Algebra II **Name:** _____

Worksheet #5

Factoring: Special Patterns

Perfect Square Trinomials

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)^2$$

The key is to ask…

"Are the FIRSTS and LASTS **perfect squares**?"

EXERCISES:

Factor the following PERFECT SQUARE TRINOMIALS.

1. $x^2 + 6x + 9$
2. $x^2 - 4x + 4$
3. $x^2 - 14x + 49$
4. $x^2 + 16x + 64$
5. $x^2 - 22x + 121$
6. $x^2 + 24x + 144$
7. $4x^2 + 12x + 9$
8. $16x^2 - 24x + 9$
9. $x^2 + 10x + 25$
10. $x^2 - 18x + 81$
11. $x^2 - 20x + 100$
12. $16x^2 - 8x + 1$
13. $36x^2 - 12x + 1$
14. $25x^2 - 40x + 16$
15. $9x^2 - 48x + 64$
16. $4x^2 + 36xy + 81y^2$
17. $49x^2 + 28xy + 4y^2$
18. $16x^2 + 56xy + 49y^2$
19. $25x^2 - 60xy + 36y^2$
20. $25x^2 - 80xy + 64y^2$
21. $x^2y^2 + 4xy + 4$
22. $x^2y^2 - 8xy + 16$
23. $4x^2y^2 + 4xyz^2 + z^4$
24. $16x^4 + 24x^2y + 9y^2$
25. $169x^2 - 26xy^2 + y^4$
26. $121x^4 + 44x^2 + 4$
27. $x^6 + 10x^3 + 25$
28. $x^4 + 2x^2y^4 + y^8$

Solutions:

$1.(x+3)^2$ $3.(x-7)^2$ $5.(x-11)^2$ $7.(2x+3)^2$ $9.(x+5)^2$ $11.(x-10)^2$
$13.(6x-1)^2$ $15.(3x-8)^2$ $17.(7x+2y)^2$ $19.(5x-6y)^2$ $21.(xy+2)$
$23.(2xy+z^2)^2$ $25.(13x-y^2)^2$ $27.(x^3+5)^2$

Algebra II **Name:** _____

Difference of Two Squares

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

The key is to ask…

"Are the FIRSTS and LASTS **perfect squares**?"

EXERCISES:

Factor the following polynomials that are DIFFERENCES OF TWO SQUARES.

29. $x^2 - 36$
30. $x^2 - 25$
31. $x^2 - 49$
32. $16 - x^2$
33. $25x^2 - 4$
34. $9x^2 - 100$
35. $169x^2 - 225$
36. $25x^2 - 1$
37. $144 - x^2$
38. $81x^2 - 121$
39. $49x^2 - 9y^2$
40. $4x^2 - 81$
41. $16x^2 - 9$
42. $1 - 9x^2$
43. $64x^2 - 25y^2$
44. $9x^2 - 4y^2$
45. $16x^2 - 25y^2$
46. $81 - x^2$
47. $64x^2 - 121$
48. $16x^2 - 36y^2$
49. $49x^2 - 25y^2$
50. $4x^2 - y^4$
51. $9x^4 - 64y^4$
52. $x^2y^2 - 9z^4$
53. $x^4 - 81y^2$
54. $4x^4 - 49y^4$
55. $x^2y^2 - z^4$
56. $x^6 - 4y^2$

Solutions:

29. $(x + 6)(x - 6)$ 31. $(x + 7)(x - 7)$ 33. $(5x + 2)(5x - 2)$ 35. $(13x + 15)(13x - 15)$ 37. $(12 + x)(12 - x)$
39. $(7x + 3y)(7x - 3y)$ 41. $(4x + 3)(4x - 3)$ 43. $(8x + 5y)(8x - 5y)$ 45. $(4x + 5y)(4x - 5y)$
47. $(8x + 11)(8x - 11)$ 49. $(7x + 5y)(7x - 5y)$ 51. $(3x^2 + 8y^2)(3x^2 - 8y^2)$ 53. $(x^2 + 9y)(x^2 - 9y)$
55. $(xy + z^2)(xy - z^2)$

Algebra II **Name:** _____

Sum and Difference of Two Cubes

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

EXERCISES:

Factor these polynomials using the formulas for factoring the sum and difference of cubes.

57. $x^3 - 27$

58. $8x^3 + 1$

59. $x^3 + 125$

60. $x^3 - 64$

61. $8 - x^3y^3$

62. $8x^3 + 27$

63. $64x^3 - 1$

64. $125x^3 - 8y^3$

65. $64x^3y^3 + 125$

66. $x^6y^3 + 1$

67. $x^6 + 8$

68. $x^6 - 8y^3$

69. $1 - 27x^6y^6$

70. $125 - 8x^6$

71. $27x^6 - 1000y^3$

72. $125x^6 + 343y^3$

Solutions:

57. $(x - 3)(x^2 + 3x + 9)$ 59. $(x + 5)(x^2 - 5x + 25)$ 61. $(2 - xy)(4 + 2xy + x^2y^2)$

63. $(4x - 1)(16x^2 + 4x + 1)$ 65. $(4xy + 5)(16x^2y^2 - 20xy + 25)$ 67. $(x^2 + 2)(x^4 - 2x^2 + 4)$

69. $(1 - 3x^2y^2)(1 + 3x^2y^2 + 9x^4y^4)$ 71. $(3x^2 - 10y)(9x^4 + 30x^2y + 100y^2)$