

Key Concepts: Solving equations and inequalities graphically
Connecting absolute value inequalities to graphical inequalities

Example 1

In figures 1-3, function f and the line $y = 3$ are shown three times.

- On Figure 1, mark the points on f with y -coordinates of 3. Mark the corresponding points on the x -axis and state the solution set to the equation $f(x) = 3$.
- On Figure 2, mark the points on f with y -coordinates greater than 3. Mark the corresponding intervals on the x -axis and state the solution set to the inequality $f(x) > 3$.
- On Figure 3, mark the points on f with y -coordinates less than or equal to 3. Mark the corresponding interval on the x -axis and state the solution set to the inequality $f(x) \leq 3$.

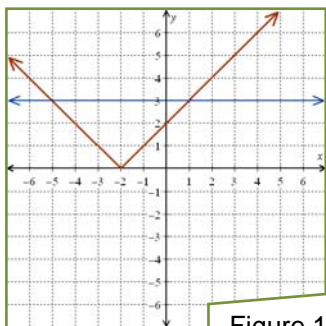


Figure 1

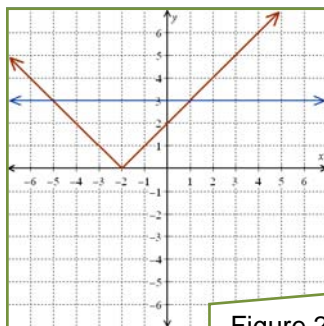


Figure 2

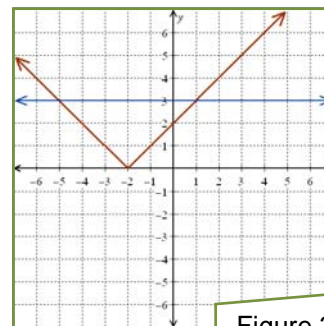


Figure 3

Example 2

The formula for f is $f(x) = |x + 2|$. Use Figure 4 to solve the inequalities $|x + 2| < -4$ and $|x + 2| \geq -4$.

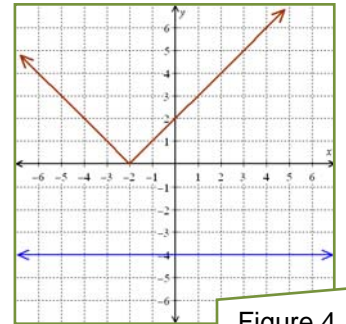


Figure 4

Example 3

The graph $y = 2|x - 2| - 5$ is shown in Figure 5.

- Use the graph to determine the solution set to $2|x - 2| - 5 \geq 1$.
- Verify your solution algebraically.

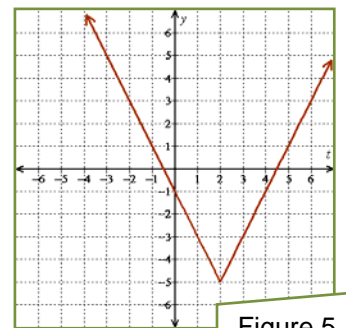


Figure 5

Example 4

The graph $y = 2|x - 2| - 5$ is shown in Figure 6.

- Use the graph to determine the solution set to $2|x - 2| - 5 < 3$.
- Verify your solution algebraically.

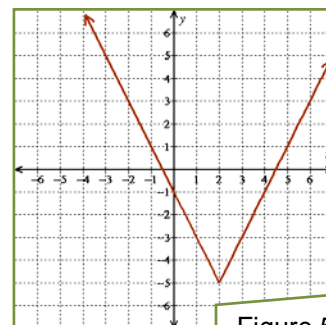


Figure 5

Example 5

Graph $y = 5 - |x + 1|$ on your graphing calculator and carefully copy the graph onto Figure 7. Then use the graph to solve the inequality $5 - |x + 1| \geq 0$.

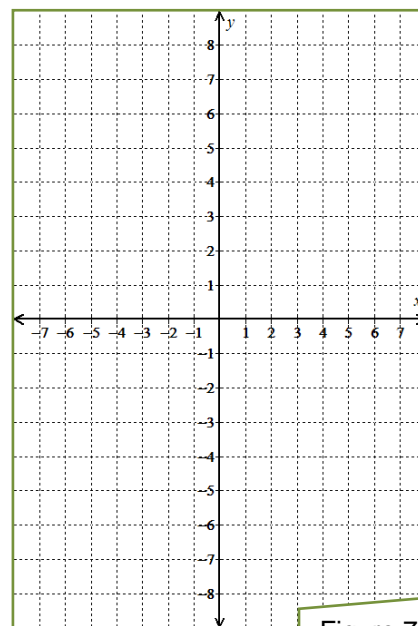


Figure 7

Example 6

Graph $y = 3|x| - 6$ on your graphing calculator and carefully copy the graph onto Figure 8. Then use the graph to solve the inequality $3|x| - 6 > -3$.

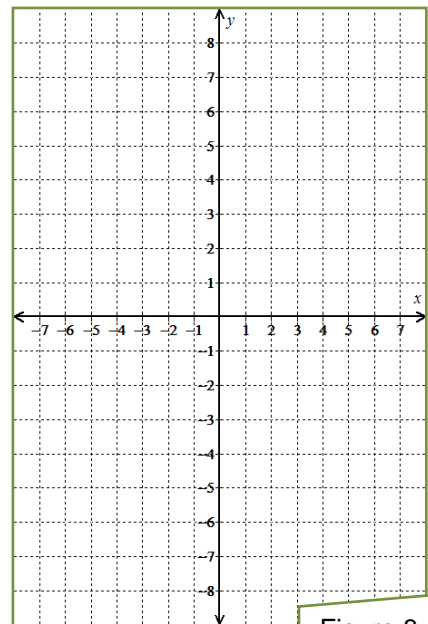


Figure 8

Example 7

Graph $y = 5 - \frac{2}{3}|x|$ on your graphing calculator and carefully copy the graph onto Figure 9. Then use the graph to solve the inequality $5 - \frac{2}{3}|x| \geq 1$.

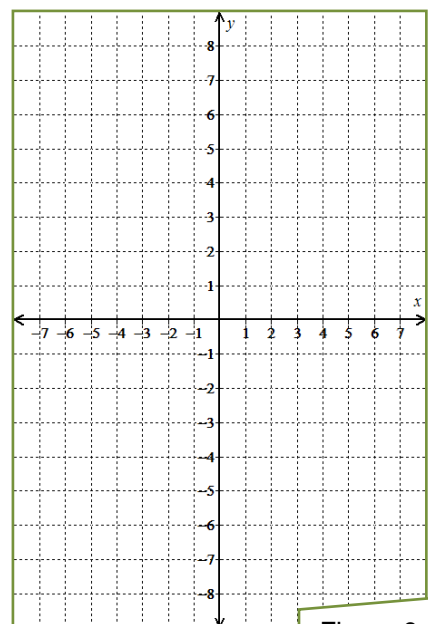


Figure 9