

Rational Equations

Solve each equation. Remember to check for extraneous solutions.

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

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

$$1 - 5x - 25 = 5x$$

$$-24 - 5x = 5x$$

$$-24 = 10x$$

$$\frac{-24}{10} = \frac{10x}{10}$$

$$\frac{-12}{5} = x$$

$$3) \frac{1}{a+2} + \frac{1}{a^2-3a-10} = \frac{1}{a-5}$$

$$a-5 + 6a+4 = a+2$$

$$7a-1 = a+2$$

$$-a+1 -a+1$$

$$6a = 3$$

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

$$5) \frac{x+5}{3x^2-9x} = \frac{5}{x^2-3x} + \frac{1}{x}$$

$$x+5 = 15 + 3(x-3)$$

$$x+5 = 15 + 3x - 9$$

$$x+5 = 3x + 6$$

$$-x - 6 -x - 6$$

$$-1 = 2x$$

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

$$2) \frac{3}{2} = \frac{b+5}{4b} + \frac{3}{2b}$$

$$6b = b+5 + 6$$

$$6b = b+11$$

$$-b -b$$

$$5b = 11$$

$$b = \frac{11}{5}$$

$$4) \frac{1}{k-3} = \frac{3}{k-3} + \frac{2}{k+4}$$

$$k+4 = 3(k+4) + 2(k-3)$$

$$k+4 = 3k+12 + 2k-6$$

$$k+4 = 5k+6$$

$$-k-6 -k-6$$

$$-2 = 4k$$

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

$$6) \frac{4}{p-5} + \frac{1}{p+1} = \frac{p}{p^2-4p-5}$$

$$4(p+1) + p-5 = p$$

$$4p+4+p-5 = p$$

$$5p-1 = p$$

$$-5p -5p$$

$$-1 = -4p$$

$$\frac{1}{4} = p$$

$$3x \quad 3x \quad 3x$$

$$7) \frac{2}{x} - 1 = \frac{4}{2x}$$

$$\begin{array}{r} 6 \\ -6 \end{array} \cdot -3x = 4$$

$$-3x = -2$$

$$x = 2/3$$

$$8) \frac{x^2 - 6x + 8}{x-6} - (x-3) = \frac{1}{x-6}$$

$$x^2 - 6x + 8 - (x-3)(x-6) = 1$$

$$x^2 - 6x + 8 - (x^2 - 9x + 18) = 1$$

$$x^2 - 6x + 8 - x^2 + 9x - 18 = 1$$

$$3x - 10 = 1$$

$$3x = 11$$

$$x = 11/3$$

$$9) \frac{k-4}{k} = \frac{k^2 - k - 20}{k^2} - \frac{1}{k^2}$$

$$k(k-4) = k^2 - k - 20 - 1$$

$$\begin{array}{r} k^2 - 4k \\ + k \end{array} = \begin{array}{r} k^2 - k - 21 \\ + k \end{array}$$

$$-3k = -21$$

$$k = 7$$

$$10) \frac{(b-4)(b-1)}{b^2 - 5b + 4} - \frac{6}{b-4} = 1 \quad (b-4)(b-1)$$

$$4 - 6(b-1) = (b-4)(b-1)$$

$$4 - 6b + 6 = b^2 - 5b + 4$$

$$\begin{array}{r} -6b + 10 \\ + 6b - 10 \end{array} = \begin{array}{r} b^2 - 5b + 4 \\ + 6b - 10 \end{array}$$

$$0 = b^2 + b - 6$$

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

$$b = -3 \quad b = 2$$

$$11) \frac{1}{b+6} + \frac{5}{b^2 + 8b + 12} = \frac{b^2 - 10b + 25}{b^2 + 8b + 12}$$

$$1(b+2) + 5 = b^2 - 10b + 25$$

$$\begin{array}{r} b + 7 \\ - b - 7 \end{array} = \begin{array}{r} b^2 - 10b + 25 \\ - b^2 - 7 \end{array}$$

$$0 = b^2 - 11b + 18$$

$$0 = (b-9)(b-2)$$

$$b = 9 \quad b = 2$$

$$12) \frac{(a+4)(a+2)}{a^2 + 6a + 8} = \frac{a+1}{a+4} - \frac{a-4}{a+2} \quad (a+4)(a+2)$$

$$a^2 - 4a = (a+1)(a+2) - (a-4)(a+4)$$

$$a^2 - 4a = a^2 + 3a + 2 - (a^2 + 16)$$

$$\begin{array}{r} a^2 - 4a \\ - a^2 + 4a \end{array} = \begin{array}{r} 2a^2 + 3a + 18 \\ - a^2 + 4a \end{array}$$

$$0 = a^2 + 7a + 18$$

$$0 = (a+2)(a+9)$$

$$a = -2 \quad a = -9$$