MATHEMATICS
WORKSHEET_180925
CHAPTER 04 LINEAR EQUATION IN TWO VARIABLES
(ANSWERS)

SUBJECT: MATHEMATICS **MAX. MARKS : 40**
CLASS : IX **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. Which option represents the equation $5y – 8x = 7(x + y) – 9$ in the standard form $ax + by + c = 0$?
(a) $–x + 6y – 9 = 0$ (b) $–x + 12y – 9 = 0$ (c) $15x + 2y – 9 = 0$ (d) $15x – 4y – 9 = 0$
Ans. (c) $15x + 2y – 9 = 0$
Here, $5y – 8x = 7(x + y) – 9$
$\Rightarrow 5y – 8x = 7x + 7y – 9$
$\Rightarrow 5y – 8x – 7x – 7y + 9 = 0$
$\Rightarrow –15x – 2y + 9 = 0$
Multiply both side by –1, we get $15x + 2y – 9 = 0$
Hence, it is the standard form of the given equation.

2. If point (2, 0) lies on the graph of the equation $2x + 3y = k$, then the value of k is
(a) 4 (b) 6 (c) 5 (d) 2
Ans: (a) 4
On putting $x = 2$ and $y = 0$ in the equation $2x + 3y = k$, we have
$2 \times 2 + 3 \times 0 = k$
$\Rightarrow 4 + 0 = k \Rightarrow k = 4$

3. The graph of the linear equation $3x + 5y = 15$ cuts the x-axis at the point
(a) (5, 0) (b) (3, 0) (c) (0, 5) (d) (0, 3)
Ans: (a) (5, 0)
At x-axis, $y = 0$
On putting $y = 0$ in $3x + 5y = 15$, we have
$\Rightarrow 3x + 5 \times 0 = 15 \Rightarrow 3x = 15 \Rightarrow x = 5$

4. Any solution of the linear equation $2x + 0y = 9$ in two variables, is of the form
(a) $\left(\frac{9}{2}, 0\right)$ (b) $\left(\frac{9}{2}, n\right)$, n is a real number
(c) $\left(n, \frac{9}{2}\right)$, n is a real number (d) $\left(0, \frac{9}{2}\right)$
Ans: (b) $\left(\frac{9}{2}, n\right)$, n is a real number

5. The value of p, if y = p and x = 3/2 is a solution of the linear equation 2x – y + 27 = 0, is:
(a) –24 (b) –9 (c) 30 (d) 19
Ans. (c) 30
Given linear equation, 2x – y + 27 = 0
Put the value y = p and x = 3/2 in the given equation, we get
2(3/2) – p + 27 = 0
⇒ 3 – p + 27 = 0
⇒ p = 30

6. The point on the graph of the equation 2x + 5y = 20, where x-coordinate is $\frac{5}{2}$, is
(a) $\left(3,\frac{5}{2}\right)$ (b) $\left(\frac{5}{2},\frac{5}{2}\right)$ (c) $\left(\frac{5}{2},0\right)$ (d) $\left(\frac{5}{2},3\right)$
Ans: (d) $\left(\frac{5}{2},3\right)$

7. x = 5, y = –2 is a solution of the linear equation
(a) 2x + y = 9 (b) 2x – y = 12(c) x + 3y = 1 (d) x + 3y = 0
Ans: (b) 2x – y = 12
Substituting x = 5 and y = –2 in LHS of 2x – y = 12,
we have
LHS = 2 × 5 – (–2) = 10 + 2 = 12 = RHS

8. If the linear equation has solutions (– 3, 3), (0, 0), (3, – 3), then equation is
(a) x – y = 0 (b) x + y = 0 (c) 2x – y = 0 (d) x + 2y = 0
Ans: (b) x + y = 0

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

9. **Assertion (A):** If x = 2 and y = 3 is a solution of the equation ax + y = 15, then the value of a is 6.
Reason (R): The solution of a line needs to satisfy the equation of the line.
Ans: (a) Both A and R are true and R is the correct explanation of A.
Given: x = 2, y = 3 is a solution of ax + y = 15
Put the values of x and y coordinates in the above equation, we get
⇒ a(2) + 3 = 15 ⇒ a(2) = 12 ⇒ a = 6
Thus, the value of a is 6.
Now, the given equation will be 6x + y = 15.
Now, substitute the values of x = 2 and y = 3, the equation 6x + y = 15
6 × 2 + 3 = 12 + 3
= 15 = R.H.S.
Hence, the solution of a line needs to satisfy the equation of the line.

10. **Assertion (A):** A linear equation 2x + 0y = 4 has infinitely many solutions.
Reason (R): A linear equation in one variable has infinitely many solutions.
Ans. (c) Assertion (A) is true but reason (R) is false.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. In a one-day International Cricket match, played between India and England in Kanpur, two Indian batsmen, Yuvraj Singh and M.S. Dhoni scored 200 in a partnership including 5 extra runs. Express this information in the form of an equation.

Ans: Let x be number of runs scored by Yuvraj Singh and y be number of runs scored by M.S. Dhoni. According to question,

$x + y + 5 = 200$

or, $x + y + 5 - 200 = 0$

or, $x + y - 195 = 0$

Hence, this is the required equation.

12. Find the value of a, if the line $5y = ax + 10$, will pass through (i) (2, 3), (ii) (1, 1).

Ans: $5y = ax + 10$

(i) On putting $x = 2$ and $y = 3$ in the given equation, we have

$5 \times 3 = a \times 2 + 10 \Rightarrow 15 = 2a + 10$

$\Rightarrow 15 - 10 = 2a$

$\Rightarrow 2a = 5 \Rightarrow a = \frac{5}{2}$

(ii) On putting $x = 1$ and $y = 1$ in the given equation, we have

$5 \times 1 = a \times 1 + 10$

$\Rightarrow 5 = a + 10 \Rightarrow a = 5 - 10 \Rightarrow a = -5$

13. Find two solutions for the equation $4x + 3y = 24$. How many solutions of this equation are possible?

Ans: $4x + 3y = 24$

On putting $x = 0$, we have $4 \times 0 + 3y = 24 \Rightarrow 0 + 3y = 24 \Rightarrow 3y = 24$

$\Rightarrow y = \frac{24}{3} \Rightarrow y = 8$

On putting $y = 0$, we have

$4x + 3 \times 0 = 24 \Rightarrow 4x + 0 = 24 \Rightarrow 4x = 24$

$\Rightarrow x = \frac{24}{4} \Rightarrow x = 6$

Therefore, two solutions are (0, 8) and (6, 0).

Given equation is a linear equation in two variables. Therefore, it has infinitely many solutions.

14. Write $3x + 2y = 18$ in the form of $y = mx + c$. Find the value of m and c. Is (4, 3) lies on this linear equation?

Ans: Given: $3x + 2y = 18$

$y = \frac{18 - 3x}{2} = -\frac{3}{2}x + 9$ ...(i)

On comparing, we get $m = -\frac{3}{2}$ and $c = 9$

Substitute $x = 4$ in (i), we get $y = -\frac{3}{2} \times 4 + 9 = -6 + 9 = 3$

Hence, point (4, 3) lies on $3x + 2y = 18$.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. (i) If the point (4, 3) lies on the linear equation $3x - ay = 6$, find whether (–2, –6) also lies on the same line?

(ii) Find the coordinate of the point lies on above line
(a) abscissa is zero (b) ordinate is zero
Ans: (i) If point (4, 3) lies on $3x - ay = 6$, then
$3 \times 4 - a \times 3 = 6$
$\Rightarrow 12 - 3a = 6$
$\Rightarrow -3a = 6 - 12 = -6$
$\Rightarrow 3a = 6$
$\Rightarrow a = 2$
So, linear equation became $3x - 2y = 6$ ...(i)
Substitute $x = -2$ and $y = -6$ in L.H.S. of (i), we get
L.H.S. $= 3 \times (-2) - 2 \times (-6) = -6 + 12 = 6 =$ R.H.S.
Hence, $(-2, -6)$ lies on the line $3x - 2y = 6$
(ii) (a) When abscissa is zero, it means $x = 0$.
From (i), we get
$3 \times 0 - 2 \times y = 6$
$\Rightarrow -2y = 6$
$\Rightarrow y = -3$
$\therefore$ Required point is $(0, -3)$
(b) When ordinate is zero. i.e. $y = 0$
From (i), we get $3x - 2 \times 0 = 6 \Rightarrow x = 2$
$\therefore$ Required point is $(2, 0)$

16. For what value of p; $x = 2$, $y = 3$ is a solution of $(p + 1)x - (2p + 3)y - 1 = 0$?
(i) Write the equation.
(ii) Is this line passes through the point $(-2, 3)$? Give justification.
Ans: Given: $(p + 1)x - (2p + 3)y - 1 = 0$ ...(i)
Put $x = 2$ and $y = 3$ in (i), we get
$(p + 1)2 - (2p + 3)3 - 1 = 0$
$\Rightarrow 2p + 2 - 6p - 9 - 1 = 0$
$\Rightarrow -4p + 2 - 10 = 0$
$\Rightarrow -4p = 8$
$\Rightarrow p = -2$
(i) Substitute the value of p in (i), we get
$(-2 + 1)x - [2(-2) + 3]y - 1 = 0$
$\Rightarrow -x + y - 1 = 0$
$\Rightarrow x - y + 1 = 0$ ...(ii)
(ii) Substitute $x = -2$ and $y = 3$ in L.H.S. of (ii), we have
L.H.S. $= -2 - 3 + 1 = -4 \neq$ R.H.S.
Hence, the line $x - y + 1 = 0$ will not pass through the point $(-2, 3)$.

17. Find the value of a, if the line $3y = ax + 7$, will pass through:
(i) (3, 4), (ii) (1, 2), (iii) (2, –3)
Ans: $3y = ax + 7$
(i) Putting $x = 3$ and $y = 4$ in the given equation of line, we have
$3 \times 4 = a \times 3 + 7 \Rightarrow 12 = 3a + 7 \Rightarrow 3a = 12 - 7$
$\Rightarrow 3a = 5 \Rightarrow a = \frac{5}{3}$
(ii) Putting $x = 1$ and $y = 2$ in the given equation of line, we have
$3 \times 2 = a \times 1 + 7 \Rightarrow 6 = a + 7 \Rightarrow a = 6 - 7 \Rightarrow a = -1$
(iii) Putting $x = 2$ and $y = -3$ in the given equation, we have
$3 \times (-3) = a \times 2 + 7 \Rightarrow -9 = 2a + 7 \Rightarrow 2a = -9 - 7$
$\Rightarrow 2a = -16 \Rightarrow a = \frac{-16}{2} \Rightarrow a = -8$

SECTION – D

Questions 18 carry 5 marks each.

18. (a) Which of the following point(s) A(5, 0), B(0, 17), C(4, 4) and D(5, 1) lie on the linear equation $5(x – 2) + 3(y + 1) = 44$. **(2)**

(b) The points A(a, b) and B(b, 0) lie on the linear equation $y = 8x + 3$. **(3)**

(i) Find the value of a and b.

(ii) Is (2, 0) a solution of $y = 8x + 3$?

(iii) Find two solutions of $y = 8x + 3$.

Ans: (a) $5(x – 2) + 3(y + 1) = 44$

$\Rightarrow 5x – 10 + 3y + 3 = 44$

$5x + 3y = 44 + 10 – 3$

$5x + 3y = 51$ ...(i)

On putting (5, 0) in (i), we have

L.H.S. $= 5 \times 5 + 3 \times 0 = 25 + 0 = 25 \neq$ R.H.S., false

Hence, (5, 0) does not lie on $5x + 3y = 51$.

On putting (0, 17) in (i), we have

L.H.S. $= 5 \times 0 + 3 \times 17 = 0 + 51 = 51 =$ R.H.S., true

Hence, (5, 0) lies on $5x + 3y = 51$.

On putting (4, 4) in (i), we have

L.H.S. $= 5 \times 4 + 3 \times 4 = 20 + 12 = 32 \neq$ R.H.S., false

Hence, (4, 4) does not lie on $5x + 3y = 51$.

On putting (5, 1) in (i), we have

L.H.S. $= 5 \times 5 + 3 \times 1 = 25 + 3 = 28 \neq$ R.H.S., false

Hence, (5, 1) does not lie on $5x + 3y = 51$.

(b) Given: $y = 8x + 3$ ...(i)

(i) On putting $x = a$ and $y = b$ in (i), we have

$b = 8a + 3$ ...(ii)

On putting $x = b$ and $y = 0$ in (i), we have

$0 = 8b + 3 \Rightarrow b = \dfrac{-3}{8}$

By putting $b = \dfrac{-3}{8}$ in (ii), we have $\dfrac{-3}{8} = 8a + 3$

$\Rightarrow \dfrac{-3}{8} – 3 = 8a \Rightarrow \dfrac{-27}{8} = 8a \Rightarrow a = \dfrac{-27}{64}$

(ii) On putting $x = 2$ and $y = 0$ in (i), we have

$0 = 8 \times 2 + 3$

$\Rightarrow 0 = 16 + 3 \Rightarrow 0 = 19$, false

Hence, (2, 0) is not a solution of the linear equation $y = 8x + 3$.

(iii) $y = 8x + 3$ (i)

Let $x = 0$, then $y = 8 \times 0 + 3 \Rightarrow y = 3$

Hence, (0, 3) is a solution of the linear equation $y = 8x + 3$.

Let $y = 0$, then $0 = 8x + 3 \Rightarrow –3 = 8x \Rightarrow x = \dfrac{-3}{8}$

Hence, $\left(\dfrac{-3}{8}, 0\right)$ is a solution of the linear equation $y = 8x + 3$.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. On his birthday, Manoj planned that this time he celebrates his birthday in a small orphanage centre. He bought apples to give to children and adults working there. Manoj donated 2 apples to

each children and 3 apples to each adult working there along with Birthday cake. He distributed 60 total apples.

(a) Taking the number of children as 'x' and the number of adults as 'y'. Represent the above situation in linear equation in two variables.
(b) If the number of children is 15, then find the number of adults.
(c) If the number of adults is 12, then find the number of children.
(d) If x = –5 and y = 2 is a solution of the equation 3x + 5y = b, then find the value of 'b'
Ans: (a) Let the number of children be x. Let the number of adult be y.
According to given condition 2x apples to each children + 3x apples to each adult
$2x + 3y = 60$
(b) Given linear equation is $2x + 3y = 60$ [From (a)]
Now, put $x = 15$
$\Rightarrow 2 \times 15 + 3y = 60$
$\Rightarrow 30 + 3y = 60 \Rightarrow 3y = 60 - 30 \Rightarrow 3y = 30 \Rightarrow y = 10$
Hence, number of adults is 10.
(c) Since, number of adults is 12.
Therefore, $y = 12$
Now, put $y = 12$ in given equation $2x + 3y = 60$ we get, $2x + 3 \times 12 = 60$
$\Rightarrow 2x + 36 = 60 \Rightarrow 2x = 60 - 36 \Rightarrow 2x = 24 \Rightarrow x = 12$
Hence, number of children is 12.
(d) Given equation is $3x + 5y = b$
On putting the values of $x = -5$ and $y = 2$ in the equation, we get
$3(-5) + 5 \times 2 = b$
$\Rightarrow -15 + 10 = b \Rightarrow b = -5$

20. Christmas is celebrated on 25 December every year to remember the birth of Jesus Christ, who Christians believe is the son of God. Santa Claus, also known as the Father of Christmas, is a legendary character originating in western Christian culture and he brings gifts for everyone on Christmas. Let Santa Claus brings 3 chocolates for each child and 2 chocolates for each adult present at the Christmas party at Michael's home along with a Christmas cake. He distributes total 90 chocolates among all.

(a) How to represent the above situation in a linear equation in two variables by taking the number of children as x and the number of adults as y? If the number of children is 10, then find the number of adults at the Christmas party.
(b) Find the value of k, if x = 5, y = 1 is a solution of the equation 5x + 7y = k.
(c) Write the standard form of the linear equation y – x = 7.
Ans: (a) Here, the number of children is x and the number of adults is y at the Christmas party.
Then, the linear equation in two variables for the given statement is,
3x + 2y = 90
Given, the number of children is 10.
Therefore, x = 10
Put x = 10 in the above equation, we get,
3(10) + 2y = 90 ⇒ 30 + 2y = 90 ⇒ 2y = 60 ⇒ y = 30
Thus, the number of adults at the christmas party is 30.
(b) Given: 5x + 7y = k and x = 5, y = 1
Substituting these values in the given equation, we get
5x +7y = k
⇒ 5 × (5)+ 7 × (1) = k
⇒ k = 25 + 7
⇒ k = 32
(c) The standard form of the linear equation in two variables is ax + by – c = 0 where a, b and c are real numbers, and a ≠ 0 and b ≠ 0.
Here, y – x =7
The standard form will be, y – x = 7
⇒ –x + y – 7 = 0
⇒ (–1) x + (1)y – 7 = 0