Algebra II
Section 9-5

SOLVING = RATIONAL EQUATIONS

Solve each equation involving addition or subtraction by first finding common denominators, then..

cross 'em off
(forget them)

More examples:

2) $\frac{y}{y-2}-\frac{3}{2-y}=\frac{2}{5}$

$5\cdot\frac{y}{y-2}-\frac{3\cdot(-1)\cdot(5)}{2-y\cdot(-1)\cdot(5)}=\frac{2}{5}\cdot(y-2)\cdot(y-2)$

5y - 3(-1)(5) = 2(y - 2)
5y + 15 = 2y - 4
3y = -19
y = -19/3

When in doubt..

factor
it out

Oddly, it can get easier...

cross multiply

1) $\frac{9}{28}+\frac{3}{x+2}=\frac{3}{4}$

$(x+2)\cdot\frac{9}{28}+\frac{3\cdot28}{x+2\cdot28}=\frac{3}{4}\cdot7(x+2)\cdot7(x+2)$

9(x + 2) + 3(28) = 21(x + 2)
9x + 18 + 84 = 21x + 42
9x + 102 = 21x + 42
60 = 12x
5 = x

3) $\frac{6}{r+5}+\frac{6}{r-5}=2$

$(r-5)\cdot\frac{6}{r+5}+\frac{6\cdot(r+5)}{(r-5)\cdot(r+5)}=\frac{2}{1}\cdot(r+5)(r-5)\cdot(r+5)(r-5)$

$6r - 30 + 6r + 30 = 2(r^2 - 25)$
$12r = 2r^2 - 50$
$0 = 2r^2 - 12r - 50$ run program
r = 8.8. -2.8

4) $\frac{2}{x^2-4}-4=\frac{1}{3x+6}$

$3\cdot\frac{2}{(x+2)(x-2)}-\frac{4}{1}=\frac{1\cdot3(x+2)(x-2)}{3(x+2)}\cdot(x-2)\cdot(x-2)$

$6 - 12(x + 2)(x - 2) = x - 2$
$6 - 12x^2 + 48 = x - 2$
$0 = 12x^2 + x - 56$ run program
x = 2.1. -2.2

5) $\frac{w}{w-12}=\frac{4}{7}$

w(7) = 4(w - 12)
7w = 4w - 48
3w = -48
w = -16

6) $\frac{2}{x-1} = \frac{x+4}{x-1}$

$2(x - 1) = (x + 4)(x - 1)$

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

$0 = x^2 + x - 2$

$0 = (x + 2)(x - 1) = 0$

$x = -2$ or $x = 1$, but $x \neq 1$ is a restriction

therefore: $x = -2$ only

Can you think of a better way to solve #6?

7) $\frac{1}{d+3} = \frac{2}{d^2-3d-18} - \frac{1}{6-d}$

$\frac{1}{d+3} = \frac{2}{(d-6)(d+3)} - \frac{1}{-1(d-6)}$ move -1 to the top

$\frac{1}{d+3} = \frac{2}{(d-6)(d+3)} - \frac{-1}{(d-6)}$

$(d-6)\cdot\frac{1}{d+3} = \frac{2}{(d-6)(d+3)} + \frac{1}{(d-6)}\cdot(d+3)$ $(d-6)\cdot$ $\cdot(d+3)$

$d - 6 = 2 + d + 3$

$-6 = 2 + 3$

$-6 = 5$ no solution (false statement)

Restrictions

(excluded or restricted values)

Name all restrictions for each equation. You do not need to solve them.

Examples:

1) $\frac{r}{r-9} = \frac{5}{r+2}$

$r \neq$ 9, -2

2) $\frac{1}{3x-2} + x = \frac{8}{x}$

$x \neq$ 2/3, 0

3) $\frac{4}{y^2-16} = \frac{y}{2} - \frac{7}{2y^2+3y-20}$

(y+4)(y-4) (2y-5)(y+4)

$y \neq$ 4, -4, 5/2