7.5

Key

Solving Rational Equations-Student Notes

Solve.

1. $\frac{x}{5} - \frac{2}{5} = \frac{1}{5}$

$x-2=1$

$x=3$

2. $\frac{2x}{9} + \frac{5}{9} = \frac{8}{9}$

$2x+5=8$

$2x=3$

$x=\frac{3}{2}$

Steps:

1. rewrite each fraction with a common denominator
2. add or subtract numerators
3. set numerators equal to each other
4. solve
5. check solutions

3. $\frac{x}{2} + \frac{1}{3} = \frac{5}{6}$

$\frac{3x}{6} + \frac{2}{6} + \frac{5}{6}$

$3x+2=5$

$3x=3$

$x=1$

Examples:

1. $\frac{2x}{3} - \frac{x+3}{6} = 2 \cdot 6$

$\frac{4x}{6} - \frac{x+3}{6} = \frac{12}{6}$

$4x-x-3=12$

$3x-3=12$

$3x=15$

$x=5$

2. $\frac{2x+1}{3} \cdot 4 + \frac{x-5}{4} \cdot 3 = \frac{9}{2} \cdot 6$

$4(2x+1)+3(x-5)=54$

$8x+4+3x-15=54$

$11x-11=54$

$11x=65$

$x=\frac{65}{11}$

Now let's try some with variables. (Remember restrictions.)

3. $\frac{3}{x} = \frac{8}{x-2}$ $\cdot x \cdot x-2$

$3(x-2)=8x$

$3x-6=8x$

$-6=5x$

$x=-\frac{6}{5}$

$x \neq 0, 2$

4. $\frac{1}{x+2} + \frac{1}{x-2} = \frac{4}{x^2-4}$ $\cdot x+2 \cdot x-2$

$(x+2)(x-2)$

$x-2+x+2=4$

$2x=4$

$x=2$ No Solution

$x \neq -2, 2$

What did you notice about the solution for #4?

Extraneous Solution

Works at first, but not when you plug it back in

If your answer is a restriction, you have to cross it off

Solve the following. Remember to check for extraneous solutions.

1. $\frac{4}{3x}+\frac{5}{4}=\frac{3}{x}$ ·4 ·3x ·12 (12x)

$16+15x=36$

$15x=20$

$x=\frac{4}{3}$

$x\neq 0$

2. $\frac{7}{x+3}+\frac{5}{x-3}=\frac{10x-2}{x^2-9}$ ·(x-3) ·(x+3) ·$(x+3)(x-3)$

$7(x-3)+5(x+3)=10x-2$

$7x-21+5x+15=10x-2$

$12x-6=10x-2$

$2x=4$

$x=2$

$x\neq 3,-3$

3. $\frac{1}{x-6}+\frac{x}{x-2}=\frac{4}{x^2-8x+12}$ ·(x-2) ·(x-6) ·$(x-6)(x-2)$

$x-2+x(x-6)=4$

$x-2+x^2-6x=4$

$x^2-5x-6=0$

$(x-6)(x+1)=0$

$x=6 \quad x=-1$

$x\neq 6,2$

4. $\frac{x+5}{x^2+x}=\frac{1}{x^2+x}-\frac{x-6}{x+1}$ ·x ·$x(x+1)$ $x(x+1)$

$x+5=1-x(x-6)$

$x+5=1-x^2+6x$

$x^2-5x+4=0$

$(x-4)(x-1)=0$

$x=4 \quad x=1$

$x\neq 0,-1$