

CHAPTER-6

LINEAR INEQUALITIES

Two marks Questions:

I 1) Solve $30x < 200$ when

i) x is a natural number, ii) x is an integer. (k)

2) Solve $24x < 100$, when

i) x is a natural number. ii) x is an integer. (k)

3) Solve $-12x > 30$, when

i) x is a natural number. ii) x is an integer. (k)

4) Solve $5x - 3 < 3x + 1$ when

i) x is an integer, ii) x is a real number. (k)

5) Solve $5x - 3 < 7$, when

i) x is an integer. ii) x is a real number. (k)

6) Solve $3x + 8 > 2$, when

i) x is an integer. ii) x is a real number. (k)

II. Solve following inequalities for real number x

1) $4x + 3 < 6x + 7$ (k)

2) $4x + 3 < 5x + 7$ (k)

3) $3x - 7 > 5x - 1$ (k)

4) $3(x - 1) \leq 2(x - 3)$ (k)

5) $3(2 - x) \geq 2(1 - x)$ (k)

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

7) $x + \frac{x}{2} + \frac{x}{3} < 11$ (U)

8) $\frac{x}{3} > \frac{x}{2} + 1$ (U)

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

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

11) $2(2x + 3) - 10 < 6(x - 2)$ (U)

$$12) 37 - (3x + 5) \geq 9x - 8(x - 3) \quad (U)$$

$$13) \frac{x}{4} < \frac{(5x-2)}{3} - \frac{(7x-3)}{5} \quad (U)$$

$$14) \frac{(2x-1)}{3} \geq \frac{(3x-2)}{4} - \frac{(2-x)}{5} \quad (U)$$

$$15) -8 \leq 5x = 3 < 7 \quad (A)$$

$$16) -5 \leq \frac{5-3x}{2} \leq 8 \quad (A)$$

$$17) 2 \leq 3x - 4 \leq 5 \quad (A)$$

$$18) 6 \leq 3(2x - 4) < 12 \quad (A)$$

$$19) -3 \leq 4 - \frac{7x}{2} \leq 18 \quad (A)$$

$$20) -15 < \frac{3(x-2)}{5} \leq 0 \quad (A)$$

$$21) -12 < 4 - \frac{3x}{-5} \leq 2 \quad (A)$$

$$22) 7 \leq \frac{(3x+11)}{2} \leq 11 \quad (A)$$

III) Solve the following inequalities and show the graph of the solution in each case on number line

$$1) 7x + 3 < 5x + 9 \quad (k)$$

$$2) \frac{3x-4}{2} \geq \frac{x+1}{4} - 1 \quad (U)$$

$$3) 3x - 2 < 2x + 1 \quad (k)$$

$$4) 5x - 3 \geq 3x - 5 \quad (k)$$

$$5) 3(1 - x) < 2(x + 4) \quad (k)$$

$$6) \frac{x}{2} \geq \frac{(5x-2)}{3} - \frac{(7x-3)}{5} \quad (U)$$

IV. 1) 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. (A)

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

3) 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. (A)

4) 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. (A)

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

6) Find all pairs of consecutive even positive integers, both of which are larger than 5 such that their sum is less than 23. (A)

V. Solve the following system of inequalities and represent the solution graphically on the number line.

1) $3x - 7 < 5 + x$, $11 - 5x \leq 1$ (A)

2) $5x + 1 > -24$, $5x - 1 < 24$ (A)

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

4) $3x - 7 > 2(x - 6)$, $6 - x > 11 - 2x$ (A)

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

VI. Solve the following Inequalities graphically in two-dimensional plane.

1) $3x + 2y > 6$ (k)

2) $3x - 6 \geq 0$ (k)

3) $y < 2$ (k)

4) $x + y < 5$ (k)

5) $2x + y \geq 6$ (k)

6) $3x + 4y \leq 12$ (k)

7) $y + 8 \geq 2x$ (k)

8) $x - y \leq 2$ (k)

9) $2x - 3y > 6$ (k)

10) $-3x + 2y \geq -6$ (k)

11) $3y - 5x < 30$ (k)

12) $y < -2$ (k)

13) $x > -3$ (k)

Five marks Questions:

I. Solve the following system of linear inequalities graphically.

1) $x + y \geq 5$, $x - y \leq 3$ (U)

2) $5x + 4y \leq 40$, $x \geq 2$, $y \geq 3$ (U)

- 3) $x + 2y \leq 8$, $2x + y \leq 8$, $x \geq 0$, $y \geq 0$ (U)
- 4) $x \geq 3$, $y \geq 2$ (U)
- 5) $3x + 2y \leq 12$, $x \geq 1$, $y \geq 2$ (A)
- 6) $2x + y \geq 6$, $3x + 4y \leq 12$ (A)
- 7) $x + y \geq 4$, $2x - y > 0$ (A)
- 8) $2x - y > 1$, $x - 2y < -1$ (A)
- 9) $x + y \leq 6$, $x + y \geq 4$ (A)
- 10) $2x + y \geq 8$, $x + 2y \geq 10$ (A)
- 11) $x + y \leq 9$, $y > x$, $x \geq 0$ (A)
- 12) $5x + 4y \leq 20$, $x \geq 1$, $y \geq 2$ (A)
- 13) $3x + 4y \leq 60$, $x + 3y \leq 30$, $x \geq 0$, $y \geq 0$ (A)
- 14) $2x + y \geq 4$, $x + y \leq 3$, $2x - 3y \leq 6$ (A)
- 15) $x - 2y \leq 3$, $3x + 4y \geq 12$, $x \geq 0$, $y \geq 1$ (A)
- 16) $4x + 3y \leq 60$, $y \geq 2x$, $x \geq 3$, $x, y \geq 0$ (A)
- 17) $3x + 2y \leq 150$, $x + 4y \leq 80$, $x \leq 15$, $y \geq 0$, $x \geq 0$ (A)
- 18) $x + 2y \leq 10$, $x + y \geq 1$, $x - y \leq 0$, $x \geq 0$, $y \geq 0$ (A)

II. Statement Problems:

- 1) 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 $C = \frac{5}{9}(F - 32)$, where C and F represent temperature in degree Celsius and degree Fahrenheit, respectively. (S)
- 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 acid content in the resulting mixture will be more than 15% but less than 18%? (S)
- 3) A solution is to be kept between 68° F and 77° F. What is the range in temperature in degree Celsius (C) if the Celsius/ Fahrenheit (F) conversion formula is given by $F = \frac{9}{5}C + 32$? (S)
- 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 we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added? (S)
- 5) 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? (S)

5) 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. (S)

PSLE