

6.1 Solving Rational Equations

PRACTICE

Directions: Solve each equation. Check for extraneous solutions.

1) $\left(\frac{2a-12}{a+5} = -2\right)(a+5)$

$$\frac{2a-12}{+2a} = \frac{-2a-10}{+2a}$$

$$\frac{4a-12}{+12} = \frac{-10}{+12}$$

$$\frac{4a}{4} = \frac{-2}{4}$$

$$a = -\frac{1}{2}$$

2) $\left[\frac{1}{x+4} = \frac{1}{x^2+4x} + \frac{5x-6}{x^2+4x}\right]x(x+4)$

$$1(x) = 1 + 5x - 6$$

$$x = 5x - 5$$

$$-4x = -5$$

$$x = \frac{5}{4}$$

3) $\left[\frac{1}{h+3} + \frac{2}{h} = \frac{3}{h+3}\right](h+3)(h)$

$$1(h) + 2(h+3) = 3(h)$$

$$h + 2h + 6 = 3h$$

$$3h + 6 = 3h$$

$$6 = 0 \quad \text{No Sol.}$$

4) $\left(\frac{2-n-3n^2}{3n-2} = n+2\right)(3n-2)$

$$2-n-3n^2 = (n+2)(3n-2)$$

$$2-n-3n^2 = 3n^2-2n+6n-4$$

$$\begin{array}{r} 2-n-3n^2 \\ -2+n+3n^2 \\ \hline 0 = 6n^2+5n-6 \end{array}$$

$$0 = (6n+9)(n-2/3)$$

$$0 = (2n+3)(3n-2)$$

$$2n+3=0 \quad \text{or} \quad 3n-2=0$$

$$n = -\frac{3}{2} \quad \text{or} \quad n = \frac{2}{3}$$

5) $\left[\frac{1}{c^2-c-12} - \frac{1}{c+3} = \frac{6}{c^2-c-12}\right](c-4)(c+3)$

$$1 - [1(c-4)] = 6$$

$$1 - c + 4 = 6$$

$$-c + 5 = 6$$

$$-c = 1$$

$$c = -1$$

6) $\left[\frac{6x}{x+4} + 4 = \frac{2x+2}{x-1}\right](x+4)(x-1)$

$$6x(x-1) + 4(x+4)(x-1) = (2x+2)(x+4)$$

$$6x^2 - 6x + 4(x^2+4x-x-4) = 2x^2+8x+2x+8$$

$$6x^2 - 6x + 4(x^2+3x-4) = 2x^2+10x+8$$

$$6x^2 - 6x + 4x^2 + 12x - 16 = 2x^2 + 10x + 8$$

$$10x^2 + 6x - 16 = 2x^2 + 10x + 8$$

$$8x^2 - 4x - 24 = 0$$

$$4(2x^2 - x - 6) = 0$$

$$4(2x-4)(2x+3) = 0$$

$$4(x-2)(2x+3) = 0$$

$$x-2=0 \quad \text{or} \quad 2x+3=0$$

$$x=2 \quad \text{or} \quad x = -\frac{3}{2}$$

PC 6.1 Practice Solutions.notebook

7) $\left(\frac{5x}{x-2} = 7 + \frac{10}{x-2}\right) x \neq 2$

$$5x = 7(x-2) + 10$$

$$5x = 7x - 14 + 10$$

$$-2x = -4$$

$$x = 2$$

SO **NO SOL.**

8) $\left(\frac{2}{3x} + \frac{2}{3} = \frac{8}{x+6}\right) 3x(x+6)$

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

$$2x+12 + 2x^2+12x = 24x$$

$$2x^2 + 14x + 12 = 24x$$

$$2x^2 - 10x + 12 = 0$$

$$2(x^2 - 5x + 6) = 0$$

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

$$x-2=0 \quad x-3=0$$

$x=2$ or $x=3$

9) $\left(\frac{1}{a+1} + \frac{1}{a-1} = \frac{2}{a^2-1}\right) (a+1)(a-1)$

$$1(a-1) + 1(a+1) = 2$$

$$a-1 + a+1 = 2$$

$$2a = 2$$

$$a = 1 \text{ BUT } a \neq 1$$

SO **NO SOL.**

10) $\left(\frac{1}{2} - \frac{x-3}{2} = \frac{x-4}{2x-10}\right) 2(x-5)$

$$1(x-5) - [(x-3)(x-5)] = x-4$$

$$x-5 - (x^2-8x+15) = x-4$$

$$x-5 - x^2 + 8x - 15 = x-4$$

$$-x^2 + 9x - 20 = x-4$$

$$0 = x^2 - 8x + 16$$

$$0 = (x-4)^2$$

$x=4$

11) $\left(\frac{1}{a^2} + \frac{5a^2+14a-24}{a^2} = \frac{a-5}{a}\right) a^2$

$$1 + 5a^2 + 14a - 24 = a(a-5)$$

$$5a^2 + 14a - 23 = a^2 - 5a$$

$$4a^2 + 19a - 23 = 0$$

$$(4a+23)(4a-4) = 0$$

$$(4a+23)(a-1) = 0$$

$$4a+23=0 \quad a-1=0$$

$$4a = -23 \quad a = 1$$

$a = -\frac{23}{4}$ or $a = 1$

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

$$x+2 - 1 = (x-6)(x+1)$$

$$x+1 = x^2 - 5x - 6$$

$$0 = x^2 - 6x - 7$$

$$0 = (x-7)(x+1)$$

$x=7$ or $x=-1$

$x+1 \neq 0$
so $x \neq -1$