

Geometric Progressions Ex 20.2 Q5

Let the three numbers in G.P. be $\frac{a}{r}$, a, ar

then product of them
$$is\left(\frac{a}{r}\right)(a)(ar) = 21$$
 ---(i)

$$=\frac{\partial}{r}\left(1+r+r^2\right)=21$$

and sum of their squares

$$\frac{a^2}{r^2} + a^2 + a^2r^2 = a^2 \frac{\left(1 + r^2 + r^4\right)}{r^2} = 189$$
 --- (ii)

Now,

$$a(1+r+r^2) = 21r \qquad ---(iii)$$

Then,
$$a^2 (1+r+r^2)^2 = 441r^2$$
 [suqaring]
$$a^2 (1+r^2+r^4) + 2a^2r (1+r+r^2) = 441r$$

Dividing both sides by $21r^2$

 $189r^2 + 2ar \times 21r = 441r^2$

$$9 + 2a = 21$$

Putting in (iii)

$$6\left(1+r+r^2\right) = 21r$$

$$6 + 6r + 6r^2 - 21r = 0$$

$$6r^2 - 15r + 6 = 0$$

$$6r^2 - 12r - 3r + 6 = 0$$

$$\Rightarrow 6r(r-2)-3(r-2)=0$$

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

∴ G.P. is 3,6,12 or 12,6,3.

Geometric Progressions Ex 20.2 Q6

Let the numbers are: $\frac{a}{r}$, a and ar.

Then

$$\frac{a}{r} + a + ar = 14$$

Again the numbers a+1, ar+1 and ar^2-1 are in A.P, therefore

$$2(a+1) = (ar-1) + \left(\frac{a}{r} + 1\right)$$

$$2(a+1) = ar + \frac{a}{r}$$

$$2(a+1)=14-a$$

$$3a = 12$$

$$a = 4$$

Now we have

$$\frac{4}{r} + 4 + 4r = 14$$

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

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

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

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

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

Thus the numbers are: 2,4,8 or 8, 4, 2.

Geometric Progressions Ex 20.2 Q7

Let the number in G.P. are $\frac{a}{r}$, a, ar

So,

$$\frac{a}{r} \times a \times ar = 216$$

$$\Rightarrow$$
 $a^3 = 216$

And also given,

$$\frac{a}{r}$$
 + 2, a + 8, ar + 6 are in A.P.

$$2(a+8) = \left(\frac{a}{r} + 2\right) + (ar+6)$$

$$\Rightarrow 2(6+8) = \left(\frac{6+2r}{r}\right) + 6r + 6$$

$$\Rightarrow$$
 28r = 6 + 2r + 6r² + 6r

$$\Rightarrow 6r^2 - 20r + 6 = 0$$

$$\Rightarrow 6r^2 - 18r - 2r + 6 = 0$$

$$\Rightarrow \qquad 6r(r-3)-2(r-3)=0$$

$$\Rightarrow \qquad \left(r-3\right)\left(6r-2\right)=0$$

$$r = 3, r = \frac{1}{3}$$

So,

Geometric Progressions Ex 20.2 Q8

Let three numbers in G.P. are $\frac{a}{r}$, a, ar Here,

$$\frac{a}{r} \times a \times ar = 729$$

$$\Rightarrow a^3 = 729$$

$$\Rightarrow a = 9$$
And,
$$\left(\frac{a}{r} \times a\right) + \left(a \times ar\right) + \left(\frac{a}{r} \times ar\right) = 819$$

$$\Rightarrow \frac{81}{r} + 81r + 81 = 819$$

$$\Rightarrow \frac{9}{r} + 9r + 9 = 91$$

$$\Rightarrow 9 + 9r^2 + 9r = 91r$$

$$\Rightarrow 9r^2 - 82r + 9 = 0$$

$$\Rightarrow 9r^2 - 81r - r + 9 = 0$$

$$\Rightarrow 9r (r - 9) - 1 (r - 9) = 0$$

$$r = 9, \frac{1}{9}$$
So, required G.P. are

Geometric Progressions Ex 20.2 Q9

Let the numbers are $\frac{a}{r}$, a and ar. Then we have

$$\frac{a}{r} + a + ar = \frac{39}{10}$$

And

$$\frac{a}{r} \cdot a \cdot ar = 1$$
$$a^3 = 1$$

Now we have

$$\frac{1}{r} + 1 + r = \frac{39}{10}$$

$$1 + r + r^2 = \frac{39}{10}r$$

$$r^2 - \frac{29}{10}r + 1 = 0$$

$$10r^2 - 29r + 10 = 0$$

$$(2r - 5)(5r - 2) = 0$$

$$r = \frac{5}{2}, \frac{2}{5}$$

Thus the numbers are: either $\frac{2}{5}$,1, $\frac{5}{2}$ or $\frac{5}{2}$,1, $\frac{2}{5}$.

********* END *******