

MATHEMATICS • CLASS 11

CHAPTER 5

Linear Inequalities

NCERT SOLUTIONS



EXERCISE 5.1 — QUESTIONS 1–2

Q1. Solve $24x < 100$.

Solution: Divide both sides by the positive number 24.

$$x < \frac{100}{24} = \frac{25}{6} = 4\frac{1}{6}.$$

(i) Natural-number solutions:
 $\{1, 2, 3, 4\}.$

(ii) Integer solutions:
 $\{\dots, -2, -1, 0, 1, 2, 3, 4\},$
equivalently integers $x \leq 4$.

Q2. Solve $-12x > 30$.

Solution: Divide both sides by the negative number -12 and reverse the inequality.

$$x < \frac{30}{-12} = -\frac{5}{2}.$$

(i) No natural-number solution:
empty set $\emptyset$.

(ii) Integer solutions:
 $\{\dots, -5, -4, -3\},$
equivalently integers $x \leq -3$.

EXERCISE 5.1 — QUESTIONS 3–4

Q3. $5x - 3 < 7 \Rightarrow 5x < 10 \Rightarrow x < 2.$

Solving the inequality, we get $x < 2.$

(i) Integers:

The integers less than 2 are

$$\{\dots, -2, -1, 0, 1\}.$$

(ii) Real numbers:

The solution set in real numbers is

$$x \in (-\infty, 2).$$

Q4. $3x + 8 > 2 \Rightarrow 3x > -6 \Rightarrow x > -2.$

Solving the inequality, we get $x > -2.$

(i) Integers:

The integers greater than -2 are

$$\{-1, 0, 1, 2, \dots\}.$$

(ii) Real numbers:

The solution set in real numbers is

$$x \in (-2, \infty).$$

EXERCISE 5.1 — QUESTIONS 5–8

Q5. $4x + 3 < 5x + 7$

Subtract $5x$ from both sides.

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

$$-x + 3 < 7$$

Subtract 3 from both sides.

$$-x < 4$$

Multiply by -1 (reverse the inequality).

$$x > -4.$$

Q6. $3x - 7 > 5x - 1$

Subtract $5x$ from both sides.

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

$$-2x - 7 > -1$$

Add 7 to both sides.

$$-2x > 6$$

Divide by -2 (reverse the inequality).

$$x < -3.$$

Q7. $3(x - 1) \leq 2(x - 3)$

Expand both sides.

$$3x - 3 \leq 2x - 6$$

Subtract $2x$ from both sides.

$$x - 3 \leq -6$$

Add 3 to both sides.

$$x \leq -3.$$

Q8. $3(2 - x) \geq 2(1 - x)$

Expand both sides.

$$6 - 3x \geq 2 - 2x$$

Add $3x$ to both sides.

$$6 \geq 2 + x$$

Subtract 2 from both sides.

$$x \leq 4.$$

EXERCISE 5.1 — QUESTIONS 9–10

Q9. $x + \frac{x}{2} + \frac{x}{3} < 11.$

Multiply both sides by positive 6:

$$6x + 3x + 2x < 66$$

$$\Rightarrow 11x < 66$$

$$\Rightarrow x < 6.$$

Q10. $\frac{x}{3} > \frac{x}{2} + 1.$

Multiply both sides by positive 6:

$$2x > 3x + 6$$

$$\Rightarrow -x > 6$$

Multiply by -1 and reverse the inequality:

$$\Rightarrow x < -6.$$



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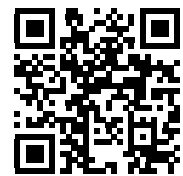


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