



MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

LINEAR INEQUATIONS (IN ONE VARIABLE)

Solved Examples

1. Solve $5x < 24$ when (i) $x \in N$, (ii) $x \in Z$.

In each, case, represent the solution set on the number line.



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2.

Solve

$12 + 1\frac{5}{6}x \leq 5 + 3x$ when (i) $x \in N$, (ii) $x \in R$.

Draw the graph of the solution set in each case.



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3. Solve $\frac{x + 4}{x - 2} > 0$ and draw the graph of the solution set.



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4. Solve $\frac{x - 3}{x + 4} < 0$ and draw the graph of the solution set.



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5. Solve $\frac{x - 2}{x + 5} > 2$.



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6. Solve $\frac{5}{x-2} > 3$ and represent the solution set on the number line.

A. 1

B.

C.

D. 1

Answer:



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7. Solve $|4 - x| < 2$.



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8. Solve $|3x - 2| \leq \frac{1}{2}, x \in R$.



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9. Solve $|x + 1| > 4, x \in R$.



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10. Solve $|3 - 4x| \geq 9, x \in R.$



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11. Solve $\frac{2}{|x - 3|} > 5, x \in R.$



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12. $\frac{|x - 2| - 1}{|x - 2| - 2} \leq 0$



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13. Solve $\frac{|x + 3| + x}{x + 2} > 1, x \in R.$



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14. Solve $|x - 1| + |x - 2| \geq 4, x \in R.$



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15. Solve the inequation

$-3 \leq 3 - 2x < 9, x \in R.$ Represent the

solution set on the real line.



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16. Solve the inequation

$$2x - 3 < x + 2 \leq 3x + 5, x \in R.$$

Draw the graph of the solution set.



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17. Solve the system of inequations

$$2x - 1 > x + \frac{7 - x}{3} > 2, x \in R.$$

Represent the solution set on the number line.



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18. Solve the system of inequations

$$-5 \leq \frac{2 - 3x}{4} \leq 9.$$



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19. Solve the system of inequations:

$$\frac{6x}{4x - 1} < \frac{1}{2}, \quad \frac{x}{2x + 1} \geq \frac{1}{4}.$$



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20. Solve the system of inequation:

$$|x - 1| \leq 5, |x| \geq 2.$$



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Word Problems Example

1. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

A. (1, 3) and (5, 7)

B. (3, 5) and (5, 7)

C. (3, 5) and (7, 9)

D. (5, 7) and (7, 9)

Answer: D



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2. 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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3. 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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4. The cost and revenue functions of a product are given by

$$C(x) = 20x + 4000 \text{ and } R(x) = 60x + 2000$$

respectively, where x is the number of items produced and sold. How many items must be sold to realise some profit?



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5. A man wants to cut three lengths from a single piece of cloth 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 piece of cloth if the third piece is to be at least 5 cm longer than the second.



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6. In drilling world's deepest hole it was found that the temperature $T(x)$ in degree Celsius, x km below the earth's surface was given by $T(x) = 30 + 25(x - 3)$, $3 \leq x \leq 15$. At what depth will the temperature be between $155^\circ C$ and $205^\circ C$?



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7. A manufacturer has 460 litres of a 9% acid solution. How many litres of a 3% acid solution must be added to it so that the acid content in the resulting mixture be more than 5% but less than 7%?



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8. A solution is to be kept between $40^{\circ}C$ and $45^{\circ}C$. What is the range of temperature in degree fahrenheit, if the conversion formula is $F = \frac{9}{5}C + 32$?



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9. 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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Exercise 6 A

1. Fill in the blanks with correct inequality sign

($>$, $<$, \geq , \leq).

(i) $5x < 20 \Rightarrow x \dots\dots 4$

(ii) $-3x > 9 \Rightarrow x \dots\dots -3$

(iii) $4x > -16 \Rightarrow x \dots\dots -4$

(iv) $-6x \leq -18 \Rightarrow x \dots\dots 3$

(v) $x > -3 \Rightarrow -2x \dots\dots 6$

(vi) $a < b$ and $c < 0 \Rightarrow \frac{a}{c} \dots\dots \frac{b}{c}$

(vii) $p - q = -3 \Rightarrow p \dots\dots q$

(viii) $u - v = 2 \Rightarrow u \dots\dots v$



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2. Solve each of the following inequations and represent the solution set on the number line.

$$6x \leq 25, \quad \text{where } (i)x \in N, \quad (ii)x \in Z.$$



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3. Solve each of the following inequations and represent the solution set on the number line.

$$-2x > 5, \quad \text{where } (i)x \in Z, \quad (ii)x \in R.$$



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4. Solve each of the following inequations and represent the solution set on the number line.

$$3x + 8 > 2, \quad \text{where } (i)x \in Z, \quad (ii)x \in R$$

.



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5. Solve each of the following inequations and represent the solution set on the number line.

$$5x + 2 < 17, \quad \text{where } (i)x \in Z, \quad (ii)x \in R$$

.



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6. Solve each of the following inequations and represent the solution set on the number line.

$$3x - 4 > x + 6, \quad \text{where } x \in R.$$



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7. Solve each of the following inequations and represent the solution set on the number line.

$$3 - 2x \geq 4x - 9, \quad \text{where } x \in R.$$



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8. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{5x - 8}{3} \geq \frac{4x - 7}{2} \quad \text{where } x \in R.$$



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9. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{5x}{4} - \frac{4x - 1}{3} > 1, \quad \text{where } x \in R.$$



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10. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{1}{4} \left(\frac{2}{3}x + 1 \right) \geq \frac{1}{3}(x - 2), \quad \text{where } x \in R.$$



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11. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{2x - 1}{12} - \frac{x - 1}{3} \leq \frac{3x + 1}{4}, \quad \text{where } x \in R.$$

A. $(0, \infty)$

B. $(-\infty, 0)$

C. R

D. None of these

Answer: A



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12. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{x}{4} < \frac{(5x - 2)}{3} - \frac{(7x - 3)}{5}, \quad \text{where } x \in R.$$

A. $(4, \infty)$

B. $(-\infty, 4)$

C. $[4, \infty)$

D. None of these

Answer: A



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13. Solve each of the following inequations and represent the solution set on the number line.

$$\frac{(2x - 1)}{3} \geq \frac{(3x - 2)}{4} - \frac{2 - x}{5}, \quad \text{where } x \in R$$

.



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14. Solve:

$$\frac{x - 3}{x + 1} < 0, x \in R$$



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15. Solve:

$$\frac{x - 3}{x + 4} > 0, x \in R$$



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16. Solve:

$$\frac{2x - 3}{3x - 7} > 0, x \in R$$



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17. Solve:

$$\frac{x - 7}{x - 2} \geq 0, x \in R$$



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18. Solve:

$$\frac{3}{x-2} > 2, x \in R$$



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19. Solve:

$$\frac{1}{x-1} \leq 2, x \in R$$



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20. Solve:

$$\frac{5x + 4}{4 - x} < 2, x \in R$$



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21. Solve:

$$|3x - 7| > 4, x \in R$$



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22. Solve:

$$|5 - 2x| \leq 3, x \in R$$



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23. Solve:

$$|4x - 5| \leq \frac{1}{3}, x \in R$$



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24. Solve:

$$\frac{1}{|x| - 3} \leq \frac{1}{2}, x \in R$$



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25. Solve:

$$\frac{|x + 2| - x}{x} < 2, x \in R$$



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26. Solve:

$$\left| \frac{2x - 1}{x - 1} \right| > 2, x \in \mathbb{R}$$



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27. Solve:

$$\frac{|x - 3|}{x - 3} > 0, x \in \mathbb{R}$$



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28. Solve:

$$\frac{|x| - 1}{|x| - 2} \geq 0, x \in \mathbb{R} - \{-2, 2\}$$



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29. Solve:

$$\frac{1}{2 - |x|} \geq 1, x \in \mathbb{R} - \{-2, 2\}$$



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30. Solve:

$$|x + 1| + |x| > 3, x \in R$$



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31. Solve:

$$\left| \frac{2}{x - 4} \right| > 1, x \neq 4$$

A. $(2, 1) \cup (4, 6)$

B. $(2, 6]$

C. $(2, 4) \cup (4, 6)$

D. None of these

Answer: C



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32. Solve the following systems of linear inequations:

$$\frac{4}{x+1} \leq 3 \leq \frac{6}{x+1}, x > 0$$



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33. Solve the following systems of linear inequations:

$$-11 \leq 4x - 3 \leq 13$$



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34. Solve the following systems of linear inequations:

$$5x - 7 < 3(x + 3), 1 - \frac{3x}{2} \geq x - 4$$



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35. Solve the following systems of linear inequations:

$$-2 < \frac{6 - 5x}{4} < 7$$



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36. Solve the following systems of linear inequations:

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



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37. Solve the following systems of linear inequations:

$$\frac{7x - 1}{2} < -3, \frac{3x + 8}{5} + 11 < 0$$



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38. Solve the following systems of linear inequations:

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



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39. Solve the following systems of linear inequations:

$$1 \leq |x - 2| \leq 3$$



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40. Find all pairs of consecutive odd positive integers, both of which are smaller than 18, such that their sum is more than 20.



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41. Find all pairs of consecutive even positive integers both of which are larger than 8 such

that their sum is less than 25.



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42. A company manufactures cassettes. Its cost and revenue functions are $C(x)=26000+30x$ and $R(x)= 43x$, respectively, where x is the number of cassettes produced and sold in a week. How many cassettes must be sold by the company to realise some profit ?



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43. The water acidity in a pool is considered normal when the average pH reading of three daily measurements is between 8.2 and 8.5. If the first two pH readings are 8.48 and 8.35, then find the range of pH value for the third reading that will result in the acidity level being normal.



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44. 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



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45. 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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46. To receive grade A in a course one must obtain an average of 90 marks or more in five papers, each of 100 marks. If Tanvy scored 89, 93, 95 and 91 marks in first four papers, find the minimum marks that she must score in the last paper to get grade A in the course.

A. 81 marks

B. 82 marks

C. 83 marks

D. 84 marks

Answer: B



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Exercise 6 B

1. Find the solution set of the inequation

$$\frac{1}{x - 2} < 0.$$



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2. Find the solution set of the inequation

$$|x - 1| < 2.$$



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3. Find the solution set of the inequation

$$|2x - 3| > 1.$$



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4. Find the solution set of the inequation

$$\frac{|x - 2|}{(x - 2)} > 0, \neq 2.$$



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5. Find the solution set of the inequation

$$\frac{x + 1}{x + 2} > 1.$$



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6. Solve the sytem of inequation

$$x - 2 \geq 0, 2x - 5 \leq 3.$$



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7. Solve $-4x > 16$, when $x \in \mathbb{Z}$.



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8. Solve $x + 5 > 4x - 10$, when $x \in R$.

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9. Solve $\frac{3}{x - 2} < 1$, when $x \in R$.

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10. Solve $\frac{x}{x - 5} > \frac{1}{2}$, when $x \in R$.

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11. Solve $|x| < 4$, when $x \in R$.



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12. Solve $|x| > 4$, when $x \in R$.



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