4$$

$$n = 5$$

Thus, the 5th of the given G.P. is $-5/72$

1. Solution:

Given,

$$t_5 = 81 \text{ and } t_2 = 24$$

We know that, the general term is

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

So,

$$t_5 = ar^{5-1} = ar^4 = 81 \dots (1)$$

And,

$$t_2 = ar^{2-1} = ar^1 = 24 \dots (2)$$

Dividing (1) by (2), we have

$$ar^4 / ar = 81 / 24$$

$$r^3 = 27 / 8$$

$$r = 3/2$$

Using r in (2), we get

$$a(3/2) = 24$$

$$a = 16$$

Hence, the G.P. is

$$\text{G.P.} = a, ar, ar^2, ar^3, \dots$$

$$= 16, 16 \times (3/2), 16 \times (3/2)^2, 16 \times (3/2)^3$$

$$= 16, 24, 36, 54, \dots$$

2. Solution:

Given,

$$t_4 = 1/18 \text{ and } t_7 = -1/486$$

We know that, the general term is

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

So,

$$t_4 = ar^{4-1} = ar^3 = 1/18 \dots (1)$$

And,

$$t_7 = ar^{7-1} = ar^6 = -1/486 \dots (2)$$

Dividing (2) by (1), we have

$$ar^6 / ar^3 = (-1/486) / (1/18)$$

$$r^3 = -1/27$$

$$r = -1/3$$

Using r in (1), we get

$$a(-1/3)^3 = 1/18$$

$$a = -27/18 = -3/2$$

Hence, the G.P. is

$$\text{G.P.} = a, ar, ar^2, ar^3, \dots$$

$$= -3/2, -3/2(-1/3), -3/2(-1/3)^2, -3/2(-1/3)^3, \dots$$

$$= -3/2, 1/2, -1/6, 1/18, \dots$$

3. If the first and the third terms of a G.P are 2 and 8 respectively, find its second term.

Solution:

Given,

$$t_1 = 2 \text{ and } t_3 = 8$$

We know that, the general term is

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

So,

$$t_1 = ar^{1-1} = a = 2 \dots (1)$$

And,

$$t_3 = ar^{3-1} = ar^2 = 8 \dots (2)$$

Dividing (2) by (1), we have

$$ar^2 / a = 8 / 2$$

$$r^2 = 4$$

$$r = \pm 2$$

Hence, the 2nd term of the G.P. is

When $a = 2$ and $r = 2$ is $2(2) = 4$

Or when $a = 2$ and $r = -2$ is $2(-2) = -4$

4. The product of 3rd and 8th terms of a G.P. is 243. If its 4th term is 3, find its 7th term

Solution:

Given,

Product of 3rd and 8th terms of a G.P. is 243

The general term of a G.P. with first term a and common ratio r is given by,

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

So,

$$t_3 \times t_8 = ar^{3-1} \times ar^{8-1} = ar^2 \times ar^7 = a^2r^9 = 243$$

Also given,

$$t_4 = ar^{4-1} = ar^3 = 3$$

Now,

$$a^2r^9 = (ar^3) ar^6 = 243$$

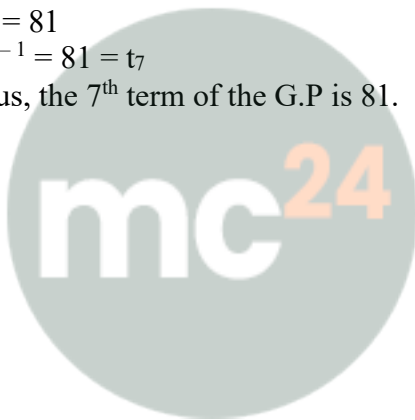
Substituting the value of ar^3 in the above equation, we get,

$$(3) ar^6 = 243$$

$$ar^6 = 81$$

$$ar^{7-1} = 81 = t_7$$

Thus, the 7th term of the G.P is 81.



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