



## MATHS

### BOOKS - NAND LAL PUBLICATION

# PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

#### Exercise 3 1

1. Aftab tells his daughter, “Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be” (Isn't

this interesting ?). Represent this situation algebraically and graphically

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### Exercise 3 2

1. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the lines representing the following pairs of linear equations intersect at point, are parallel or coincident :  $5x-4y+8=0$   $7x+6y-9=0$  .

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$$2. 9x + 3y + 12 = 0, 18x + 6y + 24 = 0$$



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$$3. 6x - 3y + 10 = 0, 2x - y + 9 = 0$$



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4. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out

whether the lines representing the following pairs of

linear equations are consistent , or inconsistent . :

$$3x+2y=5, 2x-3y=7 .$$



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5. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the lines representing the following pairs of linear equations are consistent , or inconsistent . :  $2x-3y=8$ ,  $4x-6y=9$  .



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6. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the lines representing the following pairs of linear equations are consistent , or inconsistent . :  $3/2x+5/3y=7$ ,  $9x-10y=14$  .



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7. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the lines representing the following pairs of linear equations are consistent , or inconsistent . :  $5x-3y=11$ ,  $-10x+6y=-22$ .

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8. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the lines representing the following pairs of linear equations are consistent , or inconsistent . :  $4/3x+2y=8$ ,  $2x+3y=12$ .

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9. Which of the following pairs of linear equations are consistent? Obtain the solution in such cases graphically.

$$x + y = 5, \quad 2x + 2y = 10$$



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10. Given the linear equation  $2x+3y-8 = 0$ , write another linear equation in two variables such that the geometrical representation of the pair so formed is : intersecting lines .



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**11.** Given the linear equation  $2x+3y-8 = 0$ , write another linear equation in two variables such that the geometrical representation of the pair so formed is : parallel lines .



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**12.** Given the linear equation  $2x+3y-8 = 0$ , write another linear equation in two variables such that the geometrical representation of the pair so formed is : coincident lines .



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## Exercise 3 3

1. Solve the following pair of linear equations by the substitution method :  $x+y=14$  ,  $x-y=4$ .



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2. Solve the following pair of linear equations by the substitution method :  $s-t=3$  ,  $s/3+t/2=6$  .



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3. Solve the following pair of linear equations by the substitution method :  $3x-y=3$  ,  $9x-3y=9$ .



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4. Solve  $2x + 3y = 11$  and  $2x - 4y = -24$  and hence find the value of 'm' for which  $y = mx + 3$



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5. Form the pair of linear equations for the following problems and find their solution by substitution method.

The difference between two numbers is 26 and one number is three times the other. Find them.



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6. Form the pair of linear equations for the following problems and find their solution by substitution method.

The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.



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7. Form the pair of linear equations for the following problems and find their solution by substitution method.

The coach of a cricket-team buys 7 bats and 6 balls for 3800. Later she buys 3 bats and 5 balls for Rs 1750. Find the cost of each bat and each ball.



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8. Form the pair of linear equations for the following problems and find their solution by substitution method.

The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is Rs105 and for a journey of 15 km, the charges paid is Rs155. What are the fixed charges and the charge per km? How much does a person have to pay for travelling a distance of 25 km ?



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9. Form the pair of linear equations for the following problems and find their solution by substitution method.

A fraction becomes  $\frac{9}{11}$ , if 2 is added to both the numerator and the denominator. If, 3 is added to both the numerator and the denominator it becomes  $\frac{5}{6}$  Find the fraction.



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10. Form the pair of linear equations for the following problems and find their solution by substitution method.

Five years hence, the age of Jacob will be three times.

that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages ?

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### Exercise 3 4

1. Solve the following pair of equations by the elimination method and the substitution method.  $x+y = 5$  and  $2x-3y=4$  .

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2. Solve the following pair of equations by the elimination method and the substitution method.

$$3x+4y=10 \text{ and } 2x-2y=2.$$



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3. Solve the following pair of equations by the elimination method and the substitution method.  $3x-5y-$

$$4=0 \text{ and } 9x= 2y+7 .$$



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4. Solve the following pair of equations by the elimination method and the substitution method.  $x/2 + (2y)/3 = -1$  and  $x - y/3 = 3$ .



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5. Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes  $1/2$  if we only add 1 to the denominator. What is the fraction?



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6. Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu ?



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7. Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the number. Find the number.



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8. Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : Meena went to a bank to withdraw Rs 2000. She asked the cashier to give her Rs 50 and Rs 100 notes only. Meena got 25 notes in all. Find how many notes of Rs 50 and Rs 100 she received.



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9. Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : A lending library has a fixed charge

for the first three days and an additional charge for each day there after. Saritha paid Rs 27 for a book kept for seven days, while Susy paid ' Rs 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day.



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### Exercise 3 5

1. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method. :  $x-3y-3=0$  ,  $3x-9y-2=0$ .



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2. Solve the following pair of linear Equations by the substitution method :  $2x+y=5$  ,  $3x+2y=8$  .

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3. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method. : -  $3x-5y=20$ ,  $6x-10y=40$  .

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4. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method. : -  $x-3y-7=0$  ,  $3x-3y-15=0$



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5. For which values of a and b does the following pair of linear equations have an infinite number of solutions ?  
 $2x + 3y = 7$  ,  $(a - b)x + (a + b)y = 3a + b - 2$  .



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6. For which value of  $k$  will the following pair of linear equations have no solution ?  $3x + y = 1$  ,  $(2k - 1) x + (k - 1) y = 2k + 1$ .

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7. Solve the following pair of linear equations by the substitution and cross multiplication methods :  $8x + 5y = 9$  ,  $3x + 2y = 4$  .

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**Exercise 3 6**

1. Solve the following pairs of equations by reducing them to a pair of linear equations :

$$\frac{1}{2x} + \frac{1}{3y} = 2, \quad \frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$$



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2. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ ,

$$\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1.$$



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3. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $\frac{4}{x}+3y=14$  ,  $\frac{3}{x}-4y=23$  .



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4. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $\frac{5}{(x-1)}+\frac{1}{(y-2)}=2$  ,  $\frac{6}{(x-1)}-\frac{3}{(y-2)}=1$  .



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5. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $(7x-2y)/xy=5$  ,  $(8x+7y)/xy=15$  .

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6. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $6x+3y=6xy$  ,  $2x+4y=5xy$  .

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7. Solve the following pairs of equations by reducing them to a pair of linear equations :-  $10/(x+y)+2/(x-y)=4$  ,  
 $15/(x+y)-5/(x-y)=-2$  .

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8. Solve the following pairs of equations by reducing them to a pair of linear equations:

$$\frac{1}{3x + y} + \frac{1}{3x - y} = \frac{3}{4}, \quad \frac{1}{2(3x + y)} - \frac{1}{2(3x - y)} = \frac{-1}{8}$$

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9. Formulate the following problems as a pair of equations, and hence find their solutions. :- Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.



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10. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.



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11. Formulate the following problems as a pair of equations, and hence find their solutions. :- Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately



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Exercise 3 7

1. One says, "Give me a hundred, friend ! I shall then become twice as rich as you". The other replies, "If you give me ten, I shall be six times as rich as you." Tell me what is the amount of their (respective) capital ? [From the Bijaganita of Bhaskara II]



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2. A train covered a certain distance at a uniform speed. If the train would have been 10 km/h faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/h, it would have taken 3 hours more than the scheduled time. Find the distance covered by the train.



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3. The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.



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4. In a  $\Delta ABC$ ,  $\angle C = 3\angle B = 2(\angle A + \angle B)$  . Find the three angles .



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5. Solve the following pair of linear equations:  $px+qy=p-$

$$q, qx-py=p+q$$



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6. Solve the following pair of linear equation:

$$ax + by = c$$

$$bx + ay = 1 + c$$



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7. Solve the following pair of linear equations:

$$\frac{x}{a} - \frac{y}{b} = 0, ax + by = a^2 + b^2$$



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8. Solve the following pair of linear equation:

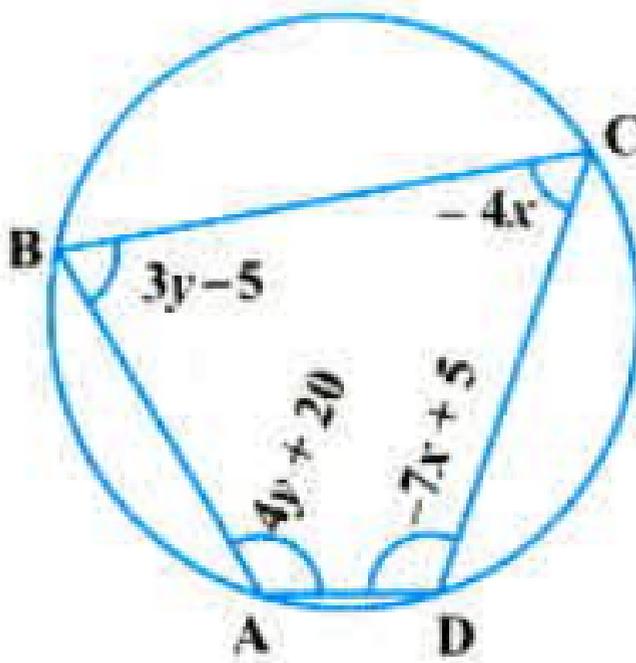
$$152x - 378y = -74$$

$$-378x + 152y = -604$$



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9. ABCD is a cyclic quadrilateral (see Fig.). Find the angles of the cyclic quadrilateral.



**Fig. 3.7**

EW



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