Sec 9-6: Solving Rational Equations

Method 1: Clear all denominators

- Find the LCD $6x$
- Multiply both sides of the equation by the LCD

$$\left(\frac{4}{x}+\frac{7}{2x}=\frac{5}{6}\right)6x$$

$$24+21=5x$$
$$45=5x$$
$$9=x$$

Method 2: Get all terms to have LCD.

- Get all terms to have the same denominator. $LCD = 6x$
- Cancel all denominators.

$$\frac{6}{6}\cdot\frac{4}{x}+\frac{7}{2x}\cdot\frac{3}{3}=\frac{5}{6}\cdot\frac{x}{x}$$

$$\frac{24}{6x}+\frac{21}{6x}=\frac{5x}{6x} \rightarrow 24+21=5x$$
$$45=5x$$
$$x=9$$

Method 3: Create a proportion

- simplify each side of the equation into a single fraction then you can cross multiply.
- This can take more work and sometimes creates an equation with exponents larger than 2 and can make it more difficult to solve so use this method with caution.

$$\frac{2}{2}\cdot\frac{4}{x}+\frac{7}{2x}=\frac{5}{6}$$

$$\frac{8}{2x}+\frac{7}{2x}$$

$$\frac{15}{2x}\times\frac{5}{6}$$

$$90=10x$$
$$9=x$$

Solve each.

1. $\dfrac{8}{2x+5}=\dfrac{3}{x-6}$

2. $\dfrac{x}{x^2-100}=\dfrac{1}{x^2-12x+20}$

3. $\dfrac{4}{x-5}+\dfrac{38}{x^2+3x-40}=\dfrac{x}{x+8}$

1. $\frac{8}{2x+5} = \frac{3}{x-6}$

$3(2x+5) = 8(x-6)$

$6x+15 = 8x-48$

$-6x \quad -6x$

$15 = 2x-48$

$x = 31.5$

2. $\frac{x}{x^2-100} = \frac{1}{x^2-12x+20}$

$\frac{x-2}{x-2}\cdot\frac{x}{(x+10)(x-10)} = \frac{1}{(x-10)(x-2)}\cdot\frac{x+10}{x+10}$

$\frac{x(x-2)}{(x-2)(x+10)(x-10)} = \frac{1(x+10)}{(x-2)(x+10)(x-10)}$

$x^2-2x = x+10 \rightarrow x^2-3x-10=0$

$(x-5)(x+2)=0$

$x=-2, 5$