CBSE Class 11 Mathematics

Important Questions

Chapter 6

Linear Inequalities

1 Marks Questions

1. Solve $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$

Ans. $\frac{3x-4}{2} \geq \frac{x+1}{4} - \frac{1}{1}$

$$\frac{3x-4}{2} \geq \frac{x+1-4}{4}$$

$$\frac{3x-4}{2} \geq \frac{x-3}{4}$$

$$2(3x-4) \geq (x-3)$$

$$6x-8 \geq x-3$$

$$x \geq 1$$

2. Solve $3x+8>2$ **when** x **is a real no.**

Ans. $3x+8>2$

$$3x > 2-8$$

$$3x > -6$$

$$x > -2$$

$$(-2, \infty)$$

3. Solve the inequality $\frac{x}{4} < \frac{(5x-2)}{3} - \frac{(7x-3)}{5}$

Ans. $\frac{x}{4} < \frac{5x-2}{3} - \frac{7x-3}{5}$

$$\frac{x}{4} < \frac{5(5x-2)-3(7x-3)}{15}$$

$$\frac{x}{4} < \frac{4x-1}{15}$$

$$15x < 16x-4$$

$$-x < -4$$

$$x > 4$$

$$(4, \infty)$$

4. If $4x > -16$ **then** $x \square -4.$

Ans. $x > -4.$

5. Solve the inequality $\frac{1}{2}\left(\frac{3x}{5}+4\right) \geq \frac{1}{3}(x-6)$

Ans. $\frac{1}{2}\left(\frac{3x}{5}+4\right) \geq \frac{1}{3}(x-6)$

$$\frac{3x}{10}+2 \geq \frac{x}{3}-2$$

$$\frac{3x}{10}-\frac{x}{3} \geq -4$$

$$\frac{9x-10x}{30} \geq -4$$

$\frac{-x}{30} \geq -4$

$-x \geq -120$

$x \leq 120$

$(-\infty, 120]$

6. Solution set of the in inequations $2x-1 \leq 3$ and $3x+1 \geq -5$ is.

Ans. $2x-1 \leq 3$, $3x+1 \geq -5$

$\Rightarrow 2x \leq 4,\ 3x \geq -6$

$\Rightarrow x \leq 2,\ x \geq -2$

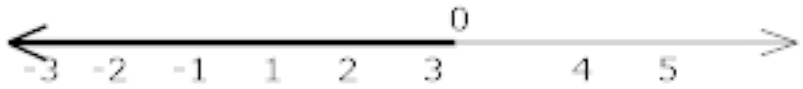
$\Rightarrow -2 \leq x \leq 2$

7. Solve $7x+3<5x+9$. Show the graph of the solution on number line.

Ans. $7x+3<5x+9$

$2x<6$

$x<3$



8. Solve the inequality. $\frac{2x-1}{3} \geq \frac{3x-2}{4} - \frac{2-x}{5}$

Ans. $\frac{2x-1}{3} \geq \frac{5(3x-2)-4(2-x)}{20}$

$20(2x-1) \geq 3(19x-18)$

$40x-20 \geq 57x-54$

$-17x \geq -34$

$x \leq 2$

$(-\infty, 2]$

9. Solve $5x-3 \leq 3x+1$ when x is an integer.

Ans. $5x-3 \leq 3x+1$

$5x-3x \leq 4$

$2x \leq 4$

$x \leq 2$

$\{\ldots, -3, -2, -1, 0, 1, 2\}$

10. Solve $30x < 200$ when x is a natural no.

Ans. $30x < 200$

$$x < \frac{200}{30}$$

$$x < \frac{20}{3}$$

Solution set of the inequality $\{1, 2, 3, 4, 5, 6\}$

11. Solve the inequality $\frac{x}{2} \geq \frac{5x-2}{3} - \frac{7x-3}{5}$

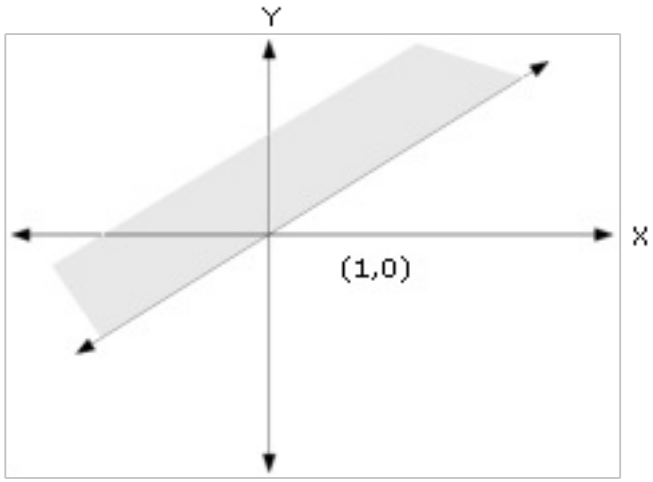
Ans. $\frac{x}{2} \geq \frac{5(5x-2)-3(7x-3)}{15}$

$$\frac{x}{2} \geq \frac{25x-10-21x+9}{15}$$

$$\frac{x}{2} \geq \frac{4x-1}{15}$$

$$15x \geq 8x - 2$$

$$7x \geq -2 \Rightarrow x \geq -\frac{2}{7}$$



12. Solve $5x-3<3x+1$ when x is an integer.

Ans. $5x-3<3x+1$

$$2x<4$$
$$x<2$$

When x is an integer the solutions of the given inequality are……-4,-3,-2,-1, 0, 1

CBSE Class 12 Mathematics

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Linear Inequalities

4 Marks Questions

1. Solve $3x-6\geq 0$ graphically

Ans. $3x-6\geq 0.....(i)$

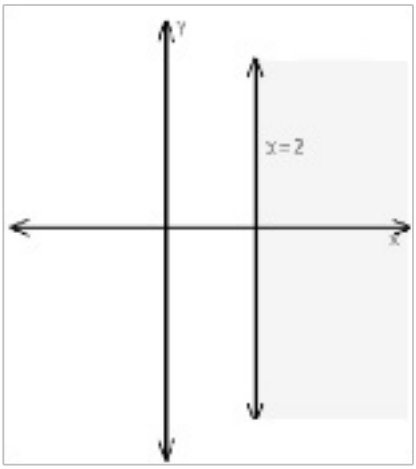
$3x-6=0$

$x=2$

Put (0,0)in eq. (i)

$0-6\geq 0$

$0>6$ false.



2. Ravi obtained 70 and 75 mark in first unit test. Find the minimum marks he should get in the third test to have an average of at least 60 marks.

Ans. Let Ravi secure x marks in third test

ATQ $\frac{70+75+x}{3}\geq 60$

$x \geq 135$

3. Find all pairs of consecutive odd natural no. both of which are larger than 10 such that their sum is less than 40.

Ans. Let x and $x+2$ be consecutive odd natural no.

ATQ $x > 10 \ldots\ldots (i)$

$(x)+(x+2) < 40$

$x < 19 \ldots\ldots (ii)$

From (i) and (ii)

$(11,13)\ \ (13,15),\ \ (15,17)\ \ (17,19)$

4. A company manufactures cassettes and its cost equation for a week is C=300+1.5 x and its revenue equation is R=2 x , where x is the no. of cassettes sold in a week. How many cassettes must be sold by the company to get some profit?

Ans. Profit = revenue-cost

$R > C \qquad [\text{for to get some profit}]$

$2x > 300 + 1.5x$

$\frac{1}{2} x > 300$

$x > 600$

5. The longest side of a Δ is 3 times the shortest side and the third side is 2 cm shorter than the longest side. If the perimeter of the Δ is at least 61 cm find the minimum length of the shortest side.

Ans. Let shortest side be x cm then the longest side is $3x$ cm and the third side $(3x-2)$ cm.

ATQ $(x)+(3x)+(3x-2)\geq 61$

$x\geq 9$

Length of shortest side is 9 cm.

6. In drilling world's deepest hole it was found that the temperature T in degree Celsius, x km below the surface of earth was given by $T=30+25(x-3), 3<x<15$ At what depth will the tempt. Be between 200^0 c and $300^0 c$

Ans. Let x km is the depth where the tempt lies between $200^0 C$ and $300^0 C$

$200^0 C<T<300^0 C$

$200<30+25(x-3)<300$

$\frac{49}{5}<x<\frac{69}{5}\Rightarrow 9.8<x<13.8$

7. A man wants to cut three lengths from a single piece of board of length 91 cm. The second length is to be 3 cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least 5 cm longer than the second.

Ans. Let the shortest length be x cm, then second length is (x +3) cm and the third length is $2x$ cm.

ATQ $4x+3\leq 91$

$x\leq \frac{88}{4}$

$x\leq 22$

Again ATQ

$2x\geq 5+(x+3)$

$x \geq 8$

$x \in [8, 22]$

8. The water acidity in a pool is considered normal when the average pH reading of three daily measurements is between 7.2 and 7.8 If the first pH reading are 7.48 and7.85, find the range of pH value for the third reading that will result in the acidity level being normal.

Ans. Let third reading be x then

$$7.2 < \frac{7.48 + 7.85 + x}{3} < 7.8$$

$$21.6 < 15.33 + x < 23.4$$

$$6.27 < x < 7.07$$

9. A plumber can be paid under two schemes as given below.

I: Rs 600 and Rs 50 per hr.

II: Rs 170 per hr.

If the job takes n hr. for what values of n does the scheme I gives the plumber the better wages.

Ans. For better wages earning should be more then

$$600 + 50n > 170n$$

$$n < 5$$

Thus for better wages scheme working hr. should be less than 5 hr.

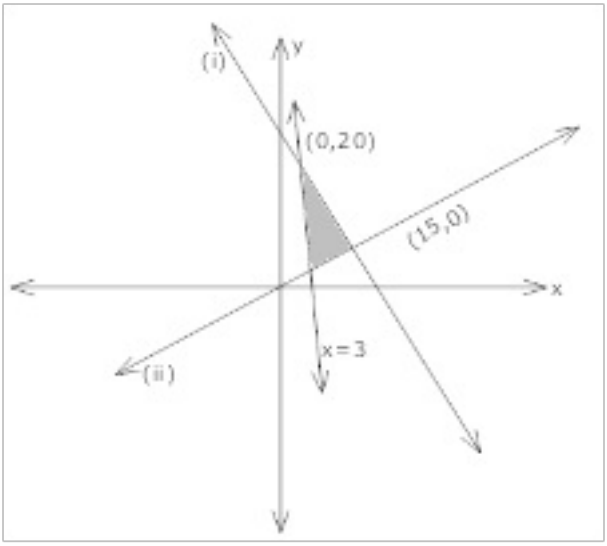
$$4x + 3y = 60$$

x	**0**	**15**
y	20	0

$y = 2x$

x	**0**	**20**
y	0	40

$x = 3$



10. Solve the inequalities $3x + 4y \leq 12$ graphically

Ans. $3x + 4y \geq 12 \ldots\ldots (i)$

$3x + 4y = 12$

x	**0**	**4**
y	3	0

Put $(0, 0)$ in eq. $\ldots\ldots\ldots (i)$

$0 + 0 \geq 12$ false

11. Solve graphically $x - y \leq 0$

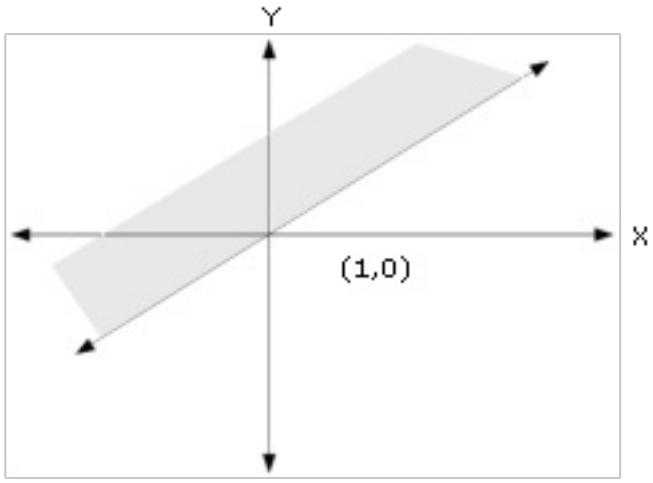
Ans. $x - y \leq 0 \ldots\ldots (i)$

$x = y$

Put (1,0) in eq. (i)

$1-0\leq 0$

$1\leq 0$ false

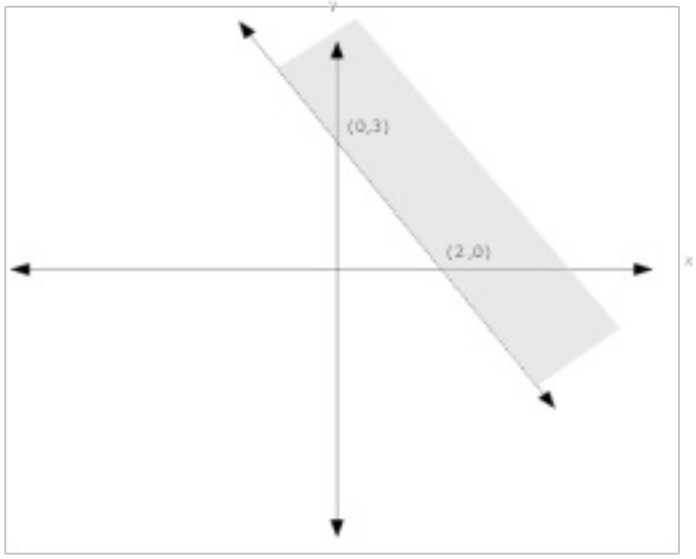


12. Solve $3x+2y>6$ graphically

Ans. $3x+2y>6.....(i)$

$3x+2y=6$

x	**0**	**2**
y	3	0



Put $(0,0)$ in eq. .....(i)

$0+0>6$

$0>6$ which is false

CBSE Class 12 Mathematics

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6 Marks Questions

1. IQ of a person is given by the formula $IQ = \frac{MA}{CA} \times 100$

Where MA is mental age and CA is chronological age. If 80 $\leq$ IQ $\leq$ 140 for a group of 12yr old children, fond the range of their mental age.

Ans. $80 \leq \text{IQ} \leq 140$ (Given)

$$80 \leq \frac{MA}{CA} \times 100 \leq 140$$

$$80 \leq \frac{MA}{12} \times 100 \leq 140$$

$$80 \times \frac{12}{100} \leq MA \times \frac{\cancel{100}}{\cancel{12}} \times \frac{\cancel{12}}{\cancel{100}} \leq 140 \times \frac{12}{100}$$

$$\frac{96}{10} \leq \text{MA} \leq \frac{168}{10}$$

$$9.6 \leq \text{MA} \leq 16.8$$

2. Solve graphically $4x + 3y \leq 60 \quad y \geq 2x \quad x \geq 3 \quad x, y \geq 0$

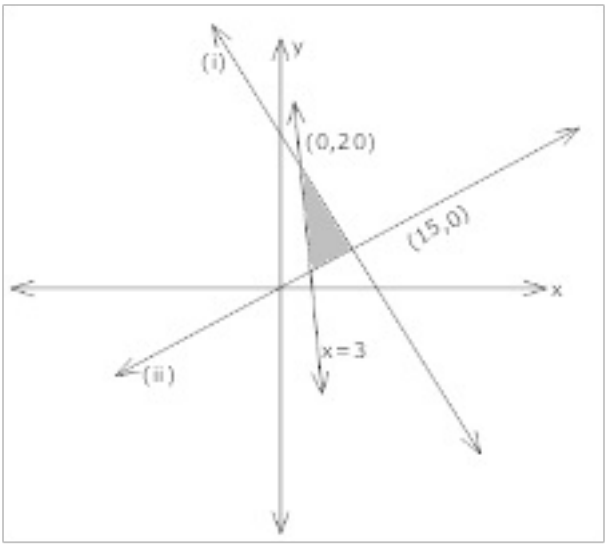
Ans. $4x + 3y = 60$

x	**0**	**15**
y	20	0

$$y = 2x$$

x	**0**	**20**
y	0	40

$x=3$



3. A manufacturer has 600 litre of a 12% sol. Of acid. How many litres of a 30% acid sol. Must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%.

Ans. Let x litres of 30% acid sol. Is required to be added.

$30\%x+12\%$ of $600>15\%$ of $(x+600)$ and

$30\%x+12\%$ of $600<18\%$ of $(x+600)$

$$\frac{30x}{100}+\frac{12}{100}(600)>\frac{15}{100}(x+600)$$

$$\frac{30x}{100}+\frac{12}{100}(600)<\frac{18}{100}(x+600)$$

$x>120$ and $x<300$

i.e. $120<x<300.$

4. Solve graphically $x-2y\leq 3\ 3x+4y\geq 12\ x\geq 0\quad y\geq 1$

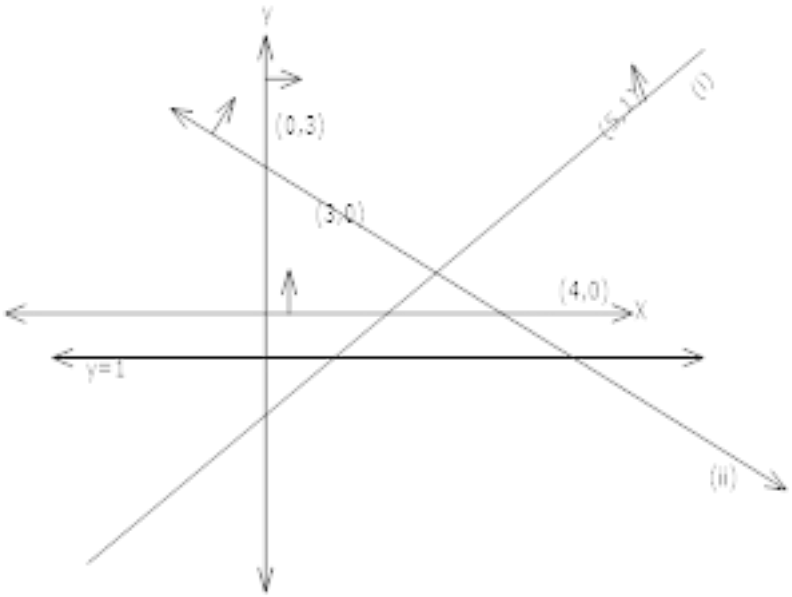
Ans. $x-2y=3$

x	**3**	**5**
y	0	1

$3x+4y=12$

x	**0**	**4**
y	3	0

$y=1$



5. A sol. Of 8% boric acid is to be diluted by adding a 2% boric acid sol. to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% sol. how many litre of the 2% sol. will have to be added.

Ans. Let x be added

ATQ 2% of $x+8\%$ of $640>4\%$ of $(640+x)$

$$\frac{2x}{100}+\frac{8\times 640}{100}>\frac{4}{100}(640+x)$$

$x < 1280.....(i)$

And 12% of $x + 8\%$ of $640 < 6\%$ of $(640 + x)$

$$\frac{2x}{100} + \frac{8 \times 640}{100} < \frac{6}{100}(640 + x)$$

$x > 320.....(ii)$

From (i) and (ii)

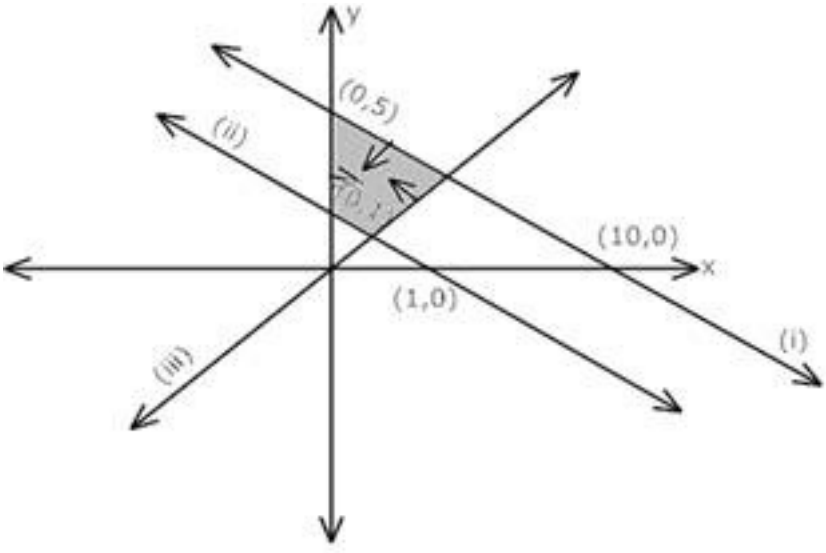
$320 < x < 1280$

6. Solve graphically $x + 2y \leq 10 \;\; x + y \geq 1 \;\; x - y \leq 0$

$x \geq 0, \qquad y \geq 0$

Ans. $x + 2y = 10$

x	**0**	**10**
y	5	0



$x + y = 1$

x	**0**	**1**

y	1	0

$x-y=0$

x	**0**	**2**
y	0	2

7. How many litres of water will have to be added to 1125 litres of the 45% sol. Of acid so that the resulting mixture will contain more than 25%but less than 30% acid content.

Ans. Let x litre of water be added to 1125 litre of 45 acid sol.

45% of $1125 > 25\%$ of $(x+1125)$

30% of $1125 < 30\%$ of $(x+1125)$

$900 > x > 562.5$

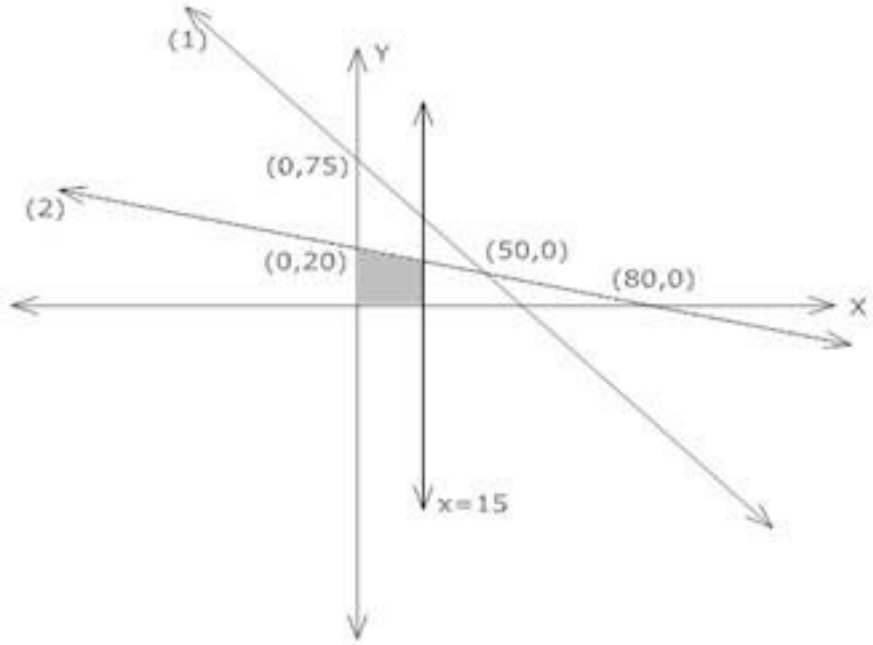
8. Solve graphically $3x+2y \le 150 \;\; x+4y \le 80 \;\; x \le 15 \;\; y \ge 0 \;\; x \ge 0$

Ans. $3x+2y=150$

$x+4y=80$

$x=15$

x	**0**	**50**
y	75	0



x	**0**	**80**
y	20	0