

139. $(2x)^3 = 2^3 \cdot x^3 = 8x^3 \neq 2x^3$

141. F = First

O = Outer

I = Inner

L = Last

143. (a) True, the product of two monomials is a monomial.

(b) False, the product of two binomials can be a trinomial. For example, $(x + 2)(x - 3) = x^2 - x - 6$.**Section 3.3 Factoring Polynomials**

1. $48 = 2^4 \cdot 3$

$90 = 5 \cdot 2 \cdot 3^2$

$96 = 2^5 \cdot 3$

GCF = $2 \cdot 3 = 6$

3. $3x^2 = 3 \cdot x \cdot x$

$12x = 2^2 \cdot 3 \cdot x$

GCF = $3x$

5. $30z^2 = 2 \cdot 3 \cdot 5 \cdot z \cdot z$

$-12z^3 = -1 \cdot 2^2 \cdot 3 \cdot z \cdot z \cdot z$

GCF = $2 \cdot 3 \cdot z \cdot z$

$= 6z^2$

7. $28b^2 = 7 \cdot 2^2 \cdot b \cdot b$

$14b^3 = 7 \cdot 2 \cdot b \cdot b \cdot b$

$42b^5 = 7 \cdot 2 \cdot 3 \cdot b \cdot b \cdot b \cdot b \cdot b$

GCF = $7 \cdot 2 \cdot b \cdot b$

$= 14b^2$

9. $42(x + 8)^2 = 7 \cdot 3 \cdot 2 \cdot (x + 8)^2$

$63(x + 8)^3 = 7 \cdot 3^2 \cdot (x + 8)^3$

GCF = $7 \cdot 3(x + 8)^2$

$= 21(x + 8)^2$

11. $8z - 8 = 8(z - 1)$

13. $4u + 10 = 2(2u + 5)$

15. $24x^2 - 18 = 6(4x^2 - 3)$

17. $2x^2 + x = x(2x + 1)$

19. $21u^2 - 14u = 7u(3u - 2)$

21. $11u^2 + 9$ is prime (No common factor other than 1.)

23. $28x^2 + 16x - 8 = 4(7x^2 + 4x - 2)$

25. $3x^2y^2 - 15y = 3y(x^2y - 5)$

27. $15xy^2 - 3x^2y + 9xy = 3xy(5y - x + 3)$

29. $14x^4y^3 + 21x^3y^2 + 9x^2 = x^2(14x^2y^3 + 21xy^2 + 9)$

31. $10 - x = -1(-10 + x) = -1(x - 10)$

33. $7 - 14x = -7(-1 + 2x) = -7(2x - 1)$

35. $16 + 4x - 6x^2 = -1(-16 - 4x + 6x^2) = -1(6x^2 - 4x - 16) = -2(3x^2 - 2x - 8)$

37. $y - 3y^3 - 2y^2 = -1(-y + 3y^3 + 2y^2) = -1(3y^3 + 2y^2 - y) = -y(3y^2 + 2y - 1)$

39. $2y - \frac{3}{5} = \frac{1}{5}(10y - 3)$

41. $\frac{3}{2}x + \frac{5}{4} = \frac{1}{4}(6x + 5)$

43. $2y(y - 3) + 5(y - 3) = (y - 3)(2y + 5)$

45. $5x(3x + 2) - 3(3x + 2) = (3x + 2)(5x - 3)$

47. $2(7a + 6) - 3a^2(7a + 6) = (7a + 6)(2 - 3a^2)$

49. $8t^3(4t - 1)^2 + 3(4t - 1)^2 = (4t - 1)^2(8t^3 + 3)$

$$51. (x - 5)(4x + 9) - (3x + 4)(4x + 9) = (4x + 9)(x - 5 - 3x - 4) = (4x + 9)(-2x - 9)$$

$$53. x^2 + 25x + x + 25 = (x^2 + 25x) + (x + 25) = x(x + 25) + 1(x + 25) = (x + 25)(x + 1)$$

$$\begin{aligned} 55. y^2 - 6y + 2y - 12 &= (y^2 - 6y) + (2y - 12) \\ &= y(y - 6) + 2(y - 6) \\ &= (y - 6)(y + 2) \end{aligned}$$

$$\begin{aligned} 57. x^3 + 2x^2 + x + 2 &= (x^3 + 2x^2) + (x + 2) \\ &= x^2(x + 2) + 1(x + 2) \\ &= (x + 2)(x^2 + 1) \end{aligned}$$

$$\begin{aligned} 59. 3a^3 - 12a^2 - 2a + 8 &= (3a^3 - 12a^2) + (-2a + 8) \\ &= 3a^2(a - 4) - 2(a - 4) \\ &= (a - 4)(3a^2 - 2) \end{aligned}$$

$$\begin{aligned} 61. z^4 - 2z + 3z^3 - 6 &= (z^4 - 2z) + (3z^3 - 6) \\ &= z(z^3 - 2) + 3(z^3 - 2) \\ &= (z^3 - 2)(z + 3) \end{aligned}$$

$$\begin{aligned} 63. 5x^3 - 10x^2y + 7xy^2 - 14y^3 &= (5x^3 - 10x^2y) + (7xy^2 - 14y^3) \\ &= 5x^2(x - 2y) + 7y^2(x - 2y) \\ &= (x - 2y)(5x^2 + 7y^2) \end{aligned}$$

$$\begin{aligned} 65. x^2 - 64 &= x^2 - 8^2 \\ &= (x - 8)(x + 8) \end{aligned}$$

$$\begin{aligned} 67. 1 - a^2 &= 1^2 - a^2 \\ &= (1 - a)(1 + a) \end{aligned}$$

$$\begin{aligned} 69. 16y^2 - 9 &= (4y)^2 - 3^2 \\ &= (4y - 3)(4y + 3) \end{aligned}$$

$$\begin{aligned} 71. 81 - 4x^2 &= 9^2 - (2x)^2 \\ &= (9 - 2x)(9 + 2x) \end{aligned}$$

$$73. 4z^2 - y^2 = (2z - y)(2z + y)$$

$$\begin{aligned} 75. 36x^2 - 25y^2 &= (6x)^2 - (5y)^2 \\ &= (6x - 5y)(6x + 5y) \end{aligned}$$

$$\begin{aligned} 77. u^2 - \frac{1}{16} &= u^2 - \left(\frac{1}{4}\right)^2 \\ &= \left(u - \frac{1}{4}\right)\left(u + \frac{1}{4}\right) \end{aligned}$$

$$\begin{aligned} 79. \frac{4}{9}x^2 - \frac{16}{25}y^2 &= \left(\frac{2}{3}x\right)^2 - \left(\frac{4}{5}y\right)^2 \\ &= \left(\frac{2}{3}x - \frac{4}{5}y\right)\left(\frac{2}{3}x + \frac{4}{5}y\right) \end{aligned}$$

$$81. (x - 1)^2 - 16 = [(x - 1) - 4][(x - 1) + 4] = (x - 5)(x + 3)$$

$$83. 81 - (z + 5)^2 = 9^2 - (z + 5)^2 = [9 - (z + 5)][9 + (z + 5)] = [9 - z - 5][9 + z + 5] = (4 - z)(14 + z)$$

$$85. (2x + 5)^2 - (x - 4)^2 = [(2x + 5) - (x - 4)][(2x + 5) + (x - 4)] = [2x + 5 - x + 4][2x + 5 + x - 4] = (x + 9)(3x + 1)$$

$$\begin{aligned} 87. x^3 - 8 &= x^3 - 2^3 \\ &= (x - 2)(x^2 + 2x + 4) \end{aligned}$$

$$\begin{aligned} 89. y^3 + 64 &= y^3 + 4^3 \\ &= (y + 4)(y^2 - 4y + 16) \end{aligned}$$

$$\begin{aligned} 91. 8t^3 - 27 &= (2t)^3 - 3^3 \\ &= (2t - 3)(4t^2 + 6t + 9) \end{aligned}$$

$$\begin{aligned} 93. 27u^3 + 1 &= (3u)^3 + 1^3 \\ &= (3u + 1)(9u^2 - 3u + 1) \end{aligned}$$

$$\begin{aligned} 95. 64a^3 + b^3 &= (4a)^3 + b^3 \\ &= (4a + b)(16a^2 - 4ab + b^2) \end{aligned}$$

$$\begin{aligned} 97. x^3 + 27y^3 &= x^3 + (3y)^3 \\ &= (x + 3y)(x^2 - 3xy + 9y^2) \end{aligned}$$

$$\begin{aligned} 99. 8 - 50x^2 &= 2(4 - 25x^2) \\ &= 2[2^2 - (5x)^2] \\ &= 2[2 - 5x][2 + 5x] \end{aligned}$$

$$\begin{aligned} 101. \quad 8x^3 + 64 &= 8(x^3 + 8) \\ &= 8(x^3 + 2^3) \\ &= 8(x + 2)(x^2 - 2x + 4) \end{aligned}$$

$$\begin{aligned} 103. \quad y^4 - 81 &= (y^2)^2 - 9^2 \\ &= (y^2 - 9)(y^2 + 9) \\ &= (y - 3)(y + 3)(y^2 + 9) \end{aligned}$$

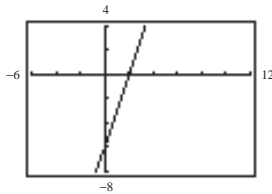
$$\begin{aligned} 105. \quad 3x^4 - 300x^2 &= 3x^2(x^2 - 100) \\ &= 3x^2(x - 10)(x + 10) \end{aligned}$$

$$\begin{aligned} 107. \quad 6x^6 - 48y^6 &= 6(x^6 - 8y^6) \\ &= 6[(x^2)^3 - (2y^2)^3] \\ &= 6(x^2 - 2y^2)(x^4 + 2x^2y^2 + 4y^4) \end{aligned}$$

$$\begin{aligned} 109. \quad 4x^{2n} - 25 &= (2x^n)^2 - 5^2 \\ &= (2x^n - 5)(2x^n + 5) \end{aligned}$$

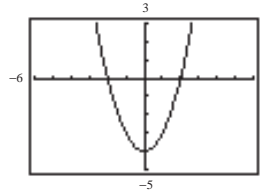
111. Keystrokes:

y_1 [Y=] 3 [X,T,θ] [-] 6 [ENTER]
 y_2 3 [X,T,θ] [-] 2 [GRAPH]
 $y_1 = y_2$



113. Keystrokes:

y_1 [Y=] [X,T,θ] [x^2] [-] 4 [ENTER]
 y_2 [X,T,θ] [+] 2 [X,T,θ] [-] 2 [GRAPH]
 $y_1 = y_2$



$$\begin{aligned} 115. \quad 3x^3 + 4x^2 - 3x - 4 &= (3x^3 + 4x^2) + (-3x - 4) &&= (3x^3 - 3x) + (4x^2 - 4) \\ &= x^2(3x + 4) - 1(3x + 4) && \text{or} &&= 3x(x^2 - 1) + 4(x^2 - 1) \\ &= (x^2 - 1)(3x + 4) && &&= (x^2 - 1)(3x + 4) \\ &= (x - 1)(x + 1)(3x + 4) && &&= (x - 1)(x + 1)(3x + 4) \end{aligned}$$

$$\begin{aligned} 117. \quad R &= 800x - 0.25x^2 \\ &= x(800 - 0.25x) \\ R &= xp \\ p &= 800 - 0.25x \end{aligned}$$

$$119. \quad P + Prt = P(1 + rt)$$

$$\begin{aligned} 121. \quad A &= 45l - l^2 \\ &= l(45 - l) \text{ so} \\ w &= 45 - l \end{aligned}$$

$$\begin{aligned} 123. \quad S &= 2x^2 + 4xh \\ S &= 2x(x + 2h) \end{aligned}$$

$$\begin{aligned} 125. \quad A &= \pi R^2 - \pi r^2 \\ &= \pi(R^2 - r^2) \\ &= \pi(R - r)(R + r) \end{aligned}$$

127. A polynomial is in factored form when the polynomial is written as a product of polynomials.

129. The method of finding the greatest common factor of two or more integers is first determine the prime factorization of each integer. Then the greatest common factor is the product of each common prime factor raised to its lowest power in either one of the integers.

131. The Distributive Property is used to factor a polynomial in this example $x^2 + 2x = x(x + 2)$.