



# MATHS

## BOOKS - V PUBLICATION

### LINEAR INEQUALITIES

#### Questionbank

1. Solve  $30x < 200$  when (i)  $x$  is a natural number, (ii)  $x$  is an integer.



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2. Solve  $5x - 3 < 3x + 1$  when (i)  $x$  is an integer, (ii)  $x$  is a real number



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3. Solve the inequality  $4x + 3 < 6x + 7$



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4. Solve  $\frac{5 - 2x}{3} \leq \frac{x}{6} - 5$ . Represent the solution set graphically.



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5. Solve,  $7x + 3 < 5x + 9, x \in R$ . express the solution on a number line.



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6. Solve  $\frac{3x - 4}{2} \geq \frac{x + 1}{4} - 1$ . Show the graph of the solution on number line.



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7. The marks obtained by a student of class XI in first and second terminal examination are 62 and 48, respectively. Find the minimum marks he should get in the annual examination to have an average of at least 60 marks.



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8. Consider two consecutive odd natural numbers both of which are larger than 10, such that their sum is less than 40.

Find all pairs of odd natural numbers having the given properties .



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9. Solve  $24x < 100$  . When  $x$  is a natural number.



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10. Solve  $-12x > 30$  When  $x$  is a natural number



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11. Solve  $5x - 3 < 7$ , when  $x$  is an integer



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12. Solve  $3x + 8 > 2$  when  $x$  is an integer





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**13.** Solve the following inequalities.

$$4x + 3 < 5x + 7$$



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**14.** Solve  $3x - 7 > 5x - 1$  for real  $x$ .



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15. Solve the following inequalities.

$$3(x - 1) \leq 2(x - 3)$$



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16. Solve the inequality:  $3(2 - x) \geq 2(1 - x)$ .



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17. Solve :  $x + \frac{x}{2} + \frac{x}{3} < 11$  for real x.



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18. Solve  $\frac{3(x - 2)}{5} \leq \frac{5(2 - x)}{3}$ .



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19. Solve the following inequalities.

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



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**20.** Solve the inequality

$$2(2x + 3) - 10 < 6(x - 2)$$



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**21.** Solve  $37 - (3x + 5) \leq 9x - 8(x - 3)$  for  
real  $x$



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**22.** Solve the following inequalities.

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



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**23.** Solve the inequality  $3x - 2 < 2x + 1$  and show its graph.



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**24.** Show the solution of each inequality on a number line.

$$5x - 3 \geq 3x - 5$$



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**25.** Show the solution of each inequality on a number line.

$$3(1 - x) < 2(x + 4)$$



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26. Solve the inequality

$$\frac{x}{2} \geq \frac{5x - 2}{3} - \frac{7x - 3}{5}$$



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



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**28.** To receive grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in the first four examinations are 87, 92, 94 and 95, find the minimum marks that Sunita must obtain in the fifth examination to get grade 'A' in the course.



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**29.** Find all pairs of consecutive odd natural numbers, both of which are smaller than 10,

such that their sum is more than 11.



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**30.** Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23.



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**31.** The longest side of a triangle is 3 times the shortest side and the third side is 2 cm shorter

than the longest side. if the perimeter of the triangle is at least 61 cm, find the minimum length of the shortest side.



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**32.** A man wants to cut three length 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.?



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



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34. Solve  $3x - 6 \geq 0$  graphically in two dimensional plane



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**35.** Solve the inequality  $y < 2$  graphically.



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**36.** Solve the inequality  $x + y < 5$  graphically.



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**37.** solve the following inequalities graphically  
in two dimensional plane

$$2x + y \geq 6$$



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**38.** solve the following inequalities graphically  
in two dimensional plane

$$3x + 4y \leq 12$$



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**39.** solve the following inequalities graphically  
in two dimensional plane

$$y + 8 \geq 2x$$



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**40. Solve graphically  $x - y \leq 2$**



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**41. Solve graphically  $2x - 3y > 6$**



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42. Solve graphically  $-3x + 2y \geq -6$



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43. solve the following inequalities graphically  
in two dimensional plane

$$3y - 5x < 30$$



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44. Solve graphically  $y < -2$



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**45.** Solve graphically  $x > -3$



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**46.** Solve the following inequalities graphically:

$$x + y \geq 5, x - y \leq 3$$



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**47.** Solve the following system of linear inequalities graphically

$$5x + 4y \leq 40. \quad x \geq 2$$

$$y \geq 3$$



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**48.** Solve the following system of inequalities graphically

$$8x + 3y \leq 100, \quad x \geq 0, \quad y \geq 0$$



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**49.** Solve the following system of inequality graphically.

$$x + 2y \leq 8, 2x + y \leq 8, x, y \geq 0.$$



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**50.** Solve the following system of inequalities graphically  $x \geq 3, y \geq 2$



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**51.** Solve the following system of inequalities graphically.

$$3x + 2y \leq 12, x \geq 1, y \geq 2$$



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**52.** Solve the following system of inequalities graphically  $2x + y \geq 6, 3x + 4y \leq 12$ .



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**53.** Solve the following system of inequalities

graphically  $x + y > 4$ ,  $2x - y > 0$



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**54.** Solve the following system of inequalities

graphically.

$2x - y > 1$ ,  $x - 2y < 1$



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**55.** Solve the following system of inequalities

graphically  $x + y \leq 6$ ,  $x + y \geq 4$



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**56.** Solve the following system of inequalities

graphically.

$2x + y \geq 8$ ,  $x + 2y \geq 10$



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**57.** Solve the following system of inequalities graphically.

$$x + y \leq 9, y > x, x \geq 0$$



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**58.** Solve the following system of inequalities graphically.  $5x + 4y \leq 20, x \geq 1, y \geq 2$



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**59.** Solve the following system of linear inequalities graphically.

$$3x + 4y \leq 60, x + 3y \leq 30, x \geq 0, y \geq 0$$



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**60.** Solve the following system of inequalities graphically.

$$2x + y \geq 4, x + y \leq 3, 2x - 3y \leq 6.$$



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**61.** Solve the following system of inequalities graphically.

$$x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$$



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**62.** Solve the following system of linear inequalities graphically.

$$4x + 3y \leq 60, y \geq 2x, x \geq 3, x, y \geq 0$$



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**63.** Solve the following system of linear inequalities graphically

$$3x + 2y \leq 150, x + 4y \leq 80, x \leq 15, x, y \geq 0$$



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**64.** Solve the following system of linear inequalities graphically.

$$x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$$



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65. Solve  $-8 \leq 5x - 3 < 7$



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66. Solve the inequality  $-5 \leq \left( \frac{5 - 3x}{2} \right) \leq 8$ .



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67. Solve the system of inequalities:

$$3x - 7 < 5 + x,$$

$$11 - 5x \leq 1$$



and represent the solutions on the number line.



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**68.** A solution is to be kept between  $68^{\circ} F$  and  $77^{\circ} F$ . What is the range in temperature in degree Celsius ( C ) if the Celsius Fahrenheit ( F ) conversion formula is given by  $F = \frac{9}{5}C + 32$



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**69.** A manufacture have 600 litres of a 12 % solution of acid. How many litres of a 30 % acid solution must be added to it so that acid content in the resulting mixture will be more than 15 % but less than 18 % ?



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**70.** Solve the following inequalities.

$$2 \leq 3x - 4 \leq 5$$



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71. Solve the following inequalities.

$$6 \leq -3(2x - 4) \leq 12$$



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72. Solve the following inequalities.

$$-3 \leq 4 - \frac{7x}{2} \leq 18$$



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**73.** Solve the following inequilities.

$$-15 < \frac{3(x - 2)}{5} \leq 0$$



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**74.** Solve the following inequilities.

$$-12 < 4 - \frac{3x}{-5} \leq 2$$



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**75.** Solve the following inequalities.

$$7 \leq \frac{3x + 11}{2} \leq 11$$



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**76.** Solve the following inequalities and represent the solution graphically on the real line.

$$5x + 1 > -24, 5x - 1 < 24$$



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77. Solve the following inequilities and represent the solution graphically on the real line.

$$2(x - 1) < x + 5, 3(x + 2) > 2 - x$$



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78. Solve the following inequalities and represent the solution graphically on the real line.

$$3x - 7 > 2(x - 6), 6 - x > 11 - 2x$$



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**79.** Solve the following inequalities and represent the solution graphically on the real line.

$$5(2x - 7) - 3(2x + 3) < 0, 2x + 19 \leq 6x + 47$$



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**80.** A solution is to be kept between  $68^{\circ} F$  and  $77^{\circ} F$ . What is the range in temperature in degree celcius ( C ) if the celcius fahrenheit ( F ) conversion formula is given by  $F = 9/5C + 32$



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**81.** A solution of 8 % boric acid is to be diluted by adding a 2 % boric acid solution 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 % solution, how many litres of the 2 % solution will have to be added.



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**82.** How many liters of water will have to be added to 1125 liters of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content ?



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**83.** 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 12 years old children find the range of their mental age.



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**84.** Verify that the solution set of the following linear inequations is empty:

$$x - 2y \geq 0, 2x - y \leq -2, x \geq 0, y \geq 0$$



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**85.** Solve  $|x| < 5$



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**86.** Solve  $3x - 7 < x + 3$  when

(i)  $x$  is a natural number ii)  $x$  is an integer (iii)

$x$  is a real number



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**87.** Solve the following system of linear inequations:

$$2x + 6 \geq 0, 4x - 7 < 0$$



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88. Draw the graph of  $-3x + 2y \geq -6$

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89. If  $\frac{a}{b} \geq \frac{c}{d}$ , then

show that:

(i)  $ad \geq bc$  if  $b$  and  $d$  are of same sign.

(ii)  $ad \leq bc$  if  $b$  and  $d$  are of opposite sign.

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**90.** A company manufactures cassettes and its cost equation for a week is  $C = 300 + 1.5x$  and its revenue equation is  $R = 2x$ , where  $x$  is the number of cassettes sold in a week. How many cassettes must be sold for the company to realize a profit?



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**91.** Solve the inequalities

$$2x + \frac{3}{4} > 3, x - \frac{4}{-3} < 2$$



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**92.** Solve the following system of inequalities:

$$2x - 7 \geq 0, x - \frac{4}{x} + 4 > 1$$



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**93.** Solve the following system of inequalities:

$$|2x + 3| \leq 4, |x - 4| \geq 7$$



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**94.** The water acidity in a pool is considered normal when the average Ph reading of three daily measurements is between 7.1 and 7.6. If the first two Ph reading are 7.18 and 7.55 and if the third reading is  $x$ , find the range of Ph value for the third reading that result in the acidity level being normal.



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**95.** Graphically solve the system of linear inequalities.  $x \geq 5, y \geq 2$ .



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