Enrichment Topic C

Two dimensional inequalities

To graph an inequality like $y < 3x - 5$, we first **draw the line** $y = 3x - 5$. Then do the following:

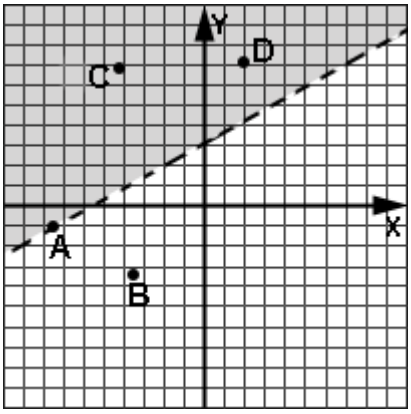
- If the inequality is **≥ or ≤** make the line **solid**. If the inequality is **< or >** make it **dotted**.
- If the inequality is **≤ or <**, shade **below** the line. If it is **≥ or >,** shade **above** the line.
- If the line is vertical then **≤ or <** dictates that we shade to the left. Shade to the right if **≥ or >.**

All the shaded points and/or a solid line are the solutions to the inequality.

In examples 1 and 2, identify those points that are solutions to the inequality.

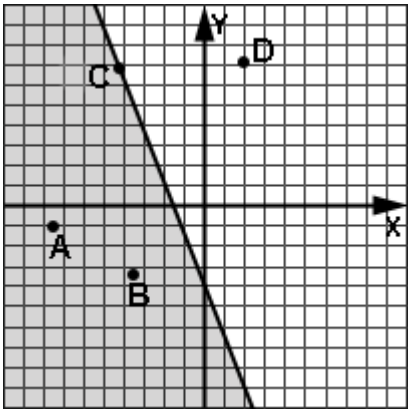
Example 1:

C, D



Example 2:

A, B, C



In Examples 3 and 4, determine algebraically if the point is part of the solution.

Example 3: $3x - 7y \leq -2$ (–4, 10)

$3(-4) - 7(10) \leq -2$

$-12 - 70 \leq -2$

$-82 \leq -2$ ✓

True, so the point (-4, 10) is part of the solution. Yes!

Example 4: $x < 2y - 17$ (–8, 1)

$-8 < 2(1) - 17$

$-8 \not< -15$

False!

(-8, 1) is not part of the Solution.

No!

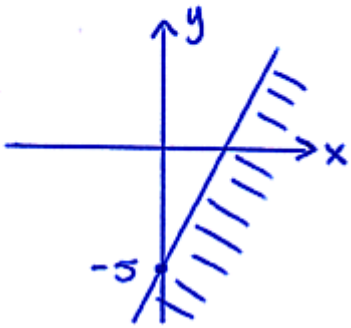
In examples 5 - 8, graph the inequality. Remember when dividing or multiplying by a negative number to reverse the inequality.

Example 5: $2x - y \geq 5$

$-y \geq -2x + 5$

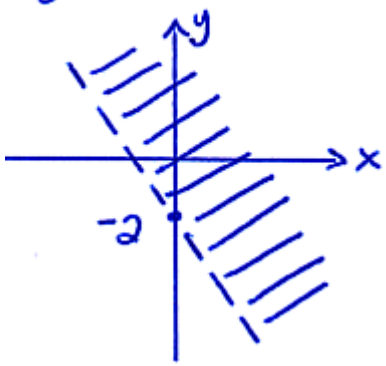
$y \leq 2x - 5$

↑ Note reversal



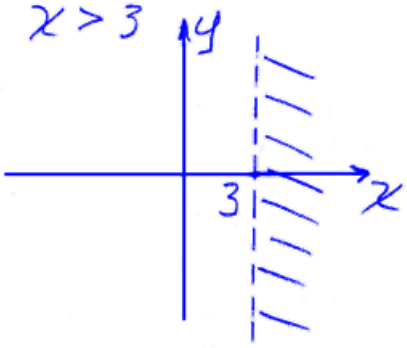
Example 6: $x + y > -2$

$y > -x - 2$

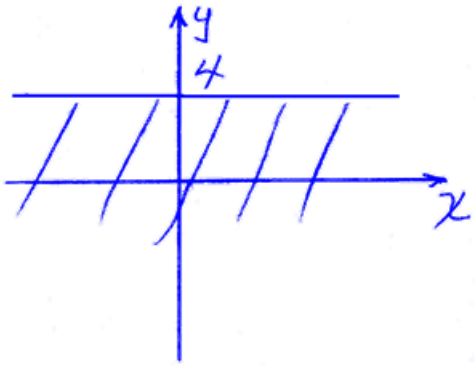


Example 7: $-x < -3$

$x > 3$



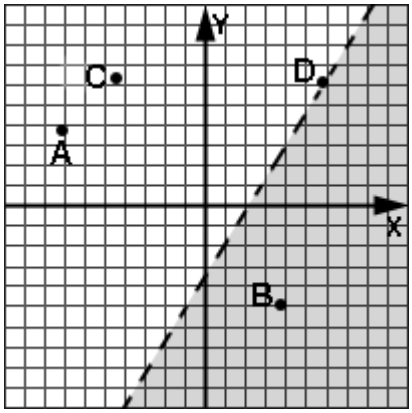
Example 8: $y \leq 4$



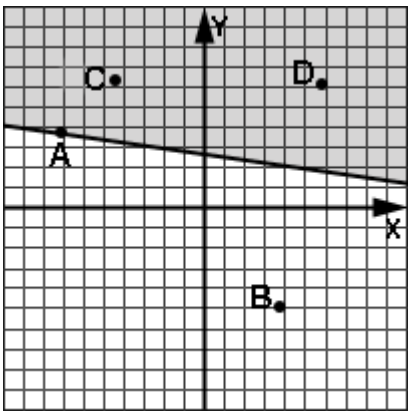
Assignment:

In problems 1 and 2, identify those points that are solutions to the inequality.

1.



2.



In problems 3 and 4, determine algebraically if the point is part of the solution to the inequality.

3. $77x - y < 2x - 1$ (0, 0)

4. $10 \geq 4x - 7y$ (–1, –2)

In problems 5 – 12 graph the inequality.

5. $x \geq -2$

6. $y < 7$

7. $y \geq 3x - 4$

8. $x - y > 18$

9. $x \geq \pi$

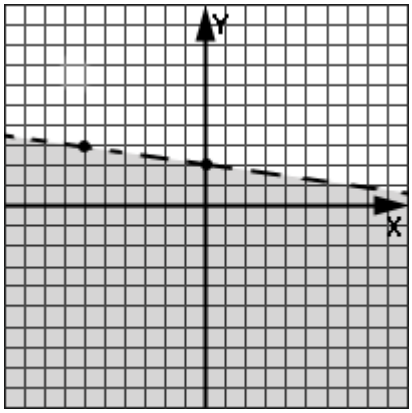
10. $x < -y + 1$

11. $3y < 12x$

12. $y < \sqrt{2}$

In problems 13 and 14, state the inequality represented by the graph.

13.



14.