



MATHS

NCERT - NCERT MATHEMATICS (ENGLISH)

LINEAR INEQUALITIES

Miscellaneous Exercise

1. Solve the inequalities : $-12 < 4 - \frac{3x}{-5} \leq 2$



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2. Solve the inequalities and represent the solution graphically on number line.

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



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3. Solve the inequalities : $-3 \leq 4 - \frac{7x}{2} \leq 18$



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4. 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 there are 640 litres of the 8% solution, how many litres of 2% solution will have to be added?



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5. Solve the inequalities : $-15 < \frac{3(x - 2)}{5} \leq 0$



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6. Solve the inequalities :

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



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7. Solve the inequalities : $2 \leq 3x - 4 \leq 5$.



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8. Solve the inequalities and represent the solution graphically on number line.

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



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9. Solve the inequalities and represent the solution graphically on number line.

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



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10. Solve the inequalities : $7 \leq \frac{(3x + 11)}{2} \leq 11$



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11. IQ of a person is given by 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 year children, find the range of their mental age.



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12. 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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13. 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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14. Solve the inequalities and represent the solution graphically on number line.

$$5(2x - 7) - 3(2x + 3) \leq 0, 2x + 19 \leq 6x + 4y$$

.



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Exercise 6 1

1. A man wants to cut three lengths from a single piece of board of length 91cm. 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 5cm longer than the second?



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2. Solve the inequalities for real x :

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



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3. Solve the inequalities for real x : $\frac{x}{3} > \frac{x}{2} + 1$



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4. Solve the inequalities for real x :

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



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5. Solve the inequalities for real x :

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



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6. Solve the inequalities for real x :

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



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7. Solve the inequalities for real x :

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



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8. Solve the inequalities and show the graph of the solution in each case on number line :

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



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9. Solve the inequalities for real x :

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



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10. Solve the inequalities and show the graph of the solution in each case on number line :

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



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11. Solve the inequalities and show the graph of the solution in each case on number line :

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



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12. Solve the inequalities for real x :

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



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13. Solve the inequalities for real x :

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



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14. Solve $3x + 8 > 2$, when

(i) x is a natural number.

(ii) x is an integer



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15. Solve the inequalities for real x :

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



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

(i) x is a natural number.

(ii) x is an integer





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

(i) x is a natural number.

(ii) x is an integer



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18. Solve $24x < 100$, when

(i) x is a natural number.

(ii) x is an integer.



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19. Solve the inequalities and show the graph of the solution in each case on number line :

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



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



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21. 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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22. Find all pairs of consecutive odd positive integers both of the which are taller than 10 such that their sum is more than 11.



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23. 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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24. The longest side of a triangle is three 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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25. Solve the inequalities for real x :

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



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26. Solve the inequalities for real x :

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



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Exercise 6 3

1. Solve the system of inequalities graphically :

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



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2. Solve the system of inequalities graphically :

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



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3. Solve the system of inequalities graphically :

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



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4. Solve the system of inequalities graphically :

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



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5. Solve the system of inequalities graphically :

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



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6. Solve the system of inequalities graphically :

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



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7. Solve the system of inequalities graphically :

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



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8. Solve the system of inequalities graphically :

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



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9. Solve the system of inequalities graphically :

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



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10. Solve the system of inequalities graphically :

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



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11. Solve the system of inequalities graphically :

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



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12. Solve the system of inequalities graphically :

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



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13. Solve the system of inequalities graphically :

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



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14. Solve the system of inequalities graphically :

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



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15. Solve the system of inequalities graphically :

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



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Solved Examples

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



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



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



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4. Solve the following linear inequation in \mathbb{R} : $(5 - 2x)/3$



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



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



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



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



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



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10. 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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11. Solve the following system of linear inequalities graphically. $x + y \geq 5$. . . (i)
 $x - y \leq 3$. . . (ii)



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12. Solve the following system of inequalities graphically $5x + 4y \leq 40$. . . (i) $x \geq 2$. . . (ii) $y \geq 3$. . .



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



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14. Solve $y < 2$ graphically.



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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 following system of inequalities

$$8x + 3y \leq 100 \dots (i) \quad x \geq 0 \dots (ii) \quad y \geq 0 \dots (iii)$$



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18. Solve the following system of inequalities

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

$$x \geq 0 \dots (iii) \quad y \geq 0 \dots (iv)$$



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19. Solve the system of inequalities :

$$3x - 7 < 5 + x, \quad 11 - 5x \leq 1 \quad \text{and} \quad \text{represent}$$

the solutions on the number line.



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20. In an experiment, a solution of hydrochloric acid is to be kept between 30° and 35° Celsius.

What is the range of temperature in degree

Fahrenheit if conversion formula is given by $C =$

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

in deg



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Exercise 6 2

1. Represent to solution set of each of the following inequation graphically in two dimensional plane: $-3x + 2y \leq 6$



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2. Represent to solution set of each of the following inequation graphically in two

dimensional plane: $3y > 6 - 2x$



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3. Solve the inequalities graphically in two-dimensional plane: $x - y \leq 2$



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4. Solve the inequalities graphically in two-dimensional plane: $y + 8 \geq 2x$



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5. Solve the inequalities graphically in two-dimensional plane: $3x + 4y \leq 12$



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6. Represent to solution set of each of the following inequation graphically in two dimensional plane: $x + 2y \geq 6$



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7. Solve the inequalities graphically in two-dimensional plane: $x + y < 5$



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8. Solve the inequalities graphically in two-dimensional plane: $y < 2$



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9. Solve the inequalities graphically in two-dimensional plane: $3y - 5x < 30$



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10. Solve the inequalities graphically in two-dimensional plane: $x > -3$



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