

Enrichment Topic C



Two dimensional inequalities

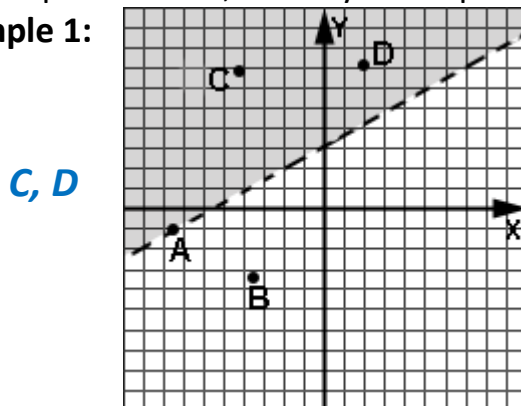
To graph an inequality like $y < 3x - 5$, we first **draw the line** $y = 3x - 5$. Then do the following:

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

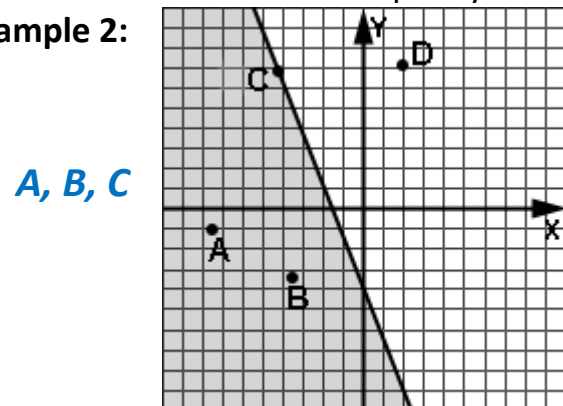
All the shaded points and/or a solid line are the solutions to the inequality.

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

Example 1:



Example 2:



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

Example 3: $3x - 7y \leq -2$ $(-4, 10)$

$$\begin{aligned}
 3(-4) - 7(10) &\leq -2 \\
 -12 - 70 &\leq -2 \\
 -82 &\leq -2 \\
 &\checkmark
 \end{aligned}$$

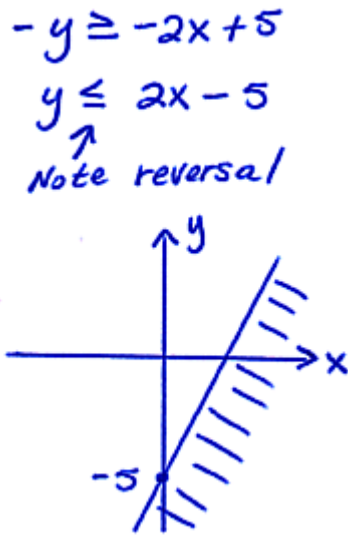
True, so the point $(-4, 10)$ is part of the solution. Yes!

Example 4: $x < 2y - 17$ $(-8, 1)$

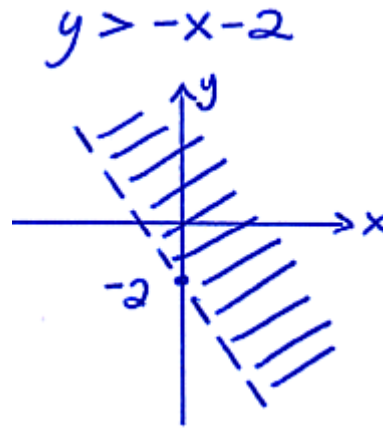
$$\begin{aligned}
 -8 &< 2(1) - 17 \\
 -8 &\not< -15 \\
 &\text{False!} \\
 (-8, 1) &\text{ is not part} \\
 &\text{ of the solution.} \\
 &\text{No!}
 \end{aligned}$$

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

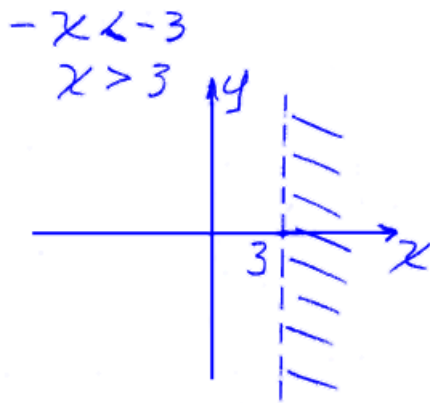
Example 5: $2x - y \geq 5$



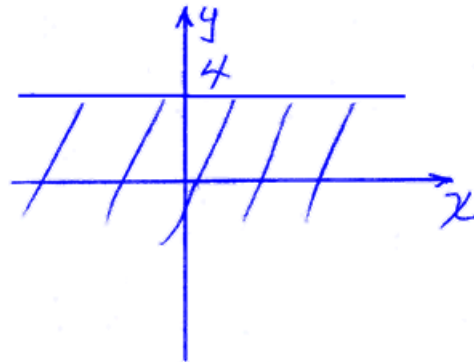
Example 6: $x + y > -2$



Example 7: $-x < -3$



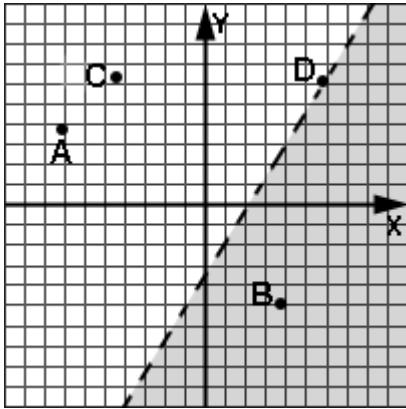
Example 8: $y \leq 4$



Assignment:

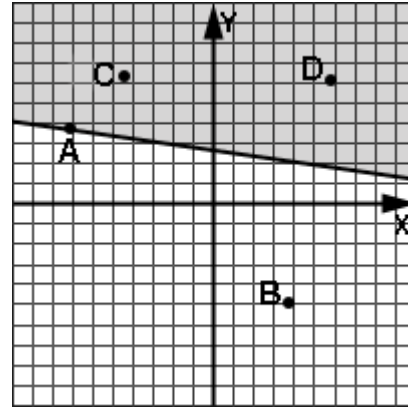
In problems 1 and 2, identify those points that are solutions to the inequality.

1.



B

2.



A, C, D

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

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

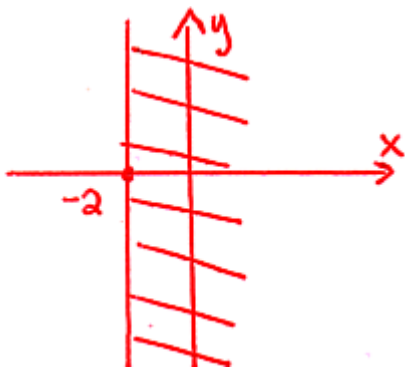
$77(0) - 0 < 2(0) - 1$
 $0 \not< -1$
 False
 $(0, 0)$ is not a solution.
 No!

4. $10 \geq 4x - 7y$ $(-1, -2)$

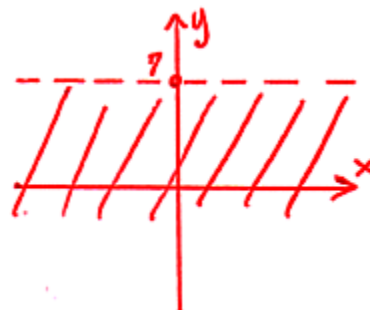
$10 \geq 4(-1) - 7(-2)$
 $10 \geq -4 + 14$
 $10 \geq 10$
 True!
 yes, $(-1, -2)$ is a solution.

In problems 5 – 12 graph the inequality.

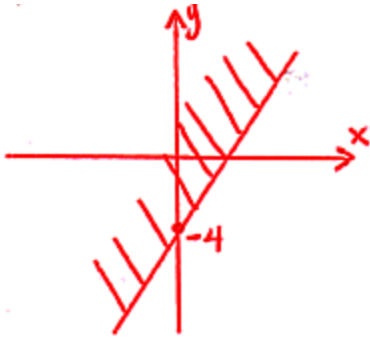
5. $x \geq -2$



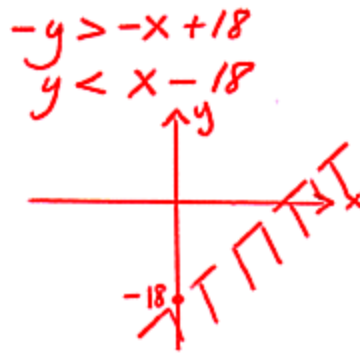
6. $y < 7$



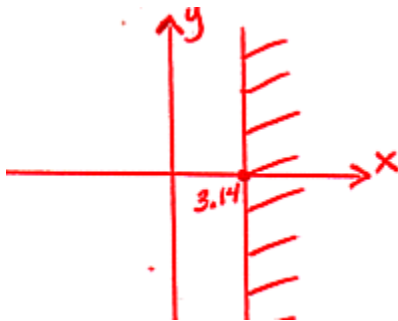
7. $y \geq 3x - 4$



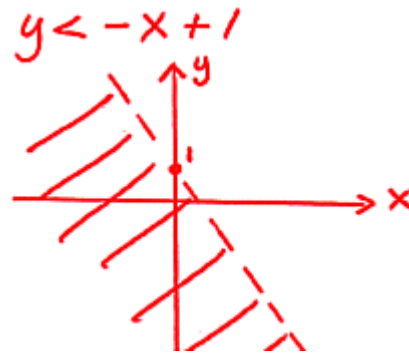
8. $x - y > 18$



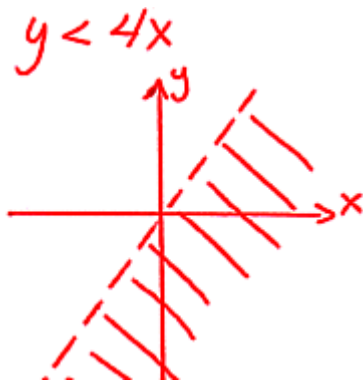
9. $x \geq \pi$



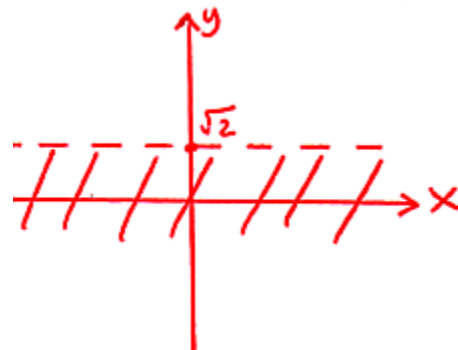
10. $x < -y + 1$



11. $3y < 12x$

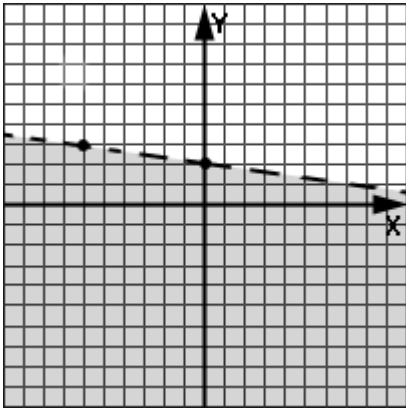


12. $y < \sqrt{2}$



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

13.

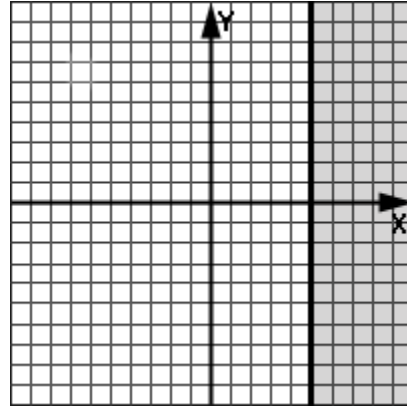


$$b = 2$$

$$y = mx + b$$

$$y < -\frac{1}{6}x + 2$$

14.



$$x \geq 5$$