MATHS

BOOKS - KUMAR PRAKASHAN

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Textual Examples

1. Akhila goes to a fair with Rs. 20 and wants to have rides on the Giant Wheel and play Hoopla.

The number of times she played Hoopla is half the number of rides she had on the Giant Wheel. Each ride on the Giant Wheel costs Rs. 3 and a game of Hoopla costs Rs. 4. Represent this situation algebraically and graphically (geometrically).

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2. Romila went to a stationery shop and purchased 2 pencils and 3 erasers for Rs.9. Her friend Sonali saw the new variety of pencils and erasers with Romila, and she also bought 4

pencils and 6 erasers of the same kind for Rs.18. Represent this situation algebraically and graphically.

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3. Two rails are represented by the equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$. Represent this situation geometrically.

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4. Check graphically whether the pair of equations

$x + 3y = 6 \quad \ldots(1)$

and $2x - 3y = 12 \quad \ldots(2)$

is consistent. If so, solve them graphically.

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5. Graphically find whether the following pair of equations has no solution, unique solution or infinitely many solutions:

$$5x - 8y + 1 = 0 \qquad \ldots(1)$$

$$3x - \frac{24}{5}y + \frac{3}{5} = 0 \qquad \ldots(2)$$

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6. Champa went to a 'Sale' to purchase some pants and skirts. When her friends asked her how many of each she had bought, she answered, “The number of skirts is two less than twice the number of pants purchased. Also, the number of skirts is four less than four times the number of pants purchased." Help her friends to find how many pants and skirts Champa bought.

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7. Solve the following pair of equations by substitution method:

$7x - 15y = 2 \quad \ldots(1)$

$x + 2y = 3 \quad \ldots(2)$

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8. Solve by the method of substitution,

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." Find their present ages.

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9. The cost of 2 pencils and 3 erasers is Rs. 9 and the cost of 4 pencils and 6 erasers is Rs. 18. Find the cost of each pencil and each eraser.

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10. Two rails are represented by the equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$. Will the rails cross each other?

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11. The ratio of incomes of two persons 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.

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12. Use elimination method to find all possible solutions of the following pair of linear equations:

$2x + 3y = 8 \quad \ldots(1)$

$4x + 6y = 7 \quad \ldots(2)$

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13. The sum of a two digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?

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14. From a bus stand in Bengaluru, if we buy 2 tickets to Malleswaram and 3 tickets to Yeshwanthpur, the total cost is Rs. 46, but if we buy 3 tickets to Malleswaram and 5 tickets to Yeshwantpur the total cost is Rs. 74. Find the fares from the bus stand to Malleswaram, and to Yeshwanthpur.

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15. For which values of p does the pair of equations given below has unique solution ?

$4x + py + 8 = 0$

$2x + 2y + 2 = 0$

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16. For what values of k will the following pair of linear equations have infinitely many solutions?

$kx + 3y - (k - 3) = 0$

$12x + ky - k = 0$

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17. Solve the pair of equations:

$$\frac{2}{x}+\frac{3}{y}=13$$
$$\frac{5}{x}-\frac{4}{y}=-2$$

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18. 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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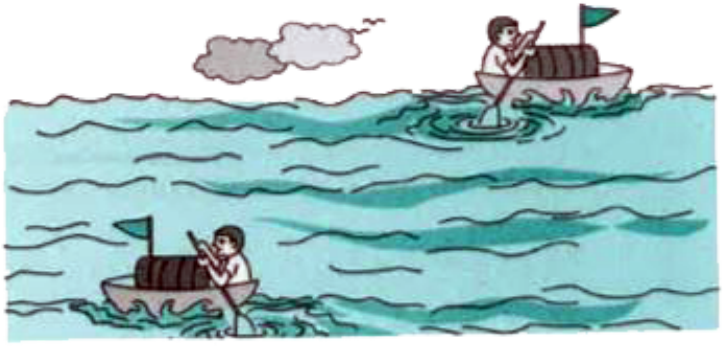
19. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55km down-stream. Determine the speed of the stream and that of the boat in still water.



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Other Important Examples

1. The present ages of two girls are in the ratio $2:3$. After four years, their ages will be in the ratio $3:4$. Represent this situation algebraically and graphically.

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2. 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 pairs of linear equations are consistent or inconsistent. Also

state the nature of the lines representing those equations:

$x + 2y - 6 = 0, 2x + 4y - 16 = 0$

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3. On comparing the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the following pairs of linear equations are consistent or inconsistent. Also state the nature of the lines representing those equations:

$2x - y - 8 = 0, 4x - 2y - 16 = 0$

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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 following pairs of linear equations are consistent or inconsistent. Also state the nature of the lines representing those equations:

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

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5. Solve the following pair of linear equations graphically:

$x + y = 6$ and $3x - 4y = -3$

Also find the coordinates of the vertices of the triangles formed by the lines with the x-axis.

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6. Solve the following pairs of linear equations by substitution method:

$2x - y = 1, 5x + 2y = 25$

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7. Solve the following pairs of linear equations by substitution method:

$3x + 5y = 21, 2x - 3y = 14$

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8. Solve the following pairs of linear equations by substitution method:

$4x + 3y = 25, 3x + 4y = 24$

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9. Find the solution of each pair of linear equations, if it exists, by substitution method:

$2x + 3y = 6, 6x + 9y = 18$

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10. Find the solution of each pair of linear equations, if it exists, by substitution method:

$x + 2y = 7, 2x + 4y = 15$

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11. Two numbers differ by 3 and the sum of thrice the smaller number and twice the greater number is 66. Find those numbers.

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12. A bag contains some coins of Rs. 5 and some coins of Rs. 2. If the total number of coins is 40 the total amount is Rs. 125, find the number of coins of each denomination.

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13. Solve by the elimination method:

$$\frac{x+1}{2}+\frac{y-1}{3}=9 \text{ and } \frac{x+1}{3}+\frac{y-1}{2}=8$$

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14. Solve by the elimination method :

$$ax+by=\frac{a+b}{2} \text{ and } 3x+5y=4.$$

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15. Kavya invests total sum of Rs. 40,000. She ivests certain sum at 6% p.a. rate of interest and

the remaining sum at 8% p.a. rat of interest. If her annual income from interest is Rs. 3000, find the sums invested at each rate.

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16. Solve the following pairs of linear equations by cross-multiplication method:

$11x + 5y = 58, 14x - 8y = 2$

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17. Solve the following pairs of linear equations by cross-multiplication method:

$4x + 3y = 28, 9x - 5y = 63$

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18. For which values of k, does the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have (1) no solution ? (2) infinitely many solutions? (3) a unique solution ?

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19. Solve for x and y : $(x, y \neq 0)$

$$\frac{2}{x} + \frac{3}{y} = 17, \frac{3}{x} + \frac{2}{y} = 18$$

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20. Solve for x and y : $(x, y \neq 0)$

$$\frac{10}{2x + y} + \frac{3}{2x - y} = 3, \frac{15}{2x + y} + \frac{9}{2x - y} = 6$$

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21. Solve the following pair of equations :

$4x + y = 3xy$ and $8x + 3y = 7xy.$

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22. A boat covers 32 km upstream and 36 km downstream in 7 hours. Also, it covers 40 km upstream and 48km downstream in 9 hours. Find the speed of the boat in still water and that of the stream.

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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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2. The each of a cricket team buys 3 bats and 6 balls for Rs. 3900. Later, she buys another bat and 3 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 4kg of apples and 2kg 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 problems, and find their solutions graphically:

10 students of Calss 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 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 $\frac{c_1}{c_2}$, find the out whether the lines equations intersect at

a point, are parallel or coincident :

$5x - 4y + 8 = 0, 7x + 6y - 9 = 0$

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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 the out whether the lines equations intersect at a point, are parallel or coincident :

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

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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 the out whether the lines equations intersect at a point, are parallel or coincident :

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

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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:

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

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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:

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

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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 the perimeter of a rectangular garden, whose length is 4m 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:

(1) intersecting lines

(2) parallel lines

(3) coincident lines

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17. 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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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:

$s - t = 3$

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

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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 the following pair of linear equations by the substitution method:

$0.2x + 0.3y = 1.3$

$0.4x + 0.5y = 2.3$

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

$\sqrt{2}x + \sqrt{3}y = 0$

$\sqrt{3}x - \sqrt{8}y = 0$

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

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8. Form the pair of linear equations for the 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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9. Form the pair of linear equations for the 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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10. Form the pair of linear equations for the 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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11. Form the pair of linear equations for the 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 Rs. 105 and for a journey of 15 km, the charge pair 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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12. Form the pair of linear equations for the 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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13. Form the pair of linear equations for the 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 linear 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 linear equations by the elimination method and the substitution method:

$3x + 4y = 10$ and $2x - 2y = 2$

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

$3x - 5y - 4 = 0$ 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. 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 a 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. Which of the following pairs of linear equations has a 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 a 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 a 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 substitutioin 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 one has taken food in the mess. When a student A takes food for 20 days she has to pay Rs. 1000 as hostel charges while student B takes food for 26 days, pays 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 a 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 a 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 increase the length by 3 units 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:

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

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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:

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

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

$$6x + 3y = 6xy$$

$$2x + 4y = 5xy$$

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

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

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

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

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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 4km 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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Exercise 3 7 Optional

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 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 them 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?

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

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6. Draw the graphs of the equations $5x - y = 5$ and $3x - y = 3$. Determine the co-ordinates 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:

$px + qy = p - q$

$qx - py = p + q$

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8. Solve the following pair of linear equations:

$ax + by = c$

$bx + ay = 1 + c$

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9. Solve the following pair of linear equations:

$\frac{x}{a} - \frac{y}{b} = 0$

$ax + by = a^2 + b^2$

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10. Solve the following pair of linear equations:

$$(a-b)x+(a+b)y=a^2-2ab-b^2$$

$$(a+b)(x+y)=a^2+b^2$$

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11. Solve the following pair of linear equations:

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

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

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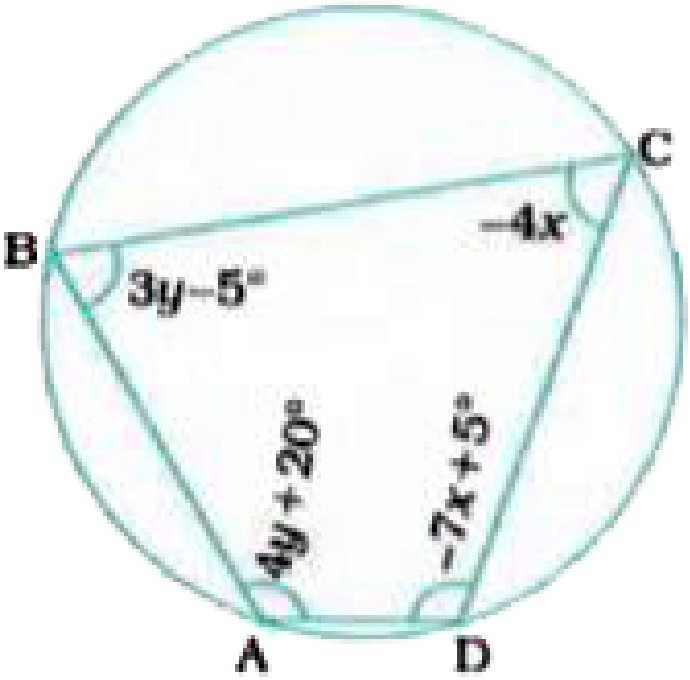
12. ABCD is a cyclic quadrilateral (see the given figure). Find the angles of the cyclic quadrilateral.



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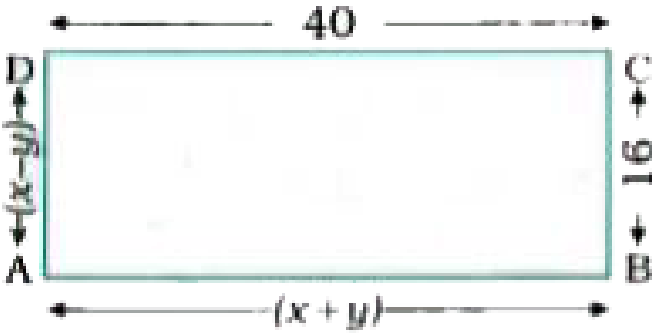
Practice Thoroughly

1. In the given figure, ABCD is a rectangle, Find the values of x and y.



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2. For what value of k, will the graphs of following pair of linear equations be parallel

lines?

$2x + 3y = 18$ and $6x + ky = 50$

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3. If $ax + by = a^2 - b^2$ and bx + ay = 0, find the value of $x + y$.

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4. For what values of a and b does the following pair of linear equations have infinitely many

solutions ?

$2x + 3y = 7$

$a(x + y) - b(x - y) = 3a + b - 2$

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5. Given the linear equation $x - 2y - 6 = 0$, write another linear equation in these two variables such that the geometrical representation of the pair so formed is (1) coincident lines. (2) intersecting lines.

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6. Find whether the following pair of linear equations is consistent or inconsistent:

$x + 3y = 5, 2x + 6y = 8$

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7. Draw the graphs of the equations x = 3, x = 5 and $2x - y - 4 = 0$. Also find the area of the quadrilateral formed by the lines and the x-axis.

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8. The cost of 4 pens and 4 pencil boxes is Rs. 100. Three times the cost of a pen is Rs. 15 more than the cost of a pencil box. Form the pair of linear equations for the above situation. Find the cost of a pen and a pencil box.

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9. Determine algebraically the vertices of the triangle formed by lines $3x - y = 3, 2x - 3y = 2$ and $x + 2y = 8.$

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10. The sum of a two digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of digits in the first number. Find the first number.

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11. 90 % pure and 97% pure acid solutions are mixed to obtain 21 litres of 95 % pure acid

solution. Find the quantity of each type of acid to be mixed to form the mixture.

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12. The incomes of two persons A and B are in the ratio 8:7 and the ratio of their expenditures is 19:16. If their savings are Rs. 2550 per month, find their monthly incomes. What is the importance of savings in life?

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13. Three lines $x + 3y = 6, 2x - 3y = 12$ and $x = 0$ are enclosing a beautiful triangular park. Find the points of intersection of the lines graphically and the area of the park, if all the measurements are in km. What type of behaviour should be expected by public in these type of parks?

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14. A fraction becomes $\frac{19}{23}$ if 2 is added to both its numerator and denominator. If 3 is added to

both its numerator and denominator it becomes $\frac{5}{6}$. Find the fraction.

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15. Jamila sold a table and a chair for Rs. 1050, thereby making a profit of 10% on the table and 25 % on the chair. If she had taken a profit of 25 % on the table and 10% on the chair, she would have got Rs. 1065. Find the cost price of each.

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16. A railway half ticket costs half the full fare, but the reservation charges are the same on a half ticket as on a full ticket. One reserved first class ticket from station A to station B costs Rs. 2530. Also, one reserved first class ticket and one reserved first class half ticket from station A to station B costs Rs. 3810. Find the full first class fare from station A to station B and also the reservation charges for a ticket.

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17. Vijay had some bananas and he divided them into two lots A and B. He sold the first lot at the rate of Rs. 2 for 3 bananas and the second lot at the rate of Rs. 1 per banana, and got a total of Rs. 400. If he had sold the first lot at the rate of Rs. 1 per banana and the second lot at the rate of Rs. 4 for 5 bananas, his total collection would have been Rs. 460. Find the total number of bananas he had.

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18. In a competitive examination, one mark is awarded for each correct answer while $\frac{1}{2}$ mark is deducted for every wrong answer. Hemant attampted 120 questions and scored 90 marks. How many questions did she answer correctly?

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19. If $x-1$ is a factor of $2x^3+ax^2+2bx+1$ and $2a-b=4$. Find the values of a and b.

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20. Solve for x and $y: 2^x + 3^y = 17$ and $2^{x+2} - 3^{y+1} = 5.$

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Objective Questions Fill In The Blanks

1. If x = 2, y = 3 is a solution of equation $5x - 3y = k$, then k = ...

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2. At present, the age of Ahaan is one-third the age of his mother Jalpa. If the present agte of Jalpa is x years, then the age of Ahaan after 12 years will be ..... years.

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3. The area of the triangle formed by the coordinate axes and the line $x + y = 6$ is ..... square units.

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4. The sum of two numbers is 30 and their difference is 16. Then, the smaller number is ..... .

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5. If $y = \frac{x}{2}$ and $3x + 4y = 20$, then x = ...

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Objective Questions

1. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The point of intersection of the line represented by $3x - 2y = 6$ and the y-axis is ..... . a) (2,0) b) (0,-3) c) (-2,0) d) (0,-3)

A. (2, 0)

B. (0, -3)

C. (-2, 0)

D. (0, -3)

Answer: C

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2. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

x = 2, y = 3 is a solution of linear equation .....

a) $2x + 3y - 13 = 0$, b) $3x + 2y - 13 = 0$, c) $2x - 3y + 13 = 0$, d) $2x + 3y + 13 = 0$

A. $2x + 3y - 13 = 0$

B. $3x + 2y - 13 = 0$

C. $2x - 3y + 13 = 0$

D. $2x + 3y + 13 = 0$

Answer: A::B::C

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3. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

If the line $y = px - 2$ passes through the point (3, 2) then p = ... a) 3/4 b) 4/3 c) 3 d) 4

A. $\frac{3}{4}$

B. $\frac{4}{3}$

C. 3

D. 4

Answer: C::D

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4. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

If $\frac{4}{x} + 5y = 7$ and $x = -\frac{4}{3}$, then y = ... a) 37 / 15 b) 2 c) 1/2 d) 1/3

A. $\frac{37}{15}$

B. 2

C. $\frac{1}{2}$

D. $\frac{1}{3}$

Answer: B

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5. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

If $x - ky = 2$ and $3x + 2y = -5$ has a unique solution, then ..... . a) k= 2 / 3 b) k ≠ -2 / 3 c) k= 3 / 2 d) k ≠ -3 / 2

A. $k = \frac{2}{3}$

B. $k \neq -\frac{2}{3}$

C. $k = \frac{3}{2}$

D. $k \neq -\frac{3}{2}$

Answer: B::C

Watch Video Solution

6. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The solution of the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ by corss-multiplication method is given by .....

$x = \frac{b_2c_1 - b_1c_2}{a_1b_2 - a_2b_1}, y = \frac{a_1c_2 - a_2c_1}{a_1b_2 - a_2b_1}$

$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, y = \frac{a_1c_2 - a_2c_1}{a_1b_2 - a_2b_1}$

$$x = \frac{b_2c_1 - b_1c_2}{a_1b_2 - a_2b_1}, y = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$$
$$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, y = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$$

A. $x = \frac{b_2c_1 - b_1c_2}{a_1b_2 - a_2b_1}, y = \frac{a_1c_2 - a_2c_1}{a_1b_2 - a_2b_1}$

B. $x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, y = \frac{a_1c_2 - a_2c_1}{a_1b_2 - a_2b_1}$

C. $x = \frac{b_2c_1 - b_1c_2}{a_1b_2 - a_2b_1}, y = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$

D. $x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, y = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$

Answer: A::B::C

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7. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The sum of the numerator and the denominator of a fraction is 12. If the denominator is increased by 3, the fraction becomes $\frac{1}{2}$. Then, that fraction is ..... a) 5/7 b) 7/5 c) 3/8 d) 8/3

A. $\frac{5}{7}$

B. $\frac{7}{5}$

C. $\frac{3}{8}$

D. $\frac{8}{3}$

Answer:

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8. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The solution of the equations $\frac{x}{a} + \frac{y}{b} = 2$ and $ax - by = a^2 - b^2$ is ..... a) x = a , y = b b) x = −a , y = −b c) x = a , y = −b d) x = −a , y = b

A. $x = a, y = b$

B. $x = -a, y = -b$

C. $x = a, y = -b$

D. $x = -a, y = b$

Answer: A::B

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9. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The point (-2, -2) lies in the ..... quadrant.

A. first

B. second

C. third

D. fourth

Answer: D

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10. Answer each question by selecting the proper alternative from those given below each question so as to make the statement true:

The graphs of equations $4x + 3y = 14$ and ..... are parallel line.

A. $3x + 4y = 14$

B. $8x + 6y = 28$

C. $12x + 9y = 42$

D. $-12x = 9y$

Answer: A::B

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Objective Questions Answer The Following By A Number Or A Word Or A Sentence

1. What is the graph of equation x = 0 ?

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2. Under which condition does ther pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinitely many solutions?

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3. If (2, 5) is a solution of $3x + ky = 31$, what is the value of k?

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4. If the graph of equation $ax + by = c$ passes through the origin, what is the value of c ?

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5. Is (2, 7) a solution of $3x - 2y = -8$ as well as $3x + 2y = 20$?

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Objective Questions True Or False

1. The graph of 3x = 7 is a line parallel to the x-axis .

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2. The graph of $5x - 4y = 0$ passes through the origin.

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Watch Video Solution

3. For $\alpha = 1$, the pair of linear equations $\alpha x + 3y = -7$ and $2x + 6y = 14$ has infinitely many solutions.

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4. If (4, a) is a solution of $2x + 3y = 23$, then a = 5.

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5. The pair of linear equations $5x - 15y = 8$ and $3x - 9y = \frac{24}{5}$ has infinitely many solutions.

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Test Your Skills

1. If the numerator of a fraction is decreased by 1. It reduces to $\frac{1}{2}$ and if its numerator is increased by 1. it reduces to 1. Represent this situation algebraically and graphically.

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2. The total cost of 2 pencils and 3 pens is Rs.31. While the total cost of 3 pencils and 2 pens is Rs.29. Represent this data algebraically and graphically.

Watch Video Solution

3. An express way is represented by equation $x - y = 0$ and a highway is represented by equation $x - y = -2$. Represent this situation geometrically.

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4. Given two natural numbers, seven times the smaller number exceeds three times the greater number by 1. Five times the smaller number exceeds twice the greater number by 2. Represent this data algebraically and geometrically.

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5. Solve the following pair of linear equations graphically:

$x - y = 1, 2x + y = 8$

Also find the coordinates of the vertices of the triangle formed by the lines and the x-axis.

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6. Find out whether the following pairs of linear equations are consistent or inconsistent. Also state the nature of the lines representing those equations:

(1) $x + 2y = 10, 2x - 3y = 12$

(2) $2x + 3y = 6, 4x + 6y = 12$

(3) $3x + 5y = 30, 9x + 15y = 50$

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7. Solve the following pair of linear equations graphically:

$3x + 4y = 24, x - y = 1$

Also find the coordinates of the vertices of the triangle formed by the lines and the y-axis.

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8. Find the value of k for which the pair of linear equations $2x - 3y = 12$ and $6x + ky = 36$ has infinitely many solutions.

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9. Determine the condition of which of pair of linear equations $x - 4y = 10$ and $3x + ky = 20$ has a unique solution.

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10. Solve the following pairs of linear equations by substitution method:

$3x + 5y = 6, 9x - 15y = -6$

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11. Solve the following pairs of linear equations by substitution method:

$3x + 2y = 4, 4x - y = -13$

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12. Solve the following pairs of linear equations by substitution method:

$2x + 3y = 20, 3x + 4y = 25$

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13. Solve the following pairs of linear equations by substitution method:

$3x + 4y = 0, x - 5y = 19$

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14. Parthiv tells his son Ariv "Five years ago my age was seven times your age then. Further, ten years hence, my age will be two and a half times your age then." Find the present age of both of them.

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15. Ahaam and Arya have certain sums with them. If Arya gives Rs. 50 to Ahaam, Ahaam with have five times the sum left with Arya. If Ahaam gives

Rs. 50 to Arya. Both of them will have equal sum. Find the sum each of them have.

16. The sum of digits of a two digit number is 10. The number obtaiend by interchanging the digits is 36 more than the original number. Find the original number.

17. The total cost of 5 pens and 2 books is Rs. 150, while the total cost of 7 pens and 3 books is Rs. 219. Find the total cost of 3 pens and 1 book.

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18. There are 50 students in a class. Each boy in the class contributed Rs. 40 and each girl contributed Rs. 50 towards Kerala Flood Relief Fund. If the total sum collected is Rs. 2,220, find the number of boys and the number of girls in the class.

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19. Solve by the elimination method:

$2x + y = 10, 3x + 2y = 17$

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20. Solve by the elimination method:

$3x + 2y = 11, x - 4y = 13$

A.

B.

C.

D.

Answer: x = 5, y = -2

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21. Solve by the elimination method:

$3x + 4y = 12, 6x + 8y = 20$

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22. Solve by the elimination method:

$x + 5y = 11, 2x - 3y = 9$

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23. Solve by the elimination method:

$2x + 3y = 2, 5x + 4y = 3\frac{5}{6}$

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24. Solve by the elimination method:

$3x - 5y = 3, 2x + 3y = -17$

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25. The sum of a two digit number and the number obtained by interchanging the digits is 99. If the digit at tens place exceeds the digit at units place by 3, find the number.

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26. Two numbers are in the ratio $3:4$. If 5 is added to each number, their ratio becomes $7:9$. Find those numbers.

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27. The sum of the numerator and the denominator of a farction is 9. If 3 is added to each of the numerator and the denominator, it becomes $\frac{1}{2}$. Find the fraction.

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28. The length of a rectangel exceeds twice its breadth by 2 cm. If the perimeter of the rectangle is 28 cm, find its length and breadth.

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29. 10 years ago, the age of a father was four times the age of his son then. 10 years hence, the age of the father will be twice the age of his son. Find their present ages.

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30. Solve the following pairs of linear equations by cross-multiplication method:

$7x - 4y = 49, 5x - 6y = 57$

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31. Solve the following pairs of linear equations by cross-multiplication method:

$11x + 15y + 23 = 0, 7x - 2y - 20 = 0$

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32. Solve the following pairs of linear equations by cross-multiplication method:

$3x + 4y = 12, 4y + 7x = 12$

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33. Solve the following pairs of linear equations by cross-multiplication method:

$15x - 17y = 66, 7x + 2y = 15$

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34. Solve the following pairs of linear equations by cross-multiplication method:

$7x + 4y = 12, 3x + 4y = -4$

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35. For which value of p does the pair of equations given below has a unique solution?

$4x + py + 8 = 0$

$2x + 2y + 2 = 0$

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36. For what value of k, the pair of linear equations $kx + 2y = k - 2$ and $8x + ky = k$ has no solution?

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37. For what values of p and q, will the following pair of linear equations have infinitely many solutions?

$4x + 5y = 2$

$(2p + 7q)x + (p + 8q)y = 2q - p + 1$

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38. Check whether the following pair of linear equations has a unique solution. If yes, find the solution :

$8x + y = 23, 5x - y = 3$

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39. The denominator of a fraction is 4 more than twice the numerator. When both the numerator and denominator are decreased by 6, then the denominator becomes 12 times the numerator. Find the fraction.

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40. The area of a rectangle gets reduced by 80 square units if its length is reduced by 5 units

and the breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area is increased by 50 square units. Find the length and breadth of the rectangle.

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41. Places A and B are 100 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction, they meet in 10 hours, but if

they move towards each other they meet in 1 hour 40 minutes. Find the speeds of the cars.

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42. Solve the following pairs of equations:

$$4x + \frac{8}{y} = 15, 6x - \frac{8}{y} = 14, y \neq 0$$

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43. Solve the following pairs of equations:

$$\frac{1}{2x} - \frac{1}{y} = -1, \frac{1}{x} + \frac{1}{2y} = -8, x, y \neq 0$$

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44. Solve the following pairs of equations:

$$\frac{2xy}{x+y} = \frac{3}{2}, \frac{xy}{2x-y} = \frac{-3}{10}, x, y \neq 0, 2x - y \neq 0$$

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45. It can take 12 hours to fill a swimming pool using two pipes. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be

filled. How long would it take for each pipe to fill the pool seperately?

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46. Ankita travels 14 km to her home partly by rickshaw and partly by bus. She takes half an hour if she travels 2 km by rickshaw and the remaining distance by bus. On the other hand, if she travels 4 km by rickshaw and the remaining distance by bus, she takes 9 minutes longer. Find the speed of the rickshaw and the bus.

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47. A motor boat can travel 30 km upstream and 28 km downstream in 7 hours. It can travel 21 km upstream and return in 5 hours. Find the speed of the boat in still water and the speed of the stream.

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48. Out of a distance of 360 km, if 240 km is covered by bus and rest by train, it takes 8 hours to complete the journey. However, if 120 km is

travelled by the bus and rest by train, it takes one hour less. What is the speed of the bus and the train ?