Factor Special Products

Review: Multiply the following expressions.

a. $(x-7)(x+7)$

$7x - 7x = 0$

	x	$+7$
x	x^2	$7x$
-7	$-7x$	-49

$x^2 + 0 - 49$

$\boxed{1x^2 - 49}$

b. $(x-5)(x+5)$

$-5x + 5x = 0$

	x	$+5$
x	x^2	$5x$
-5	$-5x$	-25

$x^2 + 0 - 25$

$\boxed{1x^2 - 25}$

c. $(x-9)(x+9)$

1. What do you notice about the "a" term? perfect square
2. What do you notice about the "c" term? perfect square + negative
3. What do you notice about the "b" term? zero / none
4. What do you notice about the factored form? same number (one + / one −)

The above polynomials are a special pattern type of polynomials; this pattern is called a

Difference of Two Squares

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

Always subtraction ✓

Both terms are perfect squares ✓

Always two terms ✓

Can you apply the "Difference of Two Squares" to the following polynomials?

a. $9x^2 - 49$ ✓✓✓

$\sqrt{9x^2}$ $\sqrt{49}$

$\boxed{(3x+7)(3x-7)}$

b. $9x^2 - 100$ ✓✓✓

$\sqrt{9x^2}$ $\sqrt{100}$

$\boxed{(3x+10)(3x-10)}$

c. $4x^2 - 25$ ✓✓✓

$\sqrt{4x^2}$ $\sqrt{25}$

$\boxed{(2x+5)(2x-5)}$

d. $16x^2 - 1$ ✓✓✓

$\sqrt{16x^2}$ $\sqrt{1}$

$\boxed{(4x+1)(4x-1)}$

e. $1x^2 - 36$ ✓✓✓

$\sqrt{1x^2}$ $\sqrt{36}$

$\boxed{(x+6)(x-6)}$

f. $25x^2 - 64$ ✓✓✓

$\sqrt{25x^2}$ $\sqrt{64}$

$\boxed{(5x+8)(5x-8)}$

g. $36x^2 - 81$ ✓✓✓

$\sqrt{36x^2}$ $\sqrt{81}$

$\boxed{(6x+9)(6x-9)}$

h. $49x^2 - 9$ ✓✓✓

$\sqrt{49x^2}$ $\sqrt{9}$

$\boxed{(7x+3)(7x-3)}$

Review: Factor the following expressions:

a. $x^2 + 8x + 16$

(x) 16, 4, 4, 8 (+)

$(x+4)(x+4)$

$\boxed{(x+4)^2}$

b. $x^2 - 2x + 1$

(x) 1, −1, −1, −2 (+)

$(x-1)(x-1)$

$\boxed{(x-1)^2}$

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

25, −5, −5, −10

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

$\boxed{(x-5)^2}$

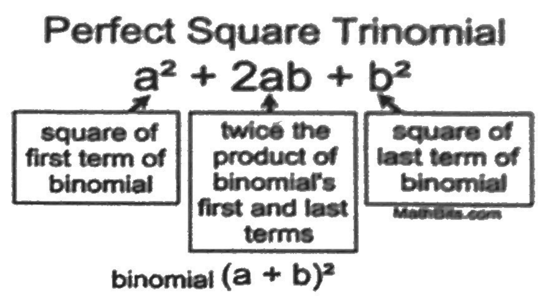
What do you notice about the factored form? factors are the same

The above polynomials are a second type of pattern; this pattern type is called a

Perfect Square Trinomials

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

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



Using the perfect square trinomial pattern, see if you can fill in the blanks below:

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

1) take square root of last term

2) multiply by 2

$\sqrt{36} = 6$

$6 \cdot 2 = 12$

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

$\sqrt{81} = 9$

$9 \cdot 2 = 18$

c. $x^2 -$ 16x $+ 64$

$\sqrt{64} = 8$

$8 \cdot 2 = 16$

Factors:

$(x-8)^2$

64, −8, −8, −16 (+)

d. $x^2 + 4x +$ 4

1) divide middle term by 2

2) square it

$4 \div 2 = 2$

$2^2 = 4$

e. $x^2 - 6x +$ 9

$6 \div 2 = 3$

$3^2 = 9$

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

$20 \div 2 = 10$

$10^2 = 100$