**Solving Rational Equations; Review** Name KEY

1. How are the algebra steps needed to solve: $4x+1=9$ and $\frac{x}{4}+1=9$ similar? What steps are different?

$4x+1=9$:
YOU NEED TO: SUBTRACT 1 FROM EACH SIDE, THEN DIVIDE BOTH SIDES BY 4

$\frac{x}{4}+1=9$: SAME FIRST STEP: SUBTRACT 1 FROM EACH SIDE – STEP 2 IS DIFFERENT. INSTEAD OF DIVIDING BY 4, YOU MULTIPLY BOTH SIDES BY 4

2. Solve the equations for $x$: $2x=5$

$\frac{2x}{2}=\frac{5}{2}$

$x=\frac{5}{2}$

$\frac{1}{2}\left(\frac{x}{2}\right)=(5)2$

$x=10$

What are the similarities and differences in solving?

EQ'N 1, DIVIDE BOTH SIDES BY 2: EQ'N 2: MULTIPLY BY 2
(SIMILARITIES → EACH HAS A 2, AN x AND A 5...)

3. Solve the equations for $x$: $5x-4=6$

$+4\ +4$

$\frac{5x}{5}=\frac{10}{5}$

$x=2$

$\frac{x}{5}-4=6$

$+4\ +4$

$5\left(\frac{x}{5}\right)=(10)5$

$x=50$

What are the similarities and differences in solving?

1ST STEP IS the same: ADD 4 TO EACH SIDE

2ND STEP FOR 1ST EQ'N IS DIVIDE BY 5: FOR 2ND EQUATION, MULTIPLY BY 5

4. Solve the equations for $x$: $7x+1=15$

$-1\ -1$

$\frac{7x}{7}=\frac{14}{7}$

$x=2$

$\frac{7}{x}+1=15$

$-1\ -1$

$x\left(\frac{7}{x}\right)=(14)x$

$7=14x$

$\frac{7}{14}=\frac{14x}{14}$

$x=\frac{1}{2}$

What are the similarities and differences in solving?

1ST STEP IS THE SAME: SUBTRACT 1 FROM BOTH SIDES

EQ'N 1 2ND STEP, DIVIDE BY 7; EQ'N 2: 2 MORE STEPS: MULTIPLY BY x, THEN DIVIDE BY 14 ON BOTH SIDES

5. Solve for $x$: $3(x-1)+5=14$

$-5\ -5$

$\frac{3(x-1)}{3}=\frac{9}{3}$

$x-1=3$

$+1\ +1$

$x=4$

OR

$3x-3+5=14$

$3x+2=14$

$-2\ -2$

$\frac{3x}{3}=\frac{12}{3}$

$x=4$

6. Solve for $x$: $\frac{15}{x-1}+5=8$

What is the Least Common Denominator (LCD)? $x-1$

What value(s) for $x$ **cannot** be solutions? $x \neq 1$

Why? GIVES A ZERO DENOMINATOR IN $\frac{15}{x-1}$

$(x-1)\left(\frac{15}{x-1}\right)+(x-1)(5)=(x-1)(8)$

$15+5x-5=8x-8$

$5x+10=8x-8$

$-5x \quad -5x$

$10=3x-8$

$+8 \quad +8$

$\frac{18}{3}=\frac{3x}{3}$

$6=x$

7. Solve for $x$: $\frac{4}{x}+\frac{3}{x}=14$

What is the Least Common Denominator (LCD)? $x$

What value(s) for $x$ **cannot** be solutions? $0$

Why? ZERO DENOMINATOR IN $\frac{4}{x}$ AND $\frac{3}{x}$

$x\left(\frac{4}{x}\right)+x\left(\frac{3}{x}\right)=x(14)$

$4+3=14x$

$\frac{7}{14}=\frac{14x}{14}$

$\frac{1}{2}=x$

8. Solve for $x$: $\frac{5}{x}-\frac{2}{2x}=4$

What is the Least Common Denominator (LCD)? $2x$

What value(s) for $x$ **cannot** be solutions? $0$

Why? ZERO DENOMINATOR IN $\frac{5}{x}$ AND $\frac{2}{2x}$

$2x\left(\frac{5}{x}\right)-2x\left(\frac{2}{2x}\right)=2x(4)$

$10-2=8x$

$8=8x$

$1=x$

9. Solve for $x$: $\frac{2}{x}+\frac{7x}{x+2}=7$

What is the Least Common Denominator (LCD)? $x(x+2)$ or $x^2+2x$

What value(s) for $x$ **cannot** be solutions? $0, -2$

Why? $x \neq 0$ and $x+2 \neq 0$ (DENOMINATORS $\neq 0$)

$x(x+2)\left(\frac{2}{x}\right)+x(x+2)\left(\frac{7x}{x+2}\right)=x(x+2)(7)$

$(x+2)(2)+x(7x)=(x^2+2x)(7)$

$2x+4+7x^2=7x^2+14x$

$2x+4=14x$

$4=12x$

$x=\frac{4}{12}=\frac{1}{3}$

$x=1/3$

10. Solve for $x$: $\frac{2}{x-3}-\frac{3}{x+2}=1$

What is the Least Common Denominator (LCD)? $(x-3)(x+2)$ or $x^2-x-6$

What value(s) for $x$ **cannot** be solutions? $3, -2$

Why? NO ZERO DENOMINATORS...

$(x-3)(x+2)\left(\frac{2}{x-3}\right)-(x-3)(x+2)\left(\frac{3}{x+2}\right)=(x-3)(x+2)(1)$

$(x+2)(2)-3(x-3)=x^2-x+6$

$2x+4-3x+9=x^2-x+6$

$-x+13=x^2-x+6$

$19=x^2$

$x=\pm\sqrt{19}$