



MATHS

BOOKS - CENGAGE

SIMPLE AND SIMULTANEOUS EQUATIONS

Worked Examples

1. If six times a number decreased by 7 results in 125, what is the number ?



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2. The sum of three consecutive odd number is 81. What are the numbers ?

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3. Solve the following $2x + 3y = 8$

$$x + 2y = 5$$

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4. Solve the following

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

$$\frac{5y - 8}{2} + \frac{4x - 3}{6} = 18 - 5x$$

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5. Solve the following

$$15x - 8y = 29$$

$$17x + 12y = 75$$



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6. Solve the following

$$13 \times 4y = 51$$

$$17x - 4y = 39$$



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7. Solve the following

$$\frac{x + y - 3}{2} = \frac{x + 2y - 4}{3} = \frac{3x + y}{11}$$



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8. Find the value of p if the equations $6x + py = 5$ and $3x + 4y = 2$ have the following

Unique solution



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9. Find the value of p if the equations $6x + py = 5$ and $3x + 4y = 2$ have the following

No solution



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10. Solve the following

$$4x + 5y + 9 = 0$$

$$3x + 4y + 8 = 0$$



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11. Solve the following

$$8x - 7y = 19$$

$$10x - 9y = 23$$



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12. Solve the following

$$x + 2y + 3z = 0$$

$$3x - 6y - 7z = 0$$

$$2x + 3y - z = 17$$



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13. Solve the following

$$3x + 2y - z = 20$$

$$2x + 3y + 6z = 70$$

$$x - y + 6z = 40$$



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14. Solve graphically the system of the following equations :

$$2x - y = 9 \text{ and } x + 2y = 2.$$



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Test Yourself Level 1

1. Write the following statements in the algebraic form :

Five times a number is equal to six times another number.



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2. Write the following statements in the algebraic form :

Thrice a number is 2 less than twice another number



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3. Write the following statements in the algebraic form :

10 years later my age will be twice what it was 5 years ago .



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4. Write the following statements in the algebraic form :

I choose a number, multiply it by 3, then subtract 7, and I get 8.



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5. Write the following statements in the algebraic form :

I think of a number, double it, and then add 6. The result is same as multiplying the original number by 3.



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6. Write the following statements in the algebraic form :

The sum of ages of Arun and Babu is 40 and their difference is 10.

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7. Solve the following

$$x + y = 7$$

$$2x + 3y = 18$$

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8. Solve the following

$$x + 4y = 14$$

$$7x - 3y = 5$$



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9. Solve the following

$$2x - y = 12$$

$$3x + 5y = 31$$



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10. Solve the following

$$4x + 3y = 17$$

$$5x - 2y = 4$$



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11. Solve the following

$$7x + 8y = 22$$

$$6x + 5y = 17$$



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12. Solve the following

$$2x + y = 18$$

$$x - 3y = -33$$



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13. Solve the following

$$x = 2y + 6$$

$$y = 2x - 3$$

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14. Solve the following

$$2x + 3y = 32$$

$$11y - 9x = 3$$

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

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16. $\frac{4x + 5y}{36} + \frac{x + y - 1}{9}$ and $\frac{2x - 3y}{3} + 3y = 10$

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17. Solve the following

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

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

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18. Solve the following

$$ax + by = c$$

$$cx + dy = e$$

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19. Solve the following

$$x + ay = b$$

$$ax - by = c$$



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20. Solve the following

$$lx + my = a$$

$$mx + ly = a$$



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21. Solve the following

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

$$\frac{1}{2}y + \frac{2}{3}x - \frac{5}{12} = 0$$



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22. Solve the following using the rule of cross - multiplication :

$$6x - 7y + 25 = 0$$

$$5x - 9y + 1 = 0$$



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23. Solve the following using the rule of cross - multiplication :

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

$$4x - 9y + 19 = 0$$

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24. Solve the following using the rule of cross - multiplication :

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

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

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25. Solve the following using the rule of cross - multiplication :

$$3x - 5y = 20$$

$$7x + 2y = 17$$

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26. Solve the following using the rule of cross - multiplication :

$$6x + 5y = 11$$

$$9x + 10y = 21$$

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27. Find the fraction which becomes $\frac{2}{3}$ when the numerator and the denominator are increased by 1 and $\frac{1}{2}$ when the numerator and the denominator are diminished by 1.

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28. A certain number of two digits is four times the sum of its digits. If 9 added to the number, the digits in the number are reversed. Find the number .

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29. Six years ago a man was three times as old as his son. In 6 years, he will be twice as old his son Find their present ages.

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30. If the length of a rectangle is increased by 8 metre and the breadth by 3 metres, its area will be increased 3 metres and breadth is increased by 8 metres. Find the length and breadth of the rectangle.

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31. In a pen (a small enclosure) there are rabbits and pheasants (game birds). They have between them 35 heads and 98 feet. How many rabbits are there ?

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32. Determine graphically whether the system of equations $x - 2y = 2$ and $4x - 2y = 5$ is consistent or inconsistent.

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33. Draw the graphs of $2y = 4x - 6$ and $2x = y + 3$ and determine whether this system of linear equations has a unique solution or not.





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34. Solve graphically the following : $2(x + y) = 1$ and $2y = 3x = 6$.



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Test Yourself Multiple Choice Questions

1. Which is the correct expression for the statement "thrice a number is 10 less than twice the another number" ?

A. $3x = 2y - 10$

B. $2x = 3y - 10$

C. $3x - 10 = 2y$

D. none of these

Answer: A



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2. How many solutions are possible for the given set of equations ?

$$2x - 3y + 1 = 0$$

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

A. one

B. more than one

C. infinite

D. none

Answer: A



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3. Number of solutions of the given set of equation is

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

$$3x + 6y + 9 = 0$$

- A. only one
- B. infinity
- C. exactly two
- D. none

Answer: B



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4. Number of solutions for the given set of equations is

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

$$6x + 9y + 5 = 0$$

- A. only one
- B. infinity
- C. no solution
- D. exactly two

Answer: C



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5. $X = 1$ and $y = 3$ is a solution of the given set of equation.

$$2x + ky = 2$$

$$x - ny = 2$$

What are the values of n and k ?

A. $n = 3, k = 2$

B. $n = \frac{-1}{3}, k = \frac{1}{3}$

C. $n = \frac{1}{3}, k = \frac{-1}{3}$

D. none of these

Answer: B



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6. If $x \in A$ and $y \in A$ such that $A = \{1, 2, 3, 4\}$, then find the solution set for $x + y = 6$.

A. $\{(1, 5), (2, 4), (3, 3), (4, 2)\}$

B. $\{(1, 5), (2, 4), (3, 3)\}$

C. $\{(2, 4), (3, 3), (4, 2)\}$

D. $\{(3, 3), (4, 2)\}$

Answer: C



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7. What is the solution of the given set of equations ?

$$0.2u + 0.3v = 1.3$$

$$0.4u + 0.5v = 2.3$$

A. $u = 2, v = 3$

B. $u = -2, v = 3$

C. $u = 2, v = 2$

D. $u = 3, v = 3$

Answer: A



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8. Find r and s for the following set of equations.

$$\sqrt{2}r + \sqrt{3}s = 0$$

$$\sqrt{3}r - \sqrt{8}s = 0$$

A. $r = 0, s = 1$

B. $r = 0, s = 0$

C. $r = 1, s = 1$

D. $r = 2, s = 0$

Answer: B



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9. Find the values of x and y for the following set of equations.

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

$$x - \frac{y}{3} - 3 = 0$$

A. $x = 2, y = -2$

B. $x = 3, y = -3$

C. $x = -2, y = -3$

$$D. x = 2, y = -3$$

Answer: D



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10. For what values of p and q , the given set of equations will have infinite solutions ?

$$2x + 3y = 7$$

$$(p - q)x + (p + q)y = 3p + q - 2$$

A. $p = 5, q = 1$

B. $p = -5, q = -1$

C. $p = 5, q = -1$

D. $p = -1, q = 5$

Answer: A



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11. By solving the following set of equations find u and v (if

$u \neq 0$ and $v \neq 0$).

$$6u + 3v = 6uv$$

$$2u + 4v = 5uv$$

A. $u = 1, v = 2$

B. $u = 2, v = 1$

C. $u = -1, v = 2$

D. $u = -1, v = -2$

Answer: A

12. Solve for x and y .

$$\frac{2}{x+y} + \frac{3}{x-y} = 2$$
$$\frac{5}{x+y} + \frac{10}{x-y} = \frac{35}{6}$$

A. $x = 5, y = -1$

B. $x = \frac{5}{2}, y = \frac{-1}{2}$

C. $x = \frac{1}{2}, y = \frac{-1}{2}$

D. none of these

Answer: B

13. Find the values of u and v for the following equations.

$$\frac{1}{3u + v} + \frac{1}{3u - v} = \frac{3}{4}$$
$$\frac{1}{2(3u + v)} - \frac{1}{2(3u - v)} = \frac{-1}{8}$$

A. $u = 1, v = -1$

B. $u = -1, v = -1$

C. $u = 1, v = 1$

D. $u = -1, v = 1$

Answer: C



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14. Solve for x and y .

$$ax + by = c$$

$$bx + ay = 1 + c$$

$$\text{A. } x = \frac{bc - ac + b}{b^2 - a^2}, y = \frac{bc - ac - a}{b^2 - a^2}$$

$$\text{B. } x = \frac{b}{b^2 - a^2}, y = \frac{a}{b^2 - a^2}$$

$$\text{C. } x = a, y = b$$

$$\text{D. } x = b, y = \frac{bc - ac + b}{b^2 - a^2}$$

Answer: A



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15. Solve for x and y.

$$ax + by = a - b$$

$$bx - ay = a + b$$

$$\text{A. } x = 1, y = 1$$

B. $x = -1, y = 1$

C. $x = 1, y = -1$

D. $x = -1, y = -1$

Answer: C

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16. Solve for x and y.

$$x - y = 0.9$$

$$\frac{11}{2(x + y)} = 1$$

A. $x = \frac{-16}{5}, y = \frac{23}{10}$

B. $x = \frac{16}{5}, y = \frac{23}{10}$

C. $x = \frac{23}{10}, y = \frac{16}{5}$

D. none of these

Answer: B



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17. Solve for x and y .

$$x + y = a + b$$

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

A. $x = b, y = -b$

B. $x = b, y = a$

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

D. $x = a, y = b$

Answer: D



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18. Find x and y .

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

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

A. $x = a, y = b$

B. $x = a^2, y = b$

C. $x = a, y = b^2$

D. $x = a^2, y = b^2$

Answer: D



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19. Find the value of p for which the given set of equations will have a unique solution.

$$px + 2y = 5$$

$$3x + y = 1$$

A. $p = 6$

B. all values

C. any real values except 6

D. none of these

Answer: C



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20. Find the value of t for which no solution of given set of equations is possible.

$$3x + y = 1$$

$$(2t - 1)x + (t - 1)y = 2t + 1$$

A. $t = 2$

B. $t = -2$

C. $t = 1/2$

D. $t = -1/2$

Answer: A



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21. Find the value of k for which given set of equations will have infinitely many solutions.

$$kx + 3y = k - 3$$

$$12x + kx = k$$

A. $k = 6$

B. $k = -6$

C. $k \neq 6$

D. not possible

Answer: A



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22. Find the value of k for which the following two lines are coincident.

$$2x + 3y = 4$$

$$(k + 2)x + 6y = 3k + 2$$

A. $k \neq 2$

B. $k = 2$

C. $k = -2$

D. $k \neq -2$

Answer: B



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23. Find the values of α and β for which the given set of equation will have infinity solutions

$$2x + 3y = 7$$

$$2\alpha + (\alpha + \beta)y = 28$$

A. $\alpha = -4, \beta = -8$

B. $\alpha = -4, \beta = 8$

C. $\alpha = 4, \beta = -8$

D. $\alpha = 4, \beta = 8$

Answer: D



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24. Find the value of m for which the given set of equations has no solution.

$$3x + y = 1$$

$$(2m - 1)x + (m - 1)y = 2m + 1$$

A. $m = 1$

B. $m = -1$

C. $m = 2$

D. $m = -2$

Answer: C



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25. Find the values of x and y (if $p \neq 0$ and $q \neq 0$)

$$p(x + y) + q(x - y) = p^2 - pq + q^2$$

$$p(x + y) - q(x - y) = p^2 + pq + q^2$$

A. $x = \frac{q^2}{2p}, y = p - \frac{q^2}{2p}$

B. $x = \frac{q^2}{2p}, y = \frac{p^2}{2q}$

C. $x = \frac{p}{q}, y = \frac{p}{q^2}$

D. $x = \frac{q^2}{2p}, y = p + \frac{q^2}{2p}$

Answer: D



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26. There is a certain two - digit number sum of whose digits is 11. If 45 is added to the number, the digits in the number

are reversed. The original number is

A. 83

B. 38

C. 56

D. 65

Answer: B



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27. ABCD (taken in order) is a cyclic quadrilateral in which

$$\angle A = (x + y + 10)^\circ, \angle B = (y + 20)^\circ, \angle C = (x + y - 30)^\circ$$

and $\angle D = (x + y)^\circ$. Find the value of x and y .

A. $x = 40^\circ, y = 60^\circ$

B. $x = 50^\circ, y = 40^\circ$

C. $x = 20^\circ, y = 80^\circ$

D. none of these

Answer: A



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28. Ratio of present ages of a father and his son is 3: 1 after 15 years, the ratio of their ages will be 2:1 What are the present ages of the father and his son, respectively ?

A. 42, 14

B. 30,10

C. 45, 15

D. 60, 20

Answer: A



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29. If the length of a rectangle is increased by 3 metres and the breadth is increased by 2 metres, its area will increase by 67 sq. metres. If its length is decreased by 5 metres and breadth is increased by 3 meters, its area will decrease by 9 sq. metres. find the area of the rectangle (in sq. metres).

A. 150

B. 153

C. 162

Answer: B



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30. In a triangle PQR, $\angle R$ is greater than $\angle Q$ by 9° . If $\angle P = \alpha^\circ$, $\angle Q = (3\alpha - 2)^\circ$, and $\angle R = \beta^\circ$ then find all the angles of the triangle.

A. $30^\circ, 60^\circ, 90^\circ$

B. $45^\circ, 45^\circ, 90^\circ$

C. $25^\circ, 73^\circ, 82^\circ$

D. none of these

Answer: C

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31. Which of the following is correct ?

Column I	Column II
(i) $3u - 5v = 20,$ $6u - 10v = 40$	(p) only one solution is possible
(ii) $x - 3y = 3,$ $3x - 9y = 2$	(q) infinitely many solution
(iii) $3x - 5y = 25,$ $7x + 2y = 15$	(r) No solution

- A. (i) -q, (ii) -r, (iii) -p
- B. (i) -q, (ii) -p, (iii) -r
- C. (i) -q, (ii) -q, (iii) -p
- D. (i) -r, (ii) -r, (iii) -q

Answer: A



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32. If x men can do a piece of work in y days, in how many days will x men do the same work ?

A. $\frac{xz}{y}$

B. $\frac{xy}{z}$

C. $\frac{yz}{x}$

D. xyz

Answer: B



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33. Find the values of x and y is $\frac{5}{y} - \frac{2}{x} = \frac{7}{6}$ and

$$\frac{36}{x} - \frac{24}{y} = 1$$

A. $x = 4, y = 3$

B. $x = -4, y = +3$

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

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

Answer: A



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34. A fraction becomes 2 when 9 is added to its numerator and 1 when 2 is subtracted from its denominator. Then the fraction is

A. $\frac{6}{8}$

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

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

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

Answer: C



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35. What should be the value of p if $3x + 2y = 8$ and

$6x + 4y = p$ have infinitely many solutions

A. 3

B. 16

C. 5

D. 6

Answer: B



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36. What should be value of m in the pair of equations to have unique solution ?

$$4x + my + 9 = 0$$

$$3x + 4y + 8 = 0$$

A. $m \neq 16$

B. $m \neq 15$

C. $m \neq \frac{16}{3}$

D. $m \neq \frac{15}{4}$

Answer: C



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37. If the sum of two numbers is 640 and their difference is 280, then the number are

A. 140, 500

B. 180, 460

C. 130, 510

D. 150, 490

Answer: B



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38. A certain number of two digits is four times the sum of the digits. If 9 is added to the number, the digits in the number are reversed. Find the number.

A. 13

B. 15

C. 12

D. 14

Answer: C



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39. Six years ago a man was three times as old as his son. In 6 years, he will be twice as old as his son Find their present

ages.

A. 30, 15

B. 40, 20

C. 42, 18

D. 41, 19

Answer: C



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40. The total salary of 15 men and 8 women is Rs. 3050. the difference of salarise of 5 women and 3 men is Rs. 50. Find the sum of the salaries of 3 men and 3 women.

A. Rs. 900

B. Rs. 850

C. Rs. 950

D. Rs. 1000

Answer: C



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