

Linear Inequalities — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Linear Inequalities in One Variable

MCQ Questions (choose the correct option)

- The solution of $x + 3 > 7$ is
 - $x > 4$
 - $x < 4$
 - $x > 10$
 - $x < 10$
- The inequality $2x < 8$ is equivalent to
 - $x < 4$
 - $x > 4$
 - $x < 16$
 - $x > 16$
- If x is a natural number, the solution set of $x + 3 > 7$ is
 - $\{5, 6, 7, \dots\}$
 - $\{4, 5, 6, \dots\}$
 - $\{1, 2, 3\}$
 - $\{0, 1, 2\}$
- The inequality $-3x > 9$ gives
 - $x < -3$
 - $x > -3$
 - $x < 3$
 - $x > 3$

1 Mark Questions

- Solve $x + 3 > 7$.
- Solve $2x < 8$.
- Solve $-3x > 9$.

2 Mark Questions

- Solve $5x - 3 < 3x + 1$ and represent the solution on a number line.
- Solve $3x + 8 > 2$ when x is a natural number.

3 Mark Questions

- Solve $5x - 3 < 7$, when (i) x is an integer, (ii) x is a real number.
- Solve $3(2 - x) \geq 2(1 - x)$ and represent the solution on the number line.

Rules for Manipulating Inequalities

MCQ Questions (choose the correct option)

- Adding the same number to both sides of an inequality
 - does not change the inequality sign
 - reverses the inequality sign
 - makes it an equation
 - removes the inequality
- Multiplying both sides of an inequality by a negative number
 - reverses the inequality sign
 - keeps the sign unchanged
 - makes both sides equal
 - is not allowed
- If $a > b$, then $a + c$ is
 - $> b + c$
 - $< b + c$
 - $= b + c$
 - unrelated to $b + c$
- If $a > b$ and $c < 0$, then ac is
 - $< bc$
 - $> bc$
 - $= bc$
 - 0

1 Mark Questions

- State the rule for adding the same number to both sides of an inequality.
- What happens to the inequality sign when both sides are multiplied by a negative number?
- If $a > b$, what can you say about $a + c$ and $b + c$?

2 Mark Questions

- Solve $4x + 3 < 6x + 7$.
- Explain the rules for manipulating inequalities with one example each.

3 Mark Questions

- State and illustrate the rules for solving inequalities (addition, subtraction, multiplication and division by positive and negative numbers).
- Solve $2(2x + 3) - 3(x - 1) \leq 6x + 4$ and state the rule used at each step.

Solving Systems of Linear Inequalities in One Variable

MCQ Questions (choose the correct option)

- The solution of the system $x > 2$ and $x < 5$ is
 - $2 < x < 5$
 - $x > 5$
 - $x < 2$
 - no solution
- The solution of $x + 1 \geq 3$ and $x - 2 \leq 4$ is

- (A) $2 \leq x \leq 6$
 (B) $x \geq 2$
 (C) $x \leq 6$
 (D) no solution
3. The solution set of $x < 1$ and $x > 3$ is
 (A) empty
 (B) all reals
 (C) $1 < x < 3$
 (D) $\{1, 2, 3\}$
4. If $2 < x \leq 4$ and x is an integer, x can be
 (A) 3, 4
 (B) 2, 3
 (C) 2, 3, 4
 (D) 3

1 Mark Questions

- Solve the system $x > 2$ and $x < 5$.
- Solve $x + 1 \geq 3$ and $x - 2 \leq 4$.
- What is the solution set of $x < 1$ and $x > 3$?

2 Mark Questions

- Solve the system $3x - 7 < 5 + x$ and $11 - 5x \leq 1$.
- Solve $5(2x - 7) - 3(2x + 3) \leq 0$ and $2x + 19 \leq 6x + 47$.

3 Mark Questions

- Solve the following system of inequalities: $2x + 1 > 3$ and $3x - 2 \leq 5$, and represent the solution on the number line.
- Solve $3x - 7 < 5 + x$ and $11 - 5x \leq 1$, and represent the combined solution on a number line.

Absolute-Value Inequalities

MCQ Questions (choose the correct option)

- The solution of $|x| < 3$ is
 (A) $-3 < x < 3$
 (B) $x < 3$
 (C) $x > -3$
 (D) $x > 3$ or $x < -3$
- The solution of $|x| > 2$ is
 (A) $x < -2$ or $x > 2$
 (B) $-2 < x < 2$
 (C) $x > 2$
 (D) $x < -2$
- $|x - 2| < 1$ is equivalent to
 (A) $1 < x < 3$
 (B) $x < 3$
 (C) $x > 1$

(D) $x < 1$ or $x > 3$

4. The solution of $|2x - 1| \leq 3$ is

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

(B) $x \leq 2$

(C) $x \geq -1$

(D) $x \leq -1$ or $x \geq 2$

1 Mark Questions

1. Solve $|x| < 3$.

2. Solve $|x| > 2$.

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

2 Mark Questions

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

2. Solve $|x + 3| \geq 5$.

3 Mark Questions

1. Solve the inequality $|2x - 3| \leq 5$ and represent the solution on the number line.

2. Solve $|3x - 4| \geq 2$ and write the solution set.

Linear Inequalities in Two Variables

MCQ Questions (choose the correct option)

1. The inequality $x + y < 5$ in two variables represents

(A) a half-plane

(B) a line

(C) a circle

(D) a single point

2. The point $(0, 0)$ with respect to $x + y < 5$ lies

(A) inside the half-plane of the solution

(B) on the boundary line

(C) outside the solution region

(D) on the y-axis only

3. For the inequality $x + y \leq 5$, the boundary line is

(A) $x + y = 5$

(B) $x + y = 0$

(C) $x = 5$

(D) $y = 5$

4. The solution region of a linear inequality in two variables is

(A) a half-plane including its boundary (for $\leq$ or $\geq$)

(B) a single line

(C) a circle

(D) the entire plane

1 Mark Questions

1. What region does the inequality $x + y < 5$ represent?
2. What is the boundary line for $x + y \leq 5$?
3. Does the point $(0, 0)$ satisfy $x + y < 5$?

2 Mark Questions

1. Solve the inequality $2x + y \geq 6$ graphically.
2. Represent the solution of $x + y < 5$ in the first quadrant graphically.

3 Mark Questions

1. Solve the inequality $3x + 2y > 6$ graphically and shade the solution region.
2. Draw the graph of $x + y \leq 5$ and determine whether the solution region includes the boundary.

Graphical Solution of Systems of Linear Inequalities

MCQ Questions (choose the correct option)

1. The solution of a system of linear inequalities in two variables is
 - (A) the intersection of the half-planes
 - (B) the union of the half-planes
 - (C) a single line
 - (D) an empty set always
2. The feasible region of a system of inequalities is
 - (A) the common region satisfying all inequalities
 - (B) the boundary of one inequality
 - (C) the origin only
 - (D) the x-axis
3. If the half-planes do not overlap, the system has
 - (A) no solution
 - (B) one solution
 - (C) infinitely many solutions
 - (D) two solutions
4. A feasible region is a bounded region if it can be enclosed within
 - (A) a circle
 - (B) a single line
 - (C) a ray
 - (D) a point

1 Mark Questions

1. What is the solution of a system of linear inequalities in two variables?
2. Define the feasible region.
3. When does a system of inequalities have no solution?

2 Mark Questions

1. Solve the system $x \geq 0, y \geq 0, x + y \leq 5$ graphically.
2. Solve the system $x + 2y \leq 8, x \geq 0, y \geq 0$ graphically.

3 Mark Questions

1. Solve the following system of inequalities graphically: $x + y \geq 4$, $2x + y \geq 6$, $x \geq 0$, $y \geq 0$.
2. Solve graphically: $x + y \leq 6$, $x + y \geq 4$, $x \geq 0$, $y \geq 0$ and determine whether the feasible region is bounded.

Word Problems

MCQ Questions (choose the correct option)

1. If x is the number of items and each costs ₹5, the cost $5x \leq 100$ means
 - (A) $x \leq 20$
 - (B) $x \geq 20$
 - (C) $x = 20$
 - (D) $x > 20$
2. A student has ₹200 and notebooks cost ₹25 each. The maximum number of notebooks is
 - (A) 8
 - (B) 7
 - (C) 9
 - (D) 10
3. The sum of two consecutive odd integers is greater than 20. If the smaller is x , then
 - (A) $2x + 2 > 20$
 - (B) $2x > 20$
 - (C) $2x + 1 > 20$
 - (D) $x > 20$
4. If a bus can carry at most 50 people and x are seated, the inequality is
 - (A) $x \leq 50$
 - (B) $x \geq 50$
 - (C) $x < 50$
 - (D) $x = 50$

1 Mark Questions

1. A student has ₹200 and notebooks cost ₹25 each. Write an inequality for the maximum number of notebooks.
2. Write an inequality for the sum of two consecutive odd integers being greater than 20.
3. A bus carries at most 50 people. Write an inequality if x are seated.

2 Mark Questions

1. A company makes ₹100 profit per item and wants at least ₹2000 profit. Write and solve an inequality for the number of items.
2. The length of a rectangle is 5 cm more than its breadth. If the perimeter is less than 50 cm, write an inequality for the breadth.

3 Mark Questions

1. 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?
2. 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 the acid content in the resulting mixture is more than 15% but less than 18%?