



Geometric Progressions Ex 20.5 Q 6

$$x^a = x^{\frac{b}{2}} z^{\frac{b}{2}} = z^c = \lambda \text{ (say)}$$

$$x = \lambda^{\frac{1}{a}}, \quad z = \lambda^{\frac{1}{c}}$$

$$x^{\frac{b}{2}} \times z^{\frac{b}{2}} = \lambda$$

$$\lambda^{\frac{1}{a} \left(\frac{b}{2} \right)} \times \lambda^{\frac{b}{2} \times \frac{1}{c}} = \lambda$$

$$\lambda^{\frac{b}{2a} + \frac{b}{2c}} = \lambda^1$$

$$\frac{b}{2a} + \frac{b}{2c} = 1$$

$$\frac{1}{a} + \frac{1}{c} = \frac{2}{b}$$

$$\Rightarrow \frac{1}{a}, \frac{1}{b}, \frac{1}{c} \text{ are in A.P.}$$

Geometric Progressions Ex 20.5 Q 7

$k + 9, k - 6, 4$ are in G.P.

$$(k - 6)^2 = (k + 9)4$$

$$k^2 + 36 - 12k = 4k + 36$$

$$k^2 - 16k = 0$$

$$k(k - 16) = 0$$

$$k = 0, k = 16$$

Geometric Progressions Ex 20.5 Q 8

Let $a - d$, a , $a + d$ be numbers in A.P.

Here,

$$\begin{aligned}a - d + a + a + d &= 15 \\3a &= 15 \\a &= 5\end{aligned}$$

Find

$$\begin{aligned}&[(5 - d) + 1], (5 + 3), [(5 + d) + 9] \text{ are in G.P.} \\ \Rightarrow (6 - d), 8, (14 + d) &\text{ are in G.P.} \\ (8)^2 &= (6 - d)(14 + d) \\ 64 &= 84 + 6d - 14d - d^2 \\ d^2 + 8d - 20 &= 0 \\ (d + 10)(d - 2) &= 0 \\ d &= 2, -10\end{aligned}$$

So,

Numbers are 3, 5, 7 or 15, 5, -5

Geometric Progressions Ex 20.5 Q 9

Let three numbers in A.P. be $a - d$, $a + d$

Here,

$$\begin{aligned}a - d + a + a + d &= 21 \\3a &= 21 \\a &= 7\end{aligned}$$

And,

$$\begin{aligned}(7 - d), (7 - 1), (7 + d) + 1 &\text{ are in G.P.} \\(7 - d), 6, (8 + d) &\text{ are in G.P.} \\(6)^2 &= (7 - d)(8 + d) \\36 &= 56 + 7d - 8d - d^2 \\d^2 + d - 20 &= 0 \\(d + 5)(d - 4) &= 0 \\d &= 4, -5\end{aligned}$$

So,

Numbers are 3, 7, 11 or 12, 7, 2.

Geometric Progressions Ex 20.5 Q 10

Here,

a, b, c are in A.P.

Let $a = A - d$, $b = A$, $c = A + d$

Here,

$$\begin{aligned}a + b + c &= 18 \\A - d + A + A + d &= 18 \\3A &= 18 \\A &= 6\end{aligned}$$

And,

$$\begin{aligned}(a + 4), (b + 4), (c + 36) &\text{ are in G.P.} \\(6 - d + 4), (6 + 4), (6 + d + 36) &\text{ are in G.P.} \\(10 - d), (10), (42 + d) &\text{ are in G.P.} \\(10)^2 &= (10 - d)(42 + d) \\100 &= 420 + 10d - 42d - d^2 \\d^2 + 32d - 320 &= 0 \\(d + 40)(d - 8) &= 0 \\d &= -40, 8\end{aligned}$$

So,

Numbers of -2, 6, 14 or 46, 6, -34.

Geometric Progressions Ex 20.5 Q 11

Let numbers are a, ar, ar^2

$$a + ar + ar^2 = 56 \text{ ---- (1)}$$

$(a-1), (ar-7), (ar^2-21)$ are in AP

$$\Rightarrow 2(ar-7) = a-1 + ar^2 - 21$$
$$= (ar^2 + a) - 22$$

$$2ar - 14 = (56 - ar) - 22 \quad [\text{using equation (1)}]$$

$$2ar - 14 = 34 - ar$$

$$3ar = 48$$

$$ar = 16 \text{ ---- (2)}$$

$$a = \frac{16}{r}$$

Put a in equation (1),

$$\frac{16 + 16r + 16r^2}{r} = 56$$

$$16 + 16r + 16r^2 = 56r$$

$$16r^2 - 40r + 16 = 0$$

$$2r^2 - 5r + 2 = 0$$

$$2r^2 - 4r - r + 2 = 0$$

$$2r(r-2) - 1(r-2) = 0$$

$$(r-2)(2r-1) = 0$$

$$r = 2, \frac{1}{2}$$

Put r in equation (2),

$$ar = 16$$

$$\text{for } r = \frac{2}{a} = 8$$

$$\text{for } r = \frac{1}{2}, a = 32$$

thus, there numbers are

$$8, 16, 32$$

in both cases.

***** END *****