Steps to Solve Inequalities by Graphing

1. Write original problem.

2. Make two new functions:
   a. $f(x)$ equals the left side of the inequality.
   b. $g(x)$ equals the right side of the inequality.

3. Rewrite inequality with $f(x)$ and $g(x)$.

4. Graph the two functions on the same coordinate system.

5. Look at the two graphs and notice the intersection points and notice regions between intersection points. In the regions between section points, one graph will be vertically higher or lower than the other graph.

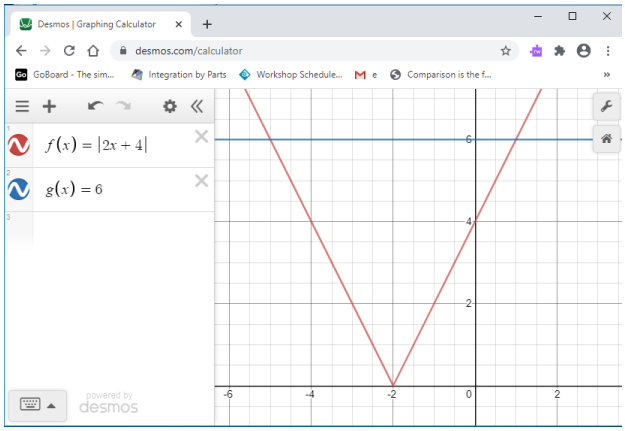
Example: Solve by graphing.

$$|2x + 4| > 6$$

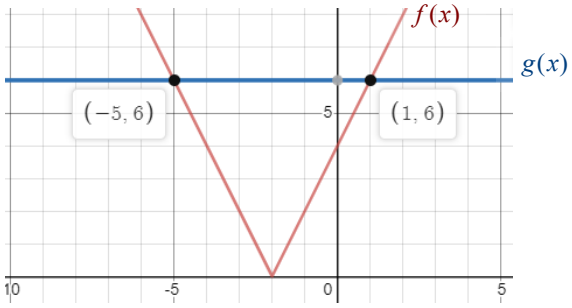
$$f(x) = |2x + 4| \quad \text{and} \quad g(x) = 6$$

$$f(x) > g(x)$$

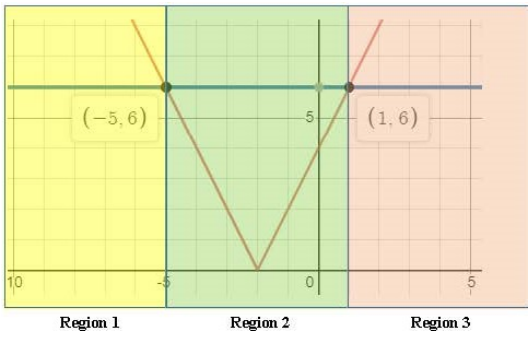
Using desmos.com:



Zooming in on the graph we see two intersection points on the **V** shaped ***red*** graph for $f(x)$ and the horizontal-line ***blue*** graph for $g(x)$:



Three regions are made by the two intersection points and these regions are highlighted below:



Region 1: $f(x) > g(x)$
Region 2: $f(x) < g(x)$
Region 3: $f(x) > g(x)$

6. Look at the inequality with $f(x)$ and $g(x)$: • If $f(x) > g(x)$ or $f(x) \geq g(x)$ then notice the region(s) where the graph for $f(x)$ is **<u>vertically higher</u>** than the graph for $g(x)$. • If $f(x) < g(x)$ or $f(x) \leq g(x)$ then notice the region(s) where the graph for $f(x)$ is **<u>vertically lower</u>** than the graph for $g(x)$.	Our inequality has, $f(x) > g(x)$, and this inequality is in regions one and three.
7. Write the region(s) of x-coordinates in set builder or interval format.	There are **<u>two regions</u>** where $f(x)$ is higher than $g(x)$; everything to the left of $x-coordinate, -5$, and to the right of the $x-coordinate$, 1. The answer in interval form: $(-\infty, -5) \cup (1, \infty)$.