



## MATHS

### BOOKS - SUPER COMPANION MADE EASY

## PAIR OF LINEAR EQUATION 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. Is not this interesting? Represent this situation algebraically and graphically.

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2. The coach of a cricket team buys 3 bats and 6 balls for Rs. 3900. Later, she buys another bat and 4 more balls of the same kind for Rs. 1300. Represent this situation algebraically and geometrically.



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3. The cost of 2kg of apples and 1 kg of grapes on a day was found to be Rs 160. After a month, the cost of 4 kg of apples and 2 kg of grapes is Rs 300. Represent the situation algebraically and geometrically.



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Exercise 3.2

1. From the pair of linear equations in the following and problems, and find their solutions graphically.

10 students, of Class X took part in a Mathematics quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls who took part in the quiz.

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2. From the pair of linear equations in the following and problems, and find their solutions graphically.

5 pencils and 7 pens together cost Rs. 50, whereas 7 pencils and 5 pens together cost Rs. 46. Find the cost of one pencil and that of one pen.

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3. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$ , and without drawing them, find out whether the lines representing the following pairs of linear equations intersect at a point, are parallel or coincide:

$$5x - 4y + 8 = 0; \quad 7x + 6y - 9 = 0 \quad \text{(ii)}$$

$$9x + 3y + 12 = 0; \quad 18x + 6y + 24 = 0 \quad \text{(iii)}$$

$$6x - 3y + 10 = 0; \quad 2x - y + 9 = 0$$



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4. Solve

$$9x + 3y + 12 = 0$$

$$18x + 6y + 24 = 0$$

- A. Unique solution
- B. Exactly two solutions
- C. Infinitely many solutions

D. No solution

**Answer: D**



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$$5. 6x - 3y + 10 = 0$$

$$2x - y + 9 = 0$$



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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 following pair of linear equations are consistent, or inconsistent.

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



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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 following pair of linear equations are consistent, or inconsistent.

$$2x - 3y = 8, 4x - 6y = 9$$

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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 following pair of linear equations are consistent, or inconsistent.

$$\frac{3}{2}x + \frac{5}{3}y = 7, 9x - 10y = 14$$

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9. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the following pair of linear equations are consistent, or inconsistent.

$$5x - 3y = 11, -10x - 10x + 6y = -22$$

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10. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$  find out whether the following pair of linear equations are consistent, or inconsistent.

$$\frac{4}{3}x + 2y = 8, 2x + 2y = 12$$

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11. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically.

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

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12. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically.

$$x - y = 8, 3x - 3y = 16$$

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13. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically.

$$2x + y - 6 = 0, 4x - 2y - 4 = 0$$

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14. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically.

$$2x - 2y - 2 = 0, 4x - 4y - 5 = 0$$

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15. Half of the perimeter of a rectangular garden, whose length is 4 m more than its width is 36m. Find the dimensions of the garden.

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**16.** 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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**17.** 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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**18.** 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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**19.** Draw the graphs of the equations  $x - y + 1 = 0$  and  $3x + 2y - 12 = 0$ . Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and shade the triangular region.

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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.

$$s - t = 3$$

$$\frac{s}{3} + \frac{t}{2} = 6$$



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3. Solve the following pair of linear equations by the substitution method.

$$0.2x + 0.3y = 1.3 \text{ and } 0.4x + 0.5y = 2.3$$

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4. Solve the following pair of linear equations by the substitution method.

$$\sqrt{2x} + \sqrt{3y} = 0 \text{ and } \sqrt{3x} - \sqrt{8y} = 0$$

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5. Solve the following pair of linear equations by the substitution method.

$$\frac{3x}{2} - \frac{5y}{3} = -2, \frac{x}{3} + \frac{y}{2} = \frac{13}{6}$$

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

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7. From 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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8. From 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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**9.** From 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 Rs. 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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**10.** From the pair of linear equations for the following problems and find their solution by substitution method.

The taxi charge in a city consists of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is Rs. 105 and for a journey of 15 km, the charge paid is

Rs. 155. 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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**11.** From the pair of linear equations for the following problems and find their solution by substitution method.

A fraction becomes  $\frac{9}{11}$  if 2 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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**12.** From 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 time 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 linear equations by the elimination method and the substitution method.

$$x + y = 5 \text{ and } 2x - 3y = 4$$

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

$$\frac{x}{2} + \frac{2y}{3} = -1 \text{ and } x - \frac{y}{3} = 3$$



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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  $\frac{1}{2}$  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 digits. 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 thereafter. Sarita 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 solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method.

$$x - 3y - 3 = 0 \text{ and } 3x - 9y - 2 = 0$$

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2. Which of the followings 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.

$$2x + y = 5$$

$$3x + 2y = 8$$

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3. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solution, no solution, or infinitely many solutions. In case there is a unique solution, find it by using cross multiplication method.

$$2x + y = 5 \text{ and } 3x, 2y = 8$$

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4. Which of the following pairs of linear equations has unique solution, no solution, or infinitely many solution, no solution, or infinitely many solutions. In case there is a unique solution, find it

by using cross multiplication method.

$$x - 3y - 7 = 0 \text{ and } 3x - 3y - 15 = 0$$



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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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8. Form the pair of linear equations in the following problems and find their solutions (if they exist) by any algebraic method :

A part of monthly hostel charges is fixed and the remaining depends on the number of days on has taken food in the mess.

When a student A takes food for 20 days she has to pay Rs. 1000 as hostel charges whereas a student B, who takes food for 26 days, Rs.

1180 as hostel charges. find the fixed charges and the cost of food per day.

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**9.** Form the pair of linear equations in the following problems and find their solutions (if they exist) by any algebraic method :

A fraction becomes  $\frac{1}{3}$  when 1 is subtracted from the numerator and it becomes  $\frac{1}{4}$  when 8 is added to its denominator. find the fraction.

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**10.** Form the pair of linear equations in the following problems and find their solutions (if they exist) by any algebraic method :

Yash scored 40 marks in test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test ?





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**11.** Form the pair of linear equations in the following problems and find their solutions (if they exist) by any algebraic method :

Places A and B are 100 km apart on highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars ?



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**12.** Form the pair of linear equations in the following problems and find their solutions (if they exist) by any algebraic method :

The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. if we

increases the length by 3 unit and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.



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### Exercise 3 6

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

$$\frac{1}{2x} + \frac{1}{2y} = 2 \text{ and } \frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$$



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

$$\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2 \text{ and } \frac{4}{\sqrt{y}} - \frac{9}{\sqrt{y}} = -1$$



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

$$\frac{4}{x} + 3y = 14 \text{ and } 3y = 14 \text{ and } \frac{3}{x} - 4y = 23$$

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

$$\frac{5}{x-1} + \frac{1}{y-2} = 2 \text{ and } \frac{6}{x-1} - \frac{3}{y-2} = 1$$

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

$$\frac{7x - 2y}{xy} = 5 \text{ and } \frac{8x + 7y}{xy} = 15$$



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

$$6x + 3y = 6xy \text{ and } 2x + 4y = 5xy$$



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

$$\frac{10}{x+y} + \frac{2}{x-4} = 4 \text{ and } \frac{15}{x+y} + \frac{5}{x-y} = -2$$



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

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



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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.** Formulate the following problems as a pair of equations, and hence find their solutions.

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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1. The ages of two friends Ani and Biju differ by 3 years. Ani's -father Dharam is twice as old as Ani and Biju is twice as old as his sister Cathy. The ages of Cathy and Dharam differ by 30 years. Find the ages of Ani and Biju.



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2. 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 Bhoaskara II].



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3. A train covered a certain distance at a uniform speed. If the train would have been 10 km/hr faster, it would have taken 2 hours less

than the scheduled time. And, if the train were slower by 10 km/hr, it would have taken 3 hours more than the scheduled time. Find the distance covered by train.

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

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6. draw the graphs of the equations  $5x - y = 5$  and  $3x - y = 3$

Determine the coordinates of the vertices of the triangle formed by these lines and the y axis.

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7. Solve the following pair of linear equations :

$$px + qy = p - q \text{ and } qx - py = p + q$$

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8. Solve the following pair of linear equations :

$$ax + by = c \text{ and } bx + ay = 1 + c$$

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9. Solve the following pair of linear equations :

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

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10. Solve the following pair of linear equations :

$$(a - b)x + (a + b)y = a^2 - 2ab - b^2 \text{ and } (a + b)(x + y) = a^3 + b^2$$

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11. Solve the following pair of linear equations :

$$152x - 378y = -74 \text{ and } -378x + 152y = -604$$

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12. ABCD is a cyclic quadrilateral (see Figure). Find the angles of the cyclic quadrilateral.



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