CCSS Advanced Algebra Reversing Operations (Other Functions) Part 2

Complete work in your math notebook.

1. Absolute Value Equations
   a. Evaluate or solve each of the following:

   - $|4| = ?$
   - $|-4| = ?$
   - $|x+3| = ?$ when $x = -10$
   - $|x| = 1,\ x = ?$ [2 answers]
   - $|x| = -2,\ x = ?$
   - $|x-1| = 0,\ x = ?$

   b. What does it mean to take the Absolute Value of a number, for example, $|-32|$.

   c. To solve equations with Absolute Value, you need to understand that $|5| = |-5| = 5$. Watch the screencast on Solving Absolute Value Equations. Then practice on the problems below.

      i. $|x-4| = 2$
      ii. $|x+5| - 3 = 10$
      iii. $2|x-1| + 4 = 10$
      iv. $-4|x+1| + 7 = -13$
      v. $-4|x+1| + 7 = 7$
      vi. $-4|x+1| + 7 = 27$

2. Rational Equations (Equations involving fractions)
   a. Solve each equation below by first removing the fractions.
      i. $\frac{x}{3} + 1 = \frac{5}{2}$
      ii. $\frac{2x}{5} + \frac{1}{20} = \frac{x}{10}$
      iii. $\frac{(x-4)^2}{2} + 1 = \frac{11}{2}$
      iv. $\frac{2|x-1|}{3} - \frac{1}{6} = 2$
      v. $(\frac{2}{3}x + 1)(\frac{x}{5} - \frac{1}{10}) = 0$

   b. Rational Equations can also have the variables in the denominator of the fraction. Consider the equation $\frac{5}{x} + 3 = \frac{2}{x}$. What operation would remove the fractions in this problem?

   c. Simplify the equation $\frac{5}{x} + 3 = \frac{2}{x}$ by removing the fractions and then solve.

3. More Rational Equations:

a. $\frac{1}{x} + \frac{6}{5x} = 1$

b. $\frac{1}{x^2} + \frac{1}{x} = \frac{1}{2x^2}$

c. $x + 1 = \frac{72}{x}$

d. $x + \frac{x-1}{x-3} = \frac{2}{x-3}$

4. Consider the equation $\frac{1}{x-1} + \frac{1}{x} = \frac{-1}{x(x-1)}$.

a. What would you need to multiply the equation by to remove the fractions?

b. Explain, based on your answer to part (a), why the equation above can be changed to $x + x - 1 = -1$.

c. Solve this equation for x.

d. Check your solution by plugging the value of x into the original equation. What happened? This is called an extraneous solution.

e. Show that $\frac{1}{x-2} + \frac{1}{x+2} = \frac{4}{(x-2)(x+2)}$ has an extraneous solution.

f. Use desmos.com or the TI-84 to check the solutions in parts (c) and (e). What is it about the graphs that creates an extraneous solution? Explain fully.