

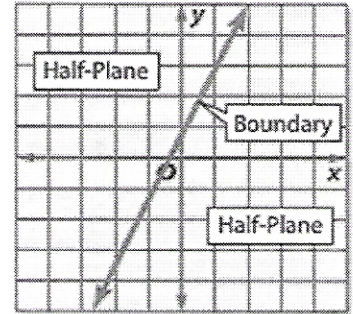
**Lesson 5.6 Notes (Graphing Inequalities in Two Variables)**

**Objectives:**

- Graph linear inequalities on the coordinate plane.
- Solve inequalities by graphing.

**Graph of a Linear Inequality** – the set of points that represent all the possible solutions of that inequality

- An equation defines a **boundary**, which divides the coordinate plane into two **half-planes**.
  - **Closed half-plane** –boundary *included* in solution
  - **Open half-plane** –boundary *not* included in solution



**KeyConcept Graphing Linear Inequalities**

**Step 1** Graph the boundary. Use a solid line when the inequality contains  $\leq$  or  $\geq$ . Use a dashed line when the inequality contains  $<$  or  $>$ .

**Step 2** Use a test point to determine which half-plane should be shaded.

**Step 3** Shade the half-plane that contains the solution.

- **Examples:** Graph each of the following inequalities.

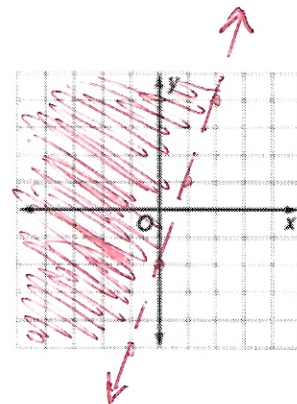
1.  $3x - y < 2$

$$\begin{array}{r} -3x \quad -3x \\ \hline -y < -3x + 2 \\ \quad -1 \quad -1 \\ \hline y > 3x - 2 \end{array}$$

Test (0,0):

$$0 > 3(0) - 2$$

$$0 > -2 \quad \checkmark$$



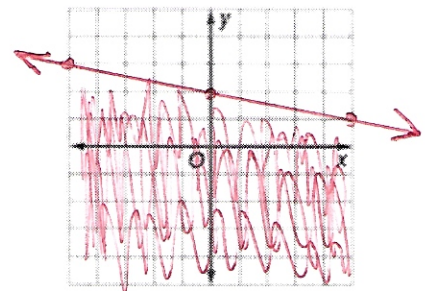
2.  $x + 5y \leq 10$

$$\begin{array}{r} -x \quad -x \\ \hline 5y \leq -x + 10 \\ \quad 5 \quad 5 \quad 5 \\ \hline y \leq -\frac{1}{5}x + 2 \end{array}$$

Test (0,0):

$$0 \leq -\frac{1}{5}(0) + 2$$

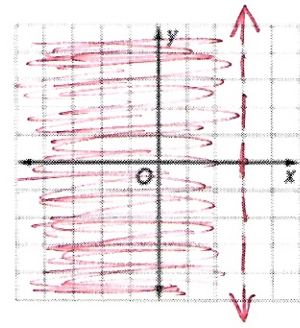
$$0 \leq 2 \quad \checkmark$$



$$3. \quad 3x + 5 < 14$$

$$\begin{array}{r} -5 \quad -5 \\ \hline 3x < 9 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline x < 3 \end{array}$$

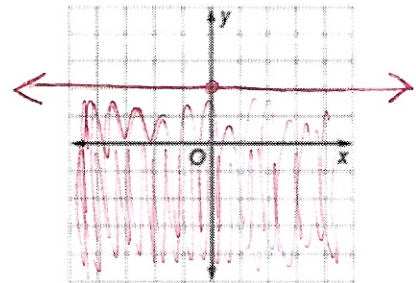
Test (0,0):  
 $0 < 3 \quad \checkmark$



$$4. \quad 2y + 3 \leq 7$$

$$\begin{array}{r} -3 \quad -3 \\ \hline 2y \leq 4 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline y \leq 2 \end{array}$$

Test (0,0):  
 $0 \leq 2 \quad \checkmark$



**Application**

5. A yearbook company promises to give the junior class a picnic if they spend at least \$28,000 on yearbooks and class rings. Each yearbook costs \$35, and each class ring costs \$140. How many yearbooks and class rings must the junior class buy to get their picnic? Write and graph an inequality to represent the possible combinations.

$y = \# \text{ of yearbooks} ; r = \# \text{ of rings}$

$$35y + 140r \geq 28,000$$

Test (0,0):  
 $35(0) + 140(0) \geq 28,000$   
 $0 \geq 28,000$   
False

To graph, find intercepts:

y-intercept: let  $r = 0$

$$35y + 140(0) = 28,000$$

$$35y = 28,000 \Rightarrow y = 800 \text{ yearbooks}$$

r-intercept: let  $y = 0$

$$35(0) + 140r = 28,000$$

$$140r = 28,000$$

$$r = 200 \text{ rings}$$

