2.05 *Difference of Squares/ Perfect Square Trinomials*

Dr. Robert J. Rapalje, Retired
Central Florida, USA

REVIEW EXERCISES. **Use the F OI L method to multiply each of the following:**

1. $(x - 2)(x + 2)$

2. $(x - 3)(x + 3)$

3. $(x - 1)(x + 1)$

4. $(x - 6)(x + 6)$

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

6. $(3x - 5)(3x + 5)$

7. $(x + 2)^2$

   $=(x + 2)(x + 2)$

   $=$____+____+____

8. $(x + 5)^2$

   $=$

   $=$

9. $(x - 5)^2$

   $=$

   $=$

10. $(x - 7)^2$

11. $(2x + 3)^2$

12. $(3x - 5)^2$

As in the previous section, in each of these e*x*ercises, you were given a **product** of two **binomials**. Now, as before, the problem will be to reverse the process, and factor the **difference of two squares** or factor a **perfect square trinomial**.

EXERCISES. **In each of the following, factor the difference of squares:**

1. $x^2 - 9$

   $(x - \_\_\_)(x + \_\_\_)$

2. $x^2 - 16$

   $(x - \_\_\_)(x + \_\_\_)$

3. $x^2 - 49$

   $(x - \_\_\_)(x + \_\_\_)$

4. $x^2 - 64$

   $(x - \_\_\_)(x + \_\_\_)$

5. $x^2 - 100$

6. $x^2 - 81$

7. $x^2 - 25$

8. $x^2 - 121$

9. $x^2 - 144$

10. $x^2 - 169$

11. $x^2 - a^2$

12. $x^2 - b^2$

13. $4x^2 - 9$

    $(2x - \_\_\_)(2x + \_\_\_)$

14. $9x^2 - 16$

    $(3x - \_\_\_)(3x + \_\_\_)$

15. $16x^2 - 49$

    $(\_\_\_ - \_\_\_)(\_\_\_ + \_\_\_)$

16. $25x^2 - 64$

17. $9x^2 - 100$

18. $49x^2 - 81$

19. $9x^2 - 25y^2$

20. $49x^2 - 121y^2$

21. $25x^2 - 144a^2$

22. $16x^2 - 81b^2$

23. $9y^2 - 169x^2$

24. $36y^2 - 49x^2$

Don't forget that the first step in any factoring problem is to **factor the common factor first**. This means that each of the following exercises requires two steps. Again, this is the "**factoring two-step**."

25. $9x^2 - 9$

$9(\quad)$

$9(\quad)(\quad)$

26. $3x^2 - 12$

$3(\quad)$

$3(\quad)(\quad)$

27. $5x^2 - 45$

$\_\_\_(\quad)$

$\_\_\_(\quad)(\quad)$

28. $4x^2 - 64$

29. $4x^2 - 100$

30. $8x^2 - 72$

31. $25x^2 - 25$

32. $7x^2 - 700$

33. $x^3 - 16x$

34. $3x^3 - 75x$

35. $5x^3 - 80x$

36. $2x^3 - 50x$

37. $16x^4 - 16x^2y^2$

38. $9y^4 - 9x^2y^2$

39. $81y^4 - 9x^2y^2$

40. $64x^4 - 4x^2y^2$

41. $12y^4 - 12x^2y^2$

42. $79y^4 - 79x^2y^2$

Factor each of the following perfect square trinomials:

43. $x^2 + 4x + 4$

$=(\quad)(\quad)$

$=(\quad)^2$

44. $x^2 + 6x + 9$

45. $x^2 + 2x + 1$

46. $x^2 + 12x + 36$

47. $x^2 + 14x + 49$

48. $x^2 + 20x + 100$

49. $x^2 - 8x + 16$

50. $x^2 - 4x + 4$

51. $x^2 - 10x + 25$

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

53. $x^2 - 18x + 81$

54. $x^2 - 24x + 144$

Remember to factor the common factor first:

55. $5x^2 - 20x + 20$

____( )

____( )( )

____( )^2

56. $2x^2 - 20x + 50$

57. $3x^2 + 6x + 3$

58. $3x^2 - 60x + 300$

59. $6x^2 - 36x + 54$

60. $4x^2 + 32x + 64$

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

62. $x^3 - 12x^2 + 36x$

63. $9x^3 - 18x^2 + 9x$

64. $6x^4 - 36x^3 + 54x^2$

65. $12y^4 - 48y^3 + 48y^2$

66. $2y^4 - 28y^3 + 98y^2$

In the next exercises, it turns out that sum of squares, such as x^2+9 or x^2+4, does NOT factor by this method. Do you think you can factor x^2+9 ? (You can try if you like, but no matter what you try, it WON'T work! The answer is NO!)

67. $x^4 - 16$

$= (x^2 - \_\_\_)(x^2 + \_\_\_)$

$= (x - \_\_\_)(x + \_\_\_)(x^2 + \_\_\_)$

68. $x^4 - 1$

69. $x^4 - 81$

70. $x^4 - y^4$

71. $81x^4 - 16y^4$

72. $16x^4 - 81$

$= (4x^2 - \_\_\_)(4x^2 + \_\_\_)$

$= (2x - \_\_\_)(2x + \_\_\_)(4x^2 + \_\_\_)$

73. $x^4 + 10x^2 + 9$

74. $x^4 + 13x^2 + 36$

75. $x^4 - 13x^2 + 36$

76. $x^4 - 5x^2 + 4$

77. $x^4 - 29x^2 + 100$

78. $y^4 + 5y^2 - 36$

79. $y^4 - 8y^2 + 16$

80. $y^4 - 18y^2 + 81$

ANSWERS 2.05

p.157: **1.** $x^2 - 4$; **2.** $x^2 - 9$; **3.** $x^2 - 1$; **4.** $x^2 - 36$; **5.** $4x^2 - 9$; **6.** $9x^2 - 25$; **7.** x^2+4x+4; **8.** $x^2+10x+25$; **9.** $x^2-10x+25$; **10.** $x^2-14x+49$; **11.** $4x^2+12x+9$; **12.** $9x^2-30x+25$.

p. 158-163: **(NOTE: Factors may be given in <u>any</u> order!)**

1. (x-3)(x+3); **2.** (x-4)(x+4); **3.** (x-7)(x+7); **4.** (x-8)(x+8); **5.** (x-10)(x+10); **6.** (x-9)(x+9); **7.** (x-5)(x+5); **8.** (x-11)(x+11); **9.** (x-12)(x+12); **10.** (x-13)(x+13); **11.** (x-a)(x+a); **12.** (x-b)(x+b); **13.** (2x-3)(2x+3); **14.** (3x-4)(3x+4); **15.** (4x-7)(4x+7); **16.**(5x-8)(5x+8); **17.** (3x-10)(3x+10); **18.** (7x-9)(7x+9); **19.** (3x-5y)(3x+5y); **20.** (7x-11y)(7x+11y); **21.** (5x-12a)(5x+12a); **22.** (4x-9b)(4x+9b); **23.** (3y-13x)(3y+13x); **24.** (6y-7x)(6y+7x); **25.** 9(x-1)(x+1); **26.** 3(x-2)(x+2); **27.** 5(x-3)(x+3); **28.** 4(x-4)(x+4); **29.** 4(x-5)(x+5); **30.** 8(x-3)(x+3); **31.** 25(x-1)(x+1); **32.** 7(x-10)(x+10); **33.** x(x-4)(x+4); **34.** 3x(x-5)(x+5); **35.** 5x(x-4)(x+4); **36.** 2x(x-5)(x+5); **37.** $16x^2(x-y)(x+y)$; **38.** $9y^2(y-x)(y+x)$; **39.** $9y^2(3y-x)(3y+x)$; **40.**$4x^2(4x-y)(4x+y)$; **41.** $12y^2(y-x)(y+x)$; **42.** $79y^2(y-x)(y+x)$; **43.** $(x+2)^2$; **44.** $(x+3)^2$; **45.** $(x+1)^2$; **46.** $(x+6)^2$; **47.** $(x+7)^2$; **48.** $(x+10)^2$; **49.** $(x-4)^2$; **50.** $(x-2)^2$; **51.** $(x-5)^2$; **52.** $(x-6)^2$; **53.** $(x-9)^2$; **54.** $(x-12)^2$; **55.** $5(x-2)^2$; **56.** $2(x-5)^2$; **57.** $3(x+1)^2$; **58.** $3(x-10)^2$; **59.** $6(x-3)^2$; **60.** $4(x+4)^2$; **61.** $x(x+2)^2$; **62.** $x(x-6)^2$; **63.** $9x(x-1)^2$; **64.** $6x^2(x-3)^2$; **65.** $12y^2(y-2)^2$; **66.** $2y^2(y-7)^2$; **67.** $(x-2)(x+2)(x^2+4)$; **68.** $(x-1)(x+1)(x^2+1)$; **69.** $(x-3)(x+3)(x^2+9)$; **70.** $(x-y)(x+y)(x^2+y^2)$; **71.** $(3x-2y)(3x+2y)(9x^2+4y^2)$; **72.** $(2x-3)(2x+3)(4x^2+9)$; **73.** $(x^2+9)(x^2+1)$; **74.** $(x^2+9)(x^2+4)$; **75.** (x-3)(x+3)(x-2)(x+2); **76.** (x-2)(x+2)(x-1)(x+1); **77.** (x-5)(x+5)(x-2)(x+2); **78.** $(y^2+9)(y-2)(y+2)$; **79.** $(y-2)^2(y+2)^2$; **80.** $(y-3)^2(y+3)^2$.