

Factoring Special Cases Notes

Factoring Special Cases:

Type 1: Difference of Two Square

$$x^2 - y^2 = (x + y)(x - y)$$

conditions: The first and last terms are both perfect squares and separated by a subtraction sign.

Steps in Factoring Difference of Two Square:

Step 1: extract the square root of the first and last term; and

Step 2: write it the square root of each term in two parenthesis and separate one of them by (+) sign and (-) sign on the other one.

Type 2: Perfect Square Trinomials

$$x^2 + 2xy + y^2 = (x + y)^2$$

$$x^2 - 2xy + y^2 = (x - y)^2$$

conditions: The first and last term are perfect squares and the middle term is two times the product of the first and last term.

Step in Factoring a Perfect Square Trinomials:

Step 1: extract the square root of the first and last term; and

Step 2: write this two term of binomial in the 2nd power, following the sign of the middle term of the polynomial.

Sample problem 1: Factor the following difference of two square.

1. $a^2 - 81$

Answer:

$$a^2 = (a)(a)$$

$$81 = (9)(9)$$

Then

$$(a + 9)(a - 9)$$

2. $16x^2 - 100$

Answer:

$$16x^2 = (4x)(4x)$$

$$100 = (10)(10)$$

Then

$$(4x + 10)(4x - 10)$$

3. $4b^2 - 16$

Answer:

$$4b^2 = (2b)(2b)$$

$$16 = (4)(4)$$

Then

$$(2b + 4)(2b - 4)$$

4. $25y^2 - 4$

Answer:

$$25y^2 = (5y)(5y)$$

$$4 = (2)(2)$$

Then

$$(5y + 2)(5y - 2)$$

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Sample problem 2: Factor the following Perfect square trinomial.

5. $4a^2 + 16a + 16$

Answer:

$$4a^2 = (2a)(2a)$$

$$16 = (4)(4)$$

$$16a = 2(4)a + 2(4)a$$

Then

$$(2a + 4)^2$$

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

Answer:

$$x^2 = (x)(x)$$

$$4 = (-2)(-2)$$

$$-4x = (-2)x + (-2)x$$

Then

$$(x - 2)^2$$

7. $4b^2 - 16b + 16$

Answer:

$$4b^2 = (2b)(2b)$$

$$16 = (-4)(-4)$$

$$-16b = -4(2)b + (-4)(2)b$$

Then

$$(2b - 4)^2$$

8. $4y^2 + 32y + 64$

Answer:

$$4y^2 = (2y)(2y)$$

$$64 = (8)(8)$$

$$32y = 2(8)y + 2(8)y$$

Then

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