Nishant Jindal

Q1 ✓ 7 ✓ 8 ✓

Q 2 $A_1 A_2 \to a, A_1 A_2 b \to AP \Rightarrow A_1 + A_2 = a + b$

$G_1 G_2 \to a, G_1 G_2 b \to GP \to ab = G_1 G_2$

$H_1 H_2 \to a, H_1 H_2 b \to HP \to$

$\frac{1}{a}, \frac{1}{H_1}, \frac{1}{H_2}, \frac{1}{b} \to AP \to \frac{1}{H_1} + \frac{1}{H_2} = \frac{1}{a} + \frac{1}{b}$

$\frac{A_1 + A_2}{H_1 + H_2} = ?$

$\frac{H_1 + H_2}{H_1 H_2} = \frac{a+b}{ab}$

$\frac{H_1 + H_2}{H_1 H_2} \quad \frac{A_1 + A_2}{G_1 G_2}$

$\frac{G_1 G_2}{H_1 H_2} = \frac{A_1 + A_2}{H_1 + H_2}$ Q

$\boxed{B}$

Q 6, 3, 4 Chhod Dena

Q5 $x^2 - 2AMx + GM^2 = 0$

$x^2 - 18x + 16 = 0$ A

Q9 $\frac{HM}{GM} = \frac{4}{5}$ then $\frac{a}{b} = ?$ A

$\frac{\frac{2ab}{a+b}}{\sqrt{ab}} = \frac{4}{5}$

$\frac{2\sqrt{ab}}{a+b} = \frac{4}{5}$

$2a + 2b - 5\sqrt{ab} = 0$

$2x^2 + 2y^2 - 5xy = 0$

$2x^2 - 4xy - xy + 2y^2 = 0$

$2x(x - 2y) - y(x - 2y) = 0$

$(2x - y)(x - 2y) = 0$

$2x = y$ OR $x = 2y$

$\frac{x}{y} = \frac{1}{2}$ | $\frac{x}{y} = 2$

$\frac{\sqrt{a}}{\sqrt{b}} = \frac{1}{2}$ | $\sqrt{\frac{a}{b}} = \frac{2}{1}$

$\frac{a}{b} = \frac{1}{4}$ | $\frac{a}{b} = 4$

Q10

$$\frac{A}{G} = \frac{m}{n}$$

$$A = \frac{m}{n} G.$$

$$\frac{\alpha}{\beta} = \frac{A + \sqrt{A^2 - G^2}}{A - \sqrt{A^2 - G^2}}$$

$$= \frac{\frac{m}{n} G + \sqrt{\frac{m^2}{n^2} G^2 - G^2}}{\frac{m}{n} G - \sqrt{\frac{m^2}{n^2} G^2 - G^2}}$$

$$\frac{\alpha}{\beta} = \frac{m + \sqrt{m^2 - n^2}}{m - \sqrt{m^2 - n^2}}$$

Q11 $A = \frac{75}{4}$, $G = 15$

$$\alpha = \frac{75}{4} + \sqrt{\left(\frac{75}{4}\right)^2 - (15)^2} = \frac{75}{4} + (15)\sqrt{\left(\frac{5}{4}\right)^2 - 1^2} = \frac{75}{4} + 15 \times \frac{3}{4}$$

$$= \frac{120}{4} = 30 \checkmark$$

A

$$\beta = \frac{75}{4} - \sqrt{\left(\frac{75}{4}\right)^2 - (15)^2}$$

12) ✓ , 13 Copy 15) $1, A_1\, A_2\, A_3 \,-\,-\, A_n\ 51$

$$\frac{A_4}{A_7} = \frac{3}{5} \quad \text{then } n = ?$$

$$d = \frac{51-1}{n+1} = \frac{50}{n+1} = 2$$

$n+1 = 25 \Rightarrow n = 24$

$$\frac{1+4d}{1+7d} = \frac{3}{5} \Rightarrow 5 + 20d = 3 + 21d$$

$$2 = d$$

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16) Copy →

17

$a, A, b \to AP$

$a, p, q, b \to GP$

$p^3 + q^3 = 2Apq$ (Q s किया)

$\frac{p^3+q^3}{apq} = 2A$ (A) ✓

$2b(x+y) = 4xy$

$\frac{x+y}{xy} = \frac{2}{b}$

$\frac{1}{x} + \frac{1}{y} = \frac{2}{b}$ $\boxed{D}$ ✓

Q18) $a, b, c \to GP \Rightarrow \boxed{b^2 = ac}$

a, x, b & $b, y, c \to AP$

$2x = a+b$ $\quad$ $2y = b+c$

$a = 2x - b$ $\quad$ $c = 2y - b$

$b^2 = (2x-b)(2y-b)$

$\cancel{b^2} = 4xy - 2by - 2xb + \cancel{b^2}$

(19) $A = \frac{3}{2}$, $H = \frac{4}{3}$

$\frac{\alpha+\beta}{\cancel{2}} = \frac{3}{\cancel{2}}$ | HM $\frac{2\alpha\beta}{\alpha+\beta} = \frac{4}{3}$

$\frac{2\alpha\beta}{\cancel{3}} = \frac{\cancel{4}^2}{\cancel{3}}$

$\alpha+\beta = 3$ $\quad$ $\alpha\beta = 2$

$x^2 - 3x + 2 = 0$ $\boxed{B}$

20 ✓

21 Chhod Dena.

22

23) G GM of x, y.

$G = \sqrt{xy}$

Demand → $\frac{1}{G^2 - x^2} + \frac{1}{G^2 - y^2} =$

$\frac{1}{x^2y^2 - x^2} + \frac{1}{x^2y^2 - y^2}$

$\frac{1}{x^2(y-x)(y+x)} + \frac{1}{y^2(x-y)(x+y)}$

$\frac{1}{x+y}\left\{\frac{1}{x^2(y-x)} - \frac{1}{y^2(y-x)}\right\}$

$\frac{1}{\cancel{x+y}}\left\{\frac{\cancel{y^2 - x^2}\,(y+x)}{x^2y^2(\cancel{y-x})}\right\} = \frac{1}{x^2y^2}$

$\frac{1}{G^2}$ $\boxed{H.P.}$

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24) $\alpha = A + \sqrt{A^2 - h^2}$ 26 ✓ HP

$\beta = A - \sqrt{A^2 - h^2}$ 27 ✓ 1 ✓ 2 ✓

25) $a = \frac{b+c}{2}$

$b, G_1, G_2, c \to GP.$

$G_1 = b \cdot r = b \cdot \left(\frac{c}{b}\right)^{\frac{1}{2+1}} = \cancel{b} \cdot \frac{c^{1/3}}{\cancel{b^{1/3}}} = b^{2/3} \cdot c^{1/3}.$

$G_2 = br^2 = b \cdot \left(\frac{c}{b}\right)^{\frac{2}{2+1}}$

$= \cancel{b} \cdot \frac{c^{2/3}}{\cancel{b^{2/3}}} = b^{1/3} \cdot c^{2/3}$

$G_1^3 + G_2^3$

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Basic Relation betn AM, GM & HM.

Yad $AM = \frac{a+b}{2}$, $GM = \sqrt{ab}$, $HM = \frac{2ab}{a+b}$.

$2A = a+b$ $\quad G^2 = ab$

$H = \frac{2ab}{a+b}$

$H = \frac{2G^2}{2A}$

$\boxed{G^2 = AH}$ $\quad b^2 = ac$ Jesi feel

$\boxed{A, G, H \to GP.}$

1) If A & G are AM, GM of 2 No then No's Are

$\alpha = A + \sqrt{A^2 - G^2}$

$\beta = A - \sqrt{A^2 - G^2}$

2) If A, H are AM & HM of 2 Nos then Nos Are

$\alpha = A + \sqrt{A^2 - AH}$

$\beta = A - \sqrt{A^2 - AH}$

Q If H is HM betn p & q then $\frac{H}{p} + \frac{H}{q} = ?$

$H = \frac{2pq}{p+q}$

Demand $= H\left(\frac{1}{p} + \frac{1}{q}\right) = H\left(\frac{p+q}{pq}\right)$

$= \frac{2\cancel{pq}}{\cancel{p+q}} \times \frac{\cancel{p+q}}{\cancel{pq}} = 2.$

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Q If $a, a_1\ a_2\ a_3 \ldots a_{2n}, b$ are in AP
$a, g_1\ g_2\ g_3 \ldots g_{2n}, b$ are in HP
& h is HM of a & b then P.T.

$$\frac{a_1+a_{2n}}{g_1 g_{2n}} + \frac{a_2+a_{2n-1}}{g_2 g_{2n-1}} + \frac{a_3+a_{2n-2}}{g_3 g_{2n-2}} + \cdots + \frac{a_n+a_{n+1}}{g_n \cdot g_{n+1}} = \frac{2n}{h}.$$

$a+b = a_1+a_{2n} = a_2+a_{2n-1} = a_3+a_{2n-2} - \ldots$

$ab = g_1 g_{2n} = g_2 \cdot g_{2n-1} = g_3 \cdot g_{2n-2} - \ldots$

LHS $\frac{a+b}{ab} + \frac{a+b}{ab} + \frac{a+b}{ab} + \cdots + \frac{a+b}{ab} = 2n\boxed{\frac{(a+b)}{2ab}} = \frac{2n}{h}$ RHS.

Q Adv If a, x, y, z, b are in AP then $x+y+z = 15$
If a, x, y, z, b are in HP then $\frac{1}{x}+\frac{1}{y}+\frac{1}{z} = \frac{5}{3}$
then a, b are.
// 1, 9,   2, 8   3, 7   4, 6

1) $a, x, y, z, b \to$ AP   AM

$x+y+z = \frac{3(a+b)}{2} = 15$

$a+b = 10$

2) $a, x, y, z, b \to$ HP   HM

$\frac{1}{x}+\frac{1}{y}+\frac{1}{z} = \frac{3}{\left(\frac{2ab}{a+b}\right)} \Rightarrow$

$\frac{5}{3} = \frac{3 \times 10}{2ab} \Rightarrow ab = 9$

1, 9 या 9, 1.

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Q $a_1\ a_2\ a_3 \ldots a_{10}$ are in AP.

Adv

& $h_1\ h_2\ h_3 \ldots h_{10}$ are in HP.

if $a_1 = h_1 = 2$ & $a_{10} = h_{10} = 3$

then $a_4 \cdot h_7 = ?$

$a_4 = a_1 + 3d$

$= 2 + 3d$

$= 2 + \frac{3}{9}$

$a_4 = 2 + \frac{1}{3} = \frac{7}{3}$.

$a_{10} = a_1 + 9d = 3$

$2 + 9d = 3$

$d = \frac{1}{9}$

$\boxed{h_7}$

$h_1 = 2$ & $h_{10} = 3$. , h_7

$A_1 = \frac{1}{2}$

$A_{10} = \frac{1}{3}$.

$A_1 + 9d = \frac{1}{3}$.

$\frac{1}{2} + 9d = \frac{1}{3}$

$9d = \frac{1}{3} - \frac{1}{2}$

$9d = -\frac{1}{6}$

$d = -\frac{1}{54}$

$A_7 = A_1 + 6d$

$= \frac{1}{2} + 6 \times \frac{-1}{54}$

$= \frac{27-6}{54}$

$A_7 = \frac{\cancel{21}\,7}{\cancel{54}\,18}$

$h_7 = \frac{18}{7}$

$a_4 \times h_7 = \frac{\cancel{7}}{\cancel{3}} \times \frac{\cancel{18}\,6}{\cancel{7}} = 6$

S.C.

$a_1 h_{10} = a_2 h_9 = a_3 h_8 = a_4 h_7$

$2 \times 3 =$

$= a_4 h_7$

Nishant Jindal

Q If A, G, H are AM, GM & HM of Roots of Cubic Eqn then find Cubic Eqn?

1) Cubic Eqn in the form of α, β, γ.

$$x^3-(\alpha+\beta+\gamma)x^2+(\alpha\beta+\beta\gamma+\gamma\alpha)x-\alpha\beta\gamma=0$$

$$x^3-3Ax^2+\frac{3G^3}{H}x-G^3=0$$

2) $A =$ AM of $\alpha, \beta, \gamma = \dfrac{\alpha+\beta+\gamma}{3}$

$\alpha+\beta+\gamma=3A$

$G =$ GM of α, β, γ

$G=(\alpha\cdot\beta\cdot\gamma)^{\frac{1}{3}}$

$G^3=\alpha\beta\gamma.$

$H =$ HM of α, β, γ.

$$H=\frac{3}{\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}}$$

$$H=\frac{3\alpha\beta\gamma}{\alpha\beta+\beta\gamma+\gamma\alpha}.$$

$$\alpha\beta+\beta\gamma+\gamma\alpha=\frac{3G^3}{H}$$

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Arithmetic Geometric Progression. AGP.

1) Sum of n AGP.

$$S = a + (a+d)r + (a+2d)r^2 + (a+3d)r^3 + \dots + (a+(n-1)d)\cdot r^{n-1}$$

$$S\cdot r = \quad a\cdot r + (a+d)\cdot r^2 + (a+2d)r^3 + \dots + (a+(n-2)d)r^{n-1} + (a+(n-1)d)r^n$$

$$S(1-r) = a + \underbrace{\{dr^1 + dr^2 + dr^3 + \dots + dr^{n-1}\}}_{\text{GP of } (n-1) \text{ terms}} - (a+(n-1)d)\, r^{n}$$

Q

AP GP

$$1 + 2\cdot 2 + 3\cdot 2^2 + 4\cdot 2^3 + \dots + 100\cdot 2^{99} = ?$$

$$S = 1 + 2\cdot 2 + 3\cdot 2^2 + 4\cdot 2^3 + \dots + 100\cdot 2^{99}$$

$$2S = \quad 2\cdot 1 + 2\cdot 2^2 + 3\cdot 2^3 \quad + 99\cdot 2^{99} + 100\cdot 2^{100}$$

$$-S = 1 + 2(2-1) + 2^2(3-2) + 2^3(4-3) - \dots + 2^{99}(100-99) - 100\cdot 2^{100}$$

$$-S = 1 + \underbrace{\{2^1 + 2^2 + 2^3 - \dots 2^{99}\}}_{99 \text{ terms of GP}} - 100\cdot 2^{100}$$

$$-S = 1 + \frac{2\cdot(2^{99}-1)}{(2-1)} - 100\cdot 2^{100}$$

$$-S = 1 + 2^{100} - 2 - 100\cdot 2^{100}$$

$$= 2^{100}(1-100) - 1$$

$$+S = +99\cdot 2^{100} + 1$$

$$S = 1 + 99\cdot 2^{100}$$

Ans

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Q $3+\frac{1}{4}(3+d)+\frac{1}{4^2}(3+2d)+ - - + \infty = 8$ then $d=?$

$$S = 3+\frac{1}{4}(3+d)+\frac{1}{4^2}(3+2d)+ - - - \infty$$

$$\frac{S}{4} = \frac{3}{4} + \frac{1}{4^2}(3+d)+ - - - \infty$$

$$\frac{3S}{4} = 3+\left\{\frac{d}{4}+\frac{d}{4^2}+\frac{d}{4^3}+ - - - \infty\right\}$$

$\leftarrow \infty$ GP $\rightarrow$

HW $\rightarrow$ DPP-4

AGP

HM

$$\frac{3S}{4} = 3+\frac{\frac{d}{4}}{1-\frac{1}{4}} = 3+\frac{\frac{d}{4}}{\frac{3}{4}}$$

$$\frac{3\times 8^2}{4} = 3+\frac{d}{3} \Rightarrow 6 = 3+\frac{d}{3}$$

$$\frac{d}{3} = 3 \Rightarrow d = 9 \text{ A}$$