

$$\begin{aligned}
 1. \quad & (2x^2y^3)(-3x^3y^5) \\
 & (2)(-3)x^{2+3}y^{3+5} \\
 & -6x^5y^8
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & -2y(3y^4 - 7y^2) \\
 & -2y(3y^4) - (-2y)(7y^2) \\
 & -2y(3y^4) + 2y(7y^2) \\
 & -6y^{1+4} + 2y(7y^2) \\
 & -6y^5 + 14y^{1+2} \\
 & -6y^5 + 14y^3
 \end{aligned}$$

$$\begin{aligned}
 5. \quad & (x - 3)(x + 4) \\
 & (x)(x) + 4x - 3x - 3(4) \\
 & x^2 + (4x - 3x) - 12 \\
 & x^2 + x - 12
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & (3x + 2)(2y - 5) \\
 & (3x)(2y) - 5(3x) + 2(2y) - 5(2) \\
 & 6xy - 15x + 4y - 10
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & (5x + 1)(4x - 9) \\
 & (5x)(4x) - 9(5x) + 1(4x) - 9(1) \\
 & 20x^{1+1} - 45x + 4x - 9 \\
 & 20x^2 - 41x - 9
 \end{aligned}$$

$$\begin{aligned}
 11. \quad & (2x - 3)(3x^2 - 4x + 2) \\
 & (2x)(3x^2) - (2x)(4x) + 2(2x) - 3(3x^2) - 3(-4x) - 3(2) \\
 & 6x^{1+2} - 8x^{1+1} + 4x - 9x^2 + 12x - 6 \\
 & 6x^3 - 8x^2 + 4x - 9x^2 + 12x - 6 \\
 & 6x^3 + (-8x^2 - 9x^2) + (4x + 12x) - 6 \\
 & 6x^3 - 17x^2 + 16x - 6
 \end{aligned}$$

$$\begin{aligned}
 13. \quad & (x - 3)^2 \\
 & (x - 3)(x - 3) \\
 & (x)(x) - 3x - 3x + (-3)(-3) \\
 & x^{1+1} - 6x + 9 \\
 & x^2 - 6x + 9
 \end{aligned}$$

$$\begin{aligned}
 15. \quad & (x - 15)(3x - 1) \\
 & (x)(3x) - 1(x) - 15(3x) - (15)(-1) \\
 & 3x^{1+1} - x - 45x + 15 \\
 & 3x^2 - 46x + 15
 \end{aligned}$$

$$\begin{aligned}
 17. \quad & (4x - 5)(3x^2 - 3x + 9) \\
 & (4x)(3x^2) - 3x(4x) + 9(4x) - 5(3x^2) - 5(-3x) - 5(9) \\
 & 12x^{1+2} - 12x^{1+1} + 36x - 15x^2 + 15x - 45 \\
 & 12x^3 - 12x^2 + 36x - 15x^2 + 15x - 45 \\
 & 12x^3 + (-12x^2 - 15x^2) + (36x + 15x) - 45 \\
 & 12x^3 - 27x^2 + 51x - 45
 \end{aligned}$$

$$\begin{aligned}
 19. \quad & (-5x - 8)(-4x^2 + 2x - 1) \\
 & (-5x)(-4x^2) - 5x(2x) - 5x(-1) - 8(-4x^2) - 8(2x) - 8(-1) \\
 & 20x^{1+2} - 10x^{1+1} + 5x + 32x^2 - 16x + 8 \\
 & 20x^3 - 10x^2 + 5x + 32x^2 - 16x + 8 \\
 & 20x^3 + (32x^2 - 10x^2) + (5x - 16x) + 8 \\
 & 20x^3 + 22x^2 - 11x + 8
 \end{aligned}$$

$$\begin{aligned}
 21. \quad & 2x^3y^4(-3x^3y - 3x^5y^9 - 8x) \\
 & 2x^3y^4(-3x^3y) + 2x^3y^4(-3x^5y^9) + 2x^3y^4(-8x) \\
 & (2)(-3)x^{3+3}y^{4+1} + (2)(-3)x^{3+5}y^{4+9} + (2)(-8)x^{3+1}y^4 \\
 & -6x^6y^5 - 6x^8y^{13} - 16x^4y^4
 \end{aligned}$$

$$\begin{aligned}
 23. & -8x^2y^6(-4x^7y^6 - 2x^7y^3 - 5x^{15}y^{14}) \\
 & -8x^2y^6(-4x^7y^6) - 8x^2y^6(-2x^7y^3) - 8x^2y^6(-5x^{15}y^{14}) \\
 & 32x^{2+7}y^{6+6} + 16x^{2+7}y^{6+3} + 40x^{2+15}y^{6+14} \\
 & 32x^9y^{12} + 16x^9y^9 + 40x^{17}y^{20}
 \end{aligned}$$

$$\begin{aligned}
 25. & (x - 4)(x + 4) \\
 & (x)(x) + 4(x) - 4(x) - 4(4) \\
 & x^2 - 0x - 16 \\
 & x^2 - 16
 \end{aligned}$$

$$\begin{aligned}
 27. & (2x - 10)(2x + 10) \\
 & (2x)(2x) + 10(2x) - 10(2x) - 10(10) \\
 & 4x^2 + 20x - 20x - 100 \\
 & 4x^2 + 0x - 100 \\
 & 4x^2 - 100
 \end{aligned}$$

$$\begin{aligned}
 29. & -2x(3x - 1)^2 \\
 & -2x(3x - 1)(3x - 1) \\
 & -2x[(3x)(3x) - 1(3x) - 1(3x) - 1(-1)] \\
 & -2x[9x^2 - 3x - 3x + 1] \\
 & -2x[9x^2 - 6x + 1] \\
 & -2x(9x^2) - 2x(-6x) - 2x(1) \\
 & -18x^{1+2} + 12x^{1+1} - 2x \\
 & -18x^3 + 12x^2 - 2x
 \end{aligned}$$

$$\begin{aligned}
 31. & (4x^2 + 8x - 5)(3x^2 - 3x + 9) \\
 & 4x^2(3x^2) + 4x^2(-3x) + 4x^2(9) + 8x(3x^2) + \\
 & 8x(-3x) + 8x(9) - 5(3x^2) - 5(-3x) - 5(9)
 \end{aligned}$$

$$\begin{aligned}
 & 12x^{2+2} - 12x^{2+1} + 36x^2 + 24x^{1+2} - 24x^{1+1} + \\
 & 72x - 15x^2 + 15x - 45
 \end{aligned}$$

$$\begin{aligned}
 & 12x^4 - 12x^3 + 36x^2 + 24x^3 - 24x^2 + 72x - \\
 & 15x^2 + 15x - 45
 \end{aligned}$$

$$\begin{aligned}
 & 12x^4 + (24x^3 - 12x^3) + (36x^2 - 24x^2 - 15x^2) + \\
 & (72x + 15x) - 45
 \end{aligned}$$

$$12x^4 + 12x^3 - 3x^2 + 87x - 45$$

$$\begin{aligned}
 33. & -2x^3y(4xy) \\
 & -2(4)x^{3+1}y^{1+1} \\
 & -8x^4y^2
 \end{aligned}$$

$$\begin{aligned}
 35. & -4m^4n^3(2m^5m^7) \\
 & -4m^4n^3(2m^{5+7}) \\
 & -4m^4n^3(2m^{12}) \\
 & -4(2)m^{4+12}n^4 \\
 & -8m^{16}n^4
 \end{aligned}$$

$$\begin{aligned}
 37. & 5a^4b^2c^8(-7a^2b^5c) \\
 & 5(-7)a^{4+2}b^{2+5}c^{8+1} \\
 & -35a^6b^7c^9
 \end{aligned}$$

$$\begin{aligned}
 39. & (8x^3y^5)(-6x^4y^0) \\
 & 8(-6)x^{3+4}y^{5+0} \\
 & -48x^7y^5
 \end{aligned}$$

$$\begin{aligned}
 41. & (-6y^5)^2(2y^6)^3 \\
 & ((-6)^2 y^{5 \cdot 2})(2^3 y^{6 \cdot 3}) \\
 & (36y^{10})(8y^{18}) \\
 & 36(8)y^{10+18} \\
 & \mathbf{288y^{28}}
 \end{aligned}$$

$$\begin{aligned}
 43. & (-3x^6y^5)^2(-2x^8y^{12})^3 \\
 & ((-3)^2 x^{6 \cdot 2} y^{5 \cdot 2})((-2)^3 x^{8 \cdot 3} y^{12 \cdot 3}) \\
 & (9x^{12}y^{10})(-8x^{24}y^{36}) \\
 & 9(-8)x^{12+24}y^{10+36} \\
 & \mathbf{-72x^{36}y^{46}}
 \end{aligned}$$

$$\begin{aligned}
 45. & (a^2b^2)^7(a^3b^5)^{10} \\
 & (a^{2 \cdot 7} b^{2 \cdot 7})(a^{3 \cdot 10} b^{5 \cdot 10}) \\
 & (a^{14}b^{14})(a^{30}b^{50}) \\
 & a^{14+30}b^{14+50} \\
 & \mathbf{a^{44}b^{64}}
 \end{aligned}$$

$$\begin{aligned}
 47. & (-x^5y^6z^3)^9(x^3y^2z)^4 \\
 & ((-1)^9 x^{5 \cdot 9} y^{6 \cdot 9} z^{3 \cdot 9})(x^{3 \cdot 4} y^{2 \cdot 4} z^4) \\
 & (-1x^{45}y^{54}z^{27})(x^{12}y^8z^4) \\
 & (-1x^{45+12}y^{54+8}z^{27+4}) \\
 & \mathbf{-1x^{57}y^{62}z^{31}}
 \end{aligned}$$

$$\begin{aligned}
 49. & (-3a^6b^3)^3(5a^4b^2)^3(-4a^2b^{12})^2 \\
 & ((-3)^3 a^{6 \cdot 3} b^{3 \cdot 3})(5^3 a^{4 \cdot 3} b^{2 \cdot 3})((-4)^2 a^{2 \cdot 2} b^{12 \cdot 2}) \\
 & (-27a^{18}b^9)(125a^{12}b^6)(16a^4b^{24}) \\
 & -27(125)(16)a^{18+12+4}b^{9+6+24} \\
 & \mathbf{-54000a^{34}b^{39}}
 \end{aligned}$$

51. Find the area of the triangle.

$$A = (1/2)(\text{base})(\text{height})$$

$$A = \frac{1}{2}(x + 3 \text{ ft})(3x \text{ ft})$$

$$A = \frac{3x}{2}(x + 3 \text{ ft})(\text{ft})$$

$$A = \frac{3x}{2}(x + 3) \text{ ft}^2$$

$$A = \left( \frac{3}{2}x + \frac{9}{2}x \right) \text{ ft}^2$$

53. Find the area of the trapezoid.

$$A = \frac{1}{2} \cdot h(b_1 + b_2)$$

$$A = \frac{1}{2} (2x \text{ yd})((x + 1) \text{ yd} + (2x - 3) \text{ yd})$$

$$A = \frac{1}{2} (2x \text{ yd})(3x - 2) \text{ yd}$$

$$A = \frac{1}{2} (2x)(3x - 2) (\text{yd})(\text{yd})$$

$$A = \frac{1}{2} (2x)(3x - 2) \text{ yd}^2$$

$$A = \frac{1}{2} (6x^2 - 4x) \text{ yd}^2$$

$$A = \left( \frac{6}{2}x^2 - \frac{4}{2}x \right) \text{ yd}^2$$

$$\mathbf{A = (3x^2 - 2x) yd^2}$$

55. Find the area of the rectangle whose length is  $5x + 1$  and width is  $2x - 4$ .

The units are in centimeters.

$$A = (\text{length})(\text{width})$$

$$A = (5x + 1 \text{ cm})(2x - 4 \text{ cm})$$

$$A = (5x + 1)(2x - 4)(\text{cm})(\text{cm})$$

$$A = (5x + 1)(2x - 4) \text{ cm}^2$$

$$A = [5x(2x) - 4(5x) + 2x(1) - 4(1)] \text{ cm}^2$$

$$A = [10x^2 - 20x + 2x - 4] \text{ cm}^2$$

$$A = [10x^2 - 18x - 4] \text{ cm}^2$$

57. Find the area of the triangle whose base is  $7x - 5$  and height is  $x + 2$ .

The units are in inches.

$$A = (1/2)(\text{base})(\text{height})$$

$$A = (1/2)(7x - 5 \text{ in})(x + 2 \text{ in})$$

$$A = (1/2)(7x - 5)(x + 2)(\text{in})(\text{in})$$

$$A = (1/2)(7x^2 + 14x - 5x - 10) \text{ in}^2$$

$$A = (1/2)(7x^2 + 9x - 10) \text{ in}^2$$

$$A = \frac{7x^2 + 9x - 10}{2} \text{ in}^2$$

59. Find the area of the triangle whose base is  $6m + 7$  and height is  $2m$ .

The units are in yards.

$$A = (1/2)(\text{base})(\text{height})$$

$$A = (1/2)(6m + 7 \text{ yd})(2m \text{ yd})$$

$$A = (1/2)(6m + 7)(2m)(\text{yd})(\text{yd})$$

$$A = (1/2)(2m)(6m + 7) \text{ yd}^2$$

$$A = (1m)(6m + 7) \text{ yd}^2$$

$$A = [6m^2 + 7m] \text{ yd}^2$$

61. Find the area of the circle whose radius is  $8x$  kilometers.

$$A = \pi r^2$$

$$A = \pi(8x \text{ km})^2$$

$$A = \pi(8x)^2 \text{ km}^2$$

$$A = \pi 64x^2 \text{ km}^2$$

$$A = 64\pi x^2 \text{ km}^2$$

63. Find the area of the circle whose radius is  $z + 1$  meters.

$$A = \pi r^2$$

$$A = \pi(z + 1 \text{ m})^2$$

$$A = \pi(z + 1)^2 \text{ m}^2$$

$$A = \pi(z + 1)(z + 1) \text{ m}^2$$

$$A = \pi[(z)(z) + z(1) + z(1) + (1)(1)] \text{ m}^2$$

$$A = \pi(z^2 + 2z + 1) \text{ m}^2$$

65. Find the area of the trapezoid whose height is  $3x$  inches, and the lengths of the parallel edges are  $3x + 2$  inches and  $2x - 5$  inches.

$$A = \frac{1}{2} \cdot h(b_1 + b_2)$$

$$A = \frac{1}{2}(3x \text{ in})[(3x + 2) \text{ in} + (2x - 5) \text{ in}]$$

$$A = \frac{1}{2}(3x \text{ in})(5x - 3) \text{ in}$$

$$A = \frac{1}{2}(3x)(5x - 3)(\text{in})(\text{in})$$

$$A = \frac{1}{2}(3x)(5x - 3) \text{ in}^2$$

$$A = \frac{1}{2}(15x^2 - 9x) \text{ in}^2$$

$$A = \frac{15}{2}x^2 \text{ in}^2 - \frac{9}{2}x \text{ in}^2$$