

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**FACTORING BASED ON CONJUGATES (DOTS!)**



**Warm Up:**

1. Multiply:  $(2x - 6)(x + 2)$

$$2x^2 + 4x - 6x - 12$$

$$2x^2 - 2x - 12$$

2. Factor (pull out the GCF!):  $8x^2 - 32x + 20$

$$4(2x^2 - 8x + 5)$$

There are a number of different types of factoring techniques. But, each one of them boils down to reversing a product. We begin the lesson today by looking at products of **conjugate binomials**, or binomials of the form  $a+b$  and  $a-b$ .

**Exercise #1:** Find each of the following products of conjugate pairs. See if you can work out a pattern.

(a)  $(x+5)(x-5)$

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

$$x^2 - 25$$

(b)  $(x-2)(x+2)$

(c)  $(4x+1)(4x-1)$

$$16x^2 - 4x + 4x - 1$$

$$16x^2 - 1$$

(d)  $(x+y)(x-y)$

$$x^2 - \underline{xy} + \underline{xy} - y^2$$

$$x^2 - y^2$$

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

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

$$25x^2 - 10xy + 10xy - 4y^2$$

$$25x^2 - 4y^2$$

What we should see is that if we multiply conjugates, opposites always cancel and instead of getting our expected **trinomial**, we still get a binomial. Specifically.

F  
X  
X  
+  
L

**MULTIPLYING CONJUGATE PAIRS**

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

**Exercise #2:** Use the pattern from Exercise #1 to quickly rewrite the following products.

(a)  $(x+6)(x-6)$

$$x^2 - 36$$

(b)  $(5x+2)(5x-2)$

$$25x^2 - 4$$

(c)  $(2x+7y)(2x-7y)$

$$4x^2 - 49y^2$$

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

conjugate

$$97x^2 + 2$$

$$97x^2 - 2$$

Now you try!

(d)  $(4+x)(4-x)$

$16 - x^2$

(e)  $(6+5y)(6-5y)$

$36 - 25y^2$

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

$100x^2 - 16y^2$

DOPS → Diff. of Perfect Squares

We now should be able to reverse this multiplication in order to rewrite expressions that are the **difference of perfect squares** into products.

DOTS → Difference of TWO SQUARES

**Exercise #3:** Write each of the following first in the form  $a^2 - b^2$  and then as equivalent products of conjugate pairs.

(a)  $x^2 - 81$

$(x+9)(x-9)$

(b)  $9x^2 - 4$

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

(c)  $25 - y^2$

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

(d)  $4x^2 - 81y^2$

(e)  $121x^2 - 1$

(f)  $1 - 4x^2$

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**FACTORING BASED ON CONJUGATE PAIRS  
HOMEWORK**

1. Use the fact that the product of conjugates follows the following pattern,  $(a+b)(a-b) = a^2 - b^2$ , to quickly find the following products in standard form.

(a)  $(x-5)(x+5)$

(b)  $(x+7)(x-7)$

(c)  $(2-x)(2+x)$

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

(e)  $(4x+1)(4x-1)$

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

(g)  $(5-4x)(5+4x)$

(h)  $(x^2-2)(x^2+2)$

(i)  $(x^3+4)(x^3-4)$

2. Write each of the following binomials as an equivalent product of conjugates.

(a)  $x^2 - 16$

(b)  $x^2 - 100$

(c)  $x^2 - 1$

(d)  $x^2 - 25$

(e)  $4 - x^2$

(f)  $9 - x^2$

(g)  $4x^2 - 1$

(h)  $16x^2 - 49$

(i)  $1 - 25x^2$

(j)  $x^2 - 9y^2$

(k)  $81 - 4t^2$

(l)  $x^4 - 36$