UDAAN

2026

Pair of Linear Equation in Two Variables

MATHS LECTURE-3

BY-RITIK SIR

Topics *to be covered*

A Substitution Method **(Continued)**

B Elimination Method

PHYSICS WALLAH
CLASS 10th TOPPER
10th BOARD RESULT CELEBRATION

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#Q. Solve the following system of equations by using the method of substitution:

(i) $3x - 5y = -1$ — (1)

$x - y = -1$ — (2)

$x - y = -1$

$x = -1 + y$ — (3)

Put (3) in (1)

$3x - 5y = -1$

$3(-1+y) - 5y = -1$

$-3 + 3y - 5y = -1$

$-2y - 3 = -1$

$-2y = -1 + 3$

$-2y = 2$

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

$\boxed{y = -1}$

Put $y = -1$ in eqn (3)

$x = -1 + -1$

$\boxed{x = -2}$

Ans: $x = -2$, $y = -1$

#Q. Solve the following system of equations by using the method of substitution:

(ii) $x + 2y = -1$ — (1)

$2x - 3y = 12$ — (2)

$x + 2y = -1$

$x = -1 - 2y$ — (3)

Put (3) in (2)

$2x - 3y = 12$

$2(-1-2y) - 3y = 12$

$-2 - 4y - 3y = 12$

$-2 - 7y = 12$

$-7y = 12 + 2$

$-7y = 14$

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

$y = -2$

Put $y = -2$, in eq^n (3)

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

$= -1 + 4$

$x = 3$

Ans: $x = 3$, $y = -2$

#Q. Solve the following system of equations by using the method of substitution:

(iii) $2x + 3y = 9$ — (1)

$3x + 4y = 5$ — (2)

$2x+3y=9$

$3y=9-2x$

$y=\frac{9-2x}{3}$ — (3)

Put (3) in (2)

$3x+4y=5$

$3x+4\left(\frac{9-2x}{3}\right)=5$

$\frac{3x}{1}+\frac{36-8x}{3}=5$

$\frac{9x+36-8x}{3}=5$

$x+36=15$

$x=15-36$

$x=-21$

$y=\frac{9-2x}{3}$

$y=\frac{9-2(-21)}{3}$

$y=\frac{9+42}{3}$

$y=17$

#OT

a, b → nos

#Q. Solve the following system of equations by using the method of substitution:

$$\frac{2x}{a}+\frac{y}{b}=2, \quad \frac{x}{a}-\frac{y}{b}=4$$

(1) (2)

$\frac{x}{a}-\frac{y}{b}=4$

$\frac{x}{a}=4+\frac{y}{b}$

$\frac{x}{a}=\frac{4b+y}{b}$

$x=a\left(\frac{4b+y}{b}\right)$ (3)

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

$\frac{2}{a}\left[a\left(\frac{4b+y}{b}\right)\right]+\frac{y}{b}=2$

$\frac{8b+2y}{b}+\frac{y}{b}=2$

$\frac{8b+2y+y}{b}=2$

$8b+3y=2b$

$3y=2b-8b$

$3y=-6b$

$y=\frac{-6b}{3}$

$y=-2b$

Put in eq^n (3)

$x=a\left(\frac{4b+-2b}{b}\right)$

$x=a\left(\frac{2b}{b}\right)$

$x=2a$

#Q. Solve the following system of equations by using the method of elimination by equating the coefficients:

(i) $(3x + 2y = 11) \times 2$ — ①

$(2x + 3y = 4) \times 3$ — ②

$6x + 4y = 22$

$6x + 9y = 12$

(−) (−) (−)

$-5y = 10$

$y = 10/-5$

$y = -2$

Put y in eq^n ①

$3x + 2y = 11$

$3x + 2(-2) = 11$

$3x - 4 = 11$

$3x = 11 + 4$

$3x = 15$

$x = 15/3$

$x = 5$

3	3, 2
2	1, 2
	1, 1

LCM(3, 2) = 6

#Q. Solve the following system of equations by using the method of elimination by equating the coefficients:

(ii) $(8x + 5y = 9) \times 3$ — (1)

$(3x + 2y = 4) \times 8$ — (2)

$24x + 15y = 27$

$24x + 16y = 32$

(1) − (2) (− − −)

$-y = -5$

$y = 5$

Put y in eq (1)

$8x + 5y = 9$

$8x + 5(5) = 9$

$8x + 25 = 9$

$8x = 9 - 25$

$8x = -16$

$x = -16/8$

$x = -2$

2	8, 3
2	4, 3
2	2, 3
3	1, 3
	1, 1

LCM = 24

#Q. Solve the following system of equations by using the method of elimination by equating the coefficients:

(ii) $8x + 5y = 9$ $\times 2$

$3x + 2y = 4$ $\times 5$

$16x + 10y = 18$

$15x + 10y = 20$

$x = -2$

$8x + 5y = 9$

$8(-2) + 5y = 9$

$-16 + 5y = 9$

$5y = 9 + 16$

$5y = 25$

$y = 5$

LCM(5, 2) = 10

#Q. Solve the following system of equations by using the method of elimination by equating the coefficients:

$$\frac{x}{10}+\frac{y}{5}+1=15, \qquad \frac{x}{8}+\frac{y}{6}=15$$

$$\frac{x}{10}+\frac{y}{5}=14$$

$$\frac{x+2y}{10}=14$$

$$\boxed{x+2y=140}$$

$$\boxed{3x+6y=420} \quad (1)$$

$$\frac{3x+4y}{24}=15$$

$$\boxed{3x+4y=360} \quad (2)$$

(1) − (2)

$$3x+6y=420$$

$$3x+4y=360$$

$$2y=60$$

$$\boxed{y=30}$$

$$x+2y=140$$

$$x+2(30)=140$$

$$x+60=140$$

$$\boxed{x=80}$$

#Q. $0.5x + 0.7y = 0.74$

$0.3x + 0.5y = 0.5$

$\frac{5}{10}x + \frac{7}{10}y = \frac{74}{100}$

$\frac{5x+7y}{10} = \frac{74}{100}$

$5x+7y = \frac{74}{100} \times 10$

$5x+7y = \frac{74}{10}$

$10(5x+7y) = 74$

$50x+70y = 74$ — (1)

$\frac{3}{10}x + \frac{5}{10}y = \frac{5}{10}$

$\frac{3x+5y}{10} = \frac{5}{10}$

$3x+5y = 5$ — (2)

$14(3x+5y = 5)$

$42x+70y = 70$

(1) − (2)

$50x+70y = 74$

$42x+70y = 70$

$8x = 4$

$x = 4/8$

$x = 1/2$ = 0.5

$3(\frac{1}{2}) + 5y = 5$

$5y = 5 - \frac{3}{2}$

$5y = \frac{7}{2}$

$y = 7/10$ = 0.7

#Q. $21x + 47y = 110$ — (1)

$47x + 21y = 162$ — (2)

$$21x+47y=110$$
$$47x+21y=162$$

(+)

$$68x+68y=272$$

$$68(x+y)=272$$

$$x+y=\frac{272}{68}=4$$

$x+y=4$ — (3)

$$21x+47y=110$$
$$47x+21y=162$$

(−) (−) (−) (−)

$$-26x+26y=-52$$

$$26(-x+y)=-52$$

$$-x+y=\frac{-52}{26}$$

$-x+y=-2$ — (4)

$x + y = 4$

$-x + y = -2$

$\pm$

$2y = 2$

$y = 1$

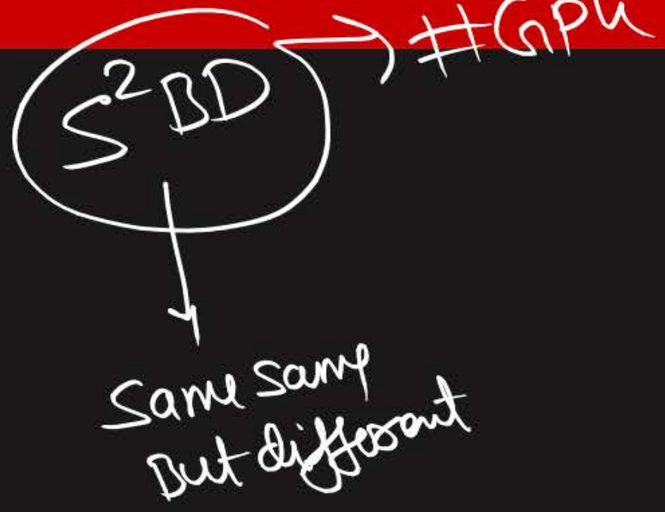
$x + 1 = 4$

$x = 3$

#Q. $99x + 101y = 499$

$101x + 99y = 501$

#Q. Solve the system of equations 217x + 131y = 913 and 131x + 217y = 827



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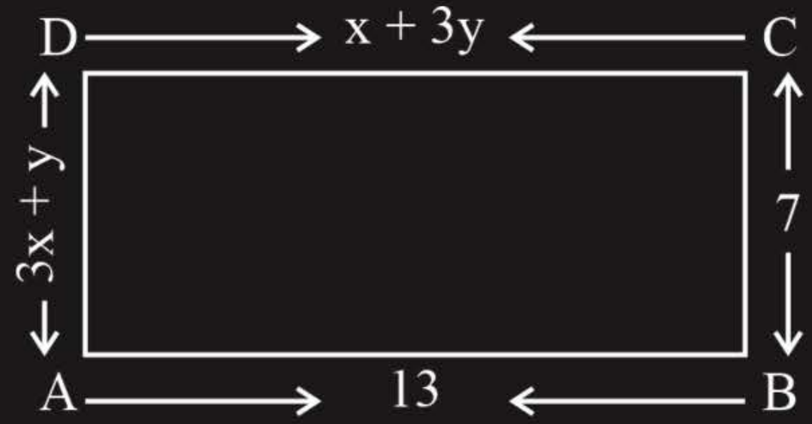
#Q. Find the values of x and y in the following rectangle.

Rectangle
↓
opp. sides
equal.



$x+3y=13$

$3x+y=7$

#Q. The number of solutions of $3^{x+y} = 243$ and $243^{x-y} = 3$ is:

$(a^m)^n = a^{mn}$

A 0

B 1

C 2

D inifnite

$3^{x+y} = 243$

$3^{x+y} = 3^5$

on comp.

$x+y=5$

$243^{x-y} = 3$

$(3^5)^{x-y} = 3$

$3^{5x-5y} = 3^1$

on comp.

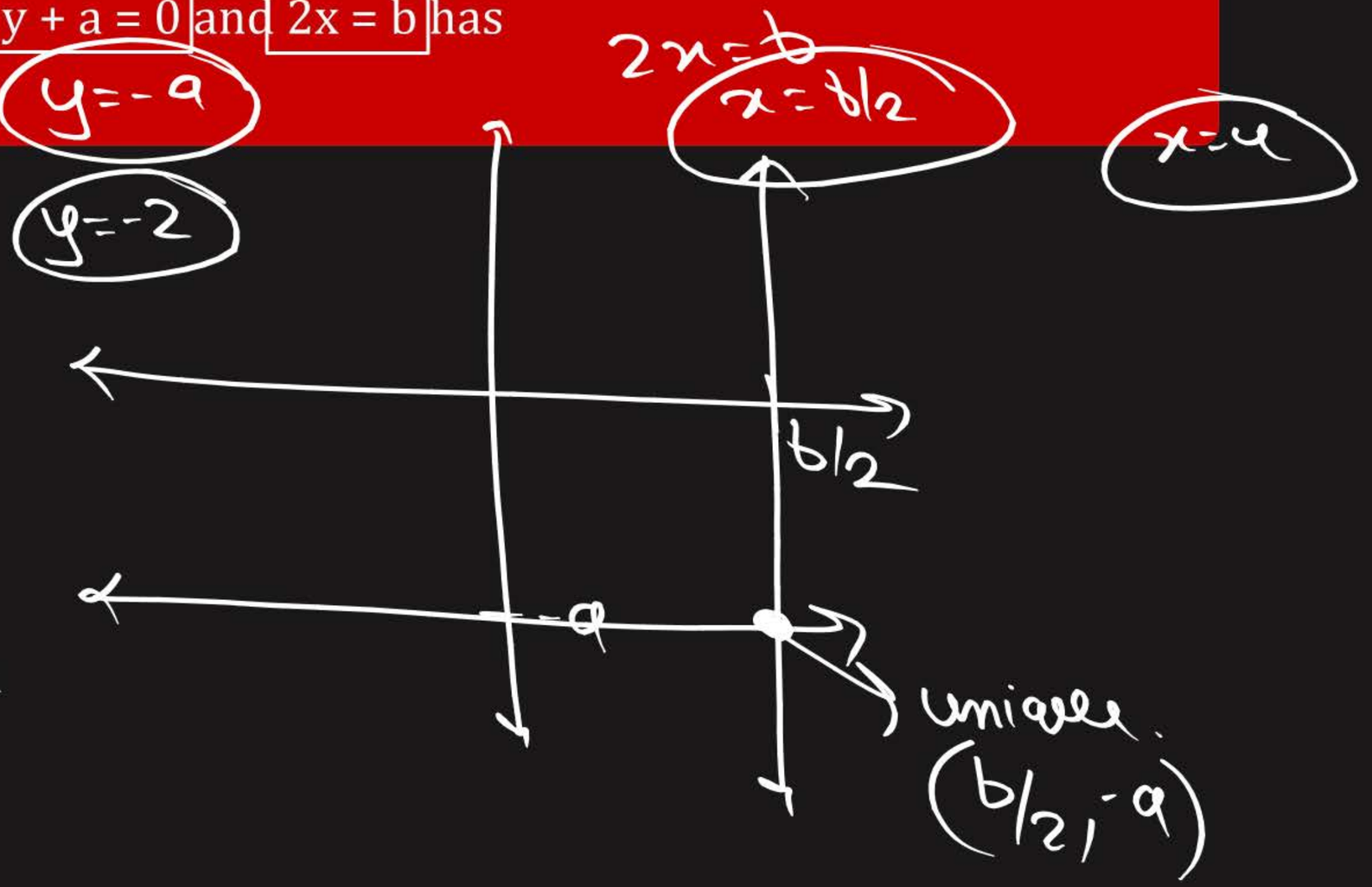
$5x-5y=1$

	243
3	81
3	27
3	9
3	3
3	1

$\frac{1}{5} \neq \frac{1}{-5}$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ → unique solution.

#Q. The system of equations $y + a = 0$ and $2x = b$ has

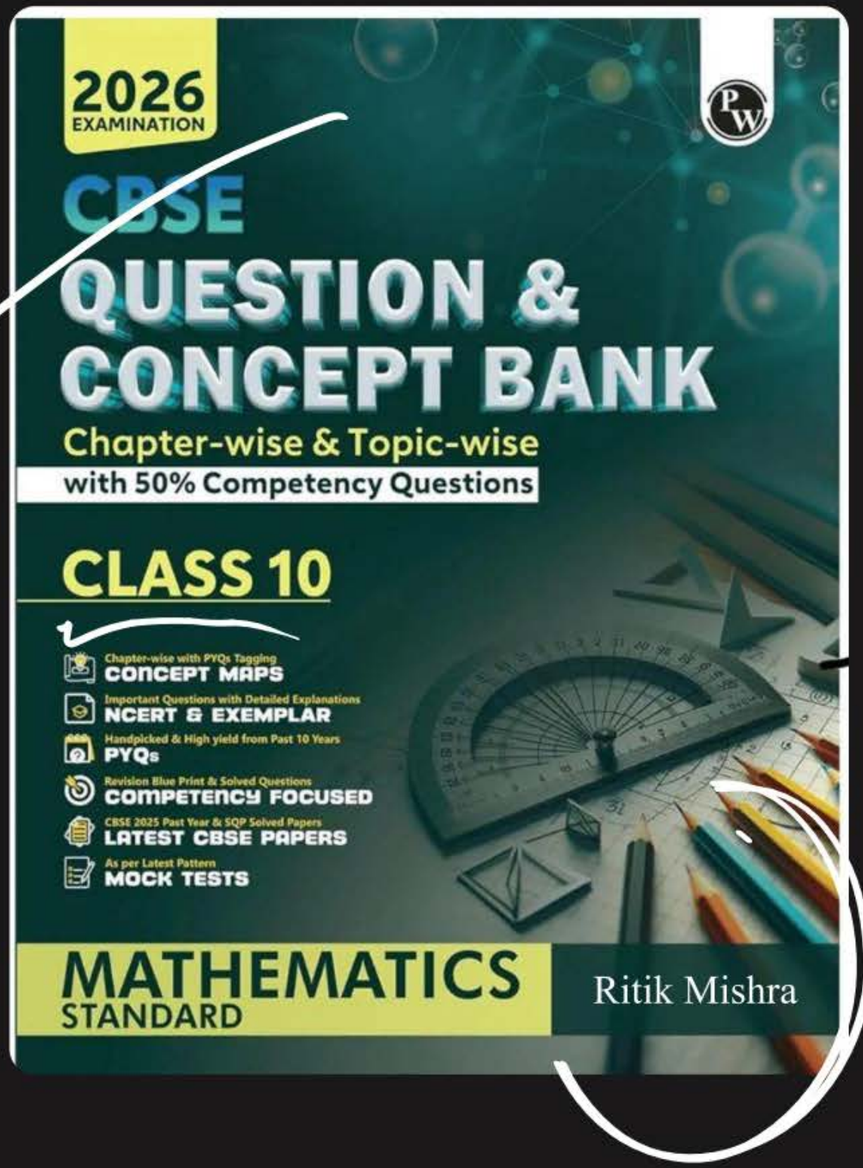


A. No Solution

B. $\left(-a, \frac{b}{2}\right)$ as its solution

C. $\left(\frac{b}{2}, -a\right)$ as its solution

D. Infinite solutions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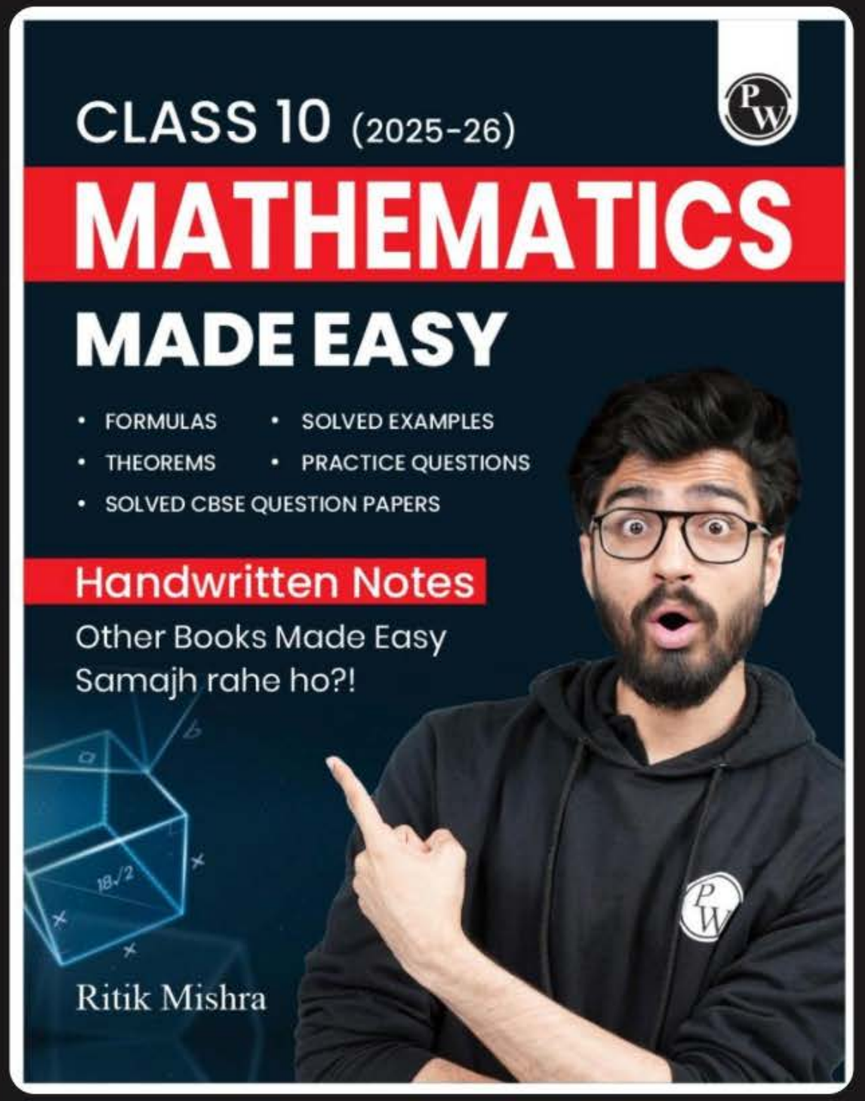
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