8-6 Solving Rational Equations

Steps

*If the problem consists of one rational equaling one rational, cross multiply. (Don't forget to FOIL / Distribute.)

1. Factor denominators and ***multiply EVERY fraction by the LCD*** (of ALL fractions). *ex:* $\frac{a}{d}+\frac{b}{d}=\frac{c}{d} \rightarrow$ *multiply everything by* $\frac{d}{1}=d$

**Remember Multiplying Fractions: $\frac{Top \cdot Top}{Bottom \cdot Bottom}$, so when the denominator of the LCD is 1, it is only necessary to multiply to the numerator.

2. Keep expressions in factored form → cancel. There should be no more fractions.

3. Solve. Don't forget, you can solve quadratics by factoring / quadratic formula. Also include ± when you take the square root of both sides of an equation.

4. Check your answer. For example, if you end up with $x=5$ and the original problem includes the expression $\frac{x}{x-5}$, there is "no solution" because it is impossible to divide by 0.

$x=5$

Examples – Solve.

1. $\frac{3}{x}=\frac{12}{x+7}$

$12x=3x+21$

$-3x \quad -3x$

$\frac{9x}{9}=\frac{21}{9}$

$x=\frac{7}{3}$

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

$x^2+6=-5x$

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

$(x+3)(x+2)=0$

$x=-3,-2$

3. $\frac{3}{x+4}+\frac{5}{4}=\frac{18}{x+4}$

$4 \cdot 3(x+4) + 5(x+4) = 18(4)$

$20 = 4(x+4)$

$12+5x+20=72$

$5x+32=72$

$-32 \quad -32$

$\frac{5x}{5}=\frac{40}{5}$

$x=8$

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

$(b+1)(b-1)$

$(b+1)(b-1)$

$b-1+b+1=2$

$\frac{2b}{2}=\frac{2}{2}$

$b=1$

$\emptyset$