



MATHS

BOOKS - ICSE

SIMULTANEOUS EQUATIONS

Example

1. Solve the following system of equations using the method of elimination by substitution $x + y = 7$ and $3x - 2y = 11$.



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2. Solve for x and y :

$$\frac{y + 7}{5} = \frac{2y - x}{4} + 3x - 5$$

$$\frac{7 - 5x}{2} + \frac{3 - 4y}{6} = 5y - 18$$



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3. Solve using the method of elimination by equating coefficients : $3x - 4y = 10$ and $5x - 3y =$

24



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4. Solve using the method of elimination by equating coefficients :

$$x + y = 3.3 \text{ and } (-0.6)/(3x - 2y) = 1.$$



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5. Solve : $65x - 33y = 97$ and $33x - 65y = 1$



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6. Solve, using cross - multiplication :

$$4x - 7y + 28 = 0 \text{ and } -7x + 5y + 9 = 0.$$



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7. Solve, using cross - multiplication :

$$2x + 3y - 17 = 0 \text{ and } 3x - 2y - 6 = 0.$$



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8. Solve by cross - multiplication :

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



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9. Solve by cross - multiplication :

$$3x + y = 13 \text{ and } x - 3y + 9 = 0.$$



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10. Solve : $\frac{7}{x} + \frac{8}{y} = 2$ and $\frac{2}{x} + \frac{13}{y} = 22$



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11.
$$\frac{44}{x + y} + \frac{30}{x - y} = 10$$
$$\frac{55}{x + y} + \frac{40}{x - y} = 13$$



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12. The sum of two numbers is 12 and their difference is 2. Find the numbers.



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13. If 1 is subtracted from the numerator of a fraction it becomes $\frac{2}{3}$, but if 5 is added to the denominator of the fraction it becomes $\frac{1}{2}$.
Find the fraction ?



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14. The sum of the digits of a two - digit number is 7. If the digits are reversed, the new number increased by 3, equal 4 times the original number. Find the original number.





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15. The ratio between a two digit number and the number obtained on reversing its digits is $4 : 7$. If the difference between the digits of the number is 3, find the number.



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16. The present ages of A and B are in the ratio $9 : 4$. Seven years hence, the ratio of their ages will be $5 : 3$. Find their present ages.



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17. A farmer sold a calf and a cow for Rs 7,600 thereby making a profit of 25 % on the calf and 10% on the cow. By selling them for Rs 7,675, he would have realised a profit of 10% on the calf and 25% on the cow. Find the cost price of each.



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18. A and B together can do a piece of work in 15 days. If one day's work of A be $1\frac{1}{2}$ times one day's work of B, find how many days will each take to finish the work alone?



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19. *A* and *B* each have certain number of oranges. *A* says to *B*, if you give me 10 of your oranges, I will have twice the number of oranges left with you. *B* replies, if you give me

10 of your oranges, I will have the same number of oranges as left with you. Find the number of oranges with A and B separately.



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20. The sum of a two digit number and the number obtained on reversing the digits is 165. If the digits differ by 3, find the number.



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21. The total railway fare for 5 members in 3-tier and 3 members in 2-tier is Rs 2,050 whereas, the total railway fare for 8 members in 3-tier and 5 members in 2-tier is Rs 3,350. Find the fare to be paid by a couple travelling through 2-tier.



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Exercise 6 A

1. Solve the following pairs of linear (simultaneous) equations using the method of elimination by substitution:

$$8x + 5y = 9$$

$$3x + 2y = 4$$



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2. Solve the following pairs of linear (simultaneous) equations using the method of elimination by substitution:

$$2x - 3y = 7$$

$$5x + y = 9$$



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3. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$2x + 3y = 8$$

$$2x = 2 + 3y$$



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4. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$0.2x + 0.1y = 25$$

$$2(x - 2) - 1.6y = 116$$



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5. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$6x = 7y + 7$$

$$7y - x = 8$$



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6. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$y = 4x - 7$$

$$16x - 5y = 25$$



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7. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$2x + 7y = 39$$

$$3x + 5y = 31$$



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8. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$1.5x + 0.1y = 6.2$$

$$3x - 0.4y = 11.2$$



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9. Solve the following pairs of linear (simultaneous) equations using method of elimination by substitution:

$$2(x - 3) + 3(y - 5) = 0$$

$$5(x - 1) + 4(y - 4) = 0$$



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10. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$\frac{2x + 1}{7} + \frac{5y - 3}{3} = 12$$

$$\frac{3x + 2}{2} - \frac{4y - 3}{9} = 13$$



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11. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

$$3x + 2y = 11$$

$$2x - 3y + 10 = 0$$



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12. Solve the following pair of linear (simultaneous) equations using method of elimination by substitution:

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

$$2x + 3y - 18 = 0$$



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13. Solve the following pairs of linear (simultaneous) equation using method of elimination by substitution:

$$\frac{3x}{2} - \frac{5y}{3} + 2 = 0$$

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



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14. Solve the following pairs of linear (simultaneous) equation using method of elimination by substitution:

$$\frac{x}{6} + \frac{y}{15} = 4$$

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



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Exercise 6 B

1. For solving each pair of equations, in this exercise, use the method of elimination by equating coefficients :

$$13 + 2y = 9x$$

$$3y = 7x$$



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2. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$3x - y = 23$$

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



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3. For solving each pair of equations, in this exercise, use the method of elimination by

equation coefficients :

$$\frac{5y}{2} - \frac{x}{3} = 8$$

$$\frac{y}{2} + \frac{5x}{3} = 12$$



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4. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$\frac{1}{5}(x - 2) = \frac{1}{4}(1 - y)$$



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5. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$y = 2x - 6$$

$$y = 0$$



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6. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$\frac{x - y}{6} = 2(4 - x)$$



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7. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$3 - (x - 5) = y + 2$$

$$2(x + y) = 4 - 3y$$



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8. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

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

$$\frac{2x}{3} + 4y + \frac{1}{2} = 0$$



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9. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$13x + 11y = 70$$

$$11x + 13y = 74$$



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10. For solving each pair of equations, in this exercise, use the method of elimination by equation coefficients :

$$41x + 53y = 135$$

$$53x + 41y = 147$$



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11. If $2x + y = 23$ and $4x - y = 19$, find the values of $x - 3y$ and $5y - 2x$.



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12. If $10y = 7x - 4$ and $12x + 18y = 1$. Find the value of $4x + 6y$ and $8y - x$.



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13. Solve for x and y :

$$\frac{y + 7}{5} = \frac{2y - x}{4} + 3x - 5$$

$$\frac{7 - 5x}{2} + \frac{3 - 4y}{6} = 5y - 18$$



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14. Solve for x and y :

$$4x = 17 - \frac{x - y}{8}$$

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



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15. Find the value of m , if $x = 2$, $y = 1$ is a solution of the equation $2x + 3y = m$.



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16. 10% of $x + 20\%$ of $y = 24$

$$3x - y = 20$$



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17. The value of expression $mx - ny$ is 3 when $x = 5$ and $y = 6$. And its value is 8 when $x = 6$ and $y = 5$. Find the values of m and n .



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18. Solve $11(x - 5) + 10(y - 2) + 54 = 0$

$$7(2x - 1) + 9(3y - 1) = 25$$



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19. Solve :

$$\frac{7 + x}{5} - \frac{2x - y}{4} = 3y - 5$$

$$\frac{5y - 7}{2} + \frac{4x - 3}{6} = 18 - 5x$$



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20. Solve for x and y :

$$4x = 17 - \frac{x - y}{8}$$

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



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Exercise 6 C

1. Solve, using cross - multiplication :

$$4x + 3y = 17$$

$$3x - 4y + 6 = 0$$



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2. Solve, using cross - multiplication :

$$3x + 4y = 11$$

$$2x + 3y = 8$$



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3. Solve, using cross - multiplication :

$$6x + 7y - 11 = 0$$

$$5x + 2y = 13$$



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4. Solve, using cross - multiplication :

$$5x + 4y + 14 = 0$$

$$3 = -10 - 4y$$



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5. Solve, using cross - multiplication :

$$x - y + 2 = 0$$

$$7x + 9y = 130$$



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6. Solve , Uing cross multiplication method

$$4x - y = 5$$

$$5y - 4x = 7$$



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7. Solve, using cross - multiplication :

$$4x - 3y = 0$$

$$2x + 3y = 18$$



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8. Solve, using cross - multiplication :

$$8x + 5y = 9$$

$$3x + 2y = 4$$



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9. Solve, using cross - multiplication :

$$4x - 3y - 11 = 0$$

$$6x + 7y - 5 = 0$$



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10. Solve, using cross - multiplication :

$$4x + 6y = 15$$

$$3x - 4y = 7$$



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11. Solve, using cross - multiplication :

$$0.4x + 1.5y = 6.5$$

$$0.3x + 0.2y = 0.9$$



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12. Solve using cross-multiplication

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

$$\sqrt{5}x + \sqrt{2}y = 0$$



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Exercise 6 D

1. Solve :

$$\frac{9}{x} - \frac{4}{y} = 8$$

$$\frac{13}{x} + \frac{7}{y} = 101$$



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2. Solve :

$$\frac{3}{x} + \frac{2}{y} = 10$$

$$\frac{9}{x} - \frac{7}{y} = 105$$



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3. Solve :

$$5x + \frac{8}{y} = 19$$

$$3x - \frac{4}{y} = 7$$



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4. Solve : $4x + \frac{6}{y} = 15$ and $3x - \frac{4}{y} = 7$.

Hence, find 'a' if $y = ax - 2$.



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Exercise 6 E

1. The ratio of two numbers is $\frac{2}{3}$. If 2 is subtracted from the first and 8 from the second, the ratio becomes the reciprocal of the original ratio. Find the numbers.



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2. Two numbers are in the ratio 4:7. If thrice the larger be added to twice the smaller, the sum is 59. Find the numbers.



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3. When the greater of the two numbers increased by 1 divides the sum of the numbers, the result is $\frac{3}{2}$. When the difference of these numbers is divided by the smaller, the result is $\frac{1}{2}$. Find the numbers .



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4. The sum of two positive numbers x and y ($x > y$) is 50 and the difference of their squares is 720. Find the numbers.



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5. The sum of two numbers is 8 and the difference of their squares is 32. Find the numbers.



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6. The difference between two positive numbers x and y ($x > y$) is 4 and the difference between their reciprocals is $\frac{4}{21}$.

Find the numbers.



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7. Two numbers are in the ratio 4: 5. If 30 is subtracted from each of the numbers, the ratio becomes 1 : 2. Find the numbers.



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8. If the numerator of a fraction is increased by 2 and denominator is decreased by 1, it becomes $\frac{2}{3}$. If the numerator is increased by 1 and denominator is increased by 2 it becomes $\frac{1}{3}$. Find the fraction.



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9. The sum of the numerator and the denominator of a fraction is equal to 7. Four

times the numerator is 8 less than 5 times the denominator. Find the fraction.



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10. If the numerator of a fraction is multiplied by 2 and its denominator is increased by 1, it becomes 1. However, if the numerator is increased by 4 and denominator is multiplied by 2, the fraction becomes $\frac{1}{2}$. Find the fraction.



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11. A fraction becomes $\frac{1}{2}$ if 5 is subtracted from its numerator and 3 is subtracted from its denominator . If the denominator of this fraction is 5 more than its numerator. Find the fraction.



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12. The sum of the digits of a two digit number is 5. If the digits are reversed, the number is reduced by 27. Find the number.



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13. The sum of the digits of a two digit number is 7. If the digits are reversed, the new number decreased by 2, equals twice the original number. Find the number



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14. The ten's digit of a two digit number is three times the unit digit. The sum of the

number and the unit digit is 32. Find the number



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15. A two-digit number is such that the ten's digit exceeds twice the unit's digit by 2 and the number obtained by inter-changing the digits is 5 more than three times the sum of the digits. Find the two digit number.



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16. Four times a certain two digit number is seven times the number obtained on interchanging its digits. If the difference between the digits is 4, find the number



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17. The sum of a two digit number and the number obtained by reversing the order of its digits is 121, and the two digits differ by 3. Find the number.



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18. A two digit number is obtained by multiplying the sum of the digits by 8. Also, it is obtained by multiplying the difference of the digits by 14 and adding 2. Find the number.



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Exercise 6 F

1. Five years ago, A's age was four times the age of B. Five years hence, A's age will be twice the age of B. Find their present ages.



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2. A is 20 years older than B. 5 years ago, A was 3 times as old as B. Find their present ages.



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3. Four years ago, a mother was four times as old as her daughter. Six years later, the mother will be two and a half times as old as her daughter at that time. Find the present ages of mother and her daughter.



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4. The age of the father is twice the sum of the ages of his two children. After 20 yr, his age

will be equal to the sum of the ages of his children. Find the age of the father.



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5. The annual incomes of A and B are in the ratio 3:4 and their annual expenditures are in the ratio 5: 7. If each saves 5,000, find their annual incomes.



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6. In an examination, the ratio of passes to failures was 4: 1. Had 30 less appeared and 20 less passed, the ratio of passes to failures would have been 5: 1. Find the number of students who appeared for the examination.



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7. A and B both have some pencils. If A gives 10 pencils to B, then B will have twice as many as A. And if B gives 10 pencils to A, then they will

have the same number of pencils. How many pencils does each have?



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8. 1250 Persons went to see a circus-show. Each adult paid $75rs$ and each child paid $25rs$ for the admission ticket. Find the number of adults and number of children, if the total collection from them amounts to $61250rs$.



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9. Two articles A and B are sold for 1,167 making 5% profit on A and 7% profit on B. If the two articles are sold for 1,165, a profit of 7% is made on A and a profit of 5% is made on B. Find the cost price of each article.



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10. Pooja and Ritu can do a piece of work in 174 days. If one day work of Pooja be three fourth of one day work of Ritu, find in how many days each will do the work alone.



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Exercise 6 G

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



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2. The sum of a two digit number and the number obtained by reversing the order of its digits is 99. If the digits differ by 3, find the number.



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3. Seven times a two-digit number is equal to four times the number obtained by reversing the digits. If the difference between the digits is 3. Find the number.



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4. From Delhi station, if we buy 2 tickets for station A and 3 tickets for station B, the total cost is 77. But if we buy 3 tickets for station A and 5 tickets for station B, the total cost is 124. What are the fares from Delhi to station A and to station B?



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5. The sum of digits of a two digit number is 11.

If the digit of ten's place is increased by 5 and

the digit at unit's place is decreased by 5 the

digit of the number are found to be reversed.

Find the original number.



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6. 90% acid solution (90% pure acid and 10%

water) and 97% acid solution are mixed to

obtain 21 litres of 95% acid solution. How many litres of each solution are mixed.



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7. Class XI students of a school wanted to give a farewell party to the outgoing students of class XII. They decided to purchase two kinds of sweets, one costing 250 per kg and the other costing 350 per kg. They estimated that 40 kg of sweets were needed. If the total

budget for the sweets was 11,800, find how much sweets of each kind were bought?



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8. Mr. and Mrs. Ahuja weigh x kg and y kg respectively. They both take a dieting course, at the end of which Mr. Ahuja loses 5 kg and weighs as much as his wife weighed before the course.

Mrs. Ahuja loses 4 kg and weighs $\frac{7}{8}$ th of what her husband weighed before the course.

Form two equations in x and y to find their weights before taking the dieting course.



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9. A part of monthly expenses of a family is constant and the remaining vary with the number of members in the family. For a family of 4 persons, the total monthly expenses are $< 10,400$, whereas for a family of 7 persons, the total monthly expenses are $15,800$. Find the

constant expenses per month and the monthly expenses on each member of a family.



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10. 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 $315rs$ and for a journey of 15km, the charge paid is $465rs$. What are the fixed charges and the charge per kilometre ? How

much does a person have to pay for travelling a distance of 32km ?



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11. 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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12. The area of a rectangle gets reduced by 9 square units if its length is reduced by 5 units and the breadth is increased by 3 units. If we increase the length by 3 units and breadth by 2 units, the area is increased by 67 square units. Find the length and breadth of the rectangle.



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13. It takes 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 is used for 9 hours, only half of the pool is filled. How long would each pipe take to fill the swimming pool ?



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