:: जय श्री राधे कृष्णा, जय श्री गिरिराज जी महाराज !!

ULTIMATE MATHEMATICS: BY AJAY MITTAL

REVISION: CHAPTER: SEQUENCE & SERIES

CLASS NO: 1

Formula List

A.P

(1) $a, a+d, a+2d, a+3d, \ldots$

(2) $a_n = a + (n-1)d$

(3) eg $a_6 = a+5d$; $a_7 = a+6d$

(4) always subtract equations in AP

(5) $S_n = \frac{n}{2}(2a + (n-1)d)$ (or) $S_n = \frac{n}{2}(a+l)$

(6) $\boxed{a_n \text{ term from end} = a+(m-n)d}$ where m = total No of term from the beginning

(7) a_n term from the end = last term + $(n-1)(-d)$

(8) A sequence is an A.P, if its n^{th} term is a linear expression in n

i.e $\boxed{a_n = An + B}$ where $A \to$ common difference

(9) A sequence is an A.P. if sum of n terms is of the form $\boxed{S_n = An^2 + Bn}$

where $2A \to$ common difference

(10) In an A.P, the the sum of the terms equidistance from the beginning and end is always equal to the sum of first and last term

i.e $\boxed{a_1 + a_n = a_2 + a_{n-1} = a_3 + a_{n-2} = \ldots}$

(11): If a constant is added or subtracted from each each term of an A.P, then the resulting sequence is also an AP with the same common difference

(12). If each term of a given AP, is multiplied or divided by a constant 'k', then the ~~nefo~~ new sequence is also in AP with common difference, kd or $\frac{d}{k}$ respectively.

(13). If a, b, c, are in AP then $\boxed{2b = a + c}$

(14). Arithmetic Mean

$a, A, b \Rightarrow \boxed{A = \frac{a+b}{2}}$

(15) Arithmetic Means

$a, A_1, A_2, A_3 \ldots A_n, b$

$n \rightarrow$ no. of A.M to be inserted

$\boxed{d = \frac{b-a}{n+1}}$ $A_1 = a + d$, $A_2 = a + 2d$, ... $A_n = a + nd$

(16) Selection of terms in AP: $a-d, a, a+d$ (three) | $a-3d, a-d, a+d, a+3d$ (Four)

$\boxed{G.P}$ (Geometric Progression)

(1) $a, ar, ar^2, ar^3, \ldots$

(2) $r = \frac{a_2}{a_1} = \frac{a_3}{a_2}$

(3) $a_n = ar^{n-1}$

$a_4 = ar^3$, $a_5 = ar^4$ (always divide in GP)

(4) m^{th} term from the end $= ar^{m-n}$

when $m \rightarrow$ total no. of term

(or) n^{th} from end $= l\left(\frac{1}{r}\right)^{n-1}$

(5) $\boxed{S_n = a\left(\frac{r^n - 1}{r-1}\right)}$; $r > 1$; $\boxed{S_n = a\left(\frac{1-r^n}{1-r}\right)}$; $r < 1$

(6) Selecting of terms in GP

$\frac{a}{r}, a, ar \rightarrow$ for three terms : ratio $= r$

$\frac{a}{r^3}, \frac{a}{r}, ar, ar^3 \rightarrow$ for four terms : ratio $= r^2$

(7) $\boxed{S_\infty = \frac{a}{1-r}}$; $|r| < 1$ (or) $-1 < r < 1$

(8) If all the terms of a GP be multiplied or divided by the same constant, then it remains in GP with the same common ratio

(9) The reciprocals of the terms of a given GP form a GP with ratio $= 1/r$

(10) If each term of a GP is raised to the same power 'k', the new sequence also form a GP with ratio $= r^k$

(11) In a finite GP, the product of the terms equidistant from the beginning and the end is always equal to the product of first and last term

ie $\boxed{a_1 a_n = a_2 a_{n-1} = a_3 a_{n-2}}$ ---

(4)

(12) If a, b, c are in GP, then $\boxed{b^2 = ac}$

(13) If a, b, c, d are in GP, then

let $a = a$, $b = ar$, $c = ar^2$, $d = ar^3$

(14) If a_1, a_2, a_3, a_4 --- is a GP, then

$\log a_1, \log a_2, \log a_3, ---$ is an AP & vice versa

(15) Geometric Mean

a, G, b then GM $\boxed{G = \sqrt{ab}}$

(16) Geometric Means

$a, G_1, G_2, G_3 --- G_n, b$

$\boxed{r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}}$ $G_1 = ar^1$; $G_2 = ar^2$, $G_3 = ar^3$

(17) $A \geq G$ AM $\geq$ GM $\Rightarrow \frac{a+b}{2} \geq \sqrt{ab}$

$\boxed{\text{Special Series}}$

(1) $\Sigma n = 1+2+3 -- n = \frac{n(n+1)}{2}$

(2) $\Sigma n^2 = 1^2+2^2+3^2 -- n^2 = \frac{n(n+1)(2n+1)}{6}$

(3) $\Sigma n^3 = 1^3+2^3+3^3 --- n^3 = \frac{n^2(n+1)^2}{4}$

(4) $\Sigma k = kn$

(5) $\Sigma(x \pm y) = \Sigma x \pm \Sigma y$

(6) $\Sigma(xy) \neq \Sigma x \cdot \Sigma y$

(7) $\Sigma(x/y) \neq \Sigma x / \Sigma y$

(8) $\boxed{S_n = \Sigma a_n}$

Ques 1 If $a_1, a_2, a_3 \ldots a_n$ are in AP, then show that

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}}+\frac{1}{\sqrt{a_2}+\sqrt{a_3}}+\cdots\frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}=\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$$

Soln

LHS $\frac{1}{\sqrt{a_1}+\sqrt{a_2}}+\frac{1}{\sqrt{a_2}+\sqrt{a_3}}+\cdots\frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}$

Rationalise

$$=\frac{\sqrt{a_1}-\sqrt{a_2}}{a_1-a_2}+\frac{\sqrt{a_2}-\sqrt{a_3}}{a_2-a_3}+\cdots\frac{\sqrt{a_{n-1}}-\sqrt{a_n}}{a_{n-1}-a_n}$$

$$=\frac{\sqrt{a_1}-\sqrt{a_2}}{-d}+\frac{\sqrt{a_2}-\sqrt{a_3}}{-d}+\cdots\left(\frac{\sqrt{a_{n-1}}-\sqrt{a_n}}{-d}\right)$$

$$=-\frac{1}{d}\left((\sqrt{a_1}-\cancel{\sqrt{a_2}})+(\cancel{\sqrt{a_2}}-\cancel{\sqrt{a_3}})+(\cancel{\sqrt{a_3}}-\sqrt{a_4})+\cdots(\sqrt{a_{n-1}}-\sqrt{a_n})\right)$$

$$=-\frac{1}{d}\left(\sqrt{a_1}-\sqrt{a_n}\right)$$

Rationalise

$$=-\frac{1}{d}\left(\frac{(\sqrt{a_1})^2-(\sqrt{a_n})^2}{\sqrt{a_1}+\sqrt{a_n}}\right)$$

$$=-\frac{1}{d}\left(\frac{a_1-a_n}{\sqrt{a_1}+\sqrt{a_n}}\right)$$

$$=\frac{-\frac{1}{d}\left(\cancel{a_1}-(\cancel{a_1}+(n-1)d)\right)}{\sqrt{a_1}+\sqrt{a_n}}=\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$$ Ans

Que 2 → If $\theta_1, \theta_2, \theta_3 \ldots \theta_n$ are in AP, with common difference 'd' Show that

(6)

$$\sec\theta_1 . \sec\theta_2 + \sec\theta_2 . \sec\theta_3 + \cdots + \sec\theta_{n-1} . \sec\theta_n = \frac{\tan\theta_n - \tan\theta_1}{\sin d}$$

LHS $\sec\theta_1 \sec\theta_2 + \sec\theta_2 . \sec\theta_3 + \cdots \sec\theta_{n-1} . \sec\theta_n$

$$= \frac{1}{\cos\theta_1 . \cos\theta_2} + \frac{1}{\cos\theta_2 . \cos\theta_3} + \cdots \frac{1}{\cos\theta_{n-1} . \cos\theta_n}$$

M & D by $\sin d$

$$= \frac{1}{\sin d}\left(\frac{\sin d}{\cos\theta_1 \cos\theta_2} + \frac{\sin d}{\cos\theta_2 \cos\theta_3} + \cdots \frac{\sin d}{\cos\theta_{n-1} . \cos\theta_n}\right]$$

$$= \frac{1}{\sin d}\left[\frac{\sin(\theta_2 - \theta_1)}{\cos\theta_1 \cos\theta_2} + \frac{\sin(\theta_3 - \theta_2)}{\cos\theta_2 \cos\theta_3} + \cdots \frac{\sin(\theta_n - \theta_{n-1})}{\cos\theta_{n-1} \cos\theta_n}\right]$$

$$= \frac{1}{\sin d}\left[\frac{\sin\theta_2 . \cos\theta_1 - \cos\theta_2 \sin\theta_1}{\cos\theta_1 \cos\theta_2} + \frac{\sin(\theta_3)\cos\theta_2 - \cos\theta_3 \sin\theta_2}{\cos\theta_2 \cos\theta_3} + \cdots\right.$$

$$\left. \cdots \frac{\sin(\theta_n)\cos(\theta_{n-1}) - \cos(\theta_n)\sin\theta_{n-1}}{\cos\theta_{n-1}\cos\theta_n}\right]$$

$$= \frac{1}{\sin d}\left[\tan\theta_2 - \tan\theta_1 + \tan\theta_3 - \tan\theta_2 + \cdots \right.$$

$$\left. \cdots - \tan\theta_n - \tan\theta_{n-1}\right]$$

$$= \frac{1}{\sin d}\left(\tan\theta_n - \tan\theta_1\right) = RHS \quad \text{Ans}$$

Que 3 → If a, b, c are in AP and x, y, z are in GP then show that $x^{b-c} \cdot y^{c-a} \cdot z^{a-b} = 1$

Sol given $\boxed{2b = a + c}$ & $\boxed{y^2 = xz}$

$\Downarrow$

$y = \sqrt{xz}$

LHS $x^{b-c} \cdot y^{c-a} \cdot z^{a-b}$

$= x^{b-c} \cdot (\sqrt{xz})^{c-a} \cdot z^{a-b}$

$= x^{b-c} \cdot (xz)^{\frac{c-a}{2}} \cdot z^{a-b}$

$= x^{b-c} \, x^{\frac{c-a}{2}} \cdot z^{\frac{c-a}{2}} \cdot z^{a-b}$

$= x^{b-c+\frac{c-a}{2}} \cdot z^{\frac{c-a}{2}+a-b}$

$= x^{\frac{2b-2c+c-a}{2}} \cdot z^{\frac{c-a+2a-2b}{2}}$

$= x^{\frac{2b-c-a}{2}} \cdot z^{\frac{c+a-2b}{2}}$

$= x^{\frac{a+c-c-a}{2}} \cdot z^{\frac{2b-2b}{2}}$

$= x^0 \cdot z^0 = 1 \times 1 = 1 = \text{RHS}$ Ans

Que 4 → If p^{th}, q^{th}, r^{th} terms of an AP and G.P are both a, b, c respectively, then show that

$a^{b-c} \cdot b^{c-a} \cdot c^{a-b} = 1$

AP	GP
$a_p = a = A' + (p-1)d$	$a_p = a = AR^{p-1}$
$a_q = b = A' + (q-1)d$	$a_q = b = AR^{q-1}$
$a_r = c = A' + (r-1)d$	$a_r = c = AR^{r-1}$

LHS $a^{b-c} \cdot b^{c-a} \cdot c^{a-b}$

$$= a^{(q-r)d} \cdot b^{(r-p)d} \cdot c^{(p-q)d}$$

$$= \left[AR^{p-1}\right]^{(q-r)d} \cdot \left[AR^{q-1}\right]^{(r-p)d} \cdot \left[AR^{r-1}\right]^{(p-q)d}$$

$$= A^{(q-r)d} \cdot R^{(p-1)(q-r)d} \cdot A^{(r-p)d} \cdot R^{(q-1)(r-p)d} \cdot A^{(p-q)d} \cdot R^{(r-1)(p-q)d}$$

$$= A^{d(\cancel{q}-\cancel{r}+\cancel{r}-\cancel{p}+\cancel{p}-\cancel{q})} \cdot R^{d(\cancel{pq}-\cancel{pr}-\cancel{q}+\cancel{r}+qr+\cdots)}$$

$$= A^0 \times R^0 = 1 \times 1 = \underline{1 \text{ Ans}}$$

Que 5 → Find the natural number 'a' for which $\sum_{k=1}^{n} f(a+k) = 16(2^n-1)$, where f satisfies $f(x+y) = f(x)\cdot f(y)$ also $f(1) = 2$

Soln $f(1) = 2$

$f(2) = f(1+1) = f(1)\cdot f(1) = 2\times 2 = 2^2$

$f(3) = f(1+2) = f(1)\cdot f(2) = 2\times 2^2 = 2^3$

$f(4) = f(1+3) = f(1)\, f(3) = 2\times 2^3 = 2^4$

we have $\sum_{k=1}^{n} f(a+k) = 16(2^n - 1)$

$\Rightarrow \sum_{k=1}^{n} f(a)\cdot f(k) = 16(2^n-1)$

$\Rightarrow f(a) \sum_{k=1}^{n} f(k) = 16(2^n-1)$

$= f(a)\left[f(1) + f(2) + f(3) + \cdots n\,\text{ts}\right] = 16(2^n-1)$

$\Rightarrow f(a)\left[\underbrace{2 + 2^2 + 2^3 + \cdots n\,\text{ts}}_{\text{GP: } a=2,\ r=2}\right] = 16(2^n-1)$

$\Rightarrow f(a)\left[2\left(\frac{\cancel{2^n-1}}{2-1}\right)\right] = 16\cancel{(2^n-1)}$

$\Rightarrow f(a) = 8$

$\Rightarrow 2^a = 8 = 2^3$

$\Rightarrow a = 3$ Ans

Qu 6 → If A is the A.M, and G_1, G_2 be two geometric means b/w any two numbers, then Prove that $2A = \frac{G_1^2}{G_2} + \frac{G_2^2}{G_1}$

Solution

let a & b are the two numbers

given a, A, b & a, G_1, G_2, b

$\boxed{A = \frac{a+b}{2}}$

$n = 2$

$r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}} = \left(\frac{b}{a}\right)^{\frac{1}{3}}$

$G_1 = ar^1 = a\left(\frac{b}{a}\right)^{1/3}$

$G_2 = ar^2 = a\left(\frac{b}{a}\right)^{2/3}$

L.H.S $\frac{G_1^2}{G_2} + \frac{G_2^2}{G_1}$

$= \frac{a^2\left(\frac{b}{a}\right)^{\cancel{2/3}}}{a\left(\frac{b}{a}\right)^{\cancel{2/3}}} + \frac{a^2\left(\frac{b}{a}\right)^{4/3}}{a\left(\frac{b}{a}\right)^{1/3}}$

$= a + a\left(\frac{b}{a}\right)^1$

$= a + b$

$= 2\left(\frac{a+b}{2}\right)$

$= 2A =$ R.H.S Ans

Qn 7 → Find the Sum of first 24 terms of the A.P $a_1, a_2, a_3, \ldots$, if it is known that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$

Soln

$a_1, a_2, a_3, \ldots\ldots a_{24}$

$a_1 + a_{24} = a_5 + a_{20} = a_{10} + a_{15}$

we have $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$

$\Rightarrow (a_1 + a_{24}) + (a_5 + a_{20}) + (a_{10} + a_{15}) = 225$

$\Rightarrow (a_1 + a_{24}) + (a_1 + a_{24}) + (a_1 + a_{24}) = 225$

$\Rightarrow 3(a_1 + a_{24}) = 225$

$\Rightarrow a_1 + a_{24} = 75$

Now $S_{24} = \frac{24}{2}[a_1 + a_{24}]$

$= \frac{24}{2} \times 75$

$= 900$ Ans

Qn. 8 → Find the minimum value of the expression $3^x + 3^{1-x}$

Soln let $a = 3^x$ & $b = 3^{1-x}$

we have $A.M \geq G.M$

$\Rightarrow \frac{a+b}{2} \geq \sqrt{ab}$

$\Rightarrow a+b \geq 2\sqrt{ab}$

$\Rightarrow 3^x+3^{1-x} \geq 2\sqrt{3^x \cdot 3^{1-x}}$

$\Rightarrow 3^x+3^{1-x} \geq 2\sqrt{3^1}$

$3^x+3^{1-x} \geq 2\sqrt{3}$

$\therefore$ Min value of 3^x+3^{1-x} is $2\sqrt{3}$

Ans 9 → In a GP of the terms, if any term is equal to the sum of the next two terms, then show that common ratio is $2\sin(18^\circ)$

Sol
given

$a_n = a_{n+1} + a_{n+2}$

$\Rightarrow ar^{n-1} = ar^n + ar^{n+1}$

$\Rightarrow r^{n-1} = r^n + r^{n+1}$

$\Rightarrow \cancel{r^{n-1}} = \cancel{r^{n-1}}(r + r^2)$

$\Rightarrow 1 = r + r^2$

$\Rightarrow r^2 + r - 1 = 0$

$r = \frac{-1 \pm \sqrt{1+4}}{2} \Rightarrow r = \frac{-1 \pm \sqrt{5}}{2}$

$r \neq \frac{-1-\sqrt{5}}{2}$ {given G.P of +ve term}

$$\boxed{\begin{aligned} r &= \frac{-1+\sqrt{5}}{2} \\ \sin(18^\circ) &= \frac{\sqrt{5}-1}{4} \\ 2\sin(18^\circ) &= \frac{\sqrt{5}-1}{2} = r \end{aligned}}$$

Qn 10 → The length of three unequal edges of a rectangular solid block are in G.P. The volume of the block is 216 cm³ and the total surface area is 252 cm². Find the length of the longest edge.

Sol: Let the sides/edges of cube $= \frac{a}{r}, a, ar$

Given volume $= 216$

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

$$\Rightarrow a^3 = 216 \Rightarrow a = 6$$

Given S.A $= 252$

$$\Rightarrow 2(lb + bh + hl) = 252$$

$$\Rightarrow 2\left[\frac{a^2}{r} + a^2 r + a^2\right] = 252$$

$$\Rightarrow \frac{a^2}{r} + a^2 r + a^2 = 126$$

$$\Rightarrow a^2\left(\frac{1}{r} + r + 1\right) = 126$$

$$\Rightarrow 36\left(\frac{1 + r^2 + r}{r}\right) = 126$$

$$\Rightarrow \frac{1 + r^2 + r}{r} = \frac{126}{36} = \frac{21}{6} = \frac{7}{2}$$

$$\Rightarrow 2 + 2r^2 + 2r = 7r$$

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

$$\Rightarrow 2r^2 - 4r - r + 2 = 0 \Rightarrow 2r(r-2) - 1(r-2) = 0$$

$\Rightarrow r = 2$ or $r = 1/2$

$a = 6,\ r = 2$ | $a = 6,\ r = 1/2$

terms

3, 6, 12 | 12, 6, 3

$\therefore$ longest ~~edge~~ is 12 cm Ans

Qn. 11 → Find the 10th common term b/w the series $3 + 7 + 11 + \ldots$ and $1 + 6 + 11 + \ldots$

Sol: Ist series

$3 + 7 + 11 + 15 + 19 + 23 + 27 + 31 + 35 + 39 + 43 + 47 + 51 \ldots$

2nd series

$1 + 6 + 11 + 16 + 21 + 26 + 31 + 36 + 41 + 46 + 51 + \ldots$

~~Series~~ sequence of common terms

$11, 31, 51, \ldots$

then is in AP $\quad a = 11,\ d = 20$

$a_{10} = a + 9d = 11 + (180) = 191$ is the 10th common term Ans

OR Ist common term $= 11$

$d_1 = 4,\ d_2 = 5 \quad$ LCM $4 \,\&\, 5 = 20$

$d = 20$

$a_{10} = a + 9d = 11 + 180 = 191$ Ans

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Q.12 (i) If a, b, c, d are four distinct +ve term in AP then show that $bc > ad$

(ii) If a, b, c, d are four distinct positive term in G.P, then show that
$$a+d > b+c$$

Ans

$a, b, c, d \to AP$

AM > GM for first three term (a b c)

$$\frac{a+c}{2} > \sqrt{ac} \quad \cdots \left\{ \begin{array}{l} \because a, b, c \to AP \\ 2b = a+c \\ \frac{a+c}{2} = b \end{array} \right.$$

$$\Rightarrow b > \sqrt{ac}$$

$$b^2 > ac \quad \cdots (1)$$

AM > GM for next three term (b, c, d)

$$\frac{b+d}{2} > \sqrt{bd} \quad \left\{ \begin{array}{l} b, c, d \to AP \\ 2c = b+d \\ \frac{b+d}{2} = c \end{array} \right.$$

$$c > \sqrt{bd}$$

$$\Rightarrow c^2 > bd \quad \cdots (2)$$

(1) × (2)

$$b^2c^2 > (ac)(bd)$$

$$\boxed{bc > ad}$$

(ii) $a, b, c, d \to GP$

$AM > GM$ for first three term $a\ b\ c$

$\frac{a+c}{2} > \sqrt{ac}$ $\quad \{\because a, b, c$ GP $b^2 = ac$ $b = \sqrt{ac}\}$

$\Rightarrow \frac{a+c}{2} > b$

$\Rightarrow a+c > 2b$ ... (1)

again $AM > GM$ for next three term $b\ c\ d$

$\frac{b+d}{2} > \sqrt{bd}$ $\quad \{b, c, d \to GP$ $c^2 = bd$ $c = \sqrt{bd}\}$

$\Rightarrow \frac{b+d}{2} > c$

$\Rightarrow b+d > 2c$ - (2)

adding (1) & (2)

$(a+c) + (b+d) > 2b + 2c$

$\Rightarrow a+d > b+c$ proved

WORKSHEET NO: 1 REVISION | SEQUENCE SERIES

Ques 1 If $a_1, a_2, a_3 \ldots a_n$ are in AP with common difference 'd', then show that

$$\sin d\left(\operatorname{cosec} a_1 \cdot \operatorname{cosec} a_2 + \operatorname{cosec} a_2 \cdot \operatorname{cosec} a_3 + \ldots \operatorname{cosec} a_{n-1} \cdot \operatorname{cosec} a_n\right) = \cot a_1 - \cot a_n$$

Ques 2 → If a, b, c, d are in GP, then prove that a^2-b^2, b^2-c^2, c^2-d^2 are also in G.P

Qn 3 → The product of three numbers in A.P is 224 and the largest number is 7 times the smallest. Find the numbers. Ans 2, 8, 14

Qn. 4 → In an AP, if $S_n = qn^2$ and $S_m = qm^2$ then show that $S_q = q^3$

Qn 5 → Find the Minimum value of $4^x + 4^{1-x}$ Ans = 4

Qn 6 → In AP; if $S_n = 3n + 2n^2$ find common difference Ans = 4

Qn 7 → A side of an equilateral triangle is 20cm long. A second equilateral triangle is inscribed in it by joining the mid points of the sides of the first triangle. The process is continued. ~~as shown in the~~ Find the perimeter of the sixth inscribed equilateral triangle Ans $\frac{15}{8}$ cm

Qn 8 → Find a GP, for which the sum of first two terms is -4 and the fifth term is 4 times the third term

Ans $-\frac{4}{3}, -\frac{8}{3}, -\frac{16}{3}, ------$

(or) $4, -8, 16, -32, ---$

Qn. 9 → If the continued product of three numbers in GP is 216 and the sum of their products in pairs is 156. Find the numbers

Ans 18, 6, 2 (or) 2, 6, 18

Qn. 10 → The product of first three terms of a GP is 1000. If 6 is added to its second term and 7 added to its third term, the terms become in A.P. Find the GP

Ans 5, 10, 20, --- (or) 20, 10, 5, ---

Qn 11 → Find four numbers in GP in which the third term is greater than the first by 9 and the second term is greater than the fourth by 18.

Ans 3, −6, 12, −24

Qn 12 → The sum of first three terms of a GP is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms

Ans $\frac{2}{5}, 1, \frac{5}{2}$

Qn. 13 → The sum of first three terms of a GP is 16 and the sum of next three terms is 128. Find the sum of n terms of GP

Ans $\frac{16}{7}(2^n - 1)$

Qn. 14 → Find two numbers whose A.M is 34 and GM is 16 Ans 64 & 4

Qn 15 → If 'a' is the A.M of b and c, and the two geometric Means are G_1 & G_2, then show that $G_1^3 + G_2^3 = 2abc$

Qn 16 → If $a_1, a_2, a_3 \ldots a_n$ be an A.P, Prove that

$$\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \ldots \frac{1}{a_{n-1} a_n} = \frac{n-1}{a_1 a_n}$$

Qn. 17 → ~~Div~~ Divide 32 in to four parts which are in A.P such that the product of extremes is to the product of means is 7:15 Ans 2, 6, 10, 14

Qn 18 → The Sum of first p, q, r terms of an AP are a, b, c respectively. show that

$$\frac{a}{p}(q-r) + \frac{b}{q}(r-p) + \frac{c}{r}(p-q) = 0$$

Qn 19 → the sum of n terms of two A.P are in the ratio (3n+8) : (7n+15). Find the ratio of their 12th terms

Ans 7:16

On 20 → Between 1 and 31, m A.M's are inserted So that the ratio of the 7th and $(m-1)^{th}$ A.M is 5:9 Find the value of m Ans m = 14

Qn 21 → The Ratio of the Sum of 'm' and 'n' terms of an A.P is $m^2 : n^2$. show that the ratio of the mth and nth terms is $(2m-1) : (2n-1)$

— x —