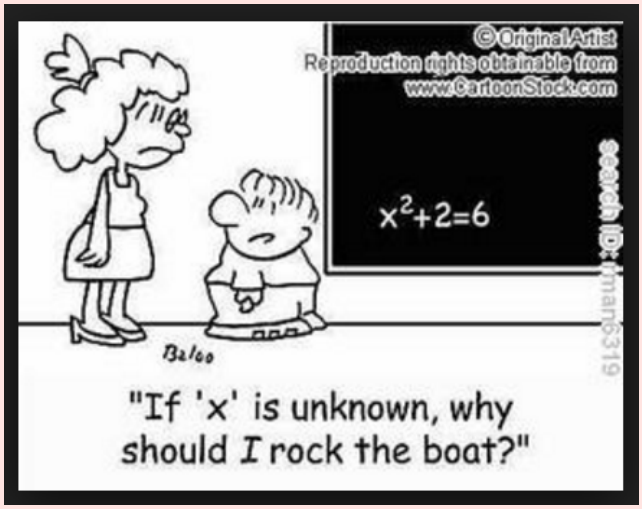
Solving Rational Equations and Inequalities
(Section 5.5)



Objectives:

~ Solve rational equations and inequalities

Try this:

$$\frac{x^2-9}{x+3}=7$$

$$\frac{(x+3)(x-3)}{(x+3)}=7$$

$x-3=7$

$x=10$

$$\frac{x^2+3x-4}{x-1}=5$$

$$\frac{(x-1)(x+4)}{(x-1)}=5$$

$x+4=5$

$x=1$

extraneous sol!

What is a rational equation?

A **rational equation** is an equation that contains one or more rational expressions.

The time t in hours that it takes to travel d miles can be determined by using the equation $t = d/r$, where r is the average rate of speed. This equation is a rational equation.

Big Hint!

To solve a rational equation, multiply each and every term by the LCD.

This eliminates denominators! Much easier!

Well, Let's Jump Right In!

Solve the equations:

Make sure to CHECK your answer(s)!

$\frac{x}{1} - \frac{18}{x} = \frac{3}{1}$ LCD: x

$(x)\left(\frac{x}{1}\right) - (x)\left(\frac{18}{x}\right) = (x)\left(\frac{3}{1}\right)$

$x^2 - 18 = 3x$

$-3x \quad -3x$

$x^2 - 3x - 18 = 0$

$(x-6)(x+3) = 0$

$x = -3 \quad x = 6$

$\frac{5x}{x-2} = \frac{3x+4}{x-2}$ LCD: $(x-2)$

$(x-2)\left(\frac{5x}{x-2}\right) = \frac{3x+14}{(x-2)}$

$5x = 3x + 14$

$-3x \quad -3x$

$2x = 14$

$x = 2$ extraneous

$\frac{2x-5}{(x-8)} + \frac{x}{2} = \frac{11}{x-8}$ LCD: $(2)(x-8)$

$(2)(x-8)\frac{2x-5}{(x-8)} + (2)(x-8)\left(\frac{x}{2}\right) = \frac{(2)(x-8)11}{(x-8)}$

$4x - 10 + x^2 - 8x = 22$

$x^2 - 4x - 10 = 22$

$-22 \quad -22$

$x^2 - 4x - 32 = 0$

extraneous

$x = 8$

$x = -4$

Your Turn!

Solve each equation.

$$\frac{10}{3} = \frac{4}{x} + 2$$

$$\frac{16}{x^2 - 16} = \frac{2}{x - 4}$$

$$\frac{1}{x-1} = \frac{x}{x-1} + \frac{x}{6}$$