

Solve each equation.

$$1. \quad \frac{x-4}{3x^2} + \frac{2}{3x^2} = \frac{3}{x^2} \cdot 3$$

$$\frac{x-4}{3x^2} + \frac{2}{3x^2} = \frac{9}{3x^2}$$

$$3x^2 \left[\frac{x-4}{3x^2} \right] = \left[\frac{9}{3x^2} \right] 3x^2$$

$$x-4 = 9$$

$$\boxed{x = 11}$$

$$3. \quad \frac{4}{x^2} = \frac{5 \cdot x}{x \cdot x} - \frac{1}{x^2}$$

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

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

$$4 = 5x - 1$$

$$5 = 5x$$

$$\boxed{1 = x}$$

$$5. \quad \frac{x-6}{x} = \frac{x+4}{x} + \frac{1 \cdot x}{1 \cdot x}$$

$$\frac{x-6}{x} = \frac{x+4}{x} + \frac{x}{x}$$

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

$$x-6 = 2x+4$$

$$\boxed{-10 = x}$$

$$2. \quad 5 \cdot \frac{1}{x} = \frac{1}{5x} - \frac{n-1}{5x}$$

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

$$5x \left[\frac{5}{5x} \right] = \left[\frac{-n+2}{5x} \right] 5x$$

$$5 = -n + 2$$

$$3 = -n$$

$$\boxed{-3 = n}$$

$$4. \quad \frac{3x+15}{4x^2} = \frac{4 \cdot 1}{4 \cdot x^2} - \frac{x-3}{4x^2}$$

$$\frac{3x+15}{4x^2} = \frac{4}{4x^2} - \frac{x-3}{4x^2}$$

$$4x^2 \left[\frac{3x+15}{4x^2} \right] = \left[\frac{-x+7}{4x^2} \right] 4x^2$$

$$3x+15 = -x+7$$

$$4x = -8$$

$$\boxed{x = -2}$$

$$7. \quad \frac{2x \cdot 1}{2x} + \frac{1}{4x^2} = \frac{1 \cdot x}{4x \cdot x}$$

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

$$4x^2 \left[\frac{2x+1}{4x^2} \right] = \left[\frac{x}{4x^2} \right] 4x^2$$

$$2x+1 = x$$

$$\boxed{x = -1}$$

$$9. \frac{5 \cdot 1}{5 \cdot x} = \frac{6}{5x} + \frac{1 \cdot 5x}{1 \cdot 5x}$$

$$\frac{5}{5x} = \frac{6}{5x} + \frac{5x}{5x}$$

$$\cancel{5x} \left[\frac{5}{5x} \right] = \left[\frac{6+5x}{5x} \right] \cancel{5x}$$

$$5 = 6 + 5x$$

$$-1 = 5x$$

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

$$(x-8) \frac{(-1)}{(x-8)1} + \frac{1}{x-8} = \frac{7}{x-8}$$

$$\frac{8-x}{x-8} + \frac{1}{x-8} = \frac{7}{x-8}$$

$$(x-8) \frac{9-x}{x-8} = \frac{7}{x-8} (x-8)$$

$$9-x=7$$

$$\boxed{x=2}$$

$$17. \frac{x-6}{3x} = \frac{x^2-5x-24}{3x} + 1 \cdot \frac{3x}{3x}$$

$$\frac{x-6}{3x} = \frac{x^2-5x-24}{3x} + \frac{3x}{3x}$$

$$\frac{x-6}{3x} = \frac{x^2-2x-24}{3x}$$

$$x-6 = x^2-2x-24$$

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

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

$$\boxed{x = -3, 6}$$

$$11. \frac{1 \cdot 4 \cdot 6}{2 \cdot 8x^2 \cdot 6} = \frac{1 \cdot 3x}{4x \cdot 3x} - \frac{11}{12x^2}$$

$$\frac{6}{12x^2} = \frac{3x}{12x^2} - \frac{11}{12x^2}$$

$$\cancel{12x^2} \cdot \frac{6}{12x^2} = \frac{3x-11}{12x^2} \cdot \cancel{12x^2}$$

$$6 = 3x - 11$$

$$17 = 3x$$

$$\boxed{\frac{17}{3} = x}$$

$$15. \frac{1}{x} + \frac{1}{x^2-x} = \frac{5}{x^2-x}$$

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

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

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

$$\boxed{x=5}$$

$$19. \frac{1}{x^2-3x} + \frac{1}{x-3} = \frac{3}{x^2-3x}$$

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

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

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

$$1+x=3$$

$$\boxed{x=2}$$

$$21. \frac{6}{x^2-6x+8} = \frac{1}{x^2-6x+8} - \frac{1}{x-4}$$

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

$$6 = 1 - x + 2$$

$$\boxed{-3 = x}$$

$$23. \frac{1}{x-2} + \frac{1}{x^2-7x+10} = \frac{6}{x-2}$$

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

$$x-5 + 1 = 6x-30$$

$$26 = 5x$$

$$\boxed{\frac{26}{5} = x}$$

$$25. \frac{x+5}{x^2+x} = \frac{1}{x^2+x} - \frac{(x-6)x}{(x+1)x}$$

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

$$x^2 - 5x + 4 = 0$$

$$(x-4)(x-1) = 0$$

$$\boxed{x = 1, 4}$$

$$27. \frac{5}{x^3+5x^2} = \frac{4x^2}{(x+5)x^2} + \frac{1(x+5)}{x^2(x+5)}$$

$$5 = 4x^2 + x + 5$$

$$0 = 4x^2 + x$$

$$0 = x(4x+1)$$

$$x = 0, -1/4$$

↑
Extraneous!

Retro Question – solve the following quadratic equation using the quadratic formula.

$$29. 3x^2 - 5x + 4 = x^2 + 5x - 3$$

$$2x^2 - 10x + 7 = 0$$

$$x = \frac{10 \pm \sqrt{(-10)^2 - 4(2)(7)}}{2(2)}$$

$$= \frac{10 \pm \sqrt{100 - 56}}{4}$$

$$= \frac{10 \pm \sqrt{44}}{4} = \frac{10 \pm 2\sqrt{11}}{4} = \boxed{\frac{5 \pm \sqrt{11}}{2}}$$