Series & Progression

Q. word at 44th rank alphabetically of word "ROADIE"

→ for keeping first two constant we have 24 arrangi

∴ AD ⇒ 24 arrangements

AE ⇒ 24 arrangements

$\boxed{\therefore \text{AERDOI}}$

Q. 8th, 12th terms 39 & 59 then first term is –

→ $a+(8-1)d = 39$

$a+(12-1)d = 59$

$d = 5$

$a + 7\times5 = 39$

$\boxed{a=4}$

Q. 15th term of 20, 15, 10 - - - -

$a+(n-1)d = l$

$20+(15-1)\times-5 = -50$

Q. $1^2+2^2+3^2 --- 10^2 = 385$ then $2^2+4^2+6^2 --- 20^2 = ?$

$(2.1)^2 + (2.2)^2 + (3.2)^2 + (2.4)^2 + --- (2.10)^2 =$

$2^2[1^2+2^2+3^2 --- 10^2]$

$2^2\times 385$

4×385

$\boxed{1540}$

Q. AP of 51 terms sum of first three 65 and sum of middle is 129 what is first and common diff?

→ $S = \frac{n}{2}(a+l)$ ⇒ $65 = \frac{3}{2}(a+l)$

$a + a+d + a+2d = 65$

$3a+3d = 65$ — (I)

$a+24d + a+25d + a+26d = 129$

$3a+75d = 129$ — (II)

$\boxed{a = \frac{187}{9} \text{ \& } d = 8/9}$

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Q. no. of terms in GP. 3, 6, 12, 24 ---- 384 ?

→ $r = \frac{x_2}{x_1} = \frac{6}{3} = 2$

$x_n = ar^{(n-1)}$

$384 = 3 \times 2^{(m)}$

$128 = 2^m$

$m = 7$

$(n-1) = 7$

$\boxed{n = 8}$

Q. How many no. between 11 & 90 divisible by 7?

→ $14 + (n-1)7 = 84$

$\boxed{n = 11}$

Q. In AP $S_1 : S_4 = 1 : 10$ then ratio of first term to fo... term is -

→ $\frac{S_1}{S_4} = \frac{a}{\frac{4}{2}(a + a + 3d)} = \frac{1}{10}$

$\frac{a}{4a + 6d} = \frac{1}{10}$

$d = \frac{\cancel{8}a}{3}$

$\frac{T_1}{T_2} = \frac{a}{(a+3d)} = \frac{a}{a + 3 \times \frac{a}{3}} = \frac{a}{4a} = \frac{1}{4}$

Q. Sum of first three in AP is 21 product of extreme is 45 find numbers.

→ $S_n = \frac{n}{2}(a + l) \Rightarrow 21 = \frac{3}{2}(a + l) \Rightarrow a = 14 - l$

$a \times l = 45 \Rightarrow a(14 - a) = 45$

$a^2 - 14a + 45 = 0$

$a = 5$ or 9 then $a_3 = 9$ $a_2 = 7$

or a be central number. then no. $(a-d, a, a+d)$

$\therefore a-d + a + a+d = 21$

$\boxed{a=7}$

$(a-d)(a+d) = 45$

$a^2 - d^2 = 45$

$\boxed{d=2}$

$\therefore \boxed{5, 7 \& 9}$

Q. sum of first three -33 and middle three 75 out of 21 terms. what is sum of AP?

→ $a + (a+d) + (a+2d) = -33$

$3a + 3d = -33$ —— (I)

$(a+9d) + (a+10d) + (a+11d) = 75$

$3a + 30d = 75$ —— (II)

$\boxed{d=4}$

$\boxed{a=-15}$

$S_n = \cancel{\frac{21}{2}(4-15)} \cancel{= 525}\ \frac{21}{2}(-15 + (-15 + 20 \times 4))$

$\boxed{S_n = 525}$

Q. The sum of n terms AP $= 3n^2 + n$ find n^{th} term

let $n = 1, 2$

$S_2 = 3 \times 2^2 + 2 = 14$, $S_1 = 3 \times 1^2 + 1 = 4$

$S_2 - S_1 = a_2$

$\boxed{a=4}$

$\boxed{a_2 = 10}$

$\therefore \boxed{d=5}$

n^{th} term is $a + (n-1)d = 4 + (n-1)6 = 6n - 2$

Q. $3x+1, 5x-1, 5x+1$ ----

→ $(3x+1) + [(5x-1) - (3x+1)] \times (n-1) = l$

$(3x+1) + (2x-2)(3-1) = 5x+1$

$\boxed{x=2}$

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Q. Ball drop from height travel distance $\frac{128}{9}, \frac{32}{3}, 8, \ldots$ total distance travelled ?

→

This is infinite GP. with $r = \frac{6}{8} = \frac{3}{4}$

$\therefore$ total distance $= \frac{a}{1-r}$

$= \frac{128}{9(1-\frac{3}{4})} = \frac{4 \times 128}{9} = \frac{512}{9}$

Q. Sum of first second term is 36 and sum of all terms of GP is 48 find second term?

→ $a + ar = 36$

$\frac{a}{(1-r)} = 48$

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

$a = 24$

$\boxed{a_2 = 12}$

Q. find three GM of 2, 81/8

→ $a = 2$

$ar^4 = \frac{81}{8} \Rightarrow r^4 = \frac{81}{16} \Rightarrow \boxed{r = \frac{3}{2}}$

$ar = 3$, $ar^2 = \frac{9}{2}$, $ar^3 = \frac{27}{4}$

Q. AM is 75 and GM is 21 Find no.

→ $\frac{a_1 + a_2}{2} = 75$ | $a_1 = 150 - a_2$

$\sqrt{a_1 a_2} = 21$ | $a_1 = \frac{441}{a_2}$

$\boxed{a_1 = 3 \quad a_2 = 147}$

Q. The product of first three terms of GP is 512 if we add 2 to second term, the three terms becomes AP. find GP let $\frac{a}{r}, a, ar$

$a^3 = 584$

$\boxed{a = 8}$

$a, a+2, ar$ in ap(AP) hence

$(a+2) - a/r = ar - (a+2)$

$10 - \frac{8}{r} = 8r - 10$

$8r^2 - 20r + 8 = 0$

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

$\therefore \boxed{GP = 4, 8, 16 \text{ or } 16, 8, 4}$

Q. What is 8th term of 1, 1/8, 1/27 ---

$\frac{1}{(1)^3}, \frac{1}{(2)^3}, \frac{1}{(3)^3} --- \frac{1}{(8)^3}$

$\boxed{= \frac{1}{512}}$

Q. Sum of three terms of GP is ₹105 and if First two multiplied by 4 and third by 3 then they are AP find highest term.

$\frac{a}{r} + a + ar = 105$

~~$4 \times \frac{a}{r} + 4ar = 2 \times$~~

$\left(a - \frac{a}{r}\right) \times 4 = 3ar - 4a$

$\cancel{a}(r-1)4 = (3r-4)\cancel{a}r$

$4r - 4 = 3r^2 - 4r$

$3r^2 - 8r + 4 = 0$

$r = 2$ or $2/3$

$\therefore \frac{a}{2} + a + 2a = 105$

$\therefore \frac{7a}{2} = 105 \qquad \therefore a = 30$

Q. x, y, z betn 4 & 40 such that i) sum is 37 ii) 4, x, y is A
iii) $y, z, 40$ is GP find z

→ $2x = 4 + y$

$z^2 = 40y \Rightarrow y = \frac{z^2}{40}$

$x + y + z = 37 \Rightarrow x = 37 - y - z$

$\therefore 2(37 - y - z) = 4 + y$

$3y = 70 - 2z$

$3y = 70 - 2 \times z$

$\frac{3z^2}{40} = 70 - 2z$

$\boxed{z = 20}$

$\therefore \boxed{y = 10 \ \& \ x = 7}$

Q. four no. p, q, r, s with first three in GP and last in AP with d
first and fourth is same find p.

→ $\frac{a}{r}, a, ar, ar+3$

$\frac{a}{r} = ar + 3$ —— (I)

$ar - a = 3$ —— (II)

from (I) & (II)

$\frac{3}{(r-1)r} = \frac{3r}{(r-1)} + 3$

$3 = 6r^2 - 3r$

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

$r = 1$ or $-1/2$

$\therefore a = \frac{3}{r-1} = \frac{3}{-\frac{1}{2} - 1} = -2$

$\therefore \boxed{a = -2}$

$\therefore \boxed{4, -2, 1, 4}$

Q. Sum of three no. in GP is 21/2 and their product is 72
what are no?

→ $a/r, a, ar$

$\frac{a}{r} \times a \times ar = 72 \Rightarrow a^3 = 27 \Rightarrow a = 3$

$\frac{a}{r} + a + ar = 21/2 \Rightarrow (r^2 + r + 1)\frac{a}{r} = 21/2 \Rightarrow 2r^2 + 5r + 2 =$

$r = 2$ or $1/2$

$\therefore \boxed{3/2, 3, 6 \ \& \ 6, 3, 3/2}$