

# LINEAR INEQUALITIES



What is a linear inequality?

an inequality which includes a linear function



What is the solution to a linear inequality?

the ordered pair that is a solution to the inequality

**example:** Determine which ordered pairs are solutions to the linear inequality  $2x - 3y < 15$

(2, 5) ✓  
 $2(2) - 3(5) < 15$   
 $4 - 15 < 15$   
 $-11 < 15$

(-1, -7) ✗  
 $2(-1) - 3(-7) < 15$   
 $-2 + 21 < 15$   
 $19 < 15$

(3, -4) ✗  
 $2(3) - 3(-4) < 15$   
 $6 + 12 < 15$   
 $18 < 15$

(0, 0) ✓  
 $2(0) - 3(0) < 15$   
 $0 - 0 < 15$   
 $0 < 15$



graphing linear inequalities is a way to show **ALL** the ordered pairs that are solutions!

## Steps for Graphing Linear Inequalities:

**Step 1:** Write the inequality in slope-intercept form!

**Step 2:** Graph the inequality.

\*Use a dashed line for  $<$  or  $>$  symbols.

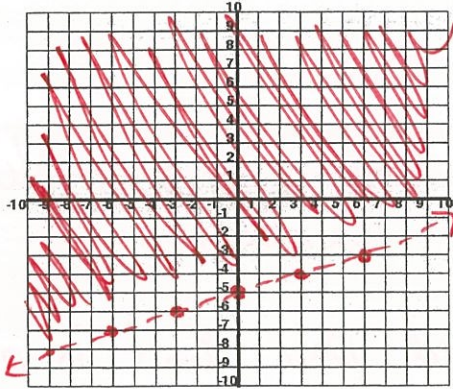
\*Use a solid line for  $\leq$  or  $\geq$  symbols.



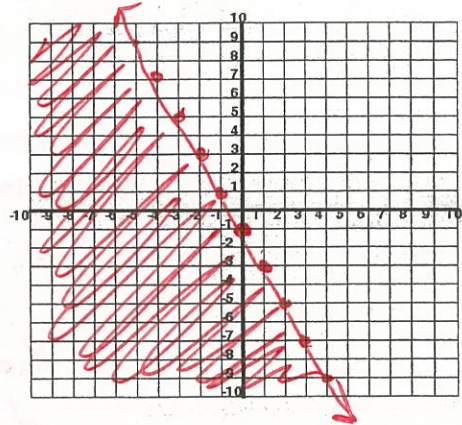
**Step 3:** Use a test point to determine which side of the line to shade.

**All the points within the shaded region represent solutions to the inequality!!!**

$$1. y > \frac{1}{3}x - 5$$

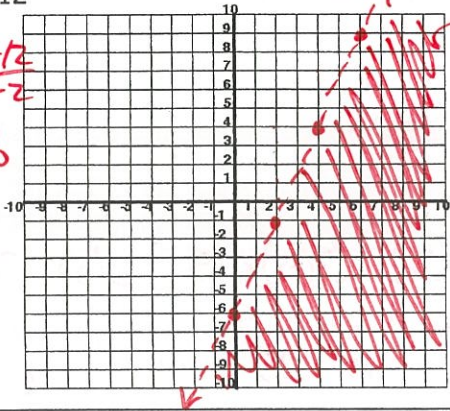


$$2. y \leq -2x - 1$$



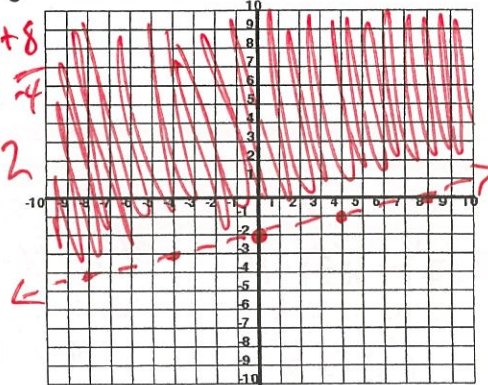
$$3. 5x - 2y > 12$$

$$\begin{aligned} -2y &> -5x + 12 \\ \frac{-2y}{-2} &> \frac{-5x + 12}{-2} \\ y &< \frac{5}{2}x - 6 \end{aligned}$$



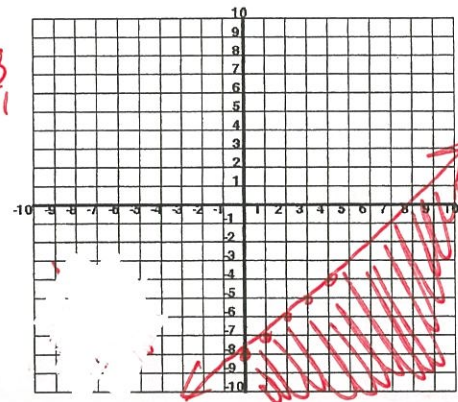
$$4. x - 4y < 8$$

$$\begin{aligned} -4y &< -x + 8 \\ \frac{-4y}{-4} &< \frac{-x + 8}{-4} \\ y &> \frac{1}{4}x - 2 \end{aligned}$$



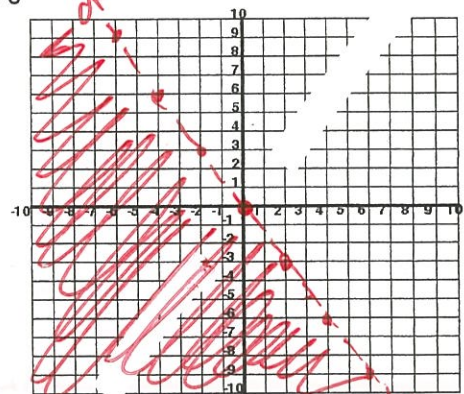
$$5. x - y \geq 8$$

$$\begin{aligned} -y &\geq -x + 8 \\ \frac{-y}{-1} &\geq \frac{-x + 8}{-1} \\ y &\leq x - 8 \end{aligned}$$

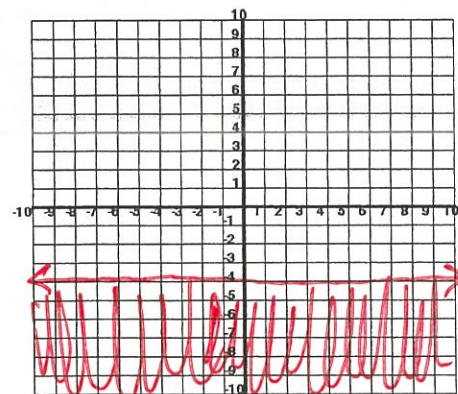


$$6. 3x + 2y < 0$$

$$\begin{aligned} 2y &< -3x \\ \frac{2y}{2} &< \frac{-3x}{2} \\ y &< -\frac{3}{2}x \end{aligned}$$



$$7. y \leq -4$$



$$8. x > 7$$

