Lesson 3:
Rational Equations
solving for the variable

Solve the following equation:

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

if denominators are equal then the numerators are also equal.

Solve the following equation:

$\frac{x-3}{7} = \frac{4x+12}{7}$

$x - 3 = 4x + 12$
$-3x = 15$
$x = -5$

Solve the following equation:

$\frac{x-1}{15} = \frac{2}{5}\frac{(3)}{(3)}$

put denominators equal to each other

$x - 1 = 6$
$x = 7$

solve for x

$$\frac{x}{4}=\frac{13}{8}$$

$\frac{x}{4}=\frac{13}{(2)(4)}$

$\frac{x(2)}{4(2)}=\frac{13}{(2)(4)}$

$2x=13$

$\boxed{x=6.5}$

* "cross multiply"

$\frac{x}{4}=\frac{13}{8}$

$8x=52$

$x=6.5$

solve for x

$$\frac{5}{x}-\frac{1}{3}=\frac{1}{x}$$

$\frac{5}{x}-\frac{1}{x}=\frac{1}{3}$

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

$\boxed{12=x}$

$x\neq 0$

$\frac{5(3)}{x(3)}-\frac{1(x)}{3(x)}=\frac{1(3)}{x(3)}$

$\frac{15}{3x}-\frac{x}{3x}=\frac{3}{3x}$

$\frac{15-x}{3x}=\frac{3}{3x}$

$15-x=3$

$-x=-12$

$\boxed{x=12}$

solve for x

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

$x \neq 0$

$$\frac{3(3)}{x^2(3)}=\frac{x-4}{3x^2}+\frac{2}{3x^2}$$

$$9 = x-4+2$$

$$9+4-2 = x$$

$$\boxed{11 = x}$$

check

$$\frac{3}{(11)^2}=\frac{11-4}{3(11)^2}+\frac{2}{3(11)^2}$$

$$\frac{3}{121}=\frac{7}{363}+\frac{2}{363}$$

$$\frac{3}{121}=\frac{9}{363}$$ ✓

solve for x

$$\frac{3}{2x^2}=\frac{5}{4x}+\frac{7}{8x^2}$$

$x \neq 0$

$$\frac{3(4)}{2x^2(4)}=\frac{5(2x)}{(4x)(2x)}+\frac{7}{8x^2}$$

$(4)(2)(x)(x)$

$$12 = 10x+7$$

$$12-7 = 10x$$

$$5 = 10x$$

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

solve for x

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

$x \neq 2$

$$\frac{x(5)}{(x-2)(5)}+\frac{1(x-2)}{5(x-2)}=\frac{2(5)}{x-2(5)}$$

$$5x+x-2=10$$

$$6x=12$$

$$x=2$$

see restriction!

$\therefore x=\phi$

solve for x

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

$\frac{x}{2x+3}+\frac{5}{2x+3}=7$ Restriction $x \neq -3/2$

$(2x+3)\left(\frac{x}{2x+3}+\frac{5}{2x+3}\right)=7(2x+3)$

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

$x+5=14x+21$

$-13x=16$

$x=\frac{-16}{13}$

You can now do:

Solving Rational Equations Worksheet
(with answers)