Ch-1 to Ch-5

[Aim: 100/100 in Maths]

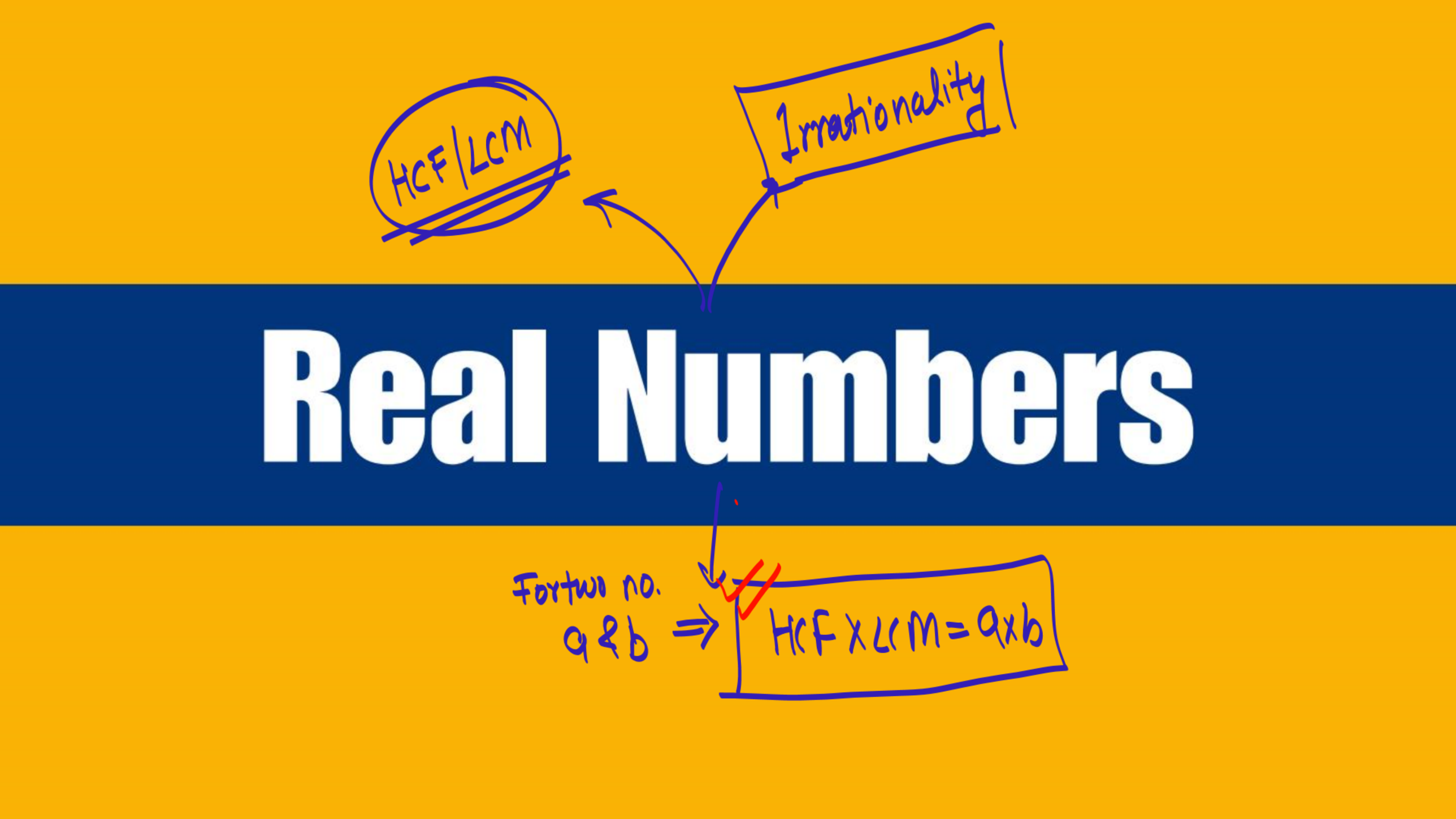
7 → Ch-1 to Ch-5

8

9

MATHS MARATHON

STAGE #2


HCF/LCM
Irrationality
Real Numbers
For two no.
a & b
HCF X LCM = a x b

#LP : Two numbers are in the ratio 2 : 3 and their LCM is 180 . What is the HCF of these numbers ?

[CBSE 2023]

$\frac{a}{b} = \frac{2}{3}$

let two ⇒ $2x$, $3x$

$2x = 2 \times x$

$3x = 3 \times x$

$LCM = 2 \times 3 \times x$

$HCF = x$

$LCM = 180$

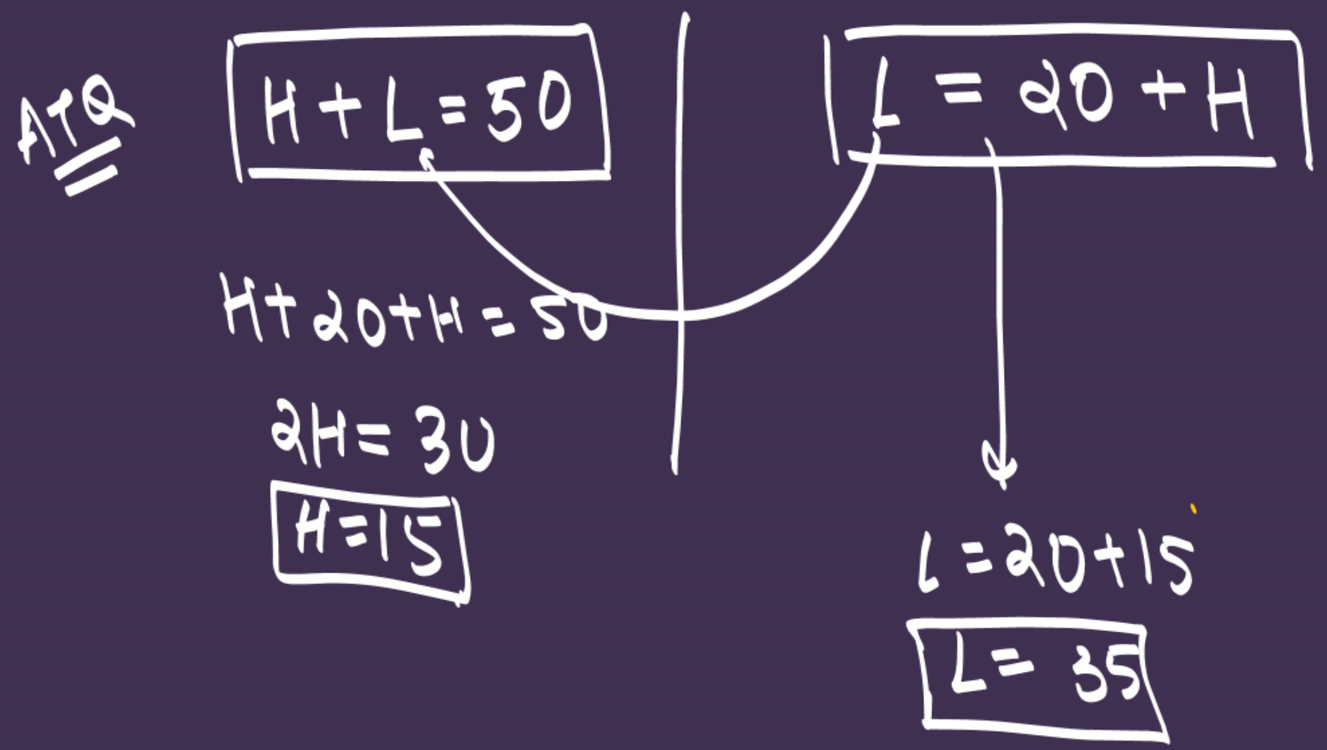
$6x = 180$

$x = 30$

$HCF = 30$

#LP : If sum of LCM and HCF of two number is 50 and their LCM is 20 more than their HCF them the product of two numbers will be :

a. 525 b. 425 c. 625 d. 325



a x b

We know,

H x L = a x b

H x L = prod. of two no

⇒ 15 x 35

⇒ 525

35
15

#LP : Write the smallest number which is divisible by both 306 and 657.

[CBSE 2019]

$\Rightarrow$ LCM (306 , 657)

306 = _____

657 = _____

LCM = 22338

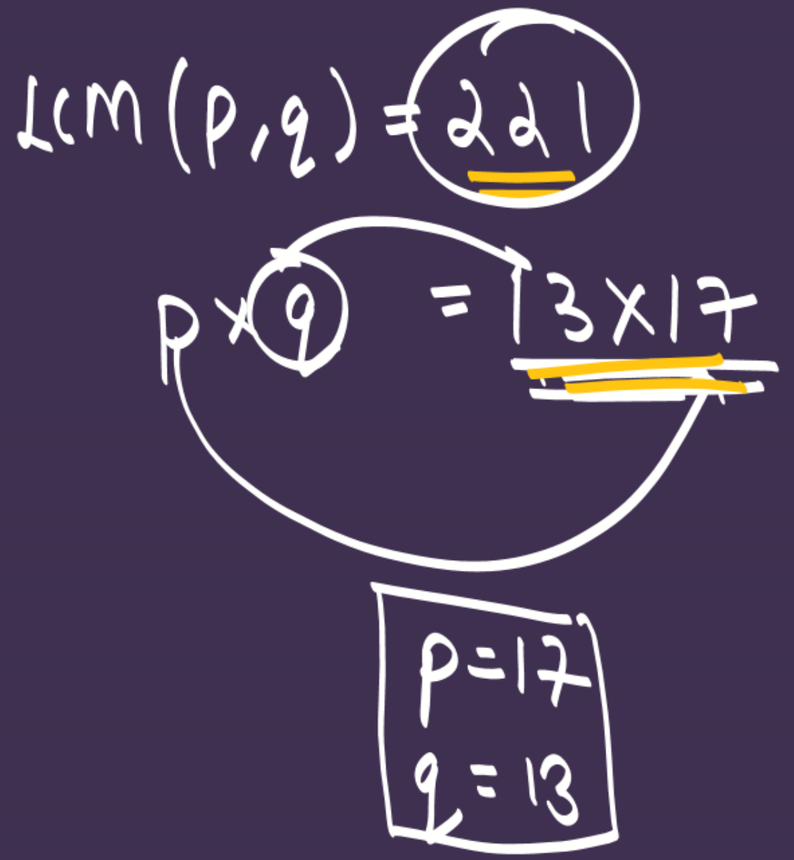
#LP : The LCM of two prime numbers p and q (p > q) is 221. Find the value of 3p - q.

a. 4

b. 28

c. 38

d. 48



$\Rightarrow 3p - q$

$\Rightarrow 3(17) - 13$

$\Rightarrow 51 - 13$

$\Rightarrow$

#LP : The largest number which divides 72 and 127 leaving remainiders 7 and 10 respectively is:

a. 845 b. 458 c. 65 d. 13

$72 - 7 = 65$

$127 - 10 = 117$

$> HCF$

#LP : Check whether 6^n can end with the digit 0 for any natural number n.

$6^n = \_\_\_\_\_0$

For any number to end with 0. It's prime fact. will contain 2 & 5 both.

$n=1 \rightarrow 6^1 = 2\times3$

$n=2 \rightarrow 6^2 = (2\times3)^2 = 2\times3\times2\times3$

$n=3 \rightarrow 6^3 = (2\times3)^3 = 2\times3\times2\times3\times2\times3$

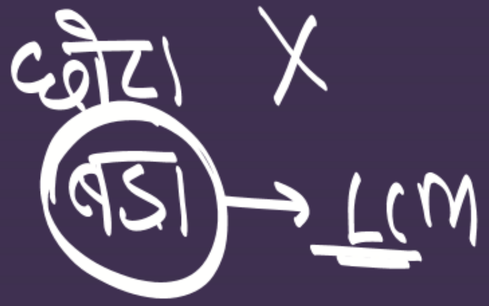
$n=100 = 6^{100} = (2\times3)^{100} = (2\times3)\times(2\times3)\times\cdots$ 100 times

$n=n \rightarrow 6^n = (2\times3)^n = 2\times3\times2\times3\times2\times3\cdots$ n times

Since, prime fact of 6^n doesn't contain 2 & 5 both. ∴ It'll not end with 0

#LP : On a morning walk , three persons step out together and their steps measure 30 cm , 36 cm and 40 cm respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps.

[CBSE 2019]

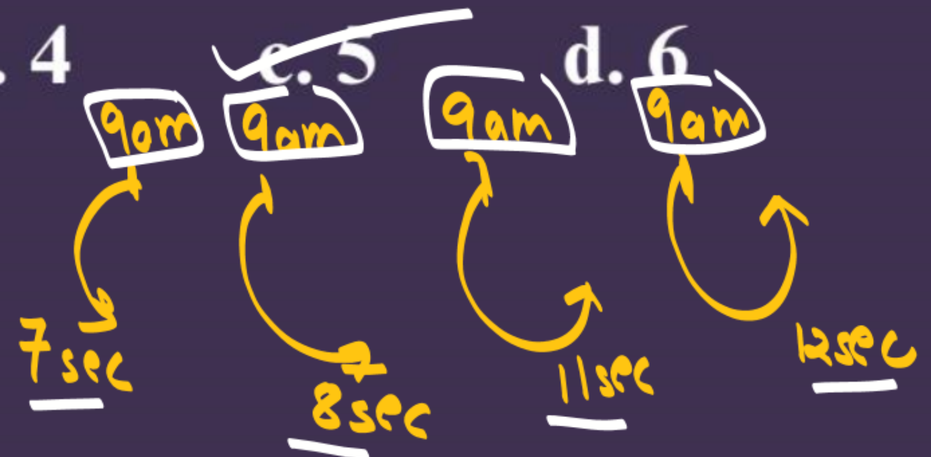


LCM (30, 36, 40) ⇒ 360cm

#LP : 4 bells toll together at 9:00 am. They toll after 7, 8, 11, and 12 seconds respectively. How many times will they toll together again in 3 hours?

a. 3 b. 4 c. 5 d. 6

इसे हल करने के लिए → LCM



LCM (7, 8, 11, 12) ⇒ 1848 sec

3hr = 3×60×60
= 10800 sec

How many times = 10800 / 1848 ≈ 5.8

Ans. 5

(by contradiction)

#LP : Prove that $(\sqrt{2}+\sqrt{3})^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number. [CBSE 2024]

Let $(\sqrt{2}+\sqrt{3})^2$ is rational.

$$(\sqrt{2}+\sqrt{3})^2 = \frac{p}{q}$$

$$(\sqrt{2})^2+(\sqrt{3})^2+2(\sqrt{2})(\sqrt{3}) = \frac{p}{q}$$

$$2+3+2\times\sqrt{2\times3} = \frac{p}{q}$$

$$2\sqrt{6} = \frac{p}{q}-5$$

R − R = R

$$\sqrt{6} = \frac{\frac{p}{q}-5}{2}$$

R / R = R

$\sqrt{6}$ is irrational.

but $\sqrt{6} \neq R$

this contradiction is due to our wrong assumption

Hence, $(\sqrt{2}+\sqrt{3})^2$ is irrational.

R + R = R
R − R = R
R × R = R
R / R = R

HP

#LP : Prove that $\sqrt{2} - \sqrt{5}$ is an irrational number. Given $\sqrt{10}$ is irr.

Let $\sqrt{2}-\sqrt{5}$ is rational

$\therefore \sqrt{2}-\sqrt{5} = \frac{p}{q}$

Squaring both sides

$(\sqrt{2}-\sqrt{5})^2 = (\frac{p}{q})^2$

$(\sqrt{2})^2 + (\sqrt{5})^2 - 2\sqrt{2}\times\sqrt{5} = \frac{p}{q}\times\frac{p}{q}$

$2 + 5 - 2\sqrt{10} = \frac{p}{q}\times\frac{p}{q}$

$-2\sqrt{10} = \left(\frac{p}{q}\times\frac{p}{q}\right) - 7$

$R \times R \Rightarrow R$

$R \Rightarrow R$

$-\sqrt{10} = \frac{\left(\frac{p}{q}\times\frac{p}{q}\right) - 7}{2}$

Ir $\quad$ $\frac{R}{R} \Rightarrow R$

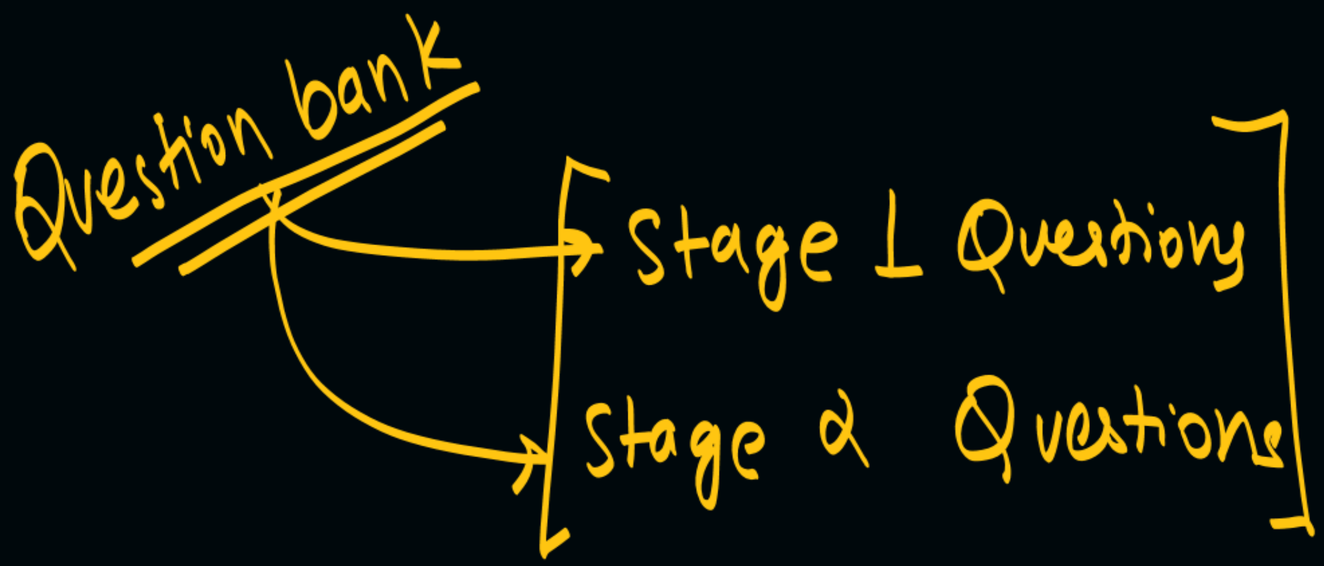
$= R$

but Ir $\neq$ R

this contradiction is due to our wrong assumption.

$\therefore$ $(\sqrt{2}-\sqrt{5})$ is irr.

Prove $\sqrt{10}$ is irr.


Question bank
Stage 1 Questions
Stage 2 Questions

CHAPTER : 2

Polynomials

→ Relation b/w zeroes and coeff. of Quad. Poly :-

ax^2+bx+c $\begin{cases} \alpha \\ \beta \end{cases}$

$$SOR = \left[\alpha+\beta = -\frac{b}{a}\right]$$

$$POR = \left[\alpha \cdot \beta = \frac{c}{a}\right]$$

#LP : Find the zeroes of the quadratic polynomial $7y^2 - 11/3\ y - 2/3$ and verify the relationship between the zeroes and the coeffecients.

[CBSE 2019]

$\Rightarrow 7y^2 - \frac{11}{3}y - \frac{2}{3}$

$\Rightarrow 21y^2 - 11y - 2$ (÷ 3)

$\Rightarrow \frac{21y^2 + 3y - 14y - 2}{3}$

$\Rightarrow \frac{3y(7y+1) - 2(7y+1)}{3}$

$\Rightarrow \frac{(3y-2)(7y+1)}{3}$

zeroes

$3y - 2 = 0$ | $7y + 1 = 0$

$y = 2/3$ (α) | $y = -1/7$ (β)

(I) $\alpha + \beta = -\frac{b}{a}$

LHS: $\frac{2}{3} + \left(\frac{-1}{7}\right) = \frac{14 - 3}{21} = \frac{11}{21}$

RHS: $-\frac{(-11/3)}{7} = \frac{11}{21}$

Verified

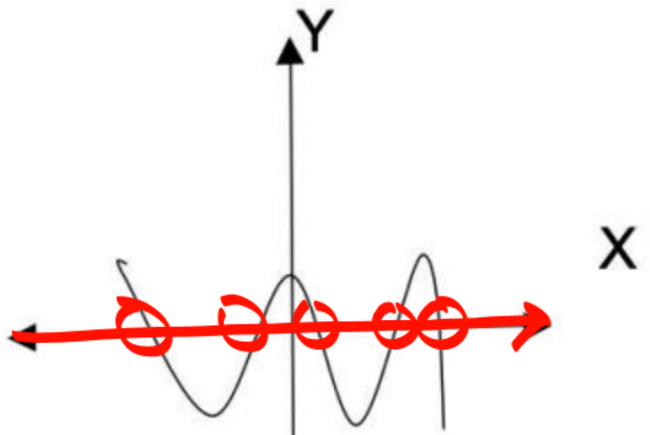
(II) $\alpha \cdot \beta = \frac{c}{a}$

$\left(\frac{2}{3}\right)\left(\frac{-1}{7}\right) = \frac{-2/3}{7} = \frac{-2}{21}$

$\frac{-2}{21} = \frac{-2}{21}$

Verified

The graph of $y = p(x)$, where $p(x)$ is a polynomial in variable x, is as follows:



The number of zeroes of $p(x)$ is 5

Eg
No. of zeroes
↓
No. of times graph touch / intersect x axis

#LP : If α and β are the zeroes of the polynomial $f(x) = x^2 - 6x + k$, find the value of k, such that $\alpha^2 + \beta^2 = 40$.

$x^2 - 6x + k$ → α, β

$\alpha + \beta = \frac{-b}{a} = \frac{-(-6)}{1} = 6$

$\alpha \cdot \beta = \frac{c}{a} = \frac{k}{1}$

$\alpha^2 + \beta^2 = 40$

$(\alpha+\beta)^2 - 2\alpha\beta = 40$

$(6)^2 - 2k = 40$

$36 - 2k = 40$

$-2k = 40 - 36$

$-2k = 4$

$k = -2$

$(\alpha+\beta)^2 = \alpha^2 + \beta^2 + 2\alpha\beta$

$(\alpha+\beta)^2 - 2\alpha\beta = \alpha^2 + \beta^2$

$\alpha^3 + \beta^3$

$(\alpha+\beta)^3 = \alpha^3+\beta^3+3\alpha\beta(\alpha+\beta)$

$(\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta) = \alpha^3+\beta^3$

#LP : If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the values of p and q. [CBSE 2022 - 23]

$x^2 + px + q$: 2α, 2β

$2x^2 - 5x - 3$: α, β

$\alpha + \beta = -\frac{(-5)}{2}$

$\alpha + \beta = \frac{5}{2}$

$\alpha \cdot \beta = \frac{c}{a}$

$\alpha \cdot \beta = -\frac{3}{2}$

$2\alpha + 2\beta = -p$

$2(\alpha + \beta) = -p$

$2 \times \frac{5}{2} = -p$

$p = -5$

$(2\alpha)(2\beta) = q$

$4\alpha\beta = q$

$4 \times \left(-\frac{3}{2}\right) = q$

$q = -6$

#LP : The zeroes of a polynomial $x^2 + px + q$ are twice the zeroes of the polynomial $4x^2 - 5x - 6$. The value of p is :

a. - 5/2 b. 5/2 c. -5 d. 10 [CBSE 2024]

$x^2 + px + q$ < 2α, 2β

SOR = $2\alpha + 2\beta = \frac{-p}{1}$

$2(\alpha + \beta) = -p$

$2 \times \frac{5}{4} = -p \Rightarrow p = -5/2$

$4x^2 - 5x - 6$ < α, β

$\alpha + \beta = -\frac{b}{a} = -\frac{(-5)}{4} = \frac{5}{4}$

$\alpha \cdot \beta = \frac{c}{a} = \frac{-6}{4}$

Making/of a quadratic Poly

formation

$S = SOR$

$P = POR$

$\rightarrow k[x^2 - Sx + P]$

$(k = 1)$

Goal is to find (S) & (P)

#LP : Find a quadratic polynomial where zeroes are $5 - 3\sqrt{2}$ and $5 + 3\sqrt{2}$.

α β

$\rightarrow k[x^2 - Sx + P]$

$S = (5 - 3\sqrt{2}) + (5 + 3\sqrt{2})$

$S = 10$

$P = (5 - 3\sqrt{2})(5 + 3\sqrt{2})$

$= (5)^2 - (3\sqrt{2})^2$

$P = 25 - 18 = 7$

$k[x^2 - 10x + 7]$

If $k = 1 \Rightarrow$ Quad Poly $\Rightarrow$ $x^2 - 10x + 7$

#LP : If α and β are zeroes of $4x^2 - x - 4$, find quadratic polynomial whose zeroes are 1 / 2α and 1 / 2β

[CBSE 2017]

$4x^2 - x - 4$ → α, β

$\alpha + \beta = -\frac{(-1)}{4} = \frac{1}{4}$

$\alpha \cdot \beta = \frac{c}{a} = \frac{-4}{4} = -1$

Quad → $\frac{1}{2\alpha}$, $\frac{1}{2\beta}$

$k(x^2 - ?x + ?)$

$S = \frac{1}{2\alpha} + \frac{1}{2\beta} \Rightarrow \frac{1}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) = \frac{1}{2}\left(\frac{\alpha+\beta}{\alpha\beta}\right)$

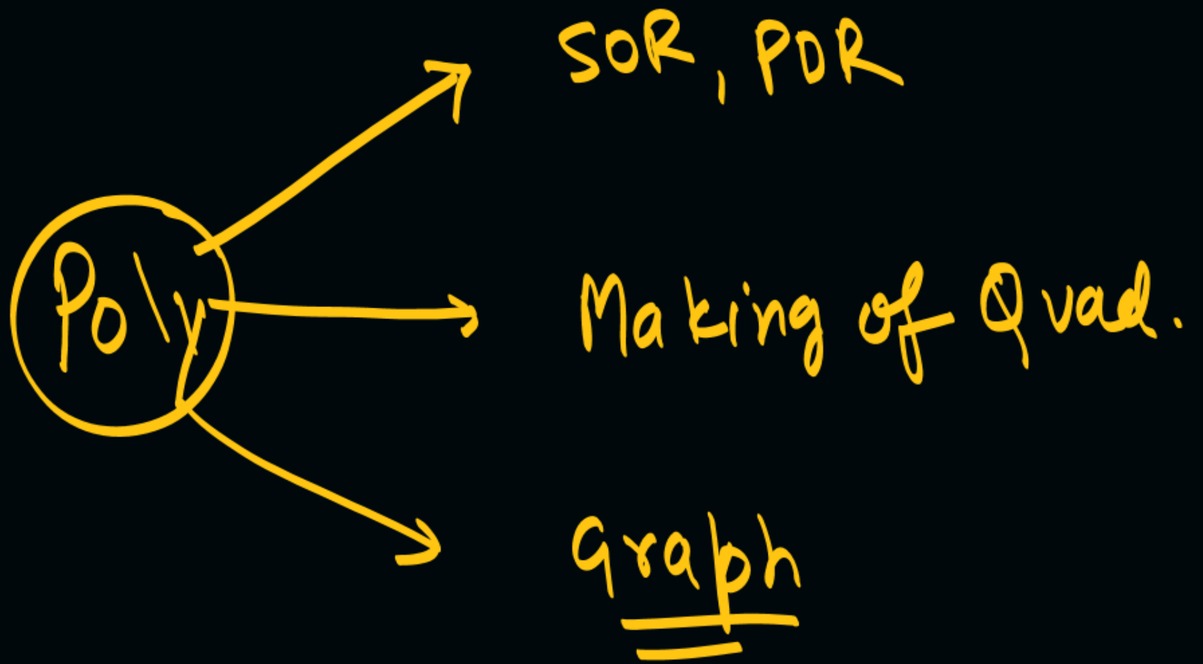
$= \frac{1}{2}\left(\frac{\frac{1}{4}}{-1}\right)$

$= -\frac{1}{2} \times \frac{1}{4}$

$S = -\frac{1}{8}$

$P = \frac{1}{2\alpha} \times \frac{1}{2\beta} \Rightarrow \frac{1}{4\alpha\beta} \Rightarrow \frac{1}{4 \times -1} \Rightarrow -\frac{1}{4}$

$\therefore$ Quad $= k\left[x^2 - \left(-\frac{1}{8}\right)x + \left(-\frac{1}{4}\right)\right]$


Poly
SOR, PDR
Making of Quad.
Graph

CHAPTER : 3

Pair of linear equation in 2 variables

Consistent → atleast one solution

L_1 — $a_1x + b_1y = c_1$

L_2 — $a_2x + b_2y = c_2$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ → Intersecting ⇒ Unique Sol.

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ → Coincident ⇒ ∞ many solutions

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ → ||el lines ⇒ No sol ⇒ Inconsistent

⇒ Consistent

Pair of Lin eq' in 2 Var

Solution

- Graphical Method

- Algebraic Method
  - Subst
  - Elimination

#LP : The area of the triangle formed by the line $x/a + y/b = 1$ with the coordinate axes is :

[CBSE 2023]

a. ab

b. 2ab

c. 1/2 ab

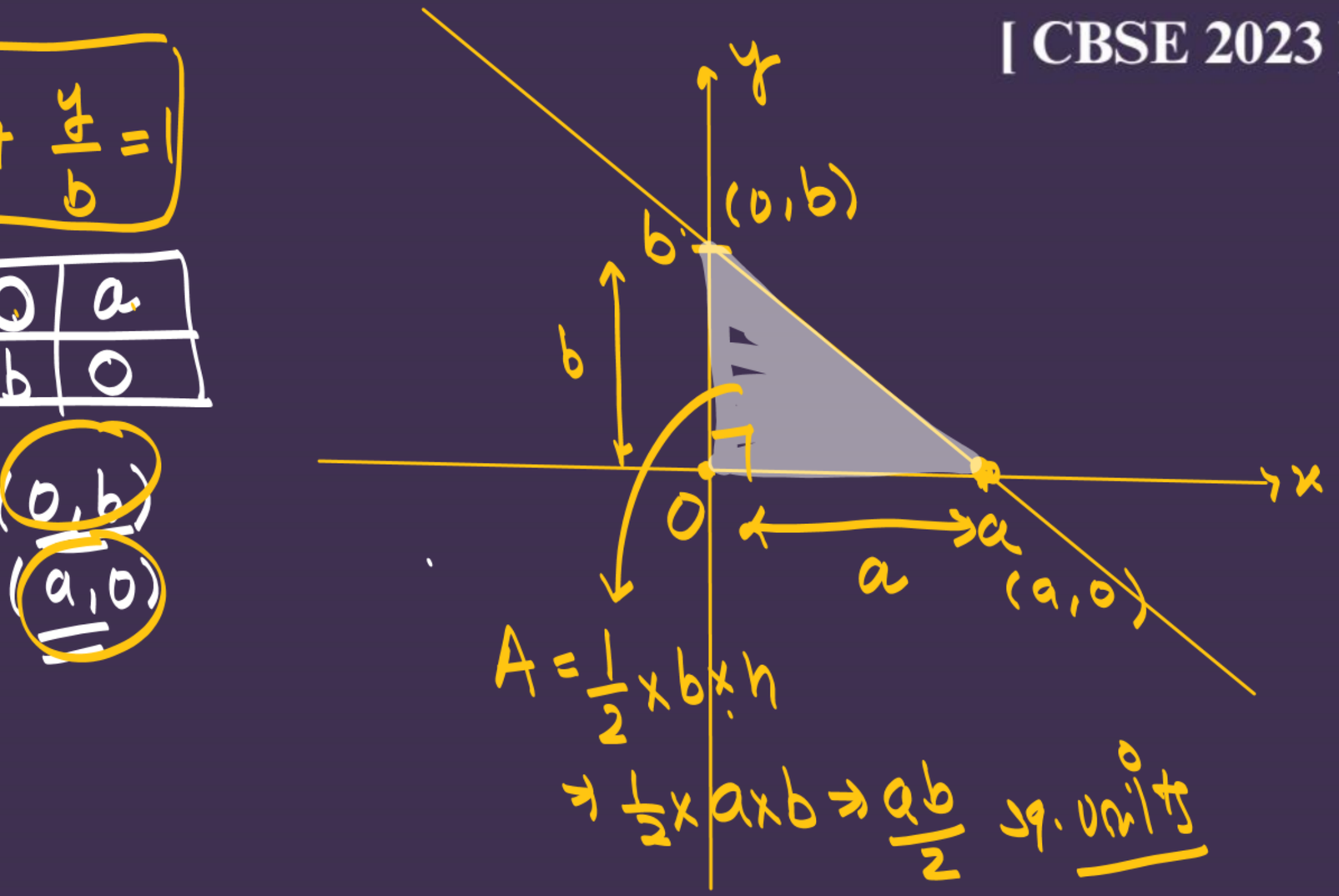
d. 1/4 ab

$$\frac{x}{a} + \frac{y}{b} = 1$$

x	0	a
y	b	0

(0, b)

(a, 0)



$A = \frac{1}{2} \times b \times h$

$\rightarrow \frac{1}{2} \times a \times b \rightarrow \frac{ab}{2}$ sq. units

Substitution → एक से दो var. की value लगाकर दूसरे में पटक दो

$x + 3y = 4$

$2x - y = 2$

$2x - 2 = y$

$x + 3(2x - 2) = 4$

$x + 6x - 6 = 4$

$7x = 10$

$x = \frac{10}{7}$

$y = 2x - 2$

$y = 2 \times \frac{10}{7} - 2$

$y = \frac{20}{7} - 2$

$y = \frac{20 - 14}{7} = \frac{6}{7}$

Elimination :- किसको substitute करना है उसके coeff बराबर कर दो

$1x + 3y = 4 \rightarrow \times 2 \Rightarrow 2x + 6y = 8$

$2x - y = 2 \rightarrow -$

$\underline{2x \mp y = 2}$

$7y = 6$

$y = \frac{6}{7}$

$2x - \frac{6}{7} = 2$

$2x = 2 + \frac{6}{7}$

$2x = \frac{14+6}{7}$

$2x = \frac{20}{7} \Rightarrow x = \frac{10}{7}$

$$0.2x + 0.3y = 1.3$$
$$0.4x + 0.5y = 2.3$$

$\frac{0.2}{10}x + \frac{0.3}{10}y = \frac{1.3}{10}$

$\frac{1}{10}(2x + 3y) = \frac{13}{10}$

$2x + 3y = 13$ — (I)

$\frac{0.4}{10}x + \frac{0.5}{10}y = \frac{2.3}{10}$

$\frac{1}{10}(4x + 5y) = \frac{23}{10}$

$4x + 5y = 23$ — (II)

$\times 2 \rightarrow 4x + 6y = 26$

$-y = -13$

$y = 3$

$2x + 3(3) = 13$

$2x + 9 = 13$

$2x = 4$

$x = 2$

#: If 49x+51y= 499, 51 x+49 y= 501, then find the value of x and y

$$49x + 51y = 499$$
$$51x + 49y = 501$$

(1) Add

$$\begin{array}{r} 49x + 51y = 499 \\ +\ 51x + 49y = 501 \\ \hline 100x + 100y = 1000 \end{array}$$

$100(x+y) = 1000$

$x + y = 10$ — (I)

(2) Substract

$$\begin{array}{r} 49x + 51y = 499 \\ -\ 51x + 49y = 501 \\ \hline -2x + 2y = -2 \end{array}$$

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

$x - y = 1$ — (II)

$x = \frac{11}{2}$, $y = \frac{9}{2}$

#LP : If a pair linear equations is consistent , then the lines will be :

a. Parallel

b. Always coincident

c. Intersection or coincident

d. Always intersecting

#LP : One equation of a pair of dependent linear equations is -5x + 7y-2 , the second equation can be :

a. 10x + 14y + 4 = 0

b. -10x - 14y + 4 = 0

c. -10x + 14y + 4 = 0

d. 10x - 14y = -4

∞ many sol

#LP : The pair of equation $3^{x+y} = 81$, $81^{x-y} = 3$ has :

a. No solution

b. Infinitely many solution

c. The solution $x = 2\frac{1}{8}$, $y = 1\frac{7}{8}$

d. None of these

Unique $\frac{1}{4} \neq \frac{1}{-4}$

$y = \frac{1}{8}, \frac{7}{8}$

$y = \frac{1}{8}, \frac{7}{8}$

$3^{x+y} = 81$

$3^{x+y} = 3^4$

comparing

$x + y = 4$

$x = 4 - y$

$[81]^{x-y} = 3$

$[3^4]^{(x-y)} = 3$

$3^{4x-4y} = 3^1$

comparing

$4x - 4y = 1$

$4(4-y) - 4y = 1$

$16 - 4y - 4y = 1$

$15 = 8y \rightarrow y = \frac{15}{8}$

#LP : The ratio of incomes of two persons (A, B) is 9: 7 and the ratio of their expenditures is 4: 3. If each of them manages to save Rs.2000 per month, find their monthly incomes.

$\frac{I_A}{I_B} = \frac{9}{7}$

Let $I_A = 9x$, $I_B = 7x$

$\frac{E_A}{E_B} = \frac{4}{3}$

Let $E_A = 4y$, $E_B = 3y$

$(Sav)_A = 2000$

$I_A - E_A = 2000$

$9x - 4y = 2000$ ✓

$(S)_B = 2000$

$I_B - E_B = 2000$

$7x - 3y = 2000$ ✓

Solve x & y

#LP : In a two digit number , the ten's digit is three times the unit's degit . When the number is decreased by 54 , the digits are reversed . Find the number.

Let unit place digit = y

tens " " = x

$\therefore N = 10 \times x + y \times 1$

$N = 10x + y$

ATQ $x = 3y$ — (1)

Rev

unit = x

tens = y

$N' = y \times 10 + x \times 1$

$N' = 10y + x$

ATQ $N - 54 = N'$

$10x + y - 54 = 10y + x$

$9x - 9y = 54$

$9(x - y) = 54$

$x - y = 6$

$3y - y = 6$

$2y = 6$

$y = 3$

$x = 3(3)$

$x = 9$

$N = 10x + y$

$= 10(9) + 3$

$= 93$

#LP : The area of a rectangle gets reduced by 9 square units if its length is reduced by 5 units and the breadth is increased by 3 units . If we increase the length by 3 units and breadth by 2 units , the area is increased by 67 square units . Find the length and breadth of the rectangle.

Let $l = x$

$b = y$

$A = xy$

Ans

$l' = x - 5$

$b' = y + 3$

$\Rightarrow (x-5)(y+3) = (xy - 9)$

$\Rightarrow xy + 3x - 5y - 15 = xy - 9$

$\Rightarrow \boxed{3x - 5y = 6}$

$l'' = x + 3$

$b'' = y + 2$

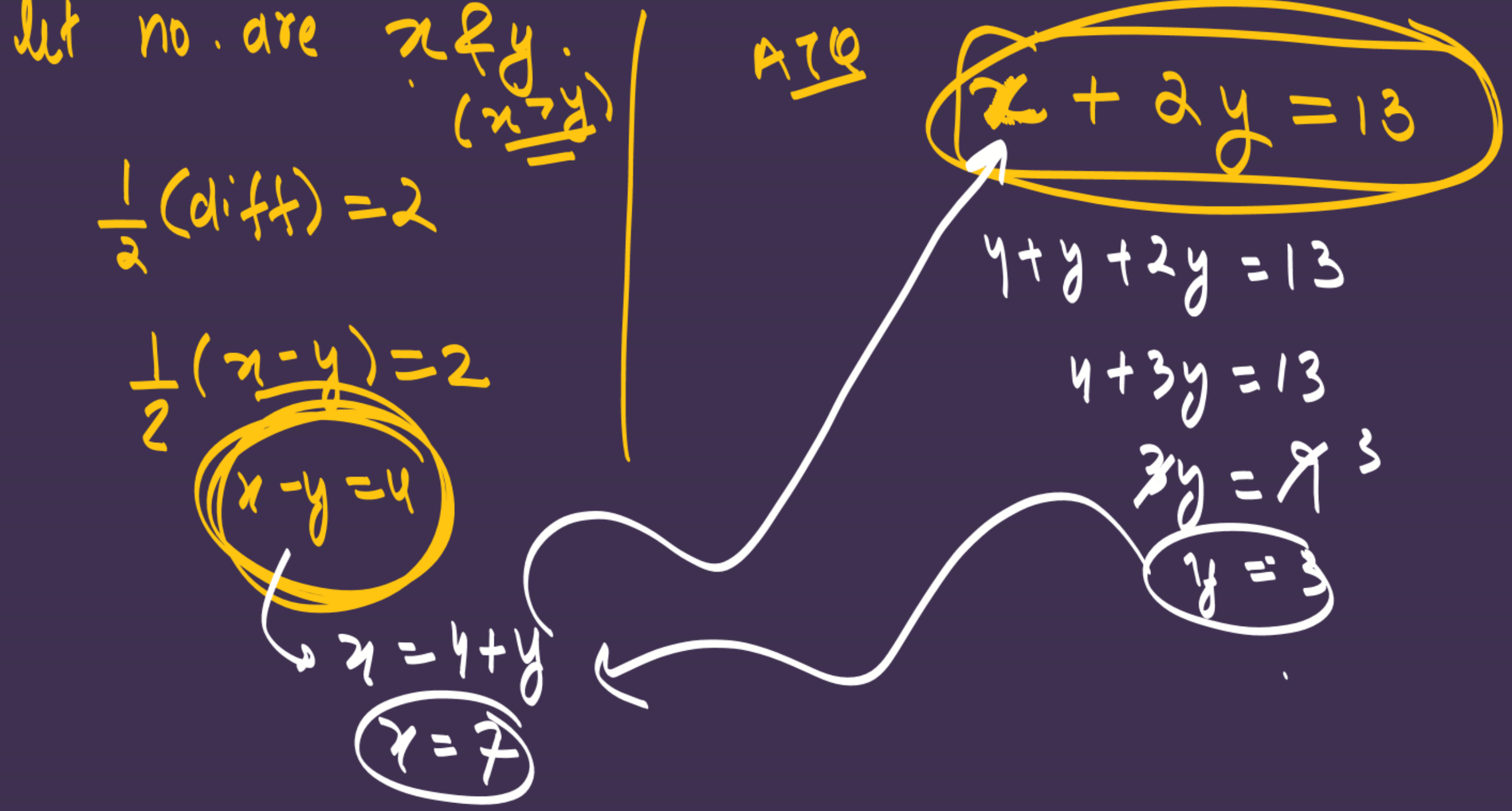
$\Rightarrow (x+3)(y+2) = xy + 67$

$\Rightarrow xy + 2x + 3y + 6 = xy + 67$

$\boxed{2x + 3y = 61}$

#LP : Half of the difference of two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

[CBSE 2023]



#LP : A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Shristi paid ₹27 for a book kept for seven days while Rekha paid ₹21 for the book she kept for five days. Find the fixed charge and the additional charge paid by them.

[CBSE 2015]

F → x ₹
S → 4y ₹
R → 2y ₹

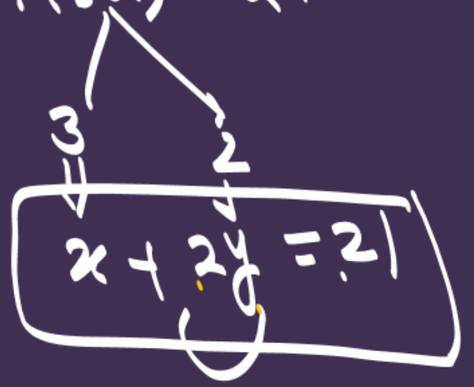
fix charge for first 3days = x

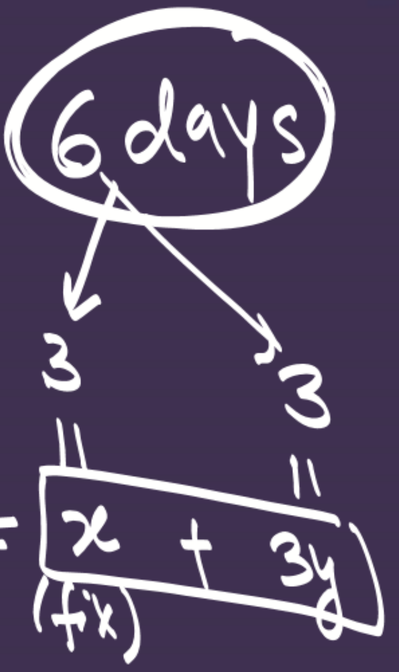
After 3days → per day charge = y

Ans

S (7day) T = 27

R T(5d) = 21





Ch → 1 to 3 समाप्त

Next → Ch-4 & 5

→ Solve करने के → Factorisation / splitting the middle term
→ Discriminant Method.

CHAPTER : 4

Quadratic Equations

#LP : Solve for x $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$, $x \neq 2, 4$

a. ~~5~~ , 5/2
b. 2 , 5/2
c. -5 , 5/2
d. 5 / -5/2

$$\Rightarrow \frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$$

$$\Rightarrow \frac{(x-1)(x-4)+(x-3)(x-2)}{(x-2)(x-4)} = \frac{10}{3}$$

$$\Rightarrow \frac{x^2-4x-x+4+x^2-2x-3x+6}{x^2-4x-2x+8} = \frac{10}{3}$$

$$\Rightarrow \frac{2x^2-10x+10}{x^2-6x+8} = \frac{10}{3}$$

$$\Rightarrow 6x^2-30x+30 = 10x^2-60x+30$$

$$\Rightarrow 0 = 4x^2-30x+50$$

$$2(2x^2-15x+25)=0$$

Qual

$D=2$

$$2x^2-15x+25=0$$

$p+q=-15$
$pq=50$

$$2x^2-10x-5x+25=0$$

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

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

$x-5=0$ | $2x-5=0$

$x=5$ | $x=5/2$

#LP : Solve for x :

$$\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}, \quad x \neq 0, \frac{3}{2}, 2$$

LCM

$$\Rightarrow \frac{1(2x-3)+2x}{x(2x-3)} = \frac{1}{x-2}$$

$$\Rightarrow \frac{4x-3}{2x^2-3x} = \frac{1}{x-2}$$

$$\Rightarrow (4x-3)(x-2) = 2x^2-3x$$

$$\Rightarrow 4x^2-8x-3x+6 = 2x^2-3x$$

$$\Rightarrow 2x^2-8x+6=0$$

$$2(x^2-4x+3)=0$$

$$x^2-4x+3=0$$

$$x^2-3x-x+3=0$$

$$x(x-3)-1(x-3)=0$$

$$(x-3)(x-1)=0$$

$x-3=0$ | $x-1=0$

$x=3$ | $x=1$

Calculation आराम से करना !!

↓

Step by step recheck करते रहो।

#LP : The roots of the quadratic equation $x^2 + x - p(p+1) = 0$ are :

a. p, p + 1

b. -p , p + 1

c. -p , - (p + 1)

d. p , - (p + 1)

$x^2 + 1x - p(p+1) = 0$

$x^2 - px + (p+1)x - p(p+1) = 0$

$x(x-p) + (p+1)(x-p) = 0$

$(x-p)[x+(p+1)] = 0$

$x - p = 0$ | $x + (p+1) = 0$

$x = p$ | $x = -(p+1)$

$a + b = 1$

$ab = -p(p+1)$

Discriminant Method

$ax^2+bx+c=0$

श्रीधराचार्य Formula

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$\frac{-b+\sqrt{b^2-4ac}}{2a}$ $\quad$ $\frac{-b-\sqrt{b^2-4ac}}{2a}$

Nature of roots

$D = b^2-4ac$

- $D>0$ → real & distinct roots
- $D=0$ → real & eq. roots
- $D<0$ → unreal roots

#LP : If - 5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots , find the value of k. [CBSE 2002 , 09 , 14]

$2x^2+px-15=0$

$2(-5)^2+p(-5)-15=0$

$2\times25-5p-15=0$

$50-5p-15=0$

$35=5p$

$\frac{35}{5}=p$

$p=7$

$7(x^2+x)+k=0$

$7x^2+7x+k=0$

eq roots $\rightarrow b^2-4ac=0$

$(7)^2-4(7)(k)=0$

$49-28k=0$

$7\frac{49}{28}=k$

$k=\frac{7}{4}$

20	Due to heavy storm an electric wire got bent as shown in the figure. It followed a mathematical shape. Answer the following questions below. 	
i)	Name the shape in which the wire is bent a) Spiral b) ellipse c) linear d) Parabola	1
ii)	How many zeroes are there for the polynomial (shape of the wire) a) 2 b) 3 d) 1 d) 0	1
iii)	The zeroes of the polynomial are a) -1, 5 b) -1, 3 c) 3, 5 d) -4, 2	1
iv)	What will be the expression of the polynomial? a) x^2+2x-3 b) x^2-2x+3 c) x^2-2x-3 d) x^2+2x+3	1
v)	What is the value of the polynomial if x = -1? a) 6 b) -18 c)) 18 d) 0	1

Information Technology.

if the no. of letters in first word = x = 11

" " " " second word = y = 10

then using x & y as roots. form a quadratic Eq.

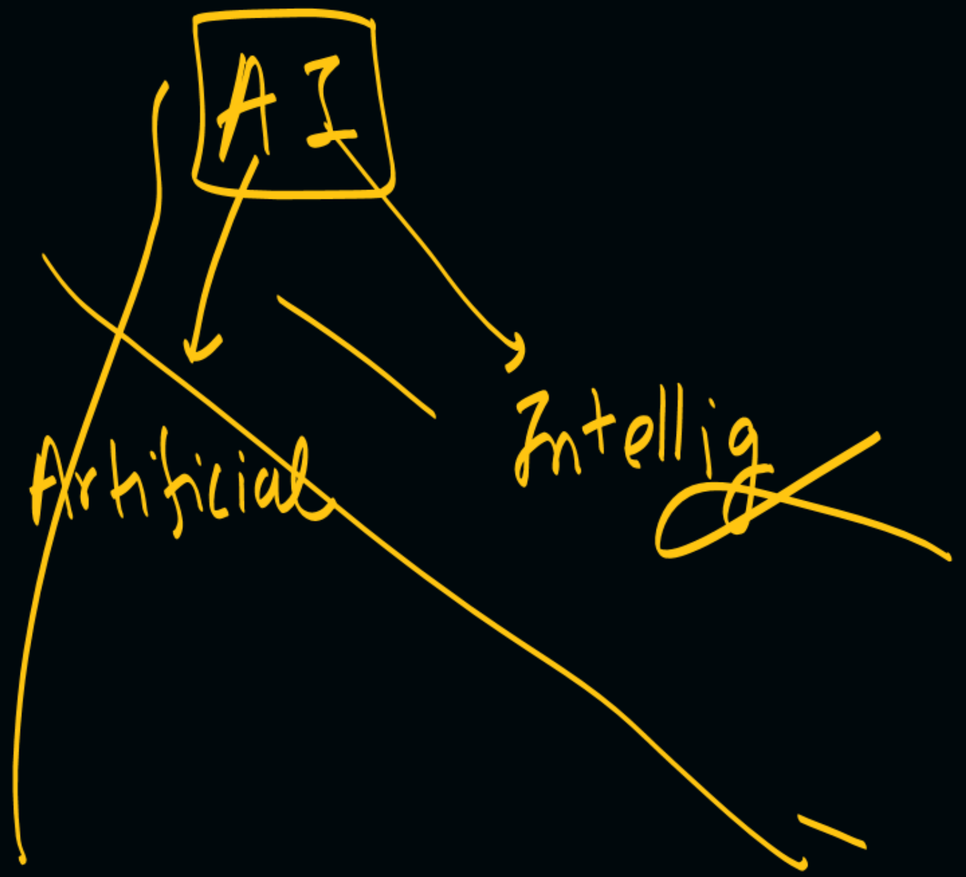
11, 10

$S = 11 + 10 = 21$

$P = 11 \times 10 = 110$

$\Rightarrow k(x^2 - Sx + P)$

$k(x^2 - 21x + 110)$


AI
Artificial
Intelligence

$d = s \times t$

#LP : A train travels a distance of 300 Km at constant speed. If the speed of the train is increased by 5 Km/ hour. The journey would have taken 2 hours less. Find the original speed of the train.

$d = 300\ km$ = $d = 300\ km$

let $s = x\ km/hr$ → $s' = (x+5)\ km/hr$

$t = y\ hr$ → $t' = y - 2$

$d = s \times t$

$300 = x \times y$ — (I)

$\frac{300}{x} = y$

$d = s' \times t'$

$300 = (x+5)(y-2)$

$300 = (x+5)\left(\frac{300}{x} - 2\right)$

#LP : Two water taps together can fill a tank in 9 hours 36 minutes. The tap of larger diameter takes 8 hours less than the smaller on to fill the tank separately. Find the time in which each tap can separately fill the tank.

[CBSE 2016]

Together time = 9hr 36min $= \left(9 + \frac{36}{60}\right)$ hr

$\Rightarrow \frac{576}{60} = 9.6$ hr

Separately → time by smaller to fill comp. = x hr

" " larger " " = $(x-8)$

Smaller

x hr → 1

1 hr → $\frac{1}{x}$

9.6 hr → $9.6 \times \frac{1}{x}$

Big

$(x-8)$ hr → 1

1 hr → $\frac{1}{x-8}$

9.6 hr → $9.6 \times \frac{1}{x-8}$

1 work

$$S_{quant} + B_{quant} = 1$$

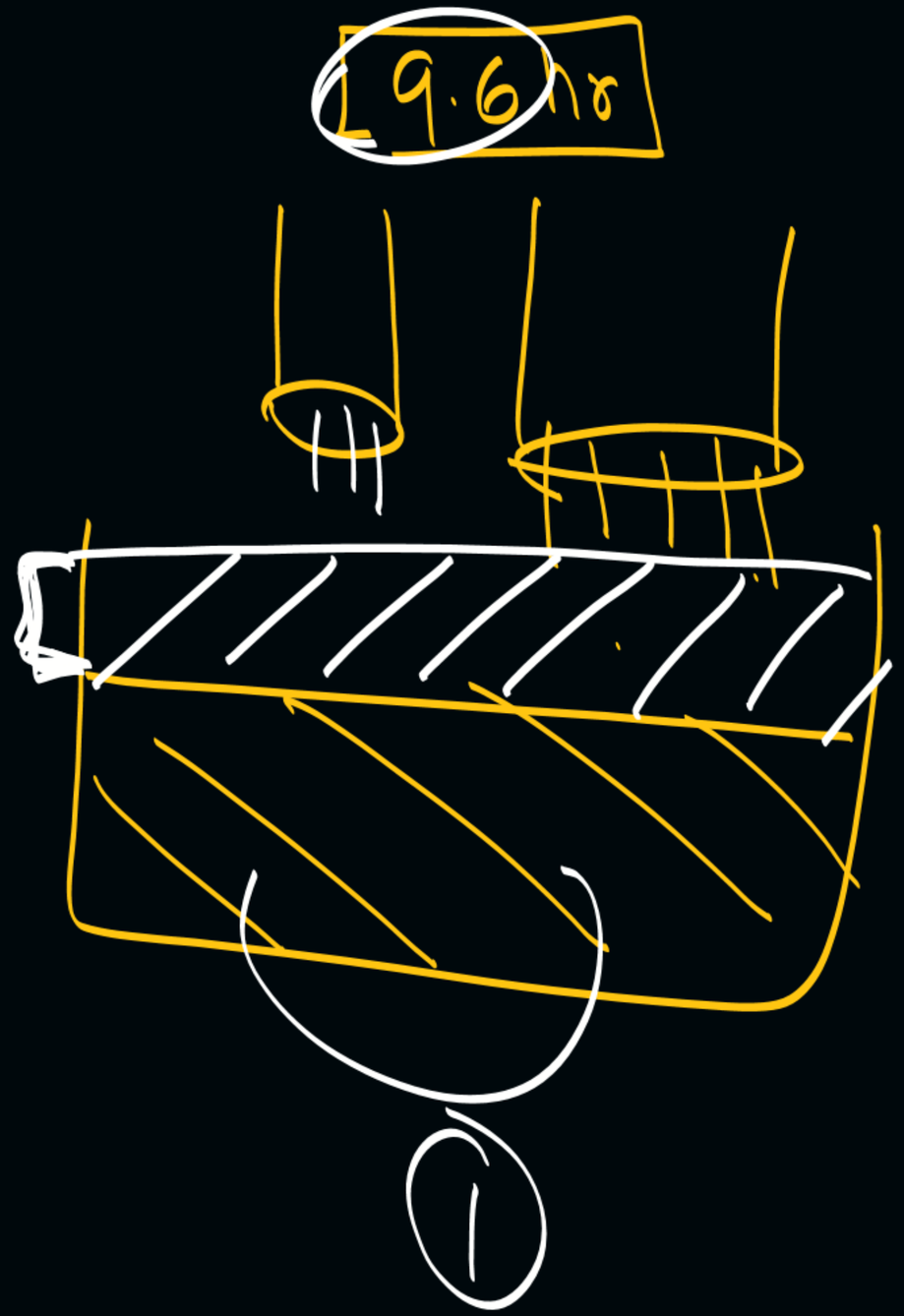
$$\left[9.6 \times \frac{1}{x}\right] + \left(9.6 \times \frac{1}{x-8}\right) = 1$$

$$9.6\left(\frac{1}{x} + \frac{1}{x-8}\right) = 1$$

$$\frac{x-8+x}{x(x-8)} = \frac{10}{9.6}$$

$$\frac{2x-8}{x^2-8x} = \frac{10}{96}$$

$$\int x$$



#LP : The denominator of a fraction is one more than twice its numerator. If the sum of the fraction and its reciprocal $2\frac{16}{21}$, find the fraction. [CBSE 2016]

let fraction $= \frac{x}{y}$

ATQ

$y = 1 + 2x$

$\frac{x}{y} + \frac{y}{x} = 2\frac{16}{21}$

#LP: A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected?

$PA - PB = 7$

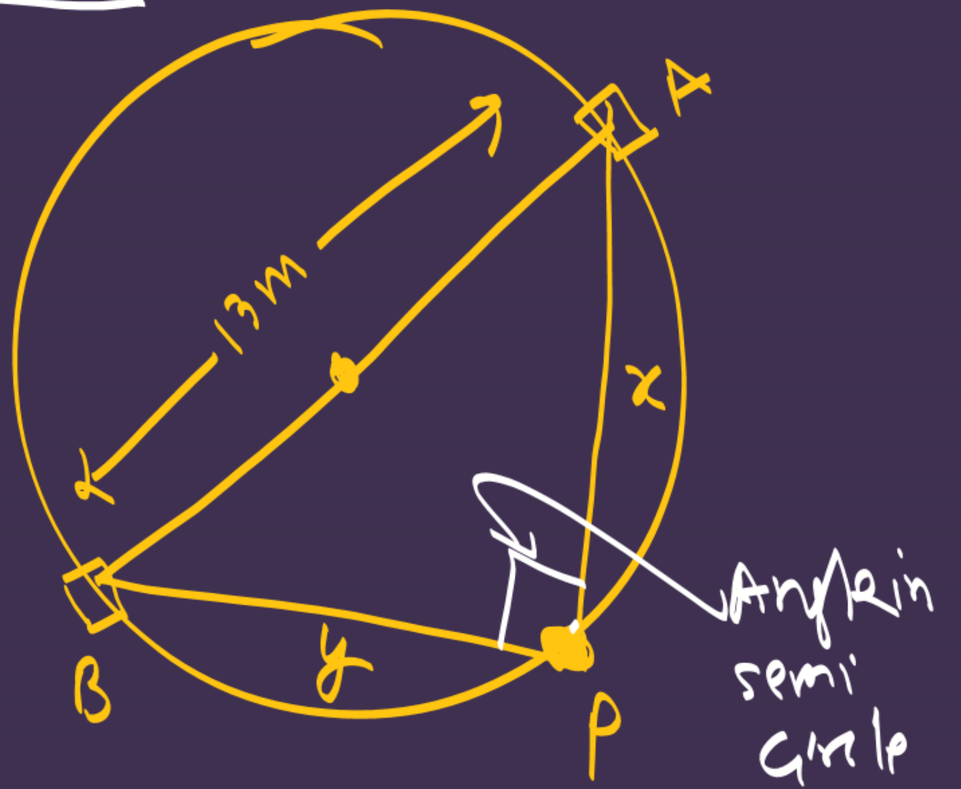
$x = y + 7$ ← $x - y = 7$ — (1)

Right Δ :- Phythagoras

$(13)^2 = x^2 + y^2$

$\boxed{(13)^2 = (y+7)^2 + y^2}$

& solve



[Aim: 100/100 in Maths]

d = अगला − पिछला

पहचानो / identify AP है या नहीं ?

→ all c.d. should be same

CHAPTER : 5

Arithmetic Progression

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

a_n = n^{th} term

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_n = \frac{n}{2}(a + l)$

l = last term

$l = a_n$

#LP : Write the common difference of A.P. $\sqrt{3}$, $\sqrt{12}$, $\sqrt{27}$, $\sqrt{48}$ ...

[CBSE 2019]

a_1 a_2

$a_2 - a_1 \Rightarrow \sqrt{12} - \sqrt{3} = 2\sqrt{3} - \sqrt{3} \Rightarrow \sqrt{3}$

$a_3 - a_2 \Rightarrow \sqrt{27} - \sqrt{12} \Rightarrow 3\sqrt{3} - 2\sqrt{2} \Rightarrow \sqrt{3}$

$a_4 - a_3 = -\sqrt{3}$

cd equal

Yes AP

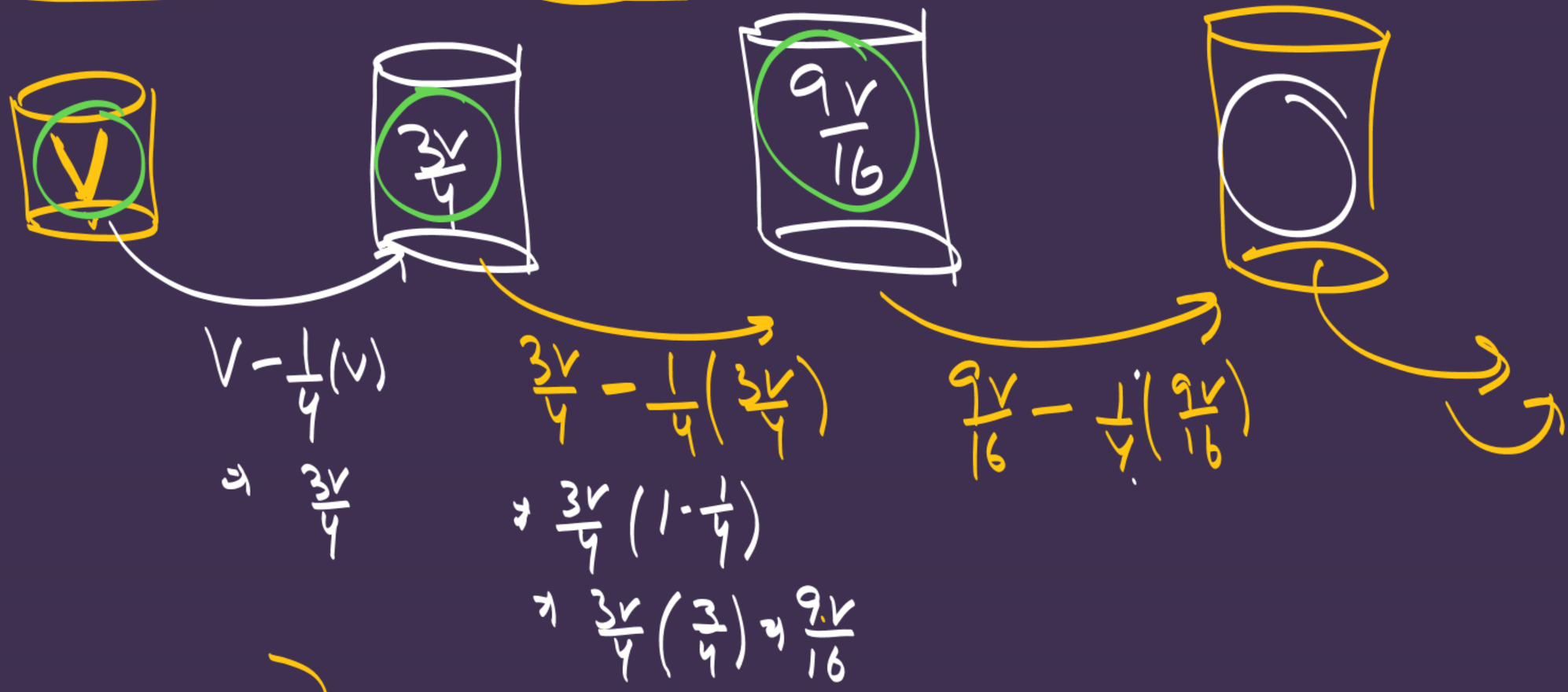
3	27
3	9
3	3
	1

$\sqrt{27} = \sqrt{3 \times 3 \times 3}$

$= 3\sqrt{3}$

#LP : The amount of air present in a cylinder when a vacuum pump removes 1/4 of the air remaining in the cylinder at a time.

Is this an AP?



$$v, \frac{3v}{4}, \frac{9v}{16} - - -$$ AP?

$a_1 \quad a_2 \quad a_3$

$$a_2 - a_1 = \frac{3v}{4} - v \Rightarrow \frac{3v-4v}{4} \Rightarrow \frac{-v}{4}$$

$$a_3 - a_2 = \frac{9v}{16} - \frac{3v}{4} \Rightarrow \frac{9v-12v}{16} \Rightarrow -\frac{3v}{16}$$

cd are not same.

Not AP

#LP : If the 8th term of an A.P. is 31 and the 15th term is 16 more than the 11th term, find the A.P. [CBSE 2006]

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

$a_8 = 31$

$a + (8-1)d = 31$

$a + 7d = 31$ — (I)

$a + 7(4) = 31$

$a + 28 = 31$

$a = 3$

A.T.Q.

$a_{15} = 16 + a_{11}$

$a + 14d = 16 + a + 10d$

$14d - 10d = 16$

$4d = 16$

$d = 4$

AP :- $a, a+d, a+2d, a+3d \cdots$

$3, 7, 11, 15 \cdots$

Middle term :-

Position of MT

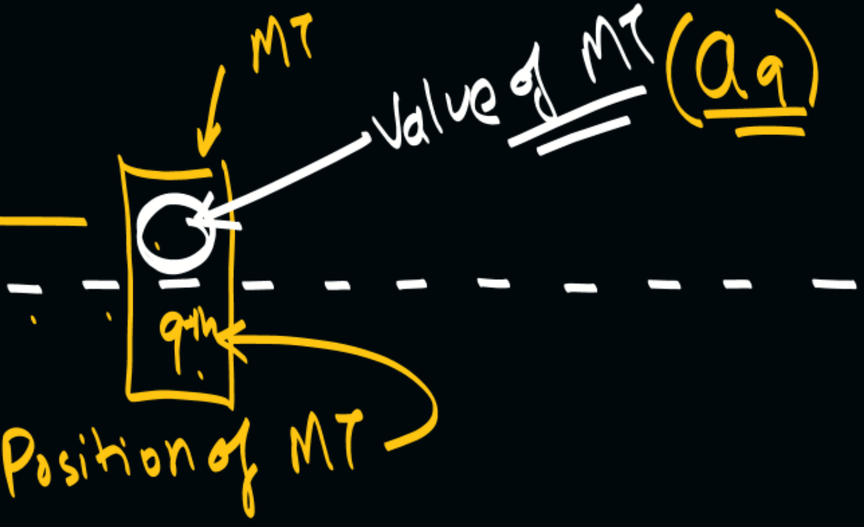
AP

$n = 17$

$n \rightarrow$ odd $\Rightarrow$ $M = \left(\frac{n+1}{2}\right)^{th}$

$= \left(\frac{17+1}{2}\right)^{th} = \left(\frac{18}{2}\right)^{th} = 9^{th}$ ← Position

$n \rightarrow$ even, $M = \left(\frac{n}{2}\right)^{th}, \left(\frac{n}{2}+1\right)^{th}$



#LP : Find the value middle term of the A.P. 6 , 13 , 20 , ... , 216.

[CBSE 2015]

① Position of MT (n)

↳ MT = $\left(\frac{n+1}{2}\right)^{th}$

$= \left(\frac{31+1}{2}\right)^{th} = \left(\frac{32}{2}\right)^{th}$

position of MT = 16^{th}

let (n) terms

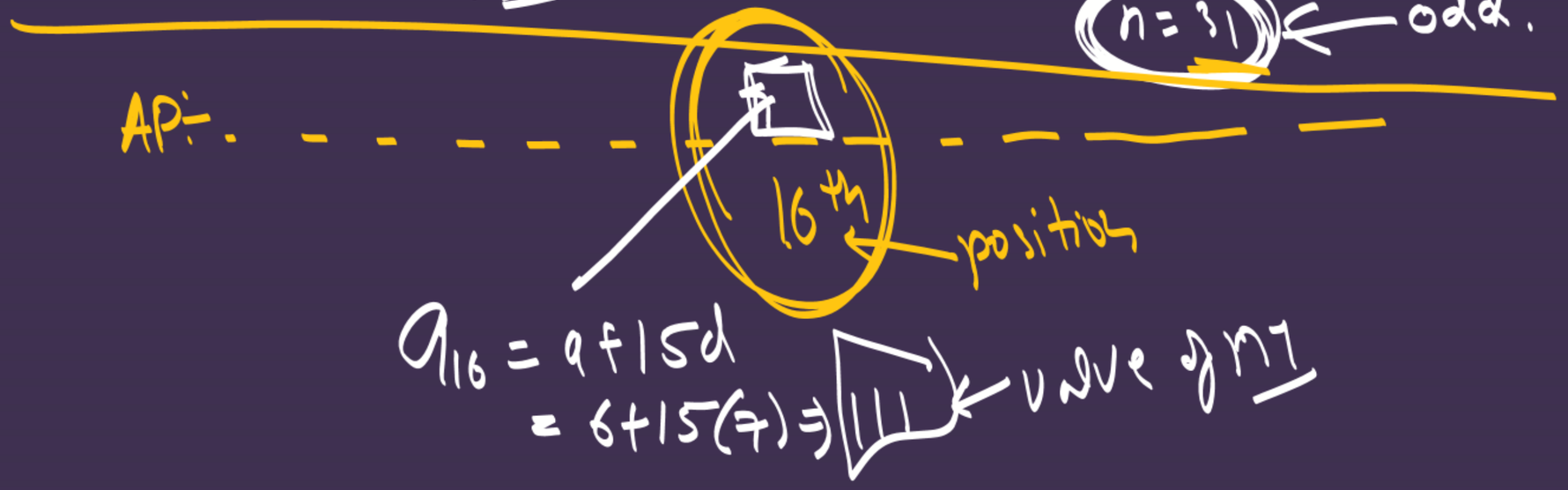
$a_n = 216$

$a+(n-1)d = 216$

$6+(n-1)(7) = 216$

$(n-1)(7) = 210$ 30

$n = 31$ ← odd.



$a_{16} = a+15d$

$= 6+15(7) = 111$ ← value of MT

#LP : Find the middle term(s) of the A.P. 7 , 13 , 19 , .. , 241.

#LP : Find the value of x when in the A.P. given below

$2 + 6 + 10 + ... + x = 1800.$

$l = a_n$

$S_n = \frac{n}{2}[a+l] = 1800$

$\frac{n}{2}[2+x] = 1800$

$n(x+2) = 3600$ — (1)

$x = a_n$

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

$x = 2+(n-1)4$

$x = 2+4n-4$

$x = 4n-2$

#LP : If Sn , the sum of first n terms of an A.P. is given by $S_n = 3n^2 - 4n$, find the nth term.

[CBSE 2019]

$$S_n = 3n^2 - 4n$$

$n = 1 \rightarrow S_1 = 3(1)^2 - 4(1)$

$a_1 = -1 = a$

$n = 2 \rightarrow S_2 = 3(2)^2 - 4(2)$

$a_1 + a_2 = 3(4) - 8$

$-1 + a_2 = 4$

$a_2 = 5$

$d = 5 - (-1)$

$d = 6$

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

$a_n = -1 + (n-1)(6)$

$= -1 + 6n - 6$

$a_n = 6n - 7$

#LP : If the ratio of the sum of the first n terms of two A.Ps is (7n + 1) : (4n + 27) , then find the ratio of their 9th terms.

$$\frac{S_n}{S'_n} = \frac{7n+1}{4n+27}$$

$n-1=16$

$n=17$

$$\frac{\frac{n}{2}\left(2a+(n-1)d\right)}{\frac{n}{2}\left(2a'+(n-1)d'\right)} = \frac{7n+1}{4n+27}$$

$n=17 \rightarrow$

$$\frac{2a+16d}{2a'+16d'} = \frac{7(17)+1}{4(17)+27}$$

$$\frac{2(a+8d)}{2(a'+8d')} = \frac{7(17)+1}{4(17)+27}$$

$$= \frac{24}{19}$$

$$\frac{a_9}{a'_9} = \frac{a+8d}{a'+8d} = \frac{24}{19}$$

7/10

Stage 2 ✱ ✓
8 → Ch 6 – 10
9 → Ch → 11 → 14

THANKYOU COODIES

10 M → 4 AM

↓

Final Rv.