MATHEMATICS

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AIM POINTS
MATHEMATICS
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XIth, XIIth, TARGET IIT-JEE (MAIN + ADVANCE) & COMPETITIVE EXAM. FOR XI (PQRS)

LINEAR INEQUATIONS

& Their Properties

CONTENTS

EXERCISE-1

1. Solve the following linear inequations :
   (i) $2x - 4 \le 0$ (ii) $-3x + 12 < 0$ (iii) $4x - 12 \ge 0$ (iv) $7x + 9 > 30$
2. Solve the following inequations :
   (i) $\frac{1}{x-2} < 0$ (ii) $\frac{x+1}{x+2} \ge 1$
3. Solve the following inequations :
   (i) $\frac{2x+4}{x-1} \ge 5$ (ii) $\frac{x+3}{x-2} \le 2$
4. Solve the linear inequations in R : $-4x > 30$ when
   (i) $x \in R$ (ii) $x \in Z$ (iii) $x \in N$
5. Solve the linear inequations in R : $2(3 - x) \ge \frac{x}{5} + 4$
6. Solve the linear inequations in R : $\frac{7x-5}{8x+3} > 4$
7. Solve the following system of inequations :
   $\frac{5x}{4} + \frac{3x}{8} > \frac{39}{8}$
   $\frac{2x-1}{12} - \frac{x-1}{3} < \frac{3x+1}{4}$
8. Solve the following system of inequations :
   $2(2x + 3) - 10 < 6(x - 2)$
   $\frac{2x-3}{4} + 6 \ge 2 + \frac{4x}{3}$
9. Solve : $-11x \le 4x - 3 \le 13$.
10. Solve : $-5 \le \frac{2-3x}{4} \le 9$
11. Let r be a positive real number nd a be a fixed real number. Then,
    (i) $|x - a| < r \Leftrightarrow a - r < x < a + r$ i.e. $x \in (a - r, a + r)$
    (ii) $|x - a| \le r \Leftrightarrow a - r \le x < a + r$ i.e. $x \in [a - r, a + r]$
    (iii) $|x - a| > r \Leftrightarrow x < a - r$, or $x > a + r$
    (iv) $|x - a| \ge r \Leftrightarrow x \le a - r$, or $x \ge a + r$
12. Solve : $|x - 2| \ge 5$.
13. Solve : $\frac{|x+3|+x}{x+2} > 1$
14. Solve : $|x - 1| + |x - 2| \ge 4$
15. Solve : $\frac{|x-1|}{x+2} < 1$

16. Find all pairs of consecutive even positive integers, both of which are larger than 8, such that their sum is less than 25.
17. In the first four papers each of 100 marks, Rishi got 95, 72, 73, 83 marks. If he wants an average of greater than or equal to 75 marks and less than 80 marks, find the range of marks he should score in the fifth paper.
18. Find all pairs of consecutive odd positive integers, both of which are smaller than 10, such that their sum is more than 11.
19. Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23.
20. A solution is to be kept between 30°C and 35°C. What is the range of temperature in degree Fahrenheit ?
21. A company manufactures cassettes and its cost and revenue functions for a week are $C = 300 + \frac{3}{2}x$ and $R = 2x$ respectively, where x is the number of cassettes produced and sold in a week. How many cassettes must be sold for the company to realize a profit ?
22. 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 triangles at least 61 cm. Find the minimum length of the shortest–side.
23. A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting maxture 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 ?
24. Represent to solution set of each of the following inequations graphically in two dimensional plane :
    (i) $x + 2y - y \leq 0$ (ii) $-3x + 2y \leq 6$
    (iii) $x \leq 8 - 4y$ (iv) $3x - 2y \leq x + y - 8$
25. Draw the diagram of the solution set of the linear inequations
    $3x + 4y \geq 12, y \geq 1, x \geq 0$
26. Find the linear inequations for which the shaded region in Figure is the solution set.
27. Show that the solution set of the following linear in equations is an unbounded set :
    $x + y \geq 9$
    $3x + y \geq 12$
    $x \geq 0, y \geq 0$
28. Write the solution set of the inequation $x + \frac{1}{x} > 0$.
29. Write the solution set of the equation $|2 - x| = x - 2$
30. Write the solution set of the inequation $|\frac{1}{x} - 2| > 4$
31. Write the number of integral solutions of $\frac{x+2}{x^2+1} > \frac{1}{2}$