5.1: Linear Inequalities in Two Variables

**Half-planes:**

A line divides the plane into two *half-planes*. A vertical line divides it into *left* and *right half-planes*; a non-vertical line divides it into *upper* and *lower half-planes*.

**Graphing linear inequalities:**

**Example 1:** There are four linear inequalities related to the line $y = 2x + 1$.
Steps for Graphing a Linear Inequality:

**Step 1**: First graph the line $Ax + By = C$. Use a solid line if equality is included ($\leq$ or $\geq$) and a dashed line if equality is not included ($<$ or $>$).

**Step 2**: Choose a test point not on the line and substitute the coordinates into the inequality. Determine whether this gives a true or a false statement.

*Note*: The origin $(0,0)$ is usually a good choice, as long as it is not on the line.

**Step 3**:
- If your test point makes the inequality true, shade the half-plane containing the test point.
- If your test point makes the inequality false, shade the half-plane not containing the test point.

**Example 2**: Graph the inequality $2x > 3y$. 

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