



## MATHS

# BOOKS - CALCUTTA BOOK HOUSE MATHS (BENGALI ENGLISH)

## LINEAR EQUATIONS

### Examples

1. If the simultaneous linear equations  $3x+4y=18$  and  $kx-4y=180$  have no solution then the value of  $k$  is-

A. 0

B. -1

C. 2

D. -3

**Answer: D**

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2. If the simultaneous linear equations  $a_1x + b_1y + c_1 = 0$  and  $a_2x + b_2y + c_2 = 0$  have only one solution, then the required condition is -

A.  $a_1b_2 = a_2b_1$

B.  $a_1b_2 = b_1b_2$

C.  $a_1a_2 = b_1b_2 \neq c_1c_2$

D.  $a_1b_2 \neq a_2b_1$

**Answer: B**

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3. Solve (by any method):

$$3x + 2y = 1$$

$$2x + y = 3$$



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4. Find the values of  $p$  for which the equations  $3x-4y=1$  and  $9x+py=2$  will have only one set of solutions.



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5. Find the values of  $r$  for which the equations  $rx+2y=5$  and  $(r+1)x+3y=2$  have no solution.



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6. Find the value of  $p$  for which the equations  $px+6y-p=0$  and  $(p-1)x+4y+(p-5)=0$  have infinitely many sets of solutions.

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7. If  $x = 3t$  and  $y = \frac{2t}{3} - 1$ , then find the value of  $t$  for which  $x = 3y$ .

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8. Find the value of  $k$  for which the equations  $2x+5y=8$  and  $2x-ky=3$  will have no solution.

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9. If  $x$  and  $y$  are real numbers and  $(x - 5)^2 + (x - y)^2 = 0$ , then find the value of  $x$  and  $y$ .

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10. Find the values of  $x$  and  $y$  if  $x^2 + y^2 - 2x + 4y = -5$ .

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11. Find the values of  $r$  for which the equations  $rx - 3y - 1 = 0$  and  $(4 - r)x - y + 1 = 0$  will have no solution.

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12. Write the equation  $a_1x + b_1y + c_1 = 0$ ,  $b_1 \neq 0$ , in the form of  $y=mx+c$ , where  $m$  and  $c$  are constants.

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13. Find the value of  $k$  for which the equations  $kx-21y+15=0$  and  $8x-7y=0$  will have only one set of solutions.

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14. Find the values of  $a$  and  $b$  for which the equations  $5x+8y=7$  and  $(a+b)x+(a-b)y=(2a+b+1)$  will have infinitely many sets of solution.

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**15.** Solve (by any method):

$$x + 3y = 1$$

$$2x - y = 3$$



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**16.** Determine whether each pair of the following equations are solvable or not by finding the relations among the ratios of the co-efficients of the same variable and the constant terms of each pair. Also write whether the graphs of the equations of each pair are parallel or intersecting or coinciding or not:

(i)  $5x+3y=11$ ,  $2x-7y=-12$ , (ii)  $6x-8y=2$ ,  $3x-4y=1$ ,

(iii)  $8x-7y=0$ ,  $8x-7y=56$ ,



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17. If  $y$  of the equation  $\frac{2}{x} + \frac{7}{y} = 1$  is expressed in term of  $x$  we get -

A.  $y = \frac{7x}{x - 2}$

B.  $y = \frac{7(x - 2)}{x}$

C.  $x = \frac{2y}{y - 7}$

D.  $x = \frac{2(x - 7)}{y}$

**Answer: C**



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18. The value of  $x$  when  $y = \frac{7 - 4x}{-5}$  is substituted in the equation  $2x + 3y = 9$  is -

A. 1



B. 2

C. 3

D. 4

**Answer: C**



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19. If  $r(x+y)=2rs$ .....(1) and  $s(x-y)=2rs$ .....(2) be two equations, then the value of  $x$  obtained from (1) that should be substituted in equation (2) so as to determine the value of  $y$  is -

A.  $s-r$

B.  $y-2r$

C.  $2r-y$

D.  $2r+y$

**Answer: A**

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**20.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$x + y = 48, x + 4 = \frac{5}{2}(y + 4)$$

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**21.** Solve the following simultaneous linear equations in two variables by the method of elimination :

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

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**22.** Solve the following simultaneous linear equations in two variables by the method of elimination :

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

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**23.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{x+y}{2} + \frac{3x-5y}{5} = 2, \quad \frac{x}{14} + \frac{y}{18} = 1$$

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**24.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{xy}{x+y} = \frac{1}{5}, \quad \frac{xy}{x-y} = \frac{1}{9}$$

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**25.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{1}{x-1} + \frac{1}{y-2} = 3, \frac{2}{x-1} + \frac{3}{y-2} = 5$$



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**26.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$(7x - y - 6)^2 + (14 + 2y - 16)^2 = 0$$



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**27.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$ax + by = 1, bx + ay = \frac{(a + b)^2}{a^2 + b^2} - 1, (a \neq b)$$



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**28.** Solve the following simultaneous linear equations in two variables by the method of elimination :

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



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**29.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$2x - 3y = 8, \frac{x + y}{x - y} = \frac{7}{3}$$



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**30.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{1}{3}(x - y) = \frac{1}{4}(y - 1), \frac{1}{7}(4x - 5y) = x - 7$$

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**31.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{x + 1}{y + 1} = \frac{4}{5}, \frac{x - 5}{y - 5} = \frac{1}{2}$$

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**32.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{1}{x} + \frac{1}{y} = \frac{5}{6}, \frac{1}{x} - \frac{1}{y} = \frac{1}{6}$$

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**33.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{x + y}{xy} = 2, \frac{x - y}{xy} = 1, (x \neq 0, y \neq 0)$$



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**34.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$\frac{x + y}{5} + \frac{x - y}{4} = 5, \frac{x + y}{4} + \frac{x - y}{5} = 5\frac{4}{5}$$



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**35.** Solve the following simultaneous linear equations in two variables by the method of elimination :

$$2 - 2(3x - y) = 10, (4 - y) - 5x = 4(y - x)$$

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**36.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$2x + \frac{3}{y} = 1, 5x - \frac{2}{y} = \frac{11}{12}$$

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**37.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{2}{x} + \frac{5}{y} = 1, \frac{3}{x} + \frac{2}{y} = \frac{19}{20}$$

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**38.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{x + y}{xy} = 3, \frac{x - y}{xy} = 1$$

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**39.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{x + y}{x - y} = \frac{7}{3}, x + y = \frac{7}{10}$$

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**40.** Solve the following simultaneous linear equations in two variables by the method of substitution :

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

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**41.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{1}{3}(x - y) = \frac{1}{4}(y - 1), \frac{1}{7}(4x - 5y) = x - 7$$

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**42.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{x}{14} + \frac{y}{18} = 1, \frac{x + y}{2} + \frac{3x - 5y}{4} = 2$$

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**43.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$p(x + y) = q(x - y) = 2pq \quad (p, q \neq 0)$$



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**44.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

$$x + 5y = 36, \quad \frac{x + y}{x - y} = \frac{5}{3}$$



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**45.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

$$\frac{x}{5} + \frac{y}{3} = \frac{x}{4} - \frac{y}{3} - \frac{3}{20} = 0$$



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**46.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

$$\frac{x + 2}{7} + \frac{y - x}{4} = 2x - 8, \quad \frac{2y - 3x}{3} + 2y = 3x + 4$$

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**47.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

$$x + y = 2b, \quad x - y = 2a$$

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**48.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

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

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**49.** Solve the following simultaneous linear equations in two linear variables by the method of cross-multiplication :

$$ax + by = 1, bx + ay = \frac{2ab}{a^2 + b^2}$$



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**50.** Ritadevi has bought 5 pens and 3 pencils for Rs.34 from a shop. Sumitadevi has also bought 7 pens and 6 pencils for Rs. 53 from the same shop. Find the value of each pen and of each pencil.



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**51.** The weights of Sitadevi and Gitadevi are together 85 kilograms . If half of the wight of Sitadevi equal to  $\frac{4}{9}$  th part of the weight of Gitadevi , then determine the weight of each separately.

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**52.** Present age of Sumitra is twice the present age of Sulekha . 10 yeras ago, the age of Sumitra was thrice the age of Sulekha . What are their present ages ?

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**53.** The value of the total number of 70 notes (currency) is Rs.590 , in which there are notes of Rs10 and 5. Find the number of each notes.

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54. The denominator of a fraction is greater than numerator of it by 5 and if 3 is added to both the numerator and the denominator the fraction becomes  $\frac{3}{4}$ . Find the fraction.

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55. If 21 is added to the number first number of two given numbers, it becomes twice the second number and if 12 is added to the second number, it becomes twice the first number. Find the numbers.

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56. A and B can complete  $\frac{2}{3}$  rd of a piece of work , if A work 3 days and B work 4 days together. While they can complete  $\frac{11}{12}$  part of the work.if A work 3 days and B works 6 days together. In how many days A and B will complete the work seperately.

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57. There are two kinds of syrup . In the first kind , there is 5 kg of sugar in 100 litres of syrup. While in the second kind,there is 8 kg of sugar in 100 litres of syrup. In how much quantities of these two kinds of syrup should be mixed so that there will have  $9\frac{2}{3}$  kg of sugar in 150 litres of syrup ?

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58. if the length be increased by 2 metres and the breadth be increased by 3 metres respectively , the area of the rectangle is increased by 75 sq. metres . But if the length be decreased by 2 metres and the breadth be increased by 3 metres , the area of the rectangle increases by 15 sq.metres . Find the length and breadth of the rectangle.



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59. Babul said to Eeshan , "If you give me  $\frac{1}{3}$  rd of your money , I will have Rs 200. " Eeshan said to Babul , "If you give me  $\frac{1}{2}$  of your money , I will have Rs. 200 . "How much money did each of them possess.



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**60.** An amount of money was distributed amongst a certain number of friends . Had the number of friends been 2 less than the original , each of them would have got RS.18. Again , had the number of friends been 3 more than the original , each of them would have got Rs. 12 . Determine the number of friends and the amount of money.



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**61.** There are coins of one rupee and 50 paisa in a box owned by elder brother of Mitali. The total value of the coins is Rs. 350. The sister of Mitali replaces  $\frac{1}{3}$  rd of the 50 paisa coins in the box by equal number of one rupee coins , so that the total value of the coins now becomes RS.400 . Determine the number of one rupee coins and 50 paisa coins each.



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**62.** The time required by a motor car to travel a certain distance is 3 hours less if its velocity be increased by 9 kilometres per hour. Again, if the velocity be decreased by 6 kilometres per hour, then the time required by the car to travel the same distance is 3 hours more. Find the velocity of the car and the certain distance.

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**63.** A number of two digits is 3 more than 4 times of the sum of its digits. If the positions of the digits of the number be interchanged, then the new number thus formed is 18 more than the original number. Determine the number.

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**64.** The sum of the digits of a number consisting of two digits is 14 and if 29 is subtracted from the number, then two digits of the number becomes equal to each other. Find the number.

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**65.** A boatsman can travel by his boat a distance of 30 kilometres in 6 hours in favour of the current . While he comes back in 10 hours against the current . Find the velocity of the current and the velocity of the boat in still water.

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**66.** If the angle of elevation of the Sun is  $30^\circ$  , then the length of the shadow of a vertical pole of length 15 metre is?

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**67.** Matangini got 6 as the quotient and 6 as the remainder when she had divided a number of two digits by the sum of the digits . Had she been divided the number obtained by interchanging the positions of the digits by the sum of the digits ,then she would get 4 as the quotient and 9 as the remainder . Determine the number .



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**68.** In order to put some oranges into some boxes , Sankarbabu found that had he been put 20 oranges more into each box, the number of boxes required would be 3 less than the original number . Again , had he been put 5 orange less into each box, the number of boxes would be 1 more than the original number . Find

the number of oranges and the number of boxes which Sankarbabu possessed.

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**69.** Two trains start at the same time, one from Kolkata to Madhupur and the other from Madhupur to Kolkata. If they arrive at Madhupur and Kolkata respectively 1 hour and 4 hours after they cross each other, find the ratio of their velocities.

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### Exercise 4 1

1. The straight line parallel to the graph of the equation  $x+y=5$  is

A.  $x-y=5$

B.  $x+y=k$  (= constant)

C.  $y-x=5$

D.  $x-y=k$

**Answer: B**



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2. The straight line which coincides with the graph of the equation  $x+y=5$  is

A.  $x+y=1$

B.  $x-y=5$

C.  $2x+2y=10$

D.  $x+y=10$

**Answer: C**



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3. The equations  $4x+3y=7$  and  $7x-3y=4$  have

- A. a certain solution
- B. infinitely many solution
- C. no solution
- D. None of these

**Answer: A**



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4. The solutions of the equation  $x+y=7$  are



A.  $(1, 6), (3, -4)$

B.  $(1, -6), (4, 3)$

C.  $(1, 6), (4, 3)$

D.  $(-1, 6), (-4, 3)$

**Answer: C**



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5.  $(1, 1)$  is the solution of

A.  $2x+3y=9$

B.  $6x+2y=9$

C.  $3x+2y=5$

D.  $4x+6y=8$

**Answer: C**

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6. Find the value of  $k$  for which the equations  $2x+5y=8$  and  $2x-ky=3$  will have no solution.

A. -1

B. -3

C. -5

D. -7

**Answer: C**

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7. If the solution  $rx+2y=5$  and  $(r-5)x+3y=2$  have no solution, then the value of  $r$  is

A. 10

B. -10

C. -3

D. -7

**Answer: B**



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8. If the solution  $rx+2y=5$  and  $(r+1)x+3y=2$  have no solution, then the value of  $r$  is

A. 1

B. 2

C. 3

D. 4

**Answer: B**



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9. If  $x = 3p$  and  $y = \frac{2p}{5} + 1$ , then find the value of  $p$  for which  $x = 5y$ .



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10. Find two sets of solutions of the equation  $ax + by + c = 0$ .



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11. Express the equation  $px+qy+r=0$  in the form of  $y=mx+c$  where  $m$  and  $c$  are constants.

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12. If  $u$  and  $v$  are real numbers and  $(u + 3)^2 + (v + 5)^2 = 0$ , then find the values of  $u$  and  $v$ .

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13. If  $x^2 + y^2 - 6x - 8y = -25$ , then find the values of  $x$  and  $y$ .

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14. Find the values of  $x$  and  $y$  when

$$x^2 + y^2 - 2\sqrt{2}x + 2\sqrt{5}y = -7.$$

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15. Find the values of  $r$  for which the equations  $rx-y=3$  and  $4x-2y=5$  will have only one solution.

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16. Find the value of  $t$  for which the graphs of the simultaneous linear equations  $2x+ty+1=0$  and  $(1-t)x-3y=1$  will be parallel to each other.

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17. Find the value of  $k$  for which the graph of the simultaneous linear equations  $3x+2y-7=0$  and  $9x+ky-21=0$ , coincide.

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18. Find the values of  $a$  and  $b$  if the simultaneous linear equation  $ax-15y+10=0$  and  $2x+6y=b$  will have infinitely many solutions.

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19. Determine the condition for which the simultaneous linear equations  $bx+cy+d=0$  and  $b'x+c'y+d'=0$  will have no solution.

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20. Show that the solution set of the simultaneous linear equations  $4x+3y=25$  and  $5x-2y=14$  is  $(4, 3)$ .



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21. Express the following statements in the form of two simultaneous linear equations in two variables and determine whether these equations are solvable or not by the method of finding the relations among the ratios of the co-efficients of the same variables and the constant terms :

The sum of the present ages of your elder sister and your father is 84 years. After 8 years, your father's age will be  $2\frac{1}{3}$  times of your elder sister.



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**22.** Express the following statements in the form of two simultaneous linear equations in two variables and determine whether these equations are solvable or not by the method of finding the relations among the ratios of the co-efficients of the same variables and the constant terms :

Debsmita bought 3 pens and 4 pencils for Rs. 42. Her friend Nayana also bought 9 pens and a dozen of pencils for Rs. 126.



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**23.** Express the following statements in the form of two simultaneous linear equations in two variables and determine whether these equations are solvable or not by the method of finding the relations among the ratios of the co-efficients of the same variables and the constant terms :

Judhisthir bought 2 art-paper and 5 sketch-pen for Rs. 16. His elder

brother Ramsundar also bought 4 art-paper and 10 sketch-pen for Rs. 28.

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**24.** Solve each pair of the following simultaneous linear equations by drawing graphs of these equations which have only one solution. Also find three sets of solutions of those pair of equations which have infinitely many solutions :

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

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**25.** Solve each pair of the following simultaneous linear equations by drawing graphs of these equations which have only one solution. Also find three sets of solutions of those pair of

equations which have infinitely many solutions :

$$x - y = 3, \frac{x}{5} - \frac{y}{5} = 3$$



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**26.** Solve each pair of the following simultaneous linear equations by drawing graphs of these equations which have only one solution. Also find three sets of solutions of those pair of equations which have infinitely many solutions :

$$4x + 3y = 20, 8x + 6y = 40$$



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**27.** If the simultaneous linear equations in two variables  $8x+5y=7$  and  $(a-b)x+(a+b)y=a+2b+1$  have infinitely many solutions, then find the values of  $a$  and  $b$ .



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28. If the simultaneous linear equations in two variables  $x + ry = r$  and  $x + (r - 2)^2y = 2$  have no solution, find the values of  $r$ .

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29. Determine the values of  $k$  for which the simultaneous linear equations in two variables  $kx + 2y - (k - 10) = 0$  and  $2x + ky + (k + 6) = 0$  have infinitely many solutions.

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30. If the simultaneous linear equations in two variables  $a^2x + b^2y = 1$  and  $\frac{x}{a^2 + 1} + \frac{y}{b^2 + 1} = k$ , where  $a \neq b$  and  $a,$

b, k are constants have no solution, then prove that

$$a^2 + b^2 + 1 = 0.$$



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## Exercise 4 2

1. The least natural numbers, by which the equations  $4x-3y=16$  and  $6x+5y=62$  should be multiplied so that the co-efficients of x in both the equations become equal are

- A. 3 and 2 respectively
- B. 2 and 1 respectively
- C. 1 and 2 respectively
- D. 5 and 3 respectively

**Answer: A**



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2. The least natural numbers, by which the equation  $2x+3y=11$  and  $3x-4y=8$  should be multiplied so that the co-efficients of  $y$  in both the equations become equal are

- A. 3 and 2 respectively
- B. 4 and 3 respectively
- C. 3 and 1 respectively
- D. 4 and (-3) respectively

**Answer: D**



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3. The number, by which the equation  $7x-5y+2=0$  should be multiplied so that after adding the result of the multiplication to the equation  $2x+15y+3=0$ , the co-efficients of the variable  $y$  in both the equation will be eliminated is

A. -2

B. -3

C. 3

D. 2

**Answer: C**



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4. The constant term, by which the equation  $ax+by=c$  should be multiplied so that after subtracting the result of the

multiplication from the equation  $a^2x + b^2y = c^2$  the co-efficients of the variable x will be eliminated, is

A. 1

B. a

C.  $a^2$

D. b

**Answer: B**



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5. The number by which the equation  $\frac{x + a}{a} = \frac{y + b}{b}$  should be multiplied so that after adding the result of the multiplication to the equation  $ax - by = a^2 - b^2$  the variable y will be eliminated, is



A.  $-b$

B.  $-b^2$

C.  $-\frac{b}{a}$

D.  $(-b^2)$  or,  $\left(-\frac{b}{a}\right)$

**Answer: D**



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6. The quantities, by which the equation  $px + qy = 1$  and  $qx + py = \frac{(a+b)^2}{a^2 + b^2} - 1$  should be multiplied so that after adding the results of the multiplication the variable  $x$  will be eliminated, are

A.  $q$  and  $p$  respectively

B.  $q$  and  $-p$  respectively

C.  $\frac{q}{p}$  and 1 respectively

D. 1 and  $\frac{p}{q}$  respectively

**Answer: B**

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7. If  $x$  of the equation  $\frac{x}{3} + \frac{y}{2} = 8$  is expressed in term of  $y$  we get,

A.  $x = \frac{3y - 48}{2}$

B.  $x = \frac{48 - 3y}{2}$

C.  $y = \frac{48 - 2x}{3}$

D.  $y = \frac{2x - 48}{3}$

**Answer: B**

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8. Solve the simultaneous linear equation in two variables  $px+qy+r=0$  and  $dy=0$ , where  $p,q,r,d$  are constants by the method of cross-multiplication.

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9. Find the quantity by which the the equation  $(a + b)(x + y) = a^2 + b^2$  should be multiplied so that after adding the result of the multiplication to the equation  $(a - b)x + (a + b)y = a^2 - 2ab - b^2$ , the variable  $x$  will be eliminated.

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10. Eliminate  $t$ :  $x=at^2$ ,  $y=2at$

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11. Prove that  $x+y=5$  when  $101x+99y=499$  and  $99x+101y=501$ .

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12. Express  $y$  of the equation  $\frac{xy}{x-y} = 8$  in term of  $x$ .

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13. If  $y = \frac{ax + b}{cx + d}$ , then express  $x$  in term of  $y$ .

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14. Determine the value of  $y$  by eliminating  $x$  from the simultaneous linear equations in two variables

$$(a + b)x - y = \frac{1}{b} \dots\dots\dots (1) \quad \text{and} \quad b^2x + (a - b)y = 1 \dots\dots\dots (2)$$

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15. Determine the value of  $x$  by substituting  $y = \frac{2}{5x + 3}$  in the equation  $2x + \frac{3}{y} = 5$ .

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16. Find the value of  $y$  by substituting  $x = \frac{by + a^2 - b^2}{a}$  in the equation  $\frac{x}{a} + \frac{y}{b} = 2$ .

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17. Find the value of  $y$  if  $x = \frac{y}{1 - 9y}$  and  $x = \frac{-y}{1 - 5y}$ .

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18. Solve the following simultaneous linear equations in two variables by the method of elimination

$$3x + 2y = 6$$

$$2x - 3y = 17$$

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19. Solve the following simultaneous linear equations in two variables by the method of elimination

$$41x + 53y = 135$$

$$53x + 41y = 147$$

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20. Solve the following simultaneous linear equations in two variables by the method of elimination

$$3x + \frac{6}{y} = 8$$

$$2x - \frac{15}{y} = -1$$

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21. Solve the following simultaneous linear equations in two variables by the method of elimination

$$5 + 3xy = 33x$$

$$4 - 7xy = 17x$$

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**22.** Solve the following simultaneous linear equations in two variables by the method of elimination

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

$$\frac{x}{4} + \frac{y}{2} = 2$$

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**23.** Solve the following simultaneous linear equations in two variables by the method of elimination

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

$$\frac{8}{x} - \frac{3}{y} = 1$$

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**24.** Solve the following simultaneous linear equations in two variables by the method of elimination



$$\frac{5}{x} + 3y = 8$$

$$\frac{4}{x} - 10y = 56$$



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**25.** Solve the following simultaneous linear equations in two variables by the method of elimination

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

$$\frac{x}{4} - \frac{3}{y} = 3$$



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**26.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$30x + 80y + 45 = 0 = 140x - 36y - 97$$



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**27.** Solve the following simultaneous linear equations in two variables by the method of elimination

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

$$\frac{xy}{x - y} = 6$$



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**28.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$23x - 29y = 98$$

$$29x - 23y = 110$$



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**29.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$65x - 33y = 97$$

$$33x - 65y = 1$$



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**30.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$\frac{14}{x+y} + \frac{3}{x-y} = 5$$

$$\frac{21}{x+y} - \frac{1}{x-y} = 2$$



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**31.** Solve the following simultaneous linear equations in two variables by the method of elimination

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

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



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**32.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$ax + by = c$$

$$a^2x + b^2y = c^2$$



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**33.** Solve the following simultaneous linear equations in two variables by the method of elimination

$$ax + by = c$$

$$bx + ay = 1 + c$$



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**34.** Solve the following simultaneous linear equations in two variables by the method of comparison :

$$2x + 2y = 10$$

$$2y - 3x = -5$$

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**35.** Solve the following simultaneous linear equations in two variables by the method of comparison :

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

$$5x + 8y = 14$$

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**36.** Solve the following simultaneous linear equations in two variables by the method of comparison :

$$3x - 2y = 2$$

$$7x + 3y = 43$$



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**37.** Solve the following simultaneous linear equations in two variables by the method of comparison :

$$x + y = 11$$

$$y + 2 = \frac{1}{8}(10y + x)$$



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**38.** Solve the following simultaneous linear equations in two variables by the method of comparison :

$$\frac{x}{3} + \frac{y}{4} = 1$$

$$2x + 4y = 11$$



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**39.** Solve the following simultaneous linear equations in two variables by the method of comparison :

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

$$2x - \frac{6}{y} = 9$$



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**40.** Solve the following simultaneous linear equations in two variables by the method of comparison :

$$\frac{4}{x} - \frac{y}{2} = -1$$

$$\frac{8}{x} + 2y = 10$$



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41. Solve the following simultaneous linear equations in two variables by the method of comparison :

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

$$3x + \frac{7}{y} = 2$$

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42. Solve the following simultaneous linear equations in two variables by the method of comparison :

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

$$\frac{x}{4} + \frac{6}{y} = 6$$

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**43.** Solve the following simultaneous linear equations in two variables by the method of comparison :

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

$$\frac{x - y}{xy} = 1(x \neq 0, y \neq 0)$$



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**44.** Solve the following simultaneous linear equations in two variables by the method of comparison :

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

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



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**45.** Solve the following simultaneous linear equations in two variables by the method of comparison :

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

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

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**46.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$5x + 3y = 11$$

$$2x - 7y = -12$$

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**47.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{x + 2y + 7}{5} = \frac{2x + y + 11}{7} = \frac{x + y - 4}{2}$$

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**48.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$2x + \frac{5}{y} = 29$$

$$8x - \frac{3}{y} = 1$$



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**49.** Solve the following simultaneous linear equations in two variables by the method of substitution :

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

$$\frac{x}{4} + \frac{y}{2} = 2$$



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**50.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{1}{x} + \frac{1}{y} = \frac{5}{6}$$
$$\frac{1}{x} - \frac{1}{y} = \frac{1}{6}$$

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**51.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$\frac{x + y}{x - y} = \frac{7}{3}$$
$$\frac{1}{x} + \frac{1}{y} = \frac{7}{10}$$

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**52.** Solve the following simultaneous linear equations in two variables by the method of substitution :

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

$$\frac{x}{4} + \frac{6}{y} = 6$$



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**53.** Solve the following simultaneous linear equations in two variables by the method of substitution :

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

$$12y - x = 7$$



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**54.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$23x + 17y = 63$$

$$17x + 23y = 57$$



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**55.** Solve the following simultaneous linear equations in two variables by the method of substitution :

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

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

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**56.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$x + y = a + b$$

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

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**57.** Solve the following simultaneous linear equations in two variables by the method of substitution :

$$ax + by = c^2$$

$$a^2x + b^2y = c^2$$



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**58.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$3x + 2y - 6 = 0$$

$$2x + 3y - 6 = 0$$



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**59.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$8x + 5y = 11$$

$$3x - 4y = 10$$

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**60.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$3x - 4y = 1$$

$$4x = 3y + 6$$

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**61.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$\frac{x}{6} - \frac{y}{3} = \frac{x}{12} - \frac{2y}{3} = 4$$

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**62.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$13x - 12y + 15 = 0$$

$$8x - 7y = 0$$



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**63.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$4x - 3y = 9$$

$$3x - 4y = 5$$



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**64.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$2x + y = 15$$

$$2y - 3x = 16$$



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**65.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

$$x - y = 2a$$

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



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**66.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

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

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



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**67.** Solve the following simultaneous linear equations in two variables by the method of cross-multiplication :

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

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



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**68.** If  $ax + by + c = 0$  and  $a'x + b'y + c' = 0$ , then prove that

$$\frac{x}{bc' - b'c} = \frac{y}{ca' - c'a} = \frac{1}{ab' - a'b}$$



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69. Find the value of  $y$  by eliminating  $x$  :

$$\frac{x + a}{2a + b} = \frac{y + 2b}{a + b}, bx + ay = a^2 + b^2$$

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70. Solve (by any method) :

$$101x + 99y = 499$$

$$99x + 101y = 501$$

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71. Solve (by any method) :

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

$$ax + by = a^3 + b^3$$

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72. Solve (by any method) :

$$\frac{b}{ax} + \frac{ay}{b} = a + b$$

$$\frac{a}{x} + by = a^2 + b^2$$



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73. Solve (by any method) :

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

$$bx + ay = a^2 + b^2$$



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74. Solve (by any method) :

$$\frac{a - b}{x} + \frac{a + b}{y} = \frac{2(a^2 + b^2)}{(a^2 - b^2)}$$

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



**75.** Solve (by any method) :

$$999x + 888y = 1332$$

$$888x + 999y = 555$$



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**76.** Solve (by any method) :

$$(p + 2) + \frac{2}{q - 2} = 2$$

$$6(p + 2) - \frac{5}{q - 2} = 1$$



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**77.** Solve (by any method) :

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

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



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## Exercise 5

1. Starting at 10a.m., a man walks at the rate of 5km/hr. Starting 2 hours later another man follows him on bicycle at the rate of 7km/hr. Determine when and where they will meet.



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2. Satyababu went to the market taking Rs. 60 in his pocket to buy some note books (khata) and dot-pens. He found the market prices of the articles to be such that if he purchased 15 note-books, then with the rest of the money he could buy 6 dot-pens .

But if he purchased 12 note-books and 7 dot-pens , Rs 1 would be left for him . What were the market prices of the articles ?

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3. The denominator of a fraction is greater than numerator of it by 5 and if 3 is added to both the numerator and the denominator the fraction becomes  $\frac{3}{4}$  . Find the fraction.

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4. The total price of 2 tables and 3 chairs is Rs. 1075. While the total price of 3 tables and 8 chairs in Rs. 1875. Determine the price of each table.

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5. The present age of a father is twice that of his son , 14years ago, the father was thrice times as old as his son, find their present ages.

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6. The sum of weight of pradip and Prakash is 80 kg. Half of the weight of pradip is equal to  $\frac{5}{6}$  times the weight of Prakash. Find the individual weight of Pradip and Prakash.

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7. sum of the ages of a father and his son is 55 years. After 10 years , the father's age will be double of that of his son. What are their present ages ?

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8. The total cost of 3 kg mustered -oil and 2 kg coconut -oil is Rs. 104. While the cost of 5kg mustered -oil and 3kg coconut-oil is Rs. 164 . Find the cost of 1 kg each of both mustered -oil and coconut.

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9. The sum of two digits of a number consisting of two digits is 7 . If 27 is added to the number, the number of its digits are interchanged . Find the number.

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10. At present , sum of the ages of a father and his son in 46 years . When the age of the son will be equal to the present age of his

father , the total age of them will be 102 years . Determine the present ages of the father and his son.



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11. If the length of a rectangle is increased by 3 metres and the breadth is decreased by 3 metres, then the area of the rectangle is decreased by 18 sq .meters . Again , if its length is increased by 3 metres and the breadth is increased by 3 metres, then area of the rectangle is increased by 60 sq. metres . Find the length and breadth of the rectangle.



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12. Sum of the numerator and the denominator of a fraction is 13. If 4 is added to the numerator and 10 is added to the denominator of the fraction it becomes  $\frac{1}{2}$  . Find the fraction.



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**13.** A man travels a distance in 3 hours with a uniform velocity . If the distance be 2 km more and his velocity be 2 km less per hour then he will take time 1 hour more to travel the new distance . Find the uniform velocity of the man.



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**14.** If the length of a a rectangular park be increased by 2 metres and the breadth be decreased by 2 metres , then the area of the park is decreased by 26 sq . Metres . Again , if the length be decreased by 1 metre and the breadth be increased by 2 meters, then the area of the park is increased by 33 sq. metres . Find the area of the rectangular park.



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15. If 2 is subtracted from the numerator and 3 is added to the denominator of a fraction , it becomes  $\frac{1}{4}$  . But , if 6 is added to the numerator and the denominator is multiplied by 3, then the fraction becomes  $\frac{2}{3}$  . Determine the fraction.

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16. The sum of the present ages of a mother and her daughter is 55 years. After 16 years, the age of the mother will be double the age of her daughter . What will be the sum of the ages of the mother and her daughter after 5 years from the present ?

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17. A number of two digits is 3 more than 4 times of the sum of its digits. The number, obtained by reversing the position of the two digits is 18 more than the initial number. Find the number.

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18. 5 times of the greater one of two numbers is 2 more than 8 times of the smaller one. Again 2 times of the smaller one is 10 more than the greater one. Find the two number.

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19. If 2 is added to both the numerator and the denominator of a fraction , it becomes  $\frac{9}{11}$  Again, if 1 is subtracted from both the numerator and denominator of the fraction ,it becomes  $\frac{3}{4}$   
Determine the fraction .



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**20.** The total price of 9 horses and 7 cows is Rs. 3000 and at the same rate, the total price of 6 horses and 13 cows is Rs. 3000. What will be the total price of 5 horses and 3 cows at the same rate ?



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**21.** A person travels by boat 5 kilometres in 1 hour in still water. The time he requires to travel 40 kilometres against the current is 3 times the time he requires to travel the same distance in favour of the current . Find the velocity of the current .



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**22.** Determine a number of three digits such that if the digits of it be rearranged in the reversed order, it remains the same and the sum of its digits is 16 and the difference of its one's and ten's digits is 2.

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**23.** A student starting from his house walks at a speed  $2\frac{1}{2}$  km/hour and reaches his school 6 minutes late. Next day starting at the same time he increases his speed by 1 km/hour and reaches 6 minutes early . How far is the school from his house ?

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**24.** Total price of 3 pens and 4 pencils is Rs. 37. Again , total price of 5 pens and 6 pencils is Rs. 60 . Find the price of each pen and of



each pencil separately.

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**25.** 2 men and 6 boys together can do a piece of work in 5 days . 8 men and 3 boys together can do the same work in 3 days . In how many days 1 man and 3 boys together can do the same work ?

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**26.** A boat travels up stream 30 kilometres and down -stream 44 kilometres in 10 hours . It also travels up-stream 40 kilometres and down-stream 55 kilometres in 13 hours . Find the velocity of the stream and of the boat in still water.

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27. Two men  $8\frac{1}{4}$  kilometres apart, start to walk at the same time .

If they walk in the same direction they meet in 11 hours but if they approach each other , they meet in 1 hour . Find their velocities.

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28. If a man sells 7 horse and buys 9 cows his purchase increases by Rs. 176, but if he sells 13 cows and buys 9 horse decreases by Rs. 182 . Find the cost of a cow.

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29. A boy was asked to add 3 to a certain number and to divide the sum by 2 , but he subtracted 2 from the number and multiplied it by 3 and got the same result. Find the number and the result.



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**30.** You can spend only Rs. 16 for witnessing football matches . You can witness 8 matches if you pay taxi fares and entry fees each time but you can witness 9 matches if you walk on foot once in every 3 matches . Find the entry fee for a match.

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**31.** If the angle of elevation of the Sun is  $30^\circ$ , then the length of the shadow of a vertical pole of length  $h$  metre is?

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