UDAAN

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Pair of linear equation in two variable

Mathematics | Lecture - 06

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Topics *to be covered*

1. Word Problems **(Part - 2)**

- Problems On Numbers
- Problems On Fractions
- Misellaneous problems.


WORK HARD
DREAM BIG
NEVER GIVE UP !!

Unit's digit = x.

Ten's digit = y.

Two-digit no. = $10y + x$.

Reversed no. = $10x + y$.

Topic : Problems Based on Numbers

#Q. The sum of a two digit number and the number formed by interchanging the digit is 132. If 12 is added to the number, the new number becomes 5 times the sum of the digits. Find the number. [CBSE 2002 C]

$10y+x + 10x+y = 132$

$11y + 11x = 132$

$11(y+x) = 132$

$y+x = \frac{132}{11}$

$y+x = 12$ ①

$12 + 10y+x$

$12+10y+x = 5(x+y)$

$12+10y+x = 5x+5y$

$-4x+5y = -12$ ②

Unit's digit = x

Ten's digit = y

Number = $10y+x$

Reversed no = $10x+y$.

$y + x = 12$

$5y + -4x = -12$

Solve Karlena:

Ans: 48

Topic : Problems Based on Numbers

#Q. The sum of a two-digit number and the number obtained by reversing the order of its digits is 165. If the digits differ by 3, find the number. [CBSE 2002]

$10y+x+10x+y=165$

$11x+11y=165$

$x+y=15$ ①

Digits differ by 3 //

$x-y=3$ or $y-x=3$

$x+y=15$

$x-y=3$

$2x=18$

$x=9$

$\Rightarrow 9+y=15$

$y=6$

$No. = 10y+x$

$= 69$

$x+y=15$

$-x+y=3$

$2y=18$

$y=9$

$\Rightarrow x+9=15$

$x=6$

$No. = 10y+x$

$= 96$

$u = x$

$T = y$

$No. = 10y+x$

$R.No. = 10x+y$

Topic : Problems Based on Numbers

#Q. A two digit number is obtained by either multiplying sum of the digits by 8 and adding 1 or by multiplying difference of the digits by 13 and adding 2. Find the number.

$8(x+y)+1 = 10y+x.$

$13(x-y)+2 = 10y+x$

Or

$13(y-x)+2 = 10y+x.$

$U = x$

$T = y$

$No. = 10y+x$

$R.No. = 10x+y$

(10y+x)
Two digit no.

→ $8(x+y)+1$

→ $13(x-y)+2$ or $13(y-x)+2$.

$10y+x = 8x+8y+1$

$2y-7x=1$ — (1)

$13x-13y+2 = 10y+x$

$12x-23y=-2$

$13y-13x+2 = 10y+x$

$3y-14x=-2$

Next page Solution:-

$2y - 7x = 1$

$12x - 28y = -2$

Substitution Method:

$2y = 1 + 7x$

$y = \frac{1+7x}{2}$

$12x - 23\left(\frac{1+7x}{2}\right) = -2$

$\frac{12x}{1} - \frac{23 - 161x}{2} = -2$

$\frac{24x - 23 - 161x}{2} = -2$

$-137x - 23 = -4$

$-137x = 19$

$x = \frac{19}{-137}$ — Ignore

x and y cannot be negative or fraction.

$(2y-7x=1)\times 3$

$(3y-14x=-2)\times 2$

$6y-21x=3$

$6y-28x=-4$

$7x=7$

$x=1$

$2y-7x=1$

$2y-7(1)=1$

$2y=1+7$

$2y=8$

$y=4$

Ans: Two digit

no $=10y+x$

$=10(4)+1$

$=41$

Topic : Problems Based On Fractions

$N = x + 5$

$D = y - 2$

$F = \frac{x+5}{y-2}$

Numerator = x

Denominator = y

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

Topic : Problems Based On Fractions

#Q. A fraction becomes 4/5, if 1 is added to both numerator and denominator. If, however, 5 is subtracted from both numerator and denominator, the fraction becomes 1/2. What is the fraction?

$5x-4y=-1$

$(2x-y=5)\times 4$

$5x-4y=-1$

$8x-4y=20$

$-3x=-21$

$x=7$

$\Rightarrow y=9$

$N=x-5$

$D=y-5$

$\frac{x-5}{y-5}=\frac{1}{2}$ ①

$2(x-5)=1(y-5)$

$2x-10=y-5$

$2x-y=5$

$N=x+1$

$D=y+1$

$\frac{x+1}{y+1}=\frac{4}{5}$ ②

$5(x+1)=4(y+1)$

$5x+5=4y+4$

$5x-4y=-1$

$N=x$

$D=y$

$F=\frac{x}{y}=\frac{7}{9}$

Ans = $\frac{7}{9}$

Topic : Problems Based On Fractions

#Q. A fraction becomes 1/3, if 1 is subtracted from both its numerator and denominator. If 1 is added to both the numerator and denominator, it becomes 1/2. Find the fraction.

$N = x+1$
$D = y+1$

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

$N = x-1$
$D = y-1$

$$\frac{x-1}{y-1} = \frac{1}{3}$$

$N = x$
$D = y$

$F = \frac{x}{y}$?

Ans: $\frac{3}{7}$

Topic : Problems Based On Fractions

#Q. The sum of the numerator and denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the ratio 2 : 3. Determine the fraction: [CBSE 2001C, 2010]

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

$-x + y = 4$ ①

$N = x + 3$

$D = y + 3$

$\frac{x+3}{y+3} = \frac{2}{3}$

$3(x+3) = 2(y+3)$

$3x + 9 = 2y + 6$

$3x - 2y = -3$ ②

$N = x$

$D = y$

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

Ans: $\frac{5}{9}$

Zindagi + ~~pyaar~~ = Happiness.

(+) zindagi − ~~pyaar~~ = Sadness.

---

2 zindagi = Happiness + Sadness.

$$\text{zindagi} = \frac{H}{2} + \frac{S}{2}$$

Doing nothing at all:

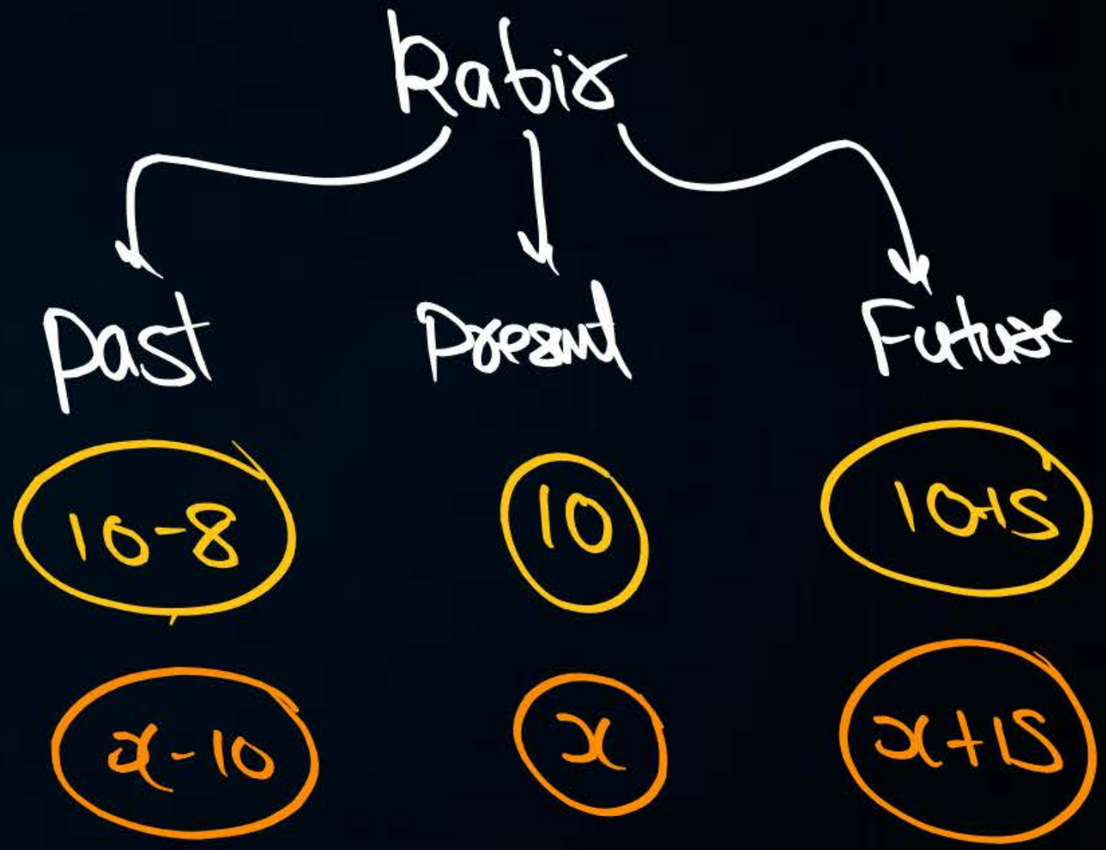
$(1.00)^{365} = 1.00$

Vs

Making small consistent efforts:

$(1.01)^{365} = 37.7$

Topic : Problems on Ages



Topic : Problems Based On Ages

#Q. If twice the son's age in years is added to the father's age, the sum is 70 . But if twice the father's age is added to the son's age, the sum is 95. Find the ages of father and son.

Present

$2y + x = 70$ ×2

$2x + y = 95$

$2x + 4y = 140$

$-2x - y = -95$

$3y = 45$

$y = 15$

$2y + x = 70$

$2(15) + x = 70$

$x = 40$

	Pa.	Pr.	Fu.
Father	—	x	—
Son.	—	y	—

∴ ages of father and son are 40 years and 15 years respectively.

Topic : Problems Based On Ages

#Q. I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I and how old is my son?

$x = 3y$

$x+5 = 2\frac{1}{2}(y+5)$

$x+5 = \frac{5}{2}(y+5)$

$3y+5 = \frac{5}{2}(y+5)$

$6y+10 = 5y+25$

$y = 15$

$x = 3y$

$x = 45$

	Pa	Po	Fu
I	–	x	$x+5$
son	–	y	$y+5$

Topic : Problems Based On Ages

#Q. Ten years ago, father was twelve times as old as his son and ten years hence, he will be twice as old as his son will be. Find their present ages.

papa

$x - 10 = 12 \times (y - 10)$

$x - 10 = 12y - 120$

$x - 12y = -110$ — (1)

$x + 10 = 2(y + 10)$

$x + 10 = 2y + 20$

$x - 2y = 10$ — (2)

	Po.	Pr.	Fu.
F	$x-10$	x	$x+10$
S	$y-10$	y	$y+10$

Ans: $x = 34$ years

$y = 12$ years

Topic : Problems Based On Ages

#Q. Five years hence, father's age will be three times the age of his son. Five years ago, father was seven times as old as his son. Find their present ages.

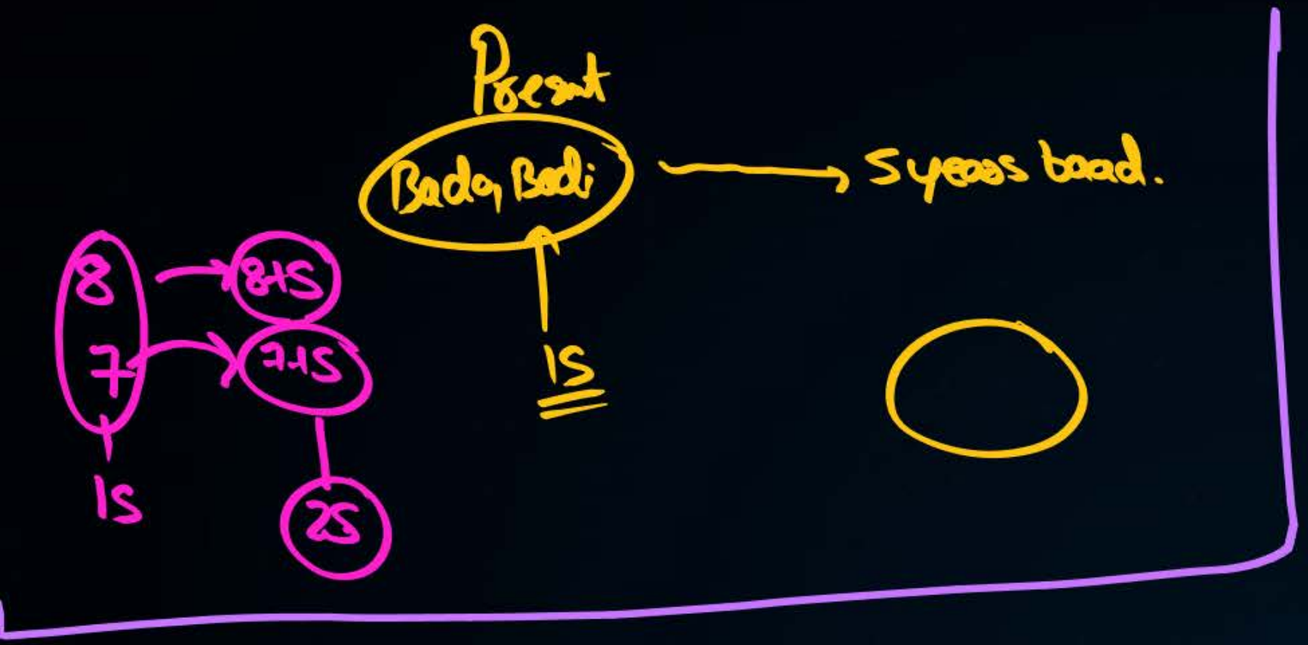
[NCERT]

$$x+5 = 3(y+5)$$

$$x-5 = 7(y-5)$$

	Pa.	Pr.	fu.
F'	$x-5$	x	$x+5$
S'	$y-5$	y	$y+5$

Ans: Father's age = 40 years.
Son's age = 10 years.



Present → Future
(After 10 years)

Present
40
60

Present → Future
(After 7 years)

Present
y
y+14

Topic : Problems Based On Ages

#Q. Father's age is three times the sum of ages of his two children. After 5 years his age will be twice the sum of ages of two children. Find the age of father.

[CBSE 2003]

$x = 3y$

$x + 5 = 2(y + 10)$

	Past	Pr.	Fu.
Father		x	$x+5$
Sum of ages of two children		y	$y+10$

Ans: Father's age = 45 years.

Homework

Question Bank

- Page-112 → 12, 1, 2
- Page-113 → 4
- Page-111 → 10

DPP

THANK YOU