MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

SIMULTANEOUS LINEAR EQUATIONS

Solved Examples

1. If $3x + 7y = 75$ and $5x - 5y = 25$, then what is the value of $x + y$? (a) 14 (b) 15 (c) 16 (d) 17 (e) None of these

2. Find the solution of the system of equation $\dfrac{4}{x} + 5y = 7$ and $\dfrac{3}{x} + 4y = 5$.

3. Solution of the system of linear equations $\left(\dfrac{5}{x}\right) - \left(\dfrac{4}{y}\right) = 3$ and $\left(\dfrac{9}{x}\right) - \left(\dfrac{8}{y}\right) = 7$ is?

4. Solve for a and b :

$2^a + 3^b = 17$ and $2^{a+2} - 3^{b+1} = 5$

5. For what value of k does the system of equation $3x + ky = 11$ and $5x - 7y = 6$ has no solution?

6. If the equations $4x + 7y = 10$ and $10x + ky = 25$ represent coincident lines then find the value of k?

7. Find the condition that the system of equation $ax + by = c$ and $lx + my = n$ has a uniqe solution?

8. Find the value of p and q for which the following system of linear equations has infinite number of solutions:

$$2x + 3y = 1, (p + q)x + (2p - q)y = 21.$$

9. 3 chairs and 2 tables cost Rs. 700 while 5 chairs and 3 table cost Rs. 1100. What is the cost of 2 chairs and 2 table?

10. The average of two number is 6 and four times and difference between them is 16. Find the numbers.

11. A part of monthly expenses of a family is constant and the remaining part varies with the price of wheat. When the rate of wheat is Rs. 250 a quintal, the total monthly expenses of the family are Rs. 1000, and when it is Rs. 240 a quintal, the total monthly expenses are Rs. 980.

Find the total monthly expenses of the family, when the cost of wheat is Rs. 350 a quintal.

12. If the numerator of a certain fraction is increased by 2 and the denominator is increased by 1, then the resulting fraction is equal to $1/2$. If however, the numerator is increased by 1 and denominator is decreased by 2, then the resulting fraction is equal to $\dfrac{3}{5}$. Find the original fraction.

13. Ram buys 4 horses and 9 cows for Rs.13,400. If he sells the horses at 10% profit and the cows at 20% profit, then he earns a total profit of Rs 1,880. The cost of a horse is:

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14. Students of a class are made to stand in rows. If 4 students are extra in each row, then there would be 2 rows less. If four students are less in

each row, then there would be 4 more rows.

What is the number of students in the class?

1. The solution of the two simultaneous equations $2x + y = 8$ and $3y = 4 + 4x$ is

A. $x = 4, y = 1$

B. $x = 1, y = 4$

C. $x = 2, y = 4$

D. $x = 3, y = -4$

Answer: C

2. The solution of the simultaneous equations $\frac{x}{2} + \frac{y}{3} = 4$ and $x + y = 10$ is give by

A. (6,4)

B. (4,6)

C. (-6,4)

D. (6,-4)

Answer: B

3. The course of an enemy submarine as plottted on a set of rectangular axes gives the equation $2x + 3y = 5$. On the same axes, the course of destroyer is indicated by $x - y = 10$. The point (X, y) at which the submarine can be destroyed is :

    A. (-7,3)

    B. (-3,7)

C. (3,-7)

D. (7,-3)

Answer: D

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4. The values of x and y satisfying

$(x + 3)(y - 5) = xy + 39$ and

$(x - 2)(y + 3) = xy - 40$ respectively are:

A. 6 and 8

B. 6 and -8

C. -6 and 8

D. -6 and -8

Answer: C

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5. If the sum and the difference of two expressions is $5x^2 - x - 4$ and $x^2 + 9x - 10$ respectively, ten the expressions are:

A. $\left(4x^2 + 8x - 6\right)$ and $\left(4x^2 - 10x + 2\right)$

B. $\left(2x^2 + 4x - 3\right)$ and $\left(3x^2 - 10x - 6\right)$

C. $\left(3x^2 + 4x - 7\right)$ and $\left(2x^2 - 5x + 3\right)$

D. $\left(3x^2 + 4x + 7\right)$ and $\left(2x^2 - 5x - 3\right)$

Answer: C

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6. If $\dfrac{5x + 6}{(2 + x)(1 - x)} = \dfrac{a}{2 + x} + \dfrac{b}{1 - x}$, then

the values of a and b respectively are:

A. $-\dfrac{5}{3}, \dfrac{6}{5}$

B. $\dfrac{5}{3}, -\dfrac{6}{5}$

C. $-\dfrac{4}{3}, \dfrac{11}{3}$

D. $\dfrac{4}{3}, \dfrac{11}{3}$

Answer: C

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7. If $(4)^{x+y} = 1$ and $(4)^{x-y} = 4$ the the value of x and y will be respectively

A. $\dfrac{1}{2}$ and $-\dfrac{1}{2}$

B. $\dfrac{1}{2}$ and $\dfrac{1}{2}$

C. $-\dfrac{1}{2}$ and $-\dfrac{1}{2}$

$$\text{D. } -\frac{1}{2} \text{ and } \frac{1}{2}$$

Answer: A

8. Solve the following system of equations:

$$\frac{2}{x} + \frac{3}{y} = \frac{9}{xy}, \qquad \frac{4}{x} + \frac{9}{y} = \frac{21}{xy}, \qquad \text{where}$$

$$x \neq 0, \; y \neq 0$$

A. 0 and 1

B. 1 and 2

C. 2 and 3

D. 1 and 3

Answer: D

9. If $\dfrac{2}{x} + \dfrac{3}{y} = 2$ and $\dfrac{6}{x} + \dfrac{18}{y} = 9,$ then the values of x and y respectively are:

A. 3 and 2

B. 2 and 3

C. 4 and 3

D. 3 and 4

Answer: B

10. The solution of the equation $\dfrac{p}{x} + \dfrac{q}{y} = m$

and $\dfrac{q}{x} + \dfrac{p}{y} = n$ is

A. $x = \dfrac{q^2 - p^2}{mp - nq},\ y = \dfrac{p^2 - q^2}{np - mq}$

B. $x = \dfrac{p^2 - q^2}{mp - nq},\ y = \dfrac{q^2 - p^2}{np - mq}$

C. $x = \dfrac{p^2 - q^2}{mp - nq},\ y = \dfrac{p^2 - q^2}{np - mq}$

D. $x = \dfrac{q^2 - p^2}{mp - nq},\ y = \dfrac{q^2 - p^2}{np - mq}$

Answer: C

11. For what value of k the following system of equations has a unique solution

$2x + 3y - 5 = 0, kx - 6y - 8 = 0$?

    A. $k = -4$

    B. $k \neq -4$

    C. $k \neq 4$

    D. $k = 4$

Answer: B

12. The value of k for which the equations

$9x + 4y = 9$ and $7x + ky = 5$, have no solution

is

A. $\dfrac{9}{5}$

B. $\dfrac{9}{7}$

C. $\dfrac{9}{28}$

D. $\dfrac{28}{9}$

Answer: D

13. For what values of k will the given equations in two variables represent coincident lines:

$2x + 32y + 3 = 0$ and $3x + 48y + k = 0$?

A. $\dfrac{2}{3}$

B. $\dfrac{3}{2}$

C. $\dfrac{9}{2}$

D. 1

Answer: C

14. The simultaneous equations

$2x + 3y = 5, 4x + 5y = 10$ have

A. no solution

B. only one solution

C. only two solutions

D. several solutions

Answer: D

15. If 2a=b, the pair of equations
$ax + by = 2a^2 - 3b^2$, $x + 2y = 2a - 6b$ possess

    A. no solution

    B. only one solution

    C. only two solutions

    D. an infinite number of solutions

Answer: D

16. A bill for Rs. 40 is paid by means of Rs. 5 notes and Rs. 10 notes. Seven notes are used in all. If x is the number of Rs. 5 notes and y is the number of Rs. 10 notes then

A. $x + y = 7$ and $x + 2y = 40$

B. $x + y = 7$ and $x + 2y = 8$

C. $x + y = 7$ and $2x + y = 8$

D. $x + y = 7$ and $2x + y = 40$

Answer: B

17. The total cost of 8 buckets and 5 mugs is Rs. 92 and the total cost of 5 buckets and 8 mugs is Rs. 77. Find the cost of 2 mugs and 3 buckets.

A. Rs. 30

B. Rs. 35

C. Rs.38

D. Rs. 70

Answer: B

18. In a group of buffaloes and ducks, the number of legs is 24 more than twice the number of heads. What is the number of buffaloes in the group? (a) 6 (b) 8 (c) 10 (d) 12

A. 6

B. 12

C. 8

D. 10

Answer: B

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19. Reena has pens and pencils which together are 40 in number. If she has 5 more pencils and 5 less pens, then number of pencils would become 4 times the number of pens. Find the original number of pens and pencils.

A. 10

B. 11

C. 12

D. 13

Answer: D

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20. If 1 is added to the age of the elder sister, then the ratio of the ages of the two sisters becomes 0.5:1, but if 2 is subtracted from the age

of the younger one, the ratio becomes 1:3. The age of the younger sister will be

A. 9 years

B. 5 years

C. 18 years

D. 15 years

Answer: B

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21. Arun and Sajal are friends. Each has some money. If Arun gives Rs 30 to Sajal, then Sajal will have twice the money left with Arun. But, if Sajal gives Rs 10 to Arun, then Arun will have thrice as much as is left with Sajal. How much money does each have?

    A. Rs. 62, Rs. 34

    B. Rs. 6, Rs. 2

    C. Rs. 170, Rs. 124

    D. Rs. 43, Rs. 26

Answer: A

22. A fraction becomes 2 when 1 is added to both the numerator and denominator and it becomes 3 when 1 is subracted from both numerator and denomiator. Find the difference of numerator and denominator.

A. 7

B. 4

C. 3

D. 2

Answer: A

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23. On selling a tea-set 5% loss and a lemon-set at 15% gain, a crockery seller gains Rs. 7. If he sells the tea-set at 5% gain and the lemon-set at 10% gain, he gains Rs. 13. Find the actual price of the tea-set and the lemon-set.

A. Rs. 100

B. Rs.80

C. Rs. 10

D. Rs. 400

Answer: B

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24. If three times the larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as the remainder. Also, if seven

times the smaller number is divided by the larger one, we get 5 as quotient and 1 as remainder. Find the numbers.

A. 34

B. 43

C. 47

D. 74

Answer: B

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25. If the two digits of the age of Mr Manoj are reversed then the new age so obtained is the age of his wife. $\dfrac{1}{11}$ of the sum of their ages is equal to the difference between their ages. If Mr Manoj is elder than his wife then find the difference between their ages

    A. 10 years

    B. 8 years

    C. 7 years

    D. 9 years

Answer: D

26. I had Rs. 14.40 in one rupee coins and 20 paise coins when I went out shopping. When I returned, I had as many one rupee coins as I originally had 20 paise coins and as many 20 paise coins as I originally had one rupee coins.Briefly, I cameback with about one-third of what I had started out with. How many one rupee coins did I have initially?

A. 10

B. 12

C. 14

D. 16

Answer: C

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27. Five times A's money added to B's money is

more than Rs. 51.00.Three times A's money minus

B's money is Rs. 21.00. If a represents A's money in Rs. a and b represents B's money in Rs. Then,

A. $a > 9, b > 6$

B. $a > 9, b < 6$

C. $a > 9, b = 6$

D. $a > 9$, but we can put no bounds on b

Answer: A

28. In a triangle ABC, $\angle A = x^2$, $\angle B = y^\circ$ and $\angle C = (y + 20)^\circ$. If $4x + y = 10$, then the triangle is

A. Right angled

B. Obtuse angled

C. Equilateral

D. None of these

Answer: A

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29. A two digit number is obtained by either multiplying sum of digits by 8 and adding 1 or by multiplying the difference of the digits by 13 and adding 2. Find the number.

A. 14

B. 42

C. 24

D. 41

Answer: D

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30. The population of a town is 53,000. If in a year the number of males was to increases by 6% and that of the females by 4%, the population will grow to 55,630. Find the difference between the number of males and females in town at present

A. 3000

B. 4000

C. 2000

D. 5000

Answer: C

31. Places A and B are 100 km apart from each other on a highway. A car starts from A another from B at the sametime. If they moves in the same direction they meet in 10 hours and if they move in opposite direction, they meet in 1 hour 40 minutes. Find the speed of the cars from places A and B respectively.

A. 45km/hr, 25km/hr

B. 65km/hr,75km/hr

C. 35km/hr,25km/hr

D. 60km/hr,45km/hr

Answer: C

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32. A person invested some amount at the rate of 12% simple interest and a certain amount at the rate of 10% simple interest. He received yearly interest of Rs 130. But if he had interchanged the amounts invested, he would have received Rs 4 more as interest. How much did he invest at 12%

simple interest? (a) Rs 400 (b) Rs 500 (c) Rs 700

(d) Rs 800

A. Rs. 600, Rs. 550

B. Rs. 800, Rs. 450

C. Rs. 700, Rs. 500

D. Rs. 500, Rs. 700

Answer: D

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33. Solve the following system of equations in x and y : $\dfrac{a}{x} - \dfrac{b}{y} = 0$, $\quad \dfrac{ab^2}{x} + \dfrac{a^2b}{y} = a^2 + b^2$, where $x, \ y \neq 0$.

A. $x = b, y = a$

B. $x = a, y = b$

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

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

Answer: A

34. 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. for 5 bananas , his total collection would have been Rs 460. Find the total number of bananas he had.

A. 50

B. 100

C. 500

D. 400

Answer: C

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35. Two men and 7 children complete a certain piece of work in 4 days while 4 men and 4 children complete the same work in only 3 days. The number of days required by 1 man to complete the work is

A. 60 days

B. 15 days

C. 6 days

D. 51 days

Answer: B

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Self Assessment Sheet

1. If the equations $4x + 7y = 10$ and $10x + ky = 25$ represent coincident lines then

find the value of k?

A. 5

B. $\dfrac{17}{2}$

C. $\dfrac{27}{2}$

D. $\dfrac{35}{2}$

Answer: D

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2. The solution of the equations $\dfrac{m}{3} + \dfrac{n}{4} = 12$ and $\dfrac{m}{2} - \dfrac{n}{3} = 1$ is

A. $m = 8, n = 6$

B. $m = 18, n = 24$

C. $m = 24, n = 18$

D. $m = 6, n = 8$

Answer: B

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3. Given that , $5 = \dfrac{5W + 2\omega}{5 + 2}$ and

$5.1 = \dfrac{7W + 3\omega}{7 + 3}$, find W and ω

A. $W = 3, \omega = 10$

B. $W = 10, \omega = 3$

C. $W = -10, \omega = 3$

D. $W = 3, \omega = -10$

Answer: A

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4. Solve for a and

$b: 2(a + b) - (a - b) = 6, 4(a - b) = 2(a + b) - 9$

A. $a = \dfrac{3}{4}, b = 1\dfrac{3}{4}$

B. $a = \dfrac{1}{2}, b = 1\dfrac{1}{2}$

C. $a = 1\dfrac{3}{4}, b = \dfrac{3}{4}$

D. $a = \dfrac{3}{2}, b = \dfrac{3}{4}$

Answer: A

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5. Solve $\dfrac{x + 2}{y + 2} + 2 = 0, \dfrac{x - 4}{y - 2} = \dfrac{x - 1}{y + 7}$

A. x=2,y=4

B. x=-2,y=4

C. x=2,y=-4

D. x=-2,y=-4

Answer: C

6. The solution of the pair of equations

$0.25x + 0.6y = 0.7$ and $0.3x - 3.5y = 2.95$ is

A. x=4,y=0.5

B. x=-4,y=-0.5

C. x=4,y=0.5

D. x=4,y=-0.5

Answer: D

7. Three times Diana's age is 17years more than twice Jim's age. The sum of their ages is 13 years less than their father's age which is three times Jim's age. What are the children ages?

    A. Diana 21 years, Jim 16 years

    B. Diana 15 years, Jim 14 years

    C. Diana 15 years, Jim 16 years

D. Diana 20 years, Jim 14 years

Answer: B

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8. A number of two digits is equal to six times the sum of its digits. If the digits are reversed the number so formed is equal to:

A. six times the sum of its digits

B. five times the sum of its digits

C. ten tims the sum of its digits

D. nine time the sum of digits

Answer: B

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9. A sports club has 130 memebrs. An increase of 10% in the number of men and 20% in the number of ladies brought up the menbership to 148. How many men and ladies were there originally?

A. 90 men, 40 women

B. 80 men, 50 women

C. 60 men, 70 women

D. 50 men, 80 women

Answer: B

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10. The difference between two angles of a triangle whose magnitude is in the ratio 10:7 is $20°$ less than the third angle. The third angle is:

A. $80°$

B. $56°$

C. $44°$

D. $70°$

Answer: C

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