### Blue Print (As per PU Board)

| Topic | 1 mark questions | 2 marks questions | 3 marks questions | 5 marks questions | Total Marks |
|---|---|---|---|---|---|
| Linear Inequalities | – | 1 | – | 1 | 7 |

## One mark questions

1. **Solve** $5x < 26$ **when** $x$ **is a natural number.**

   Answer: $5x < 26 \Rightarrow x < \frac{26}{5} \Rightarrow x < 5.2$. Thus the solution set is $\{1, 2, 3, 4, 5\}$

2. **Solve** $(2x-3) > 6$ **when** $x$ **is an integer.**

   Answer: $(2x-3) > 6 \Rightarrow 2x > (6+3) \Rightarrow 2x > 3 \Rightarrow x > \frac{3}{2} \Rightarrow x > 15$.

   Thus the solution set is $\{1, 2, 3, .....\}$.

3. **Sole** $(3x+5) < (5x-8)$ **when** $x$ **is an integer**

   Answer: $(3x+5) < (5x-8) \Rightarrow (5x-3x) > (5+8) \Rightarrow 2x > 13$

   $\Rightarrow x > \frac{13}{2} \Rightarrow x > 6.5$. Thus the solution set is $\{7, 8, 9, ....\}$

4. **Solve** $(3x+5) \geq (5x-8)$ **when** $x$ **is a real number.**

   Answer: $(3x+5) \geq (5x-8) \Rightarrow (5x-3x) \leq (5+8) \Rightarrow 2x \leq 13$

   $\Rightarrow x \leq \frac{13}{2} \Rightarrow x \leq 6.5$. Thus the solution set is $(-\infty, 6.5]$

5. **Solve** $3x < 17$ **when** $x$ **is an integer.**

   Answer: $3x < 17 \Rightarrow x < \frac{17}{3} \Rightarrow x < 5.67$. Thus the solution set is $\{..., -1, 0, 1, 2, 3, 4, 5\}$.

## Two marks questions

6. **Solve** $\frac{1}{3}\left(\frac{2x}{5}-3\right) < \frac{1}{4}(3x-5)$

   Answer: $\frac{1}{3}\left(\frac{2x}{5}-3\right) < \frac{1}{4}(3x-5) \Rightarrow \frac{1}{3}\left(\frac{2x-15}{5}\right) < \frac{1}{4}(3x-5)$

   $\Rightarrow 4(2x-15) < 15(3x-5) \Rightarrow (8x-60) < (45x-75)$

   $\Rightarrow (45x-8x) > (75-60) \Rightarrow 37x > 15 \Rightarrow x > \frac{15}{37}$

   Thus the solution set is $\left(\frac{15}{37}, \infty\right)$

7. **Solve** $\frac{2x-1}{3} > \left\{\frac{3x-2}{4} - \frac{2-x}{5}\right\}$

   Answer: $\frac{2x-1}{3} > \left\{\frac{3x-2}{4} - \frac{2-x}{5}\right\} \Rightarrow \frac{2x-1}{3} > \left\{\frac{5(3x-2)-4(2-x)}{20}\right\}$

   $\Rightarrow \frac{2x-1}{3} > \left\{\frac{15x-10-8+4x}{20}\right\} \Rightarrow \frac{2x-1}{3} > \left\{\frac{19x-18}{20}\right\}$

   $\Rightarrow 20(2x-1) > 3(19x-18) \Rightarrow (40x-20) > (57x-54)$

   $\Rightarrow (40x-57x) > (20-54) \Rightarrow 17x > -34 \Rightarrow -x > -2$

$\Rightarrow x < 2$ Thus the solution set $(-\infty, 2)$

8. **Find all pairs of consecutive odd positive integers both of which are lesser than 18 and such that their sum is more than 15.**

Answer: Let $x$ and $x+2$ are two consecutive odd positive integers. Now $x \le 17, (x+2) \le 17$. Hence $x \le 15$. Also $(x+x+2) > 15$

$\Rightarrow (2x+2) > 15 \Rightarrow 2x > 13 \Rightarrow x > \frac{13}{2} = 6.5$.

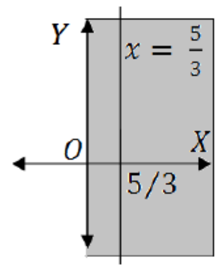
Thus the possible pairs of consecutive odd positive numbers are $(7,9), (9,11), (11,13), (13,15), (15,17)$.

9. **Solve the inequality $3x \ge 5$ and represent the solution region graphically.**

Answer: $3x \ge 5 \Rightarrow x \ge \frac{5}{3}$. Thus solution set is $\left[\frac{5}{3}, \infty\right)$.

The solution region is the half plane to the right of the line $x = \frac{5}{3}$.

Also the line, $x = \frac{5}{3}$ is included in the solution region.




### Five marks questions

10. **Solve the inequalities $2x+3y < 12, x \ge 2, y \ge 2, y \ge 2$ graphically.**

Answer: Consider the straight line $2x+3y = 12$

When $x = 0, \ y = 4$ and

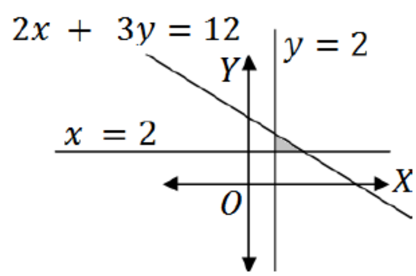
When $y = 0, \ x = 6$.

When $x = 0, \ y = 0$, we get,

$2x+3y = 0 < 12$

Thus solution region is the part of half plane separated by the line $2x+3y = 12$ containing the origin.

The solution region of the set of inequalities is the region bounded by the lines $2x+3y = 12, \ x = 2$ and $y = 2$.




11. **Solve the inequalities $x+2y \le 6, \ 4x+3y \ge 12$ graphically.**

Answer: Consider the line $x+2y = 6$. This passes through the points $(0,3)$ and $(6,0)$. Also when $x = 0, \ y = 0$, the number $x+2y = 0 < 6$.

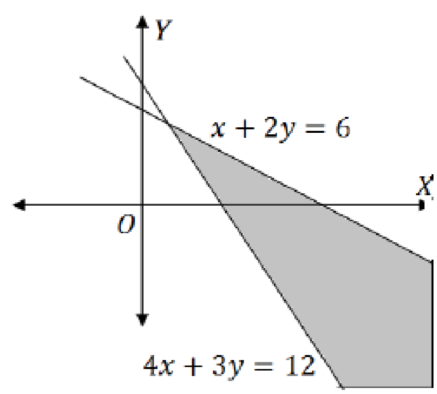
Solution region is the part of the half plane separated by $x+2y = 6$ containing the origin.

Consider the line $4x+3y = 12$.

This passes through the points $(0, 4)$ and $(3, 0)$

Also when $x = 0, \ y = 0$, the number $4x+3y = 0 < 12$.

Solution region is the part of the half plane separated by $4x+3y = 12$ not containing the origin. The common enclosed region is the solution region. Also the two lines are included in the solution region.



12. **Solve the inequalities $2x+y>8,\ x+2y>10$ graphically.**

Answer: Consider the line $2x+y=8$. This passes through the points (0, 8) and (4, 0). Also when $x=0,\ y=0$, the number $2x+y=0 \not> 10$. Solution region is the part of the half plane separated by $2x+y=8$ not containing the origin.

Consider the line $x+2y=10$. This passes through the points $(0, 5)$ and $(10, 0)$. Also when $x=0,\ y=0,$ the number $x+2y=0 \not> 10$.

Solution region is the part of the half plane separated by $x+2y=10$ not containing the origin.

The common region of the above two is the solution region. Also the two lines are not included in the solution region.