

Solving absolute value and radical equations

NAME:

This worksheet is designed to help you make sense of some of the methods we use to solve absolute value and radical equations algebraically. We will also look at solving these equations graphically.

1a. Consider the equation $|4x - 2| = 7$. If this equation is true, what must be true of the number $4x - 2$? Why? (In other words, what two numbers could this number, $4x - 2$, possibly be? How do you know for sure?)

1b. Use what we know about the number $4x - 2$ to rewrite $|4x - 2| = 7$ as two equations. (Notice the absolute value signs are gone at this point.) Then solve them to find the two solutions to $|4x - 2| = 7$.

1c. Check your two solutions. Do they make the original equation true?

2. Solve the equation $|6 + 3x| - 4 = 10$. If you do it algebraically, isolate the absolute value part before you use the procedure above and show your work. If you do it graphically, draw a labeled, complete graph with the solution labeled.

3a. Why must the equation $\sqrt{5x-6} = -8$ have no solution? (In other words, what about the equation makes it so that there is no x value that makes it true?)

3b. Draw the labeled, complete graph that would be used to solve the equation $\sqrt{5x-6} = -8$. From the graph, how can you tell that there is no solution to the equation?

3c. Often, people will attempt to solve $\sqrt{5x-6} = -8$ algebraically, not realizing that the equation does not work. Below, you will see the (wrong) solution that is most common. Check the solution given below in the original equation to show that it does not work.

$$\begin{aligned}\sqrt{5x-6} &= -8 \\ (\sqrt{5x-6})^2 &= (-8)^2 \\ 5x-6 &= 64 \\ 5x &= 70 \\ x &= 14\end{aligned}$$

4a. In contrast, the equation $\sqrt{5x-6} = 8$ does have a solution. How does it differ from the last equation? Why does that make a difference?

4b. Solve the equation $\sqrt{5x-6} = 8$ algebraically. Notice you are undoing what was done to the x . Show your work. Check your answer by substituting it into the original equation.

4c. Solve the equation $\sqrt{5x-6} = 8$ graphically. Draw a labeled, complete graph with the solution labeled.

5. Solve the equation $\sqrt{4x^2 + 3x - 8} = 15$. It would probably be easiest to solve it graphically. Draw a labeled, complete graph with the solutions labeled. (An algebraic solution will be an option when we learn the quadratic formula.)