

Factor Completely

1. $6x^3 - 9x^2 + 12x$

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

2. $\underbrace{6x^3 - 4x^2}_{\text{blue}} + \underbrace{15x - 10}_{\text{green}}$

$$2x^2(\underbrace{3x - 2}_{\text{purple}}) + 5(\underbrace{3x - 2}_{\text{purple}})$$

$$(3x - 2)(2x^2 + 5)$$

3. $x^2 + 8xy + 15y^2$

$$(x + 3y)(x + 5y)$$

4. $x^2 - 14x - 15$

$$(x - 15)(x + 1)$$

$$40. x^2 + 18x + 81 = (x + 9)(x + 9)$$

$$42. x^2 - 12x + 36 = (x - 6)(x - 6)$$

$$44. 25x^2 - 20x + 4$$

$$\frac{100x^2}{10, 10}$$

$$25x^2 - 10x - 10x + 4$$

$$5x(5x - 2) - 2(5x - 2)$$

$$(5x - 2)(5x - 2)$$

$$46. m^4 + 10m^2 + 25$$

$$(m^2 + 5)(m^2 + 5)$$

$$48. 3y^2 - 6y + 3$$

$$3(y^2 - 2y + 1)$$

$$3(y - 1)(y - 1)$$

$$50. 9y^2 + 48y + 64$$

$$(3y)^2 \quad 8^2$$

$$(3y + 8)^2$$

$$\underbrace{(3y + 8)(3y + 8)}$$

$$\overbrace{9y^2 + 48y + 64}$$

$$\underbrace{9y^2 + 24y} + \underbrace{24y + 64}$$

$$3y(\underline{3y+8}) + 8(\underline{3y+8})$$

$$(3y+8)(3y+8)$$

$$\underline{576}$$

$$9, 64$$

$$12, 48$$

$$16, 36$$

$$18, 32$$

$$24, 24$$

$$\overbrace{52x^2 + 7x - 72}$$

$$\underbrace{2x^2 - 9x} + \underbrace{16x - 72}$$

$$x(\underline{2x-9}) + 8(\underline{2x-9})$$

$$(2x-9)(x+8)$$

$$- \underline{144}$$

$$1, 144$$

$$2, 72$$

$$3, 48$$

$$4, 36$$

$$6, 24$$

$$8, 18$$

$$9, 16$$

$$57. -9x + 20 + x^2$$

$$x^2 - 9x + 20$$

$$(x - 4)(x - 5)$$

$$72. -15x^2 + 26x - 8$$

$$- (15x^2 - 26x + 8)$$

$$\begin{array}{r} \underline{120} \\ \swarrow, 24 \\ 6, 20 \end{array}$$

$$- \left[\underbrace{15x^2 - 6x}_{\text{blue}} - \underbrace{20x + 8}_{\text{green}} \right]$$

$$- \left[3x(\underline{5x - 2}) - 4(\underline{5x - 2}) \right]$$

$$- (5x - 2)(3x - 4)$$

$$60. m^2 + 20mn + 100n^2$$

$$68. 12x^3 - 34x^2 + 24x$$

$$2x \overbrace{(6x^2 - 17x + 12)}$$

$$2x \left[\underbrace{6x^2 - 8x}_{\text{blue}} - \underbrace{9x + 12}_{\text{green}} \right]$$

$$2x \left[\underbrace{2x(3x - 4)}_{\text{blue}} - \underbrace{3(3x - 4)}_{\text{green}} \right]$$

$$2x(3x - 4)(2x - 3)$$

72

8,9

$$74. 9q^4 - 42q^3 + 49q^2$$

$$(3q)^2 \quad (7)^2$$

$$q^2 (9q^2 - 42q + 49)$$

$$q^2 (3q - 7)^2$$

$$80. 1 + 16x^2 + x^4$$

$$x^4 + 16x^2 + 1$$

not factorable

$$92. \overbrace{3a^2b^2 + 12ab} + 1$$

not factorable

Ex: (p 390)

14. $15x^2 + 11x + 2$

20. $2x^2 - 7x + 3$

34. $30a^2 + 38a - 20$

6.5: Factoring Binomials

EX: $(x+4)(x-4) = x^2 - 16$

$x^2 - 4x + 4x - 16$

$$w^2 - a^2 = (w+a)(w-a)$$

Note: $w^2 + a^2$ does not factor

$x^2 + 16$


Ex: (p 396)

$$2. x^2 - 36 = x^2 - 6^2 = (x-6)(x+6)$$

$$6. 49a^2 - 16 = (7a)^2 - 4^2 = (7a+4)(7a-4)$$

$$\begin{aligned} 14. -9t^2 + 1 &= 1 - 9t^2 \\ &= 1^2 - (3t)^2 \\ &= (1+3t)(1-3t) \end{aligned}$$

$$x^2 + 9 = x^2 + 3^2$$

DNF


20. $n^4 - 16$

38. $x^2 - 225y^2$

44. $36x^2y - 25y$

56. $100 - \frac{4}{81}n^2$

64. $100x^3y - 49xy^3$

70. $25y^4 - 100y^2$

6.6: Solving Quadratic Equations by Factoring

Quadratic Equation

A quadratic equation is one that can be written in the form

$$ax^2 + bx + c = 0$$

where $a, b,$ and c are real numbers and $a \neq 0$.

Zero Factor Theorem

If a and b are real numbers and if $ab = 0$, then $a = 0$ or $b = 0$.

Ex: (p 408)

2. $(x + 4)(x - 10) = 0$

4. $(x + 11)(x + 1) = 0$

6. $x(x - 7) = 0$

20. $x^2 + 2x - 63 = 0$

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

24. $x^2 - 3x = 0$

28. $x^2 = 9$

30. $(x + 3)(x + 8) = x$

32. $x(4x - 11) = 3$

34. $-2y^2 + 72 = 0$

36. $6x^2 + 57x = 30$

42. $4y^3 - 36y = 0$

44. $15x^3 + 24x^2 - 63x = 0$

46. $(x - 6)(x + 7) = 0$

48. $x^2 + 15x = 0$

50. $5(3 - 4x) = 9$

52. $4y^2 - 81 = 0$

60. $9x^2 + 7x = 2$

62. $3x^2 - 6x - 9 = 0$

64. $(y - 5)(y - 2) = 28$

74. $2x^2 + 12x - 1 = 4 + 3x$

76. $4x^2 - 20x = -5x^2 - 6x - 5$

