

Solve each equation by factoring, and state all real solutions.

1.) $k^2 + 24 = -11k$

$$k^2 + 11k + 24 = 0$$

$$(k+8)(k+3) = 0$$

$$k+8=0 \quad k+3=0$$

Solutions:

$$k = -8, -3$$

3.) $81n^2 - 16 = 0$

$$9n \cdot 9n \quad 4 \cdot 4$$

$$(9n-4)(9n+4) = 0$$

$$9n-4=0 \quad 9n+4=0$$

Solutions:

$$n = 4/9, -4/9$$

2.) $2x^3 + 8x^2 - 3x - 12 = 0$

$$(2x^3 + 8x^2) + (-3x - 12) = 0$$

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

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

$$2x^2 - 3 = 0 \quad x + 4 = 0$$

$$2x^2 = 3 \quad x = -4$$

$$x^2 = 3/2$$

$$x = \pm \sqrt{3/2}$$

Solutions:

$$x = \sqrt{\frac{3}{2}}, -\sqrt{\frac{3}{2}}, -4$$

4.) $6x^4 - 9x^3 - 42x^2 = 0$

$$3x^2(2x^2 - 3x - 14) = 0$$

$$3x^2(2x^2 - 7x + 4x - 14) = 0$$

$$3x^2[(2x^2 - 7x) + (4x - 14)] = 0$$

$$3x^2[x(2x-7) + 2(2x-7)] = 0$$

$$3x^2(x+2)(2x-7) = 0$$

$$3x^2 = 0 \quad x+2=0 \quad 2x-7=0$$

Solutions:

$$x = 0, 0, -2, 7/2$$

$$5.) 6x^3 - 22x^2 + 12x = 0$$

$$2x(3x^2 - 11x + 6) = 0$$

$$2x[3x^2 - 9x - 2x + 6] = 0 \quad \begin{matrix} 18 \\ -11 \end{matrix}$$

$$2x[(3x^2 - 9x) + (-2x + 6)] = 0$$

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

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

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

Solutions:

$$x = 0, \frac{2}{3}, 3$$

$$6.) 6x^2 - 5x + 1 = 0$$

$$\begin{matrix} 6 \\ -2 \times -3 \\ -5 \end{matrix}$$

$$6x^2 - 2x - 3x + 1 = 0$$

$$(6x^2 - 2x) + (-3x + 1) = 0$$

$$2x(3x-1) - 1(3x-1) = 0$$

$$(2x-1)(3x-1) = 0$$

$$2x-1 = 0 \quad 3x-1 = 0$$

Solutions:

$$x = \frac{1}{2}, \frac{1}{3}$$

$$7.) 5y^2 - 12y - 12 = -10y^2 - 40y + 20$$

$$15y^2 + 28y - 32 = 0$$

$$15y^2 + 40y - 12y - 32 = 0 \quad \begin{matrix} -480 \\ 28 \end{matrix}$$

$$(15y^2 + 40y) + (-12y - 32) = 0$$

$$5y(3y+8) - 4(3y+8) = 0$$

$$(5y-4)(3y+8) = 0$$

$$5y-4 = 0 \quad 3y+8 = 0$$

Solutions:

$$y = \frac{4}{5}, -\frac{8}{3}$$

$$8.) 2x^3 - 10x = 20 - 4x^2$$

$$2x^3 + 4x^2 - 10x - 20 = 0$$

$$(2x^3 + 4x^2) + (-10x - 20) = 0$$

$$2x^2(x+2) - 10(x+2) = 0$$

$$(2x^2 - 10)(x+2) = 0$$

$$2x^2 - 10 = 0 \quad x+2 = 0$$

$$x^2 = 5$$

$$x = -2$$

$$x = \pm \sqrt{5}$$

Solutions:

$$x = \sqrt{5}, -\sqrt{5}, -2$$