

Creating Neighborhoods with Absolute Value

Absolute value inequalities having the format $|x - a| < \#$ form "neighborhoods". Here are a couple of examples to give you the idea.

Consider $|x - 6| < 2$

This forms a neighborhood with center 6 and extending 2 to the left and 2 to the right. In other words, the solution is $4 < x < 8$. We can read this as "The difference between x and 6 is less than 2." A number line graph of this would have open circles at 4 and 8 with everything in between 4 and 8 colored in.

Consider $|x - 10| < 4$ or equivalently $|x - 10| < 4$

Here we would get a neighborhood having center 10 and extending 4 units left and right. We would have a solution of $6 < x < 14$.

Now...you try a few. Perhaps you could make a number line graph for each one!

1. $|x - 12| < 6$

2. $|x - 7| < 3$

3. $|x - 6| < 2$

The importance of "neighborhoods" will become clear early on in calculus. In particular, we will be creating very small neighborhoods. Here is a very small neighborhood. $|x - 4| < .001$. This creates a very small neighborhood about 4. It places us within .001 of 4.