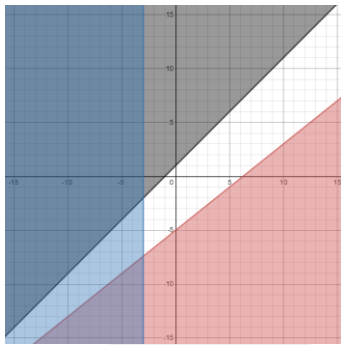




Solving & Graphing Linear Inequalities

Linear Inequalities

Linear inequalities are linear equations that have inequality symbols.



WHAT ARE INEQUALITY SYMBOLS?

- $<$ – lesser than ($x < 2$)
- $>$ – greater than ($x > 2$)
- $\geq$ – lesser than or equal to ($x \leq 2$)
- $\leq$ – greater than or equal to ($x \geq 2$)

These symbols will indicate which side of the boundary line needs to be shaded. Points in the shaded region are true for the linear inequality.

For simple linear inequalities:

BLACK: $y \geq x + 1$

STEP ONE: Graph the linear equation. Find the x and y -intercepts.

STEP TWO: Substitute in the test point $(0,0)$. Identify which side of the boundary line are true (shaded) and which are false (unshaded).

$$\begin{aligned} y &\geq x + 1 \\ (0) &\geq (0) + 1 \\ 0 &\geq 1 \end{aligned}$$

FALSE – 0 is not larger than 1.

This means that all values below the boundary line are also false and all points above it are true. Shade above the line.

For complex linear inequalities:

RED: $4x - 5y \geq 25$

STEP ONE: Graph the linear equation.

Find the x and y -intercepts using substitution.

STEP TWO: Substitute in the test point $(0,0)$.

Sub in $x = 0$ to find y

$$4x - 5(0) = 25$$

$$4x = 25$$

$$x = \left(\frac{25}{4}\right)$$

$$x = 6.25$$

Sub in $y = 0$ to find x

$$4(0) - 5y = 25$$

$$-5y = 25$$

$$y = \left(\frac{25}{-5}\right)$$

$$y = -5$$

$$4x - 5y \geq 25$$

$$4(0) - 5(0) \geq 25$$

$$0 \geq 25$$

FALSE – 0 is not larger than 25.

Shade below the line without $(0,0)$.

For inequalities with negative numbers:

BLUE: $-2x - 5 \geq 1$

For Step One, transposing to find the x -intercept may require multiplication or division by a negative number. ss

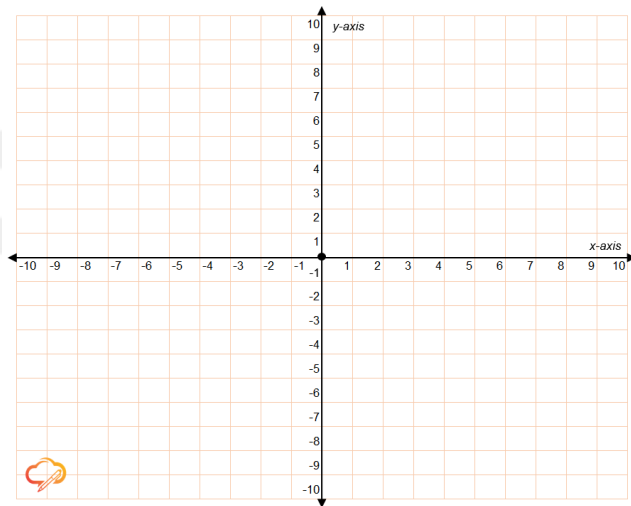
Note: Transposing with addition or subtraction does not affect the inequality sign.



Instructions: Solve and graph the linear inequalities below.

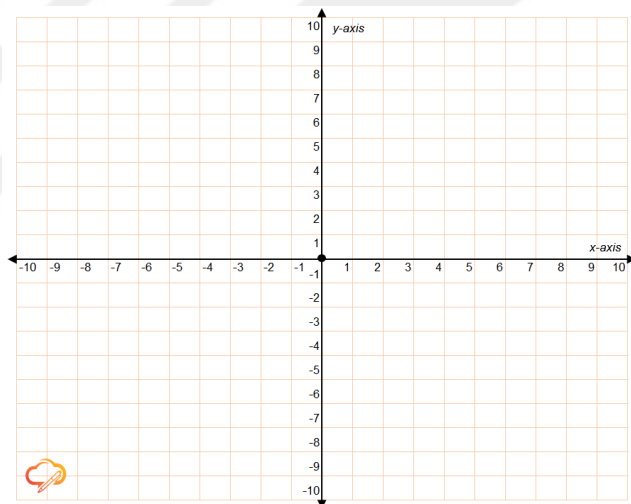
1

Graph $\frac{1}{2}x \leq 3$



2

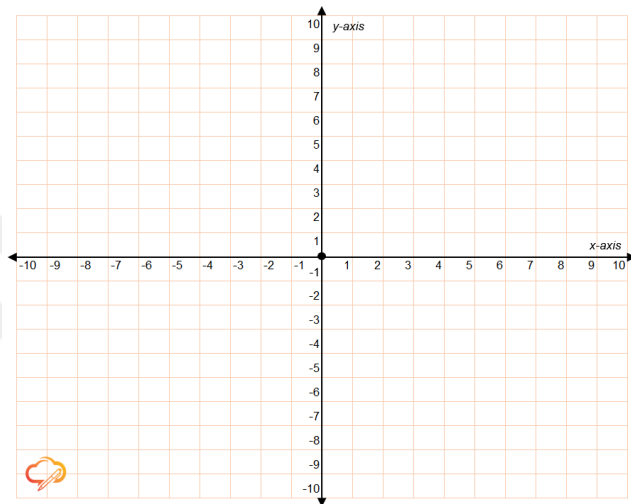
Graph $2y \leq x - 6$





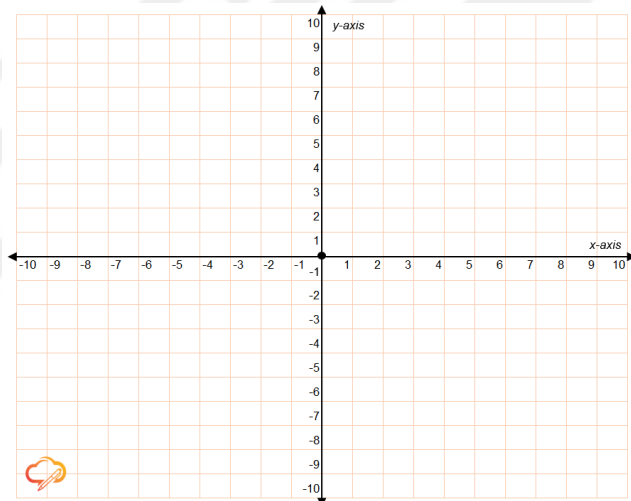
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Graph $\frac{4x}{-3} \geq 1 - y$



4

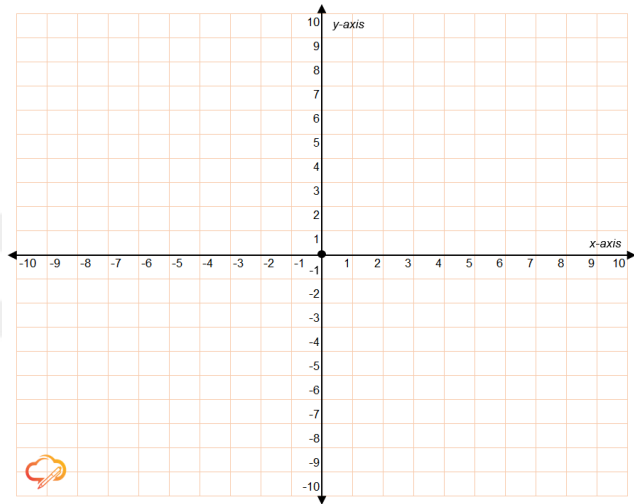
Graph $-2x - 5 \geq 1$





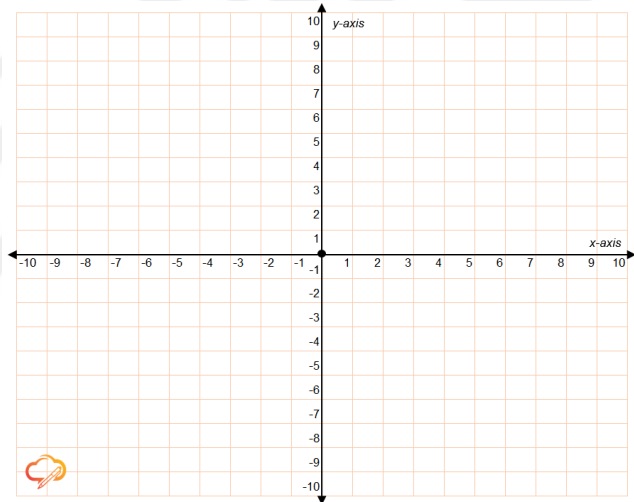
5

Graph $2x - 7 \leq -9$



6

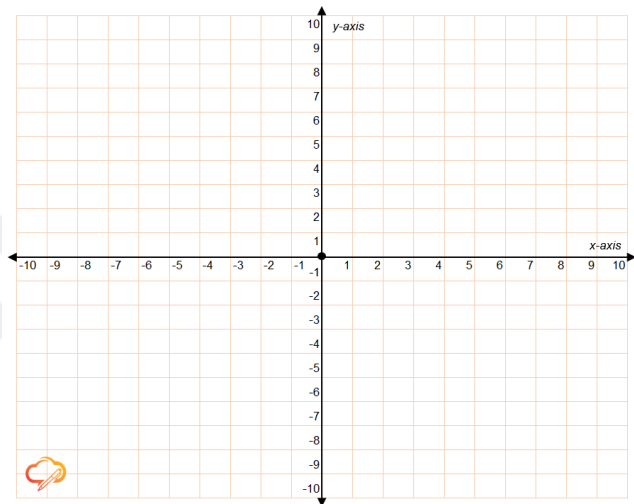
Graph $3x + 2y \leq 6$





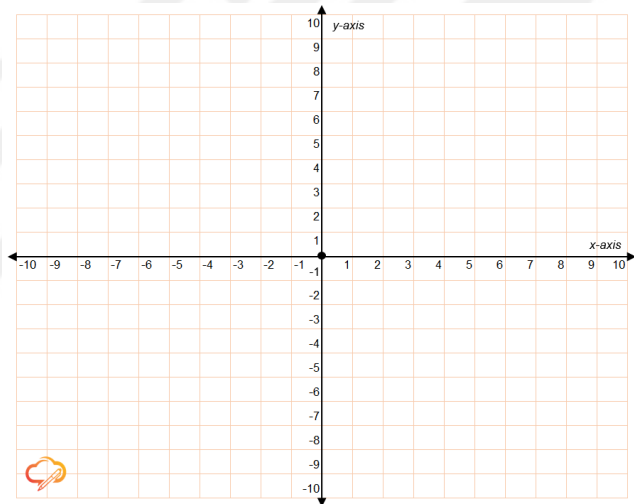
7

Graph $4x \geq 5y - 10$



8

Graph $4(-2x + y) \leq -8$

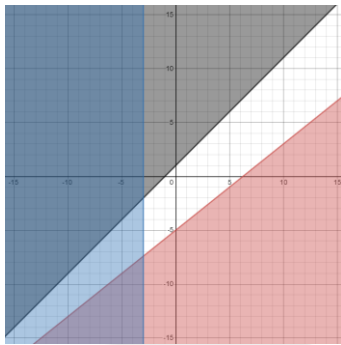




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$$y = \left(\frac{25}{-5}\right)$$

$$y = -5$$

$$4x - 5y \geq 25$$

$$4(0) - 5(0) \geq 25$$

$$0 \geq 25$$

FALSE – 0 is not larger than 25.

Shade below the line without $(0,0)$.

For inequalities with negative numbers:

BLUE: $-2x - 5 \geq 1$

For Step One, transposing to find the x -intercept may require multiplication or division by a negative number. In these cases, you have to flip the inequality sign.

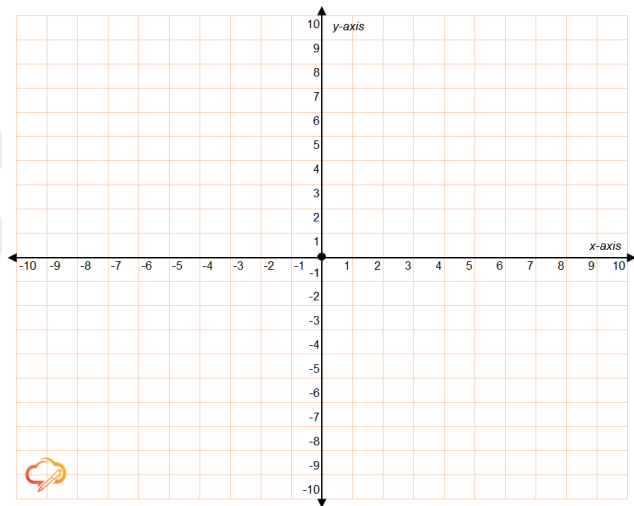
Note: Transposing with addition or subtraction does not affect the inequality sign.



Instructions: Solve and graph the linear inequalities below.

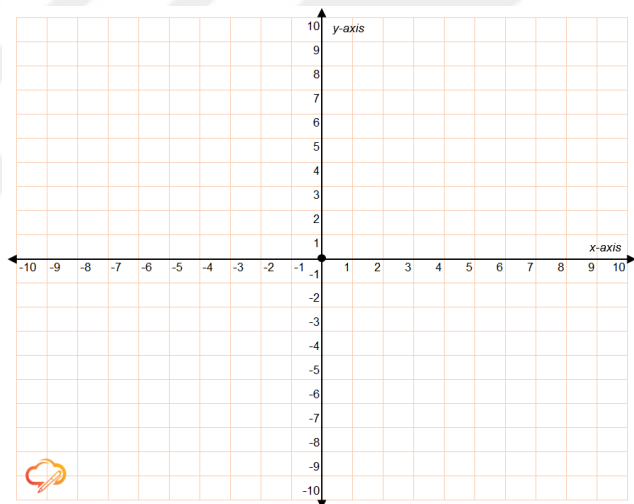
1

Graph $3x + 2 \leq -7$



2

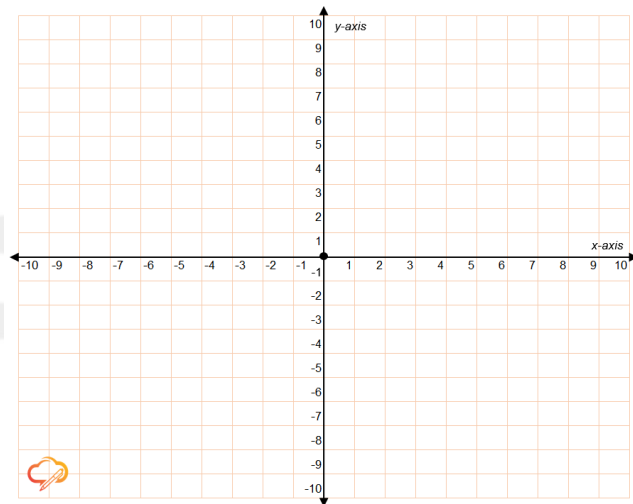
Graph $-2y + 4 \geq 0$





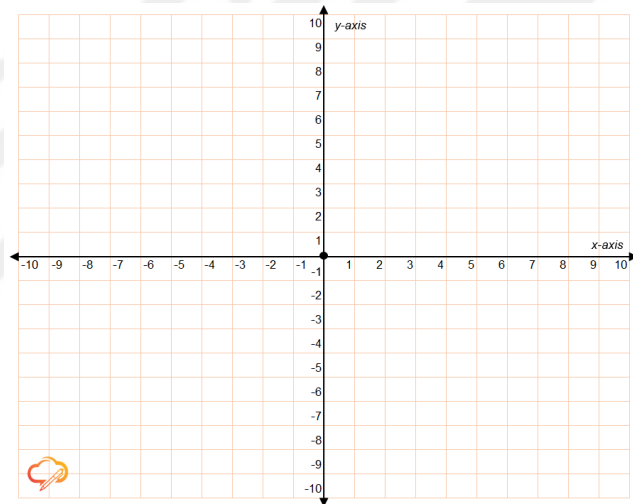
3

Graph $-4y \leq 2x - 12$



4

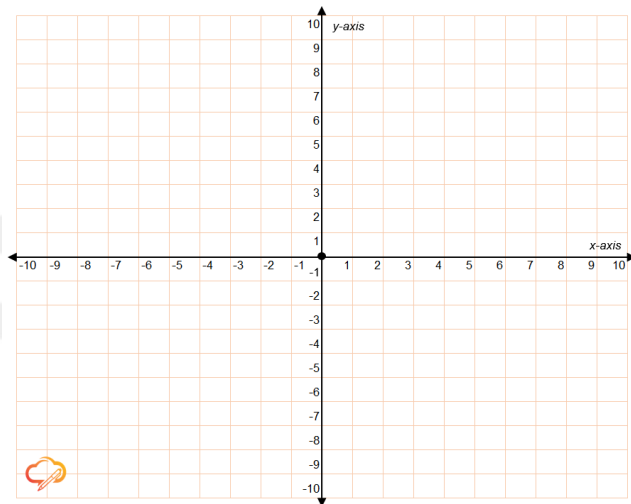
Graph $\frac{3x}{4} - 2 \geq 4$





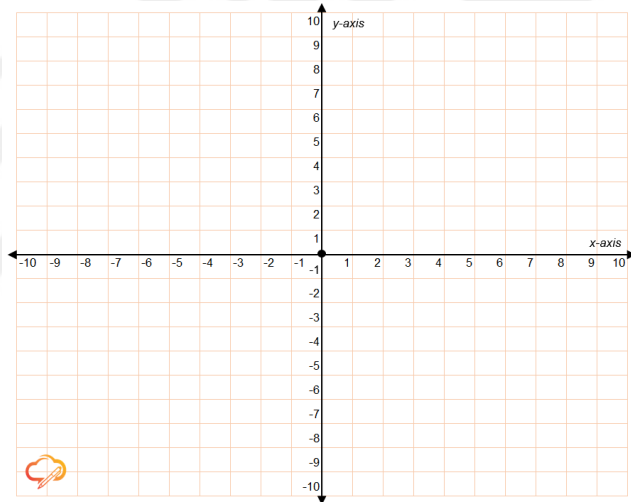
5

Graph $-x \geq 2y - 5$



6

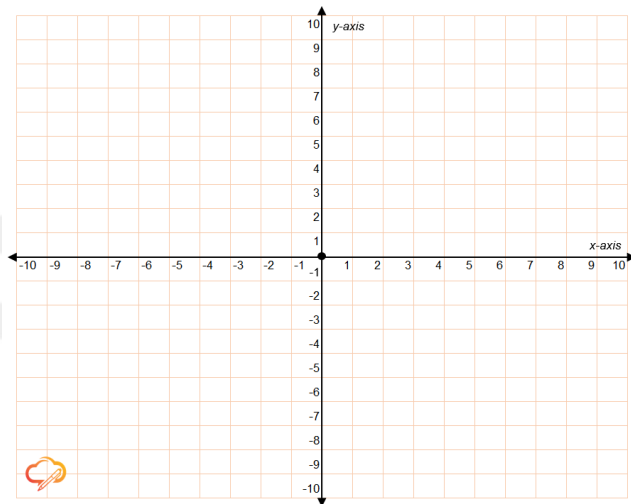
Graph $-(y + 2) \leq \frac{5}{2}$





7

Graph $4(x - 3) \leq 2y$



8

Graph $-2(3 - y) \geq 4x$

