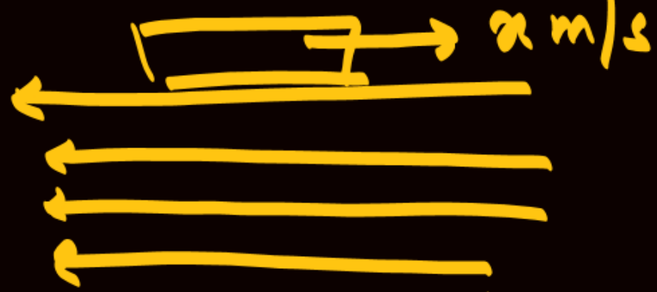
#Upstream & Downstream

Still water

Speed of boat = (x m/s) in still water



stream = t m/s

Upstream

Net speed of boat = (x - t) m/s

Downstream go with the flow

Net speed of Boat = (x+t) m/s

#LP: Speed of boat in still water is 8 km/hr. It can go 15 km upstream and 22 km downstream in 5 hrs. Find the speed of stream.

$x = 8$ km/hr

$d = s \times t$

$t = \frac{d}{s}$

Let speed of stream = t km/hr

(t)

Total time = 5 hr

$t_1 + t_2 = 5$

Upstream :-

Speed = $(8 - t)$ km/hr

dist = 15 km

$t = \frac{d}{s} = \left(\frac{15}{8-t}\right)$ hr

#Downstream

speed = $(8 + t)$ km/hr

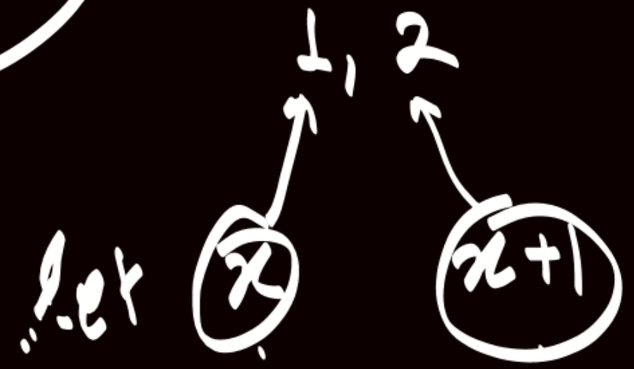
d = 22 km

$t_2 = \left(\frac{22}{8+t}\right)$ hr

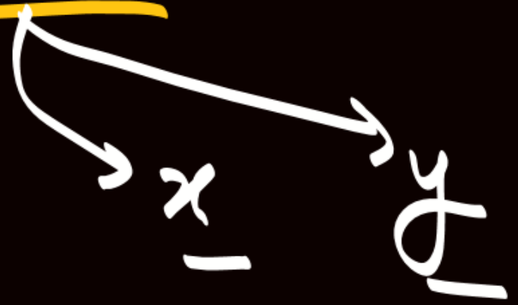
$$\left(\frac{15}{8-t}\right) + \left(\frac{22}{8+t}\right) = 5$$

Solve

Consequtive natural no :- → एक के बाद एक .



Two numbers :-



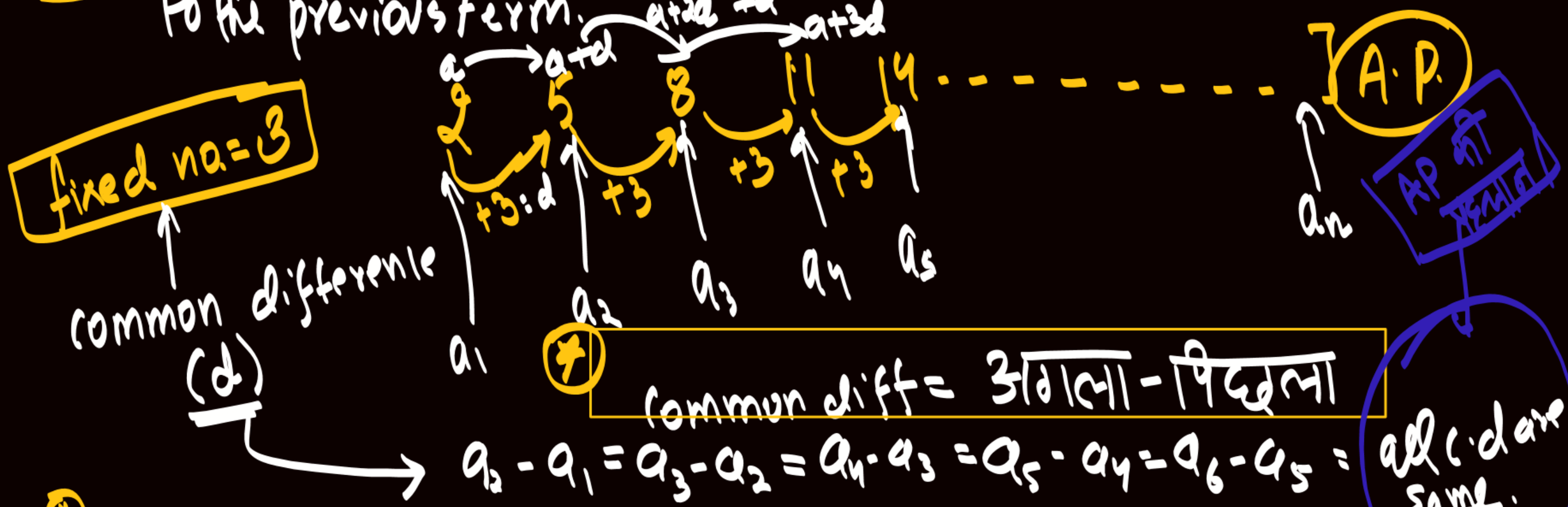
[Aim: 100/100 in Maths]

अभय CLASS 10

ARITHMETIC PROGRESSION (AP)

CHAPTER - 5

AP :- A sequence in which each term is obtained by adding a fixed number to the previous term.



fixed no = 3

common difference (d)

a_1 a_2 a_3 a_4 a_5 ..... a_n

Common diff = अगला - पिछला

$a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = a_5 - a_4 = a_6 - a_5 =$ all c.d are same.

General form of AP → $a, a+d, a+2d, a+3d, a+4d$ - - - -

#Lp:

$a = 4$, $d = 3$

find the first 4 terms of AP.

$a, a+d, a+2d, a+3d$

$\rightarrow 4, 4+3, 4+2(3), 4+3(3)$

$\rightarrow 4, 7, 10, 13 \cdots$

$a = 4, d = -1$

$a, a+d, a+2d \cdots$

$4, 4+(-1), 4+2(-1) \cdots$

$4, 3, 2 \cdots$

KSB → AP मतलब → All c.d. are same.

अभय

LP : For what value of k will k + 9 , 2k - 1 and 2k + 7 are the consecutive terms of an AP ?

$a_1 \quad a_2 \quad a_3$

$k+9, \; 2k-1, \; 2k+7 \longrightarrow$ AP

$a_2 - a_1 = a_3 - a_2$

$(2k-1) - (k+9) = (2k+7) - (2k-1)$

$2k - 1 - k - 9 = 2k + 7 - 2k + 1$

$2k - k = 10 + 8$

$k = 18$

n^{th} term of an AP

$a_1 = a$

$a_2 = a + (2-1)d$

$a_3 = a + (3-1)d$

$a_4 = a + (4-1)d$

$a_5 = a + (5-1)d$

$a_6 = a + (6-1)d$

$\vdots$

$a_{10} = a + (10-1)d$

$\vdots$

$a_{1000} = a + (1000-1)d$

$a_{5021} = a + (5021-1)d$

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

n^{th} term of AP

फायदा? इस formula से आप AP की कोई भी term की value find कर सकते हो।

अभय

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

*Ex:- (a) = 100

(d) = 2

Find the value of :-

(i) 1001 term

$a_{1001} = a + (1001-1)d = 100 + (1000)(2)$

$= 100 + 2000 \Rightarrow 2100$

(ii) 2001 term

$a_{2001} = a + (2001-1)d$

$= 100 + (2000)(2) \Rightarrow 100 + 4000 \Rightarrow 4100$

LP : Determine the A.P . whose fourth term is 18 and the difference of the ninth term from the fifteenth term is 30 .

Ans

$a_4 = 18$

$a+(4-1)d = 18$

$a+3d = 18$

$a+3(5)=18$

$a+15=18$

$a=18-15$

$a=3$

Ans $a_{15} - a_9 = 30$

$\Rightarrow [a+(15-1)d] - [a+(9-1)d] = 30$

$\Rightarrow [a+14d] - [a+8d] = 30$

$a+14d-a-8d = 30$

$6d = 30$

$d = \frac{30}{6} = 5$

AP : $a, a+d, a+2d, a+3d$

$- \; - \; - \; -$

$\Rightarrow 3, 3+5, 3+2(5), 3+3(5) \cdots$

$\Rightarrow 3, 8, 13, 18 \cdots$

अभय

 # LP : The general term of a sequence is given by an = - 4n + 15 . is the sequence of an A.P ? If so , find the 15th term and the common difference .

$a_n = -4n + 15$

$a_1 = -4(1) + 15 \Rightarrow 11$

$a_2 = -4(2) + 15 \Rightarrow 7$

$a_3 = -4(3) + 15 \Rightarrow 3$

11, 7, 3 - - -

a_1 a_2 a_3

$a_2 - a_1 = 7 - 11 \Rightarrow -4$

$a_3 - a_2 = 3 - 7 \Rightarrow -4$

$= d$

All c.d. are same.

∴ It is an AP.

$a_{15} = a + (15-1)d$

$= a + 14d$

$= 11 + 14(-4)$

LP : The nth term of an A.P is 6n + 2 . Find the common difference .

$a_n = 6n + 2$

$a_1 = 6(1) + 2 \Rightarrow 8$

$a_2 = 6(2) + 2 \Rightarrow 14$

$\therefore d = 14 - 8 \Rightarrow 6$

अभय

HW

LP : If the pth term of an A.P is q and the qth term is p , then the nth term is :

a. p + q - n

b. p + q + n

c. p - q - n

d. q - p - n

$a_p = q$

$a + (p-1)d = q$

$a_q = p$

$a + (q-1)d = p$

Unknown term → n^{th} term मान लेना।

अभय

LP : Which term of the sequence 4 , 9 , 14 , 19 , ... is 124 ?

AP check

Checking AP

$9-4 = 5$

$14-9 = 5$

$19-14 = 5$

All cd same

Yes

4, 9, 14, 19 ----- AP

Let n^{th} term is 124.

$a_n = 124$

$a+(n-1)d = 124$

$4+(n-1)(5) = 124$

$(n-1)(5) = 120$

$n-1 = 24$

$n = 25$

25^{th} term is 124.

LP : Find the number of the terms of the AP : 3 , 6 , 9 , 12 , .. 111

AP: 3, 6, 9, 12 - - - - 111 ← n^{th}

let 'n' terms

$a_n = 111$

$a+(n-1)d = 111$

$3+(n-1)(3) = 111$

$n = 37$

अभय

LP : Is 184 a term of the sequence 3 , 7 , 11 , ... ?

check AP

Checking AP

7 − 3 = 4

11 − 7 = 4

∴ Yes, AP

AP: 3, 7, 11 - - - - , 184 ??

let $a_n = 184$

$a + (n-1)d = 184$

$3 + (n-1)(4) = 184$

$(n-1)(4) = 181$

$n - 1 = \frac{181}{4}$

$n = \frac{181}{4} + 1$

$n = \frac{185}{4}$

46.2 - -

n ≠ Natural no.

∴ 184 is not a term in this AP

LP : Which term of the progression 53 , 48 , 43 ,... is the first negative term ?

53, 48, 43 - - - -

→ let n^{th} term is the first (-)ve term

$d = 48 - 53$

$d = -5$

$a_n < 0$

$a + (n-1)d < 0$

$53 + (n-1)(-5) < 0$

$53 - (n-1)(5) < 0$

$53 < (n-1)(5)$

$\frac{53}{5} < n-1$

$\frac{53}{5} + 1 < n$

or, $n > \frac{53}{5} + 1$

$n > \frac{53+5}{5}$

$n > \frac{58}{5}$ 11. ..

$n > 11 \ldots$

$n = 12$

12th term is first -ve term.

LP : The sum of 5th and 9th terms of an A.P is 72 and the sum of 7th and 12th terms is 97 . Find the A.P .

LP : Find the number of natural numbers between 102 and 998 which are divisible by 2 and 5 both .

LP : Find the middle term of the A.P. 13 , 19 , ... , 247 .

THANK YOU

COODIES 🥰