THEORETICAL PART:

Definition:

- If the equality symbol in a linear equation is replaced with $<, \leq, \geq, >$, the result is a linear inequality.

Properties: Let A, B and C represent algebraic expressions and D represent a nonzero constant. Then

- If $A < B$, then $A + C < B + C$

- If $A < B$ and $D > 0$, then $A \cdot D < B \cdot D$

- If $A < B$ and $D < 0$, then $A \cdot D > B \cdot D$

The inequality symbol $<$ can be replaced with $>, \geq, \leq$.

Definition:

- A **compound inequality** is a statement containing two or more distinct inequalities joined by either of the words "and" (**double inequality**) or "or".

- An **absolute value inequality** is an inequality in which some variable expression appears inside absolute value symbols.

$$|x| < a \iff \quad -a < x < a$$

$$|x| > a \iff \quad x < -a \quad \text{or} \quad x > a$$

Translating inequality phrases:

- "x is no greater than y": $x \leq y$

- "x is at least as large as y": $x \geq y$

- "x does not exceed y": $x \leq y$

- "y exceeds x": $x < y$

PRACTICAL PART:

1. Solve the following inequalities, using interval notation to describe the solution set:

    (a)
$$5 - 2(x - 3) \leq -(1 - x)$$

    (b)
$$\frac{3(a - 2)}{2} < \frac{5a}{4}$$

2. Graph the following intervals:

    (a) $[-3, 6]$

    (b) $(-\infty, 5]$

    (c) $[2, 9)$

3. Solve the following double inequalities:

    (a)
$$-1 < 3 - 2x \leq 5$$

(b)
$$2(2x - 1) \le 4x + 2 \le 4(x + 1)$$

4. Solve the following absolute value inequalities:

   (a)
   $$|4 - 2x| > 6$$

   (b)
   $$|5 + 2s| \le -3$$

   (c)
   $$2|3y - 2| + 3 \le 11$$

5. Express the following problem as an inequality, and then solve the inequality.

   Problem: The average daily temperature in Santa Fe, NM, over the course of three days exceeded 75. Given that the high on the first day was 72 and the high on the third day was 77, what can we say about the high temperature on the second day?