6.3: Factoring Trinomials of the Form $ax^2 + bx + c$ and Perfect Square Trinomials

Multiply two binomials

Ex: $(2x+3)(4x+5)$

$8x^2 + 10x + 12x + 15$

$8x^2 + 22x + 15$

$(2\cdot4)x^2 + (2\cdot5 + 3\cdot4)x + 3\cdot5$

Two Strategies: guess & check
key numbering (by grouping)

Ex: (p 384)

2. $2y^2 + 27y + 25 = (2y + 25)(y+1)$

15

4. $6y^2 + 11y - 10 = (2y + 5)(3y-2)$

-4

6. $4y^2 - 20y + 25 = (2y - 5)(2y-5)$

8. $3x^2 + 8x + 4$

$$\frac{12x^2}{\begin{array}{c}1, 12\\ 2, 6\end{array}}$$

$$\underbrace{3x^2 + 2x}\ \underbrace{+ 6x + 4}$$

$$x(3x+2) + 2(3x+2)$$

$$(3x+2)(x+2)$$

key number approach

10. $21x^2 - 31x + 10$

$$\frac{210}{21, 10}$$

$$\underbrace{21x^2 - 21x}\ \underbrace{-10x + 10}$$

$$21x(x-1) - 10(x-1)$$

$$(x-1)(21x-10)$$

14. $3x^2 + 20x - 63$

-189

$1, 189$

$3, 63$

$7, 27$

$3x^2 - 7x + 27x - 63$

$x(3x - 7) + 9(3x - 7)$

$(3x - 7)(x + 9)$

18. $3n^2 + 20n + 5$

$15n^2$

$1, 15$

$3, 5$

not factorable

20. $8x^2 - 14xy + 3y^2$

$$\frac{24x^2y^2}{2,\ 12}$$

$$\underbrace{8x^2 - 2xy} \underbrace{-12xy + 3y^2}$$

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

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

24. $8a^3 + 14a^2 + 3a = a(8a^2 + 14a + 3)$

$$\frac{24a^2}{2,12}$$

$$a(\underbrace{8a^2 + 2a} \underbrace{+ 12a + 3})$$

$$a[2a(4a+1) + 3(4a+1)]$$

$$a(4a+1)(2a+3)$$

30. $8x^2y + 34xy - 84y = 2y(4x^2 + 17x - 42)$

-168 (17)

$1, 168$

$2, 84$

$3, 56$

$4, 42$

$6, 28$

$7, 24$

$2y[\underbrace{4x^2 - 7x}\ \underbrace{+24x - 42}]$

$2y[x(4x-7) + 6(4x-7)]$

$2y(4x-7)(x+6)$

30. $8x^2y + 34xy - 84y = 2y(4x^2 + 17x - 42)$

$4x^2$	42
1, 4	1, 42
2, 2	2, 21
	3, 14
	6, 7

$$2y(x+6)(4x-7)$$

$+24x$

$-7x$

34. $-x^2 + 4x + 21 = -1(x^2 - 4x - 21)$

$-(x-7)(x+3)$

or

$(7-x)(x+3)$

or

$(x-7)(-x-3)$

40. $x^2 + 18x + 81$

42. $x^2 - 12x + 36$

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

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

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

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

52. $2x^2 + 7x - 72$

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

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

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

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

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

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

92. $3a^2b^2 + 12ab + 1$

Ex: (p 390)

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

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

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

6.5: Factoring Binomials

Ex: (p 396)

2. $x^2 - 36$

6. $49a^2 - 16$

14. $-9t^2 + 1$

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