



## MATHS

### NCERT - NCERT MATHEMATICS (GUJRATI)

#### LINEAR INEQUALITIES

##### Example

1. Solve  $30x < 200$  when

(i)  $x$  is a natural number.

(ii)  $x$  is an integer.



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2. Solve  $4x + 3 < 6x + 7$ .



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3. Solve  $\frac{5 - 2x}{3} \leq \frac{x}{6} - 5$ .



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



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



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6. 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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7. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.



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



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



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10. Solve  $y < 2$  graphically.



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11. Solve the following system of linear inequalities graphically.

$$x + y \geq 5 \quad \dots(1)$$

$$x - y \leq 3 \quad \dots(2)$$



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

$$5x + 4y \leq 40 \quad \dots(1)$$

$$x \geq 2 \quad \dots(2)$$

$$y \geq 3 \quad \dots(3)$$



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

$$8x + 3y \leq 100 \quad \dots(1)$$

$$x \geq 0 \quad \dots(2)$$

$$y \geq 0 \quad \dots(3)$$



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

$$x + 2y \leq 8 \quad \dots(1)$$

$$2x + y \leq 8 \quad \dots(2)$$

$$x \geq 0 \quad \dots(3)$$

$$y \geq 0 \quad \dots(4)$$



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



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**16. Solve  $-5 \leq \frac{5 - 3x}{2} \leq 8$ .**



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**17.** Solve the system of inequalities:

$$3x - 7 < 5 + x \quad \dots(1)$$

$$11 - 5x \leq 1 \quad \dots(2)$$



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**18.** In an experiment, a solution of hydrochloric acid is to be kept between  $30^{\circ}$  and  $35^{\circ}$  Celsius.

What is the range of temperature in degree Fahrenheit if conversion formula is given by

$$C = \frac{5}{9}(F - 32), \text{ where } C \text{ and } F \text{ represent}$$

temperature in degree Celsius and degree Fahrenheit, respectively.



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**19.** A manufacturer has 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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## Exercise 6 1

1. Solve  $24x < 100$ , when

(i)  $x$  is a natural number,

(ii)  $x$  is an integer.



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2. Solve  $-12x > 30$ , when

(i)  $x$  is a natural number.

(ii)  $x$  is an integer.



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**3. Solve  $5x - 3 < 7$ , when**

(i)  $x$  is an integer.

(ii)  $x$  is a real number.



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**4. Solve  $3x + 8 > 2$ , when**

(i)  $x$  is an integer.

(ii)  $x$  is a real number.



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## Exercise 6 1 Solve The Inequalities In Exercises 5 To 16 For Real X

1.  $4x + 3 < 5x + 7$



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2.  $3x - 7 > 5x - 1$



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



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$$4. 3(2 - x) \geq 2(1 - x)$$



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$$5. x + \frac{x}{2} + \frac{x}{3} < 11$$



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$$6. \frac{3(x - 2)}{5} \leq \frac{5(2 - x)}{3}$$



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$$7. \frac{1}{2} \left( \frac{3x}{5} + 4 \right) \geq \frac{1}{3} (x - 6)$$



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$$8. 2(2x + 3) - 10 < 6(x - 2)$$



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$$9. 37 - (3x + 5) \geq 9x - 8(x - 3)$$



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



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



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**Exercise 6 1 Solve The Inequalities In Exercises 17 To 20 And Show The Graph Of The Solution In Each Case On Number Line**



1.  $3x - 2 < 2x + 1$



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2.  $5x - 3 \geq 3x - 5$



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



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



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



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6. 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 first four examinations are 87, 92, 94 and 95, find minimum marks that Sunita must obtain in fifth examination to get grade 'A' in the course.



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7. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such

that their sum is more than 11.



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**8.** 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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**9.** 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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**10.** A man wants to cut three lengths from a single piece of Board of length 91 cm . The second length is to be 3cm longer than the shortest and third length is to be twice long as shortest .what are the possible lengths of shortest board if the third piece is to be 5cm longer than second piece ?



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## Exercise 6 2 Solve The Following Inequalities Graphically In Two Dimensional Plane

1.  $x + y < 5$



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2.  $2x + y \geq 6$



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



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**4.**  $y + 8 \geq 2x$



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**5.**  $x - y \leq 2$



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**6.**  $2x - 3y < 6$



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**7.**  $-3x + 2y \geq -6$



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**8.**  $3y - 5x < 30$



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9.  $y < -2$



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10.  $x > -3$ .



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## Exercise 6 3 Solve The Following System Of Inequalities Graphically

1.  $x \geq 3, y \geq 2$



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



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$$3. 2x + y \geq 6, 3x + 4y \leq 12$$



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$$4. x + y \geq 4, 2x - y < 0$$





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$$5. 2x - y > 1, x - 2y < -1$$



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



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$$7. 2x + y \geq 8, x + 2y \geq 10$$



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**8.**  $x + y \leq 9, y > x, x \geq 0$



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**9.**  $5x + 4y \leq 20, x \geq 1, y \geq 2$



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**10.**  $3x + 4y \leq 60, x + 3y \leq 30, x \geq 0, y \geq 0$



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**11.**  $2x + y \geq 4, x + y \leq 3, 2x - 3y \geq 6$



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



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**13.**  $4x + 3y \leq 60, y \geq 2x, x \geq 3, x, y \geq 0$



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14.

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



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15.

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



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**Exercise Miscellaneous Exercise On Chapter 6 Solve  
The Inequalities In Exercises 1 To 6**

$$1. 2 \leq 3x - 4 \leq 5$$



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



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



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4.  $-14 < \frac{3(x - 2)}{5} \leq 0$



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



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6.  $7 \leq \frac{(3x + 11)}{2} \leq 11.$



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## Exercise Miscellaneous Exercise On Chapter 6 Solve The Inequalities In Exercises 7 To 10 And Represent The Solution Graphically On Number

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



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



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



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4.

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

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Exercise Miscellaneous Exercise On Chapter 6

1. A solution is to be kept between  $68^{\circ}\text{F}$  and  $77^{\circ}\text{F}$ . 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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2. 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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3. How many litres of water will have to be added to 1125 litres 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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4. 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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