

3.3. Advanced Algebra

Solving Systems of Inequalities

DATE: 11/11

Target 3D. Graph a system of inequalities to determine the feasible region and maximize or minimize the objective function



LINE:

- \geq and \leq draw a solid line ($\leftarrow\text{---}\rightarrow$)
- $>$ and $<$ draw a dashed line ($\leftarrow\text{- - - -}\rightarrow$)

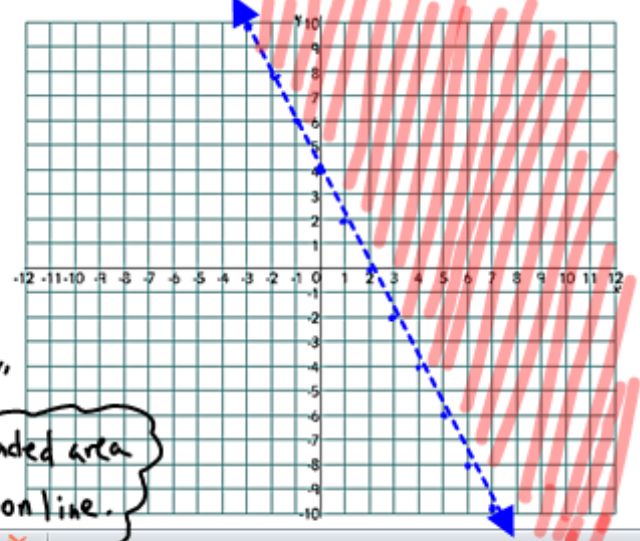
SHADING:

- $>$ and \geq shade "above" (where y is greater)
- $<$ and \leq shade "below" (where y is less)

Examples: Graph each inequality.

1. $y > -2x + 4$

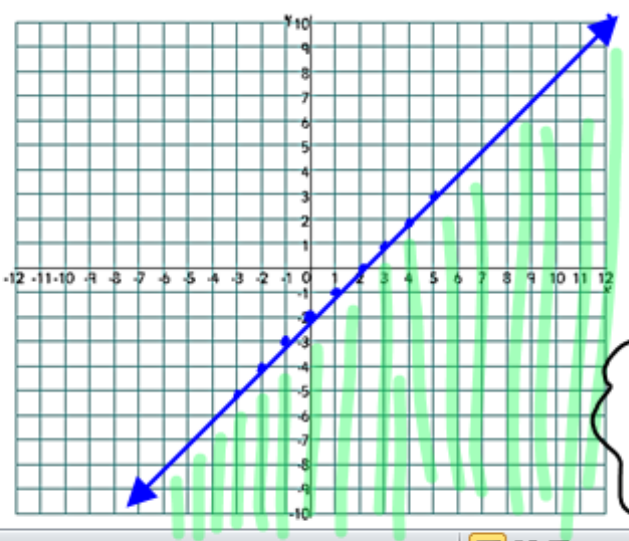
- Slope: $-\frac{2}{1}$
- y-int: 4
- Line: dashed
- Shade: above
= "y is greater"



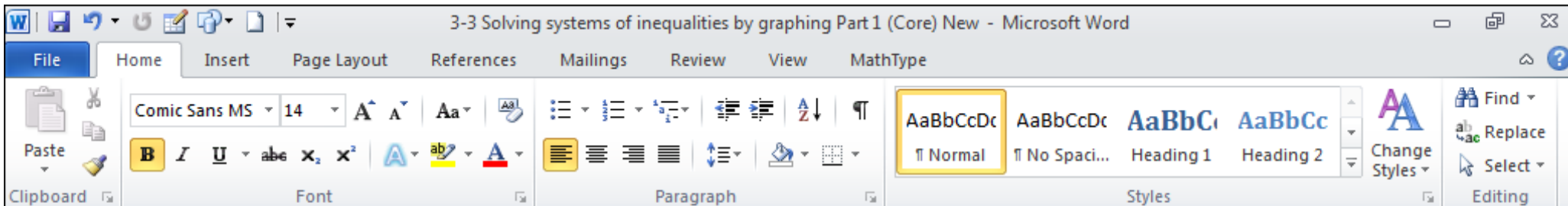
∴ Solution is shaded area not including pts on line.

2. $y \leq x - 2$

- Slope: $\frac{1}{1}$
- y-int: -2
- Line: solid
- Shad: below
= "y is less"



∴ Solution is shaded area, including pts. on the line

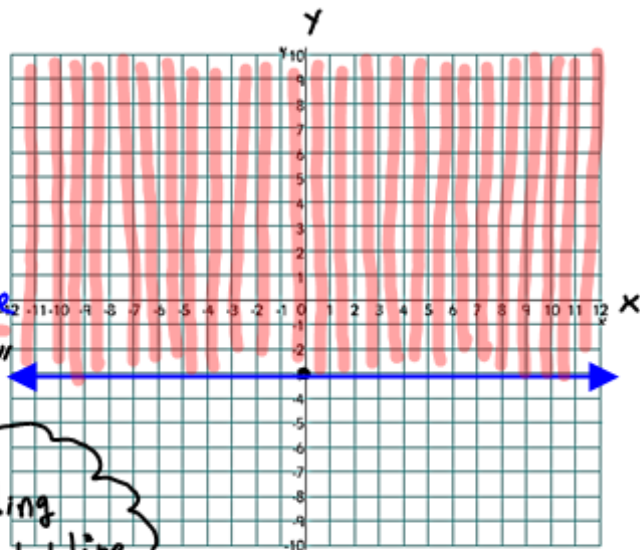


HORIZONTAL LINE

5. $y \geq -3$

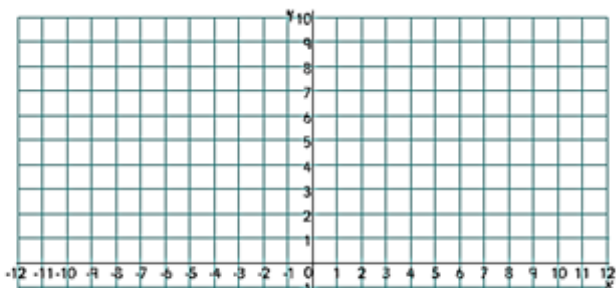
- Slope: 0
- y-int: -3
- Line: solid
- Shade: above

"y is greater"



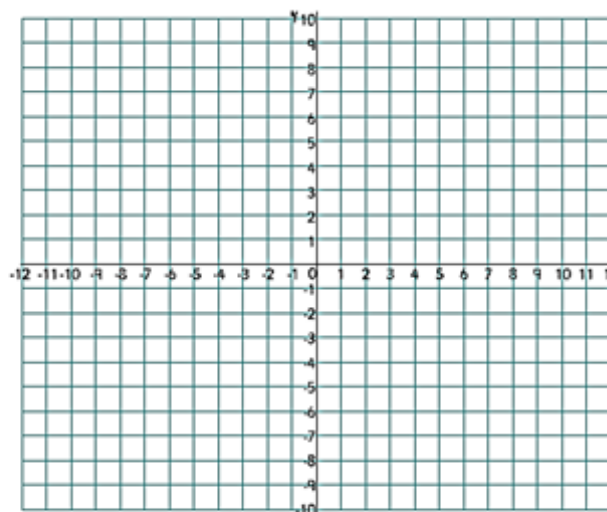
∴ Shaded area is solution including any pt. on horizontal line

7. $x < 3$

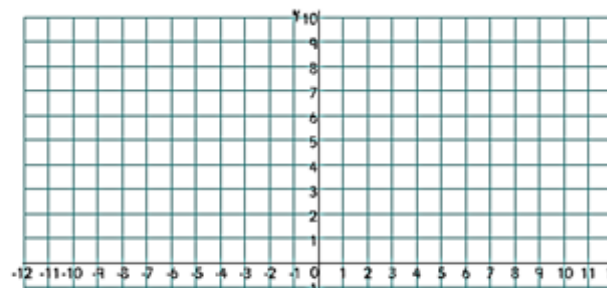


You try it!

6. $y > \frac{1}{2}x + 1$



8. $2x - y \geq -1$



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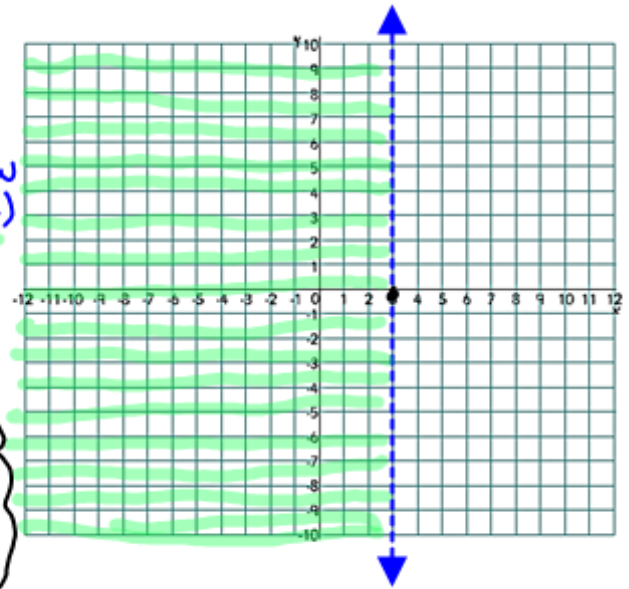
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7. $x < 3$ VERTICAL LINE

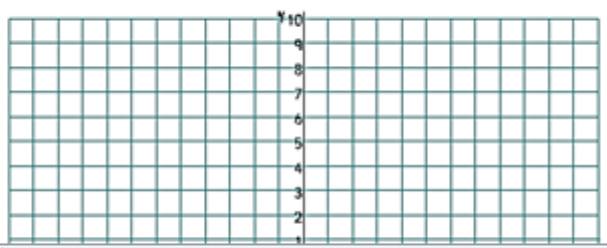
Line: dashed
Shade: below (left)



"x is less"

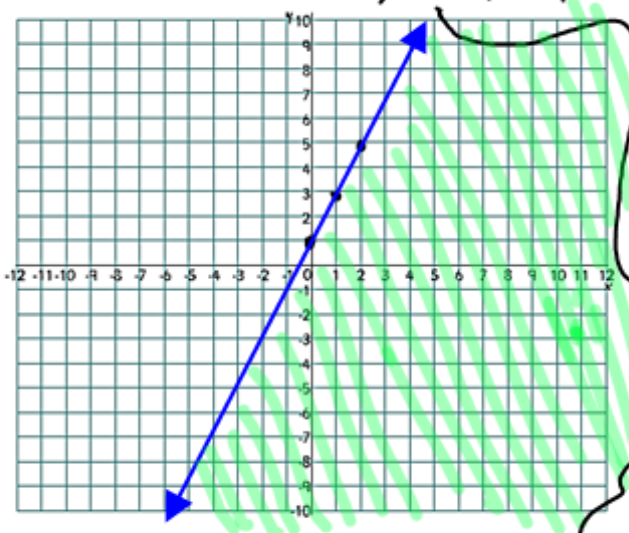
∴ solution is shaded area, not including pts. on line.

9. $x + 4y \geq 4$



8. $2x - y \geq -1$
-2x -2x
 $y \leq 2x + 1$

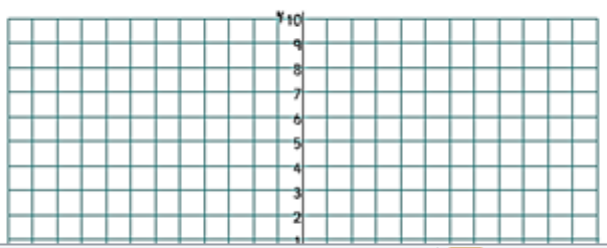
÷ by a negative # so flip inequality



Slope: $\frac{2}{1}$
y-int: 1
Line: solid
Shade: below
"y is less"

∴ Solution is shaded area, including pts. on line

10. $4x - 3y < 9$



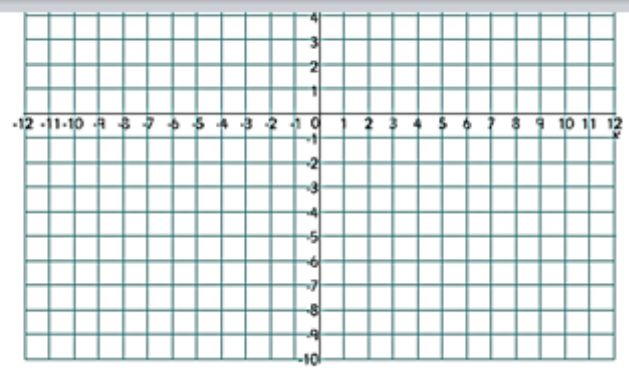
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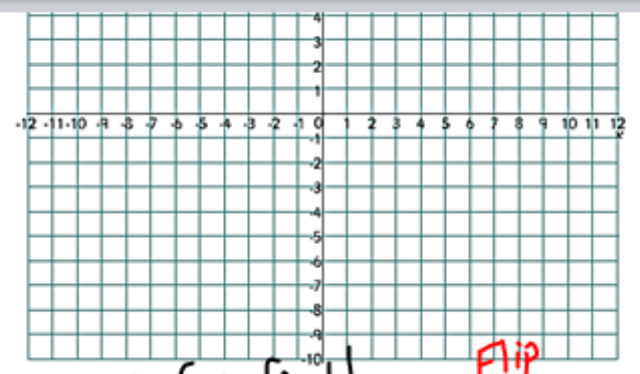
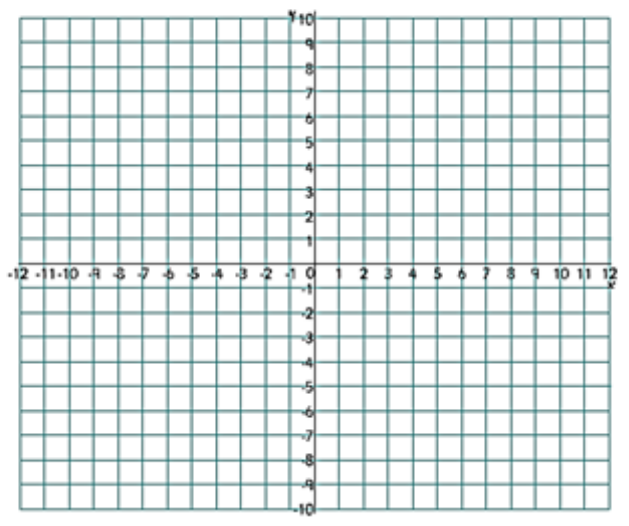
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9. $x + 4y \geq 4$ You try it!



solve for y first!

$$10. \begin{array}{r} 4x - 3y < 9 \\ -4x \quad -4x \\ \hline -3y < -4x + 9 \\ \frac{-3y}{-3} < \frac{-4x + 9}{-3} \end{array}$$

Flip

$$y > \frac{4}{3}x - 3$$

Slope: $\frac{4}{3}$

y-int: -3

Line: dashed

Shade: above

"y is greater"

Where is the solution?