

EXERCISE 2.1

Def → यदि कोई श्रेणी के दो लगातार पदों का अनुपात समान हो, तो उस श्रेणी को गुणोत्तर श्रेणी कहेंगे। इसके पास एक ही small 'a' तथा common ratio को r से निरूपित करते हैं।

G.P (Geometric Progression)
 $2, 4, 8, 16, \dots$
 $a = 2, r = \frac{4}{2} = 2$
 $t_n = a \cdot r^{n-1}$

Q.1. which term of G.P $1, \sqrt{3}, 3, \dots$ will be 81?
 $a = 1, r = \sqrt{3} = \sqrt{3}, t_n = 81$

$t_n = a \cdot r^{n-1}$
 or, $81 = 1 \cdot (\sqrt{3})^{n-1}$
 or, $(3)^4 = (\sqrt{3})^{n-1}$
 or, $(\sqrt{3})^8 = (\sqrt{3})^{n-1}$
 or, $n-1 = 8$
 or, $n = 8+1 = 9$ th term Ans.

Q.2. write down the 9th term of the G.P $\sqrt{3}, \frac{1}{\sqrt{3}}, \frac{1}{3\sqrt{3}}, \dots$?

$a = \sqrt{3}, r = \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}}, n = 9$
 $t_n = a \cdot r^{n-1}$
 $= \sqrt{3} \times \left(\frac{1}{\sqrt{3}}\right)^{9-1} = \sqrt{3} \cdot \frac{1}{3^4} = \frac{\sqrt{3}}{(3)^8}$ Ans.

Q.3. How many terms are there in G.P. 5, 20, 80, ..., 5120

$$a = 5, \quad r = \frac{20}{5} = 4, \quad t_n = 5120$$

$$t_n = a \cdot r^{n-1}$$

$$\text{or, } 5120 = 5 \cdot (4)^{n-1}$$

$$\text{or, } \frac{5120}{5} = (4)^{n-1}$$

$$\text{or, } 1024 = (4)^{n-1}$$

$$\text{or, } (4)^5 = (4)^{n-1}$$

$$\text{or, } n-1 = 5$$

$$\text{or, } n = 5 + 1$$

$$\therefore n = 6 \text{ Ans.}$$

Q.4. Which term of G.P. 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, ... will be $\frac{1}{512}$.

$$a = 1, \quad r = \frac{1}{2}, \quad t_n = \frac{1}{512}$$

$$t_n = a \cdot r^{n-1}$$

$$\text{or, } \frac{1}{512} = 1 \cdot \left(\frac{1}{2}\right)^{n-1}$$

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

$$\text{or, } \left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$$

$$\text{or, } n = 9 + 1 = 10 \text{ Ans.}$$

Q.5. Find the seventh term of the G.P. $2^2, 2^3, 2^4, \dots$
 $4, 8, 16, \dots$

$$a = 4, r = \frac{8}{4} = 2, n = 7$$

$$\begin{aligned} t_n &= a \cdot r^{n-1} \\ &= 4 \cdot 2^{7-1} \\ &= 4 \cdot (2)^6 \\ &= 4 \cdot 64 \\ &= 256 \text{ Ans.} \end{aligned}$$

Q.6. If the fifth term of the G.P. is 81 and second term is 27, Find the G.P.

$$T_5 = 81 \quad \text{let, } a = 1, (r = 2)$$

$$T_2 = 27$$

$$T_5 = 81$$

$$a \cdot r^{5-1} = 81$$

$$a \cdot r^4 = 81 \quad \dots \text{ (i)}$$

$$T_2 = 27$$

$$a \cdot r^{2-1} = 27$$

$$a \cdot r = 27 \quad \dots \text{ (ii)}$$

Divide (i) by (ii)

$$\frac{a \cdot r^4 = 81}{a \cdot r = 27} =$$

$$\text{or, } (2)^3 = \frac{27}{8}, \text{ or, } (2)^3 = \left(\frac{3}{2}\right)^3, a, r = \frac{3}{2}$$

Putting the value of d in (i)

$$a \cdot r^4 = 81$$

$$\therefore a \cdot \left(\frac{3}{2}\right)^4 = 81$$

$$\therefore a = \frac{81 \times 16}{81}$$

$$a = 16$$

∴ P

$$a, ar, ar^2$$

$$16, 16 \times \frac{3}{2}, 16 \times \frac{9}{4}$$

$$16, 24, 36, \dots \text{Ans}$$

Q.8. If 5th and 8th term of a G.P. be 48 and 384 respectively. Find the G.P.

$$\text{Let, } a = a, r = r$$

$$T_5 = 48$$

$$a \times r^4 = 48 \quad \dots \text{(i)}$$

$$T_8 = 384$$

$$a \times r^7 = 384 \quad \dots \text{(ii)}$$