Gurukul Coaching Classes

Weekly Test [MODEL ANSWER]

Std: SSC (E.M)	**Subject: Mathematics I**	**Time: 2Hrs**
Date : 12/May/2019	**CH-1**	**Max Marks: 40**

Q.1 Solve the following questions (9th std) **5**

1) Ans. $\text{Ratio of } 138 \text{ to } 161 = \frac{138}{161}$

$= \frac{23 \times 6}{23 \times 7} = \frac{6}{7}$

$= 6 : 7$

2) Ans. $\text{Ratio of } 114 \text{ to } 133 = \frac{114}{133}$

$= \frac{19 \times 6}{19 \times 7} = \frac{6}{7}$

$= 6 : 7$

3) Ans. $\text{Ratio of radius to diameter of a circle} = \frac{r}{d}$

$= \frac{r}{2r} = \frac{1}{2}$

$= 1 : 2$

4) Ans. $\text{Ratio of } 38 \text{ to } 57 = \frac{38}{57}$

$= \frac{19 \times 2}{19 \times 3} = \frac{2}{3}$

$= 2 : 3$

5) Ans. $\text{Ratio of } 52 \text{ to } 78 = \frac{52}{78}$

$= \frac{26 \times 2}{26 \times 3} = \frac{2}{3}$

$= 2 : 3$

Q.2 Solve the following questions (9th std) **4**

1) Ans. $\sqrt{247}, \sqrt{274}$

$247 < 274$

$\sqrt{247} < \sqrt{274}$

2) Ans. $-\frac{5}{9}\sqrt{45}$

$-\frac{5}{9}\sqrt{3 \times 3 \times 5}$

$-\frac{5}{9} \times 3\sqrt{5}$

$-\frac{5}{3}\sqrt{5}$

Q.3 Choose the correct alternative answer for each of the following questions: **6**

1) Ans. (a) (6, 0)

Observing carefully the set of values,
Coordinate pair (6, 0) is common in both
Therefore solution of system of linear equations will be (6, 0)

2) Ans. (b) $(10x + y) + (10y + x) = 88$

Given that x and y are tens and unit's place digits of a two digit number.
Number = $10x + y$
Reversible number = $10y + x$
Now, Sum of a two digit number and its reversible number is 88
$(10x + y) + (10y + x) = 88$

3) Ans. (a)

Given that one girl alone finishes the work in x days

1 day work of a girl = $\frac{1}{x}$

1 day work of 8 girls = $8\left(\frac{1}{x}\right)$

And one boy alone finishes the work in y days

1 day work of a boy= $\frac{1}{y}$

1 day work of 12 boys = $12\left(\frac{1}{y}\right)$

Therefore, condition 8 girls and 12 boys can finish work in 10 days is expressible as

$8\left(\frac{1}{x}\right)+12\left(\frac{1}{y}\right)=\frac{1}{10}$

Similarly, condition 6 girls and 8 boys can finish work in 14 days is expressible as

$6\left(\frac{1}{x}\right)+8\left(\frac{1}{y}\right)=\frac{1}{14}$

Thus, the equations are $8\left(\frac{1}{x}\right)+12\left(\frac{1}{y}\right)=\frac{1}{10}$; $6\left(\frac{1}{x}\right)+8\left(\frac{1}{y}\right)=\frac{1}{14}$

4) Ans. (c) 1

As –2 is y– intercept. Therefore, lines meets y axis at (0, – 2)
(0, – 2) are one of the solution of equation $2x + ky + 14 = 0$
Place $x = 0$ and $y = -2$ in equation $2x + ky + 14 = 0$
$2(0) + k(-2) + 14 = 0$
$-2k + 14 = 0$
$-2k = -14$
$k = 7$

5) Ans. (d) 9, 16

Assume the two numbers be 'x' and 'y'.
Now, Sum of two numbers is 25
$x + y = 25$ … (I)
Their difference is 7
$x – y = 7$ … (II)
Adding (I) and (II) , we get
$2x = 32$
$x = 16$
Place $x = 16$ in equation (I)
$x + y = 25$

16 + y = 25
y = 25 – 16
y = 9
Thus, the numbers are 9 and 16

6) Ans. (b) x + y = 50 ; x + 2y = 75

Given that 'x' be the number of Re1 coins and 'y' be the number of Re 2 coins
The total number of coins is 50.
x + y = 50
And the coins amount to Rs. 75
1(x) + 2(y) = 75
x + 2y = 75
Therefore, equations so formed are x + y = 50 ; x + 2y = 75

Q.4 Solve the following questions (ANY FIVE) **10**

1) Ans. Here the equations are

$2x - 3y = 9$ ... (I)
$2x + y = 13$ ... (II)

As the sign of '2x' in the equations (I) and (II) is same, proceed as subtracting equation (I) and (II)

$$\begin{array}{rcrcr} 2x & - & 3y & = & 9 \\ 2x & + & y & = & 13 \\ - & & - & = & - \\ \hline & - & 4y & = & -4 \end{array}$$

$$y = \frac{(-4)}{(-4)}$$

$y = 1$

Place y = 1 in equation (I) and obtain the value of 'x'

$2x - 3 \times 1 = 9$
$2x - 3 = 9$
$2x = 9 + 3$
$2x = 12$

$$x = \frac{12}{2}$$

$x = 6$

∴ Solution is (x, y) = (6, 1)

2) Ans. Here the equations are

$5m - 3n = 19$ ... (I)

$m - 6n = -7$ ... (II)

Both the variables are having different coefficients, first make the coefficient same.

Multiply equation (II) by '5' as

$5m - 30n = -35$ ... (III)

As the sign of '5m' in both the equations is same, proceed as subtracting equation (II) and (III)

$$\begin{array}{rcrcr} 5m & - & 3n & = & 19 \\ 5m & - & 30n & = & -35 \\ - & & + & = & + \\ \hline & & 27n & = & 54 \end{array}$$

$$n = \frac{54}{27}$$

$m = 2$

Place $m = 2$ in equation (I) and obtain the value of 'n'

$5 \quad x\,2 - 3n = 19$

$10 - 3n = 19$

$- \quad 3n = 19 - 10$

$- \quad 3n = 9$

$$n = \frac{9}{(-3)}$$

$n = (-3)$

$\therefore$ Solution is $(m, n) = (2, -3)$

3) Ans.

$$A = \begin{vmatrix} 5 & 3 \\ 7 & 9 \end{vmatrix} = (5 \times 9) - (3 \times 7) = 45 - 21 = 24$$

4) Ans.

$$N = \begin{vmatrix} -8 & -3 \\ 2 & 4 \end{vmatrix} = [(-8) \times (4)] - [(-3) \times 2)] = -32 - (-6)$$

$$= -32 + 6 = -26$$

5) Ans. Let's add equations (I) and (II).

$5x + 3y = 9$

$+2x - 3y = 12$

$\boxed{7}x = \boxed{21}$

$x = \dfrac{\boxed{21}}{\boxed{7}}$

$x = \boxed{3}$

Place $x = 3$ in equation (I).

$5 \times \boxed{3} + 3y = 9$

$3y = 9 - \boxed{15}$

$3y = \boxed{-6}$

$y = \dfrac{\boxed{-6}}{3}$

$y = \boxed{-2}$

$\therefore$ Solution is $(x, y) = (\boxed{3}, \boxed{-2})$

6) Ans. Here the equations are

$x + 7y = 10$ ... (I)

$3x - 2y = 7$ ... (II)

Both the variables are having different coefficients, first make the coefficient same. Multiply equation (I) by '3' as

$3x + 21y = 30$ ... (III)

As the sign of '3x' in the equations (II) and (III) is same, proceed as subtracting equation (II) and (III)

$$\begin{array}{rcrcr} 3x & + & 21y & = & 30 \\ 3x & - & 2y & = & 7 \\ - & & + & = & - \\ \hline & & 23y & = & 23 \end{array}$$

$y = \dfrac{23}{23}$

$y = 1$

Place $y = 1$ in equation (I) and obtain the value of 'x'

$x + 7 \times 1 = 10$

$x + 7 = 10$

$x = 10 - 7$

$x = 3$

$\therefore$ Solution is $(x, y) = (3, 1)$

7) Ans.

$$B = \begin{vmatrix} 2\sqrt{3} & 9 \\ 2 & 3\sqrt{3} \end{vmatrix} = [2\sqrt{3} \times 3\sqrt{3})] - [2 \times 9)] = 18 - 18 = 0$$

Q.5 Complete the following Activities (ANY THREE) **6**

1) Ans. $3x + 2y = 29$ . . . (I) and $5x - y = 18$ . . . (II)

Let's solve the equations by eliminating 'y'. Fill suitably the boxes below

Multiplying equation (II) by 2.

$\therefore 5x \times$ [2] $- y \times$ [2] $18 \times$ [2]

$\therefore 10x - 2y =$ [36] . . (III)

Let's add equations (I) and (III)

$3x + 2y = 29$

$+$ [10x] $-$ [2y] $=$ [36]

[13x] $=$ [13] $\therefore x =$ [1]

Substituting $x = 5$ in equation (I)

$3x + 2y = 29$

$\therefore 3 \times$ [1] $+ 2y = 29$

$\therefore$ [3] $+ 2y = 29$

$\therefore 2y = 29 -$ [3]

$\therefore 2y =$ [26] $\therefore y =$ [13]

$(x, y) = ($ [1] , [13] $)$ is the solution.

2) Ans. Here the equations are

$3a + 5b = 26$ ... (I)

$a + 5b = 22$ ... (II)

As the sign of '5b' in both the equations is same, proceed as subtracting equation (I) and (II)

$3a + 5b = 26$

$a + 5b = 22$

$- \quad - \quad = \quad -$

[2a] $=$ [4]

$a = \frac{4}{2}$

a = [2]

Place a = 2 in equation (I) and obtain the value of 'b'

3 x 2 + 5b = [26]

6 + 5b = 26

5b = [26] – 6

5b = 20

b = $\frac{[20]}{5}$

b = [4]

$\therefore$ Solution is (a, b) = (2, 4)

3) Ans. Given equations are

$3x - 4y = 10$

$4x + 3y = 5$

$$D = \begin{vmatrix} 3 & -4 \\ 4 & 3 \end{vmatrix} \qquad D_x = \begin{vmatrix} 10 & -4 \\ 5 & 3 \end{vmatrix} \qquad D_y = \begin{vmatrix} 3 & 10 \\ 4 & 5 \end{vmatrix}$$

$= 3(3) - \boxed{4(-4)}$ $\qquad = 10(3) - 5(-4)$ $\qquad = 3(5) - 4(10)$

$= 9 + 16$ $\qquad = 30 + \boxed{20}$ $\qquad = \boxed{15} - 40$

$= 25$ $\qquad = \boxed{50}$ $\qquad = -25$

Thus,

$$x = \frac{D_x}{D} \qquad \text{and} \qquad y = \frac{D_y}{D}$$

$$= \frac{50}{25} \qquad\qquad = \frac{\boxed{-25}}{25}$$

$$= \boxed{2} \qquad\qquad = -1$$

Therefore, (x, y) = $\boxed{(2, -1)}$ is the solution.

4) Ans. Given equations are

$6x - 4y = -12$

$8x - 3y = -2$

$$D = \begin{vmatrix} 6 & -4 \\ 8 & -3 \end{vmatrix} \qquad D_x = \begin{vmatrix} -12 & -4 \\ -2 & -3 \end{vmatrix} \qquad D_y = \begin{vmatrix} 6 & -12 \\ 8 & -2 \end{vmatrix}$$

$= \boxed{6(-3)} - 8(-4)$ $\qquad = -12(-3) - \boxed{(-2)}(-4)$ $\qquad = 6(-2) - 8(-12)$

$= -18 + 32$ $\qquad = \boxed{36} - 8$ $\qquad = -12 + 96$

$= 14$ $\qquad = 28$ $\qquad = \boxed{84}$

$$x = \frac{D_x}{D} \qquad \text{and} \qquad y = \frac{D_y}{D}$$

$$= \frac{28}{14} \qquad\qquad = \frac{\boxed{84}}{14}$$

$$= \boxed{2} \qquad\qquad = 6$$

Therefore, (x, y) = $\boxed{(2, 6)}$ is the solution.

Q.6 Solve the following questions (ANY THREE) **9**

1) Ans. Given equations are

$2x+3y=2$

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

$$D=\begin{vmatrix}2 & 3\\ 2 & -1\end{vmatrix} \qquad D_x=\begin{vmatrix}2 & 3\\ 1 & -1\end{vmatrix} \qquad D_y=\begin{vmatrix}2 & 2\\ 2 & 1\end{vmatrix}$$

$=2(-1)-2(3)$ $\quad$ $=2(-1)-1(3)$ $\quad$ $=2(1)-2(2)$

$=-2-6$ $\quad$ $=-2-3$ $\quad$ $=2-4$

$=-8$ $\quad$ $=-5$ $\quad$ $=-2$

Thus,

$$x=\frac{D_x}{D} \qquad y=\frac{D_y}{D}$$

$=\frac{(-5)}{(-8)}$ and $=\frac{(-2)}{(-8)}$

$=\frac{5}{8}$ $\quad$ $=\frac{1}{4}$

Therefore, $(x, y)=\left(\frac{5}{8},\frac{1}{4}\right)$ is the solution.

2) Ans. $\frac{4}{x}+\frac{5}{y}=7;\ \frac{3}{x}+\frac{4}{y}=5$

$4\left(\frac{1}{x}\right)+5\left(\frac{1}{y}\right)=7$ . . . (I)

$3\left(\frac{1}{x}\right)+4\left(\frac{1}{y}\right)=5$ . . . (II)

Replacing $\left(\frac{1}{x}\right)$ by m and $\left(\frac{1}{y}\right)$ by n in equations (I) and (II), we get

$4m+5n=7$ . . . (III)

$3m+4n=5$ . . . (IV)

On solving these equations we get

$m=3,\ n=-1$

Now, $m=\frac{1}{x}$ $\quad \therefore\ 3=\frac{1}{x}$ $\quad \therefore\ x=\frac{1}{3}$

$n=\frac{1}{y}$ $\quad \therefore\ -1=\frac{1}{y}$ $\quad \therefore\ y=-1$

$\therefore$ Solution of given simultaneous equations is $(x,\ y)=(\frac{1}{3},\ -1)$

3) Ans. To draw the graphs of equations $3x - y = 2$; $2x - y = 3$, obtain 4 ordered pairs for each equation as

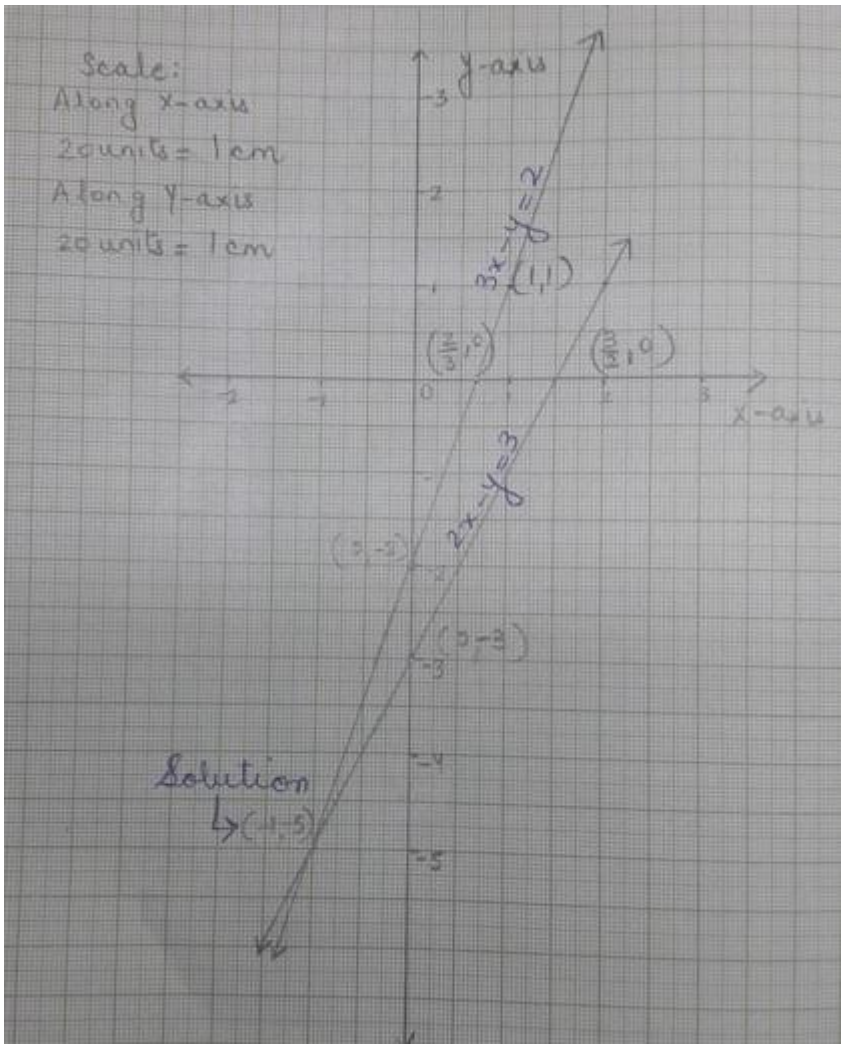
$3x - y = 2 \rightarrow$

x	0	$\frac{2}{3}$	1	2
y	–2	0	1	4
(x, y)	(0, –2)	$(\frac{2}{3}, 0)$	(1, 1)	(2, 4)

$2x - y = 3 \rightarrow$

x	0	$\frac{3}{2}$	2	–1
y	–3	0	1	–5
(x, y)	(0, –3)	$(\frac{3}{2}, 0)$	(2, 1)	(–1, –5)

Now plotting the ordered pairs on graph paper as



Observe the intersecting point as (-1, -5).

Therefore, (x, y) = (-1, -5) is the solution

4) Ans. To draw the graphs of equations $x + y = 0$; $2x - y = 9$, obtain 4 ordered pairs for each equation as

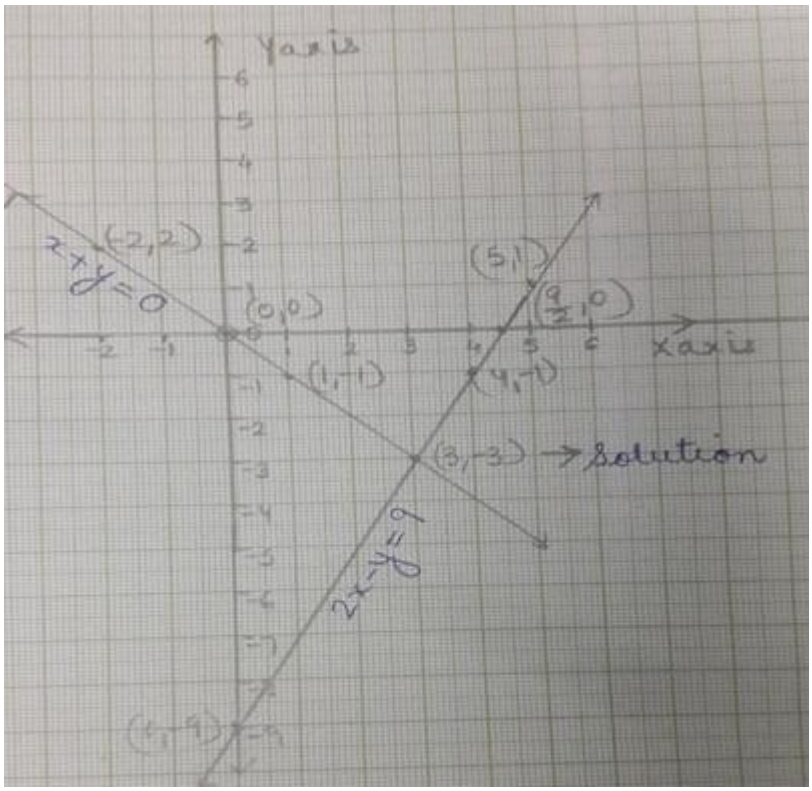
$x + y = 0 \rightarrow$

x	0	1	–2	3
y	0	–1	2	–3
(x, y)	(0, 0)	(1, –1)	(–2, 2)	(3, –3)

$2x - y = 9 \rightarrow$

x	0	$\frac{9}{2}$	5	4
y	–9	0	1	–1
(x, y)	(0, –9)	$(\frac{9}{2}, 0)$	(5, 1)	(4, –1)

Now plotting the ordered pairs on graph paper as



Observe the intersecting point as (3, -3).
Therefore, (x, y) = (3, -3) is the solution

5) Ans. Assume that the greater number be 'x' and smaller number be 'y'

From condition (I): Two numbers differ by 3

$x - y = 3$ ... (I)

From condition (II): The sum of twice the smaller number and thrice the greater number is 19

$2y + 3x = 19$

$3x + 2y = 19$ ... (II)

Solving (I) and (II) using Cramer's rule as

$$D = \begin{vmatrix} 1 & -1 \\ 3 & 2 \end{vmatrix} \qquad D_x = \begin{vmatrix} 3 & -1 \\ 19 & 2 \end{vmatrix} \qquad D_y = \begin{vmatrix} 1 & 3 \\ 3 & 19 \end{vmatrix}$$

$$= 1(2) - 3(-1) \qquad = 3(2) - 19(-1) \qquad = 1(19) - 3(3)$$

$$= 2 + 3 \qquad = 6 + 19 \qquad = 19 - 9$$

$$= 5 \qquad = 25 \qquad = 10$$

Thus,

$$x = \frac{D_x}{D} \qquad y = \frac{D_y}{D}$$

$$= \frac{25}{5} \quad \text{and} \quad = \frac{10}{5}$$

$$= 5 \qquad = 2$$

Therefore, the numbers are 5 and 2.