Name: _____ Date: _____

COMPLETE FACTORING
ALGEBRA 2 WITH TRIGONOMETRY

Each expression that we have factored has been the product of two quantities. But, factoring can produce many more than just two factors. In *Exercise* #1, we first warm-up by multiplying three factors together.

***Exercise* #1:** Write each of these in their simplest form. The last two should take little time to do.

(a) $2(x+4)(x+7)$ (b) $5(2x-5)(x+3)$ (c) $3(x-5)(x+5)$ (d) $4x(3x-2)(3x+2)$

To completely factor an expression means to write it as a product which includes binomials that contain no greatest common factors (gcf's).

***Exercise* #2:** Consider the trinomial $2x^2-4x-6$.

(a) Verify that both of the following products are *correct* factorizations of this trinomial.

$(2x-6)(x+1)$ $(2x+2)(x-3)$

(b) Why are neither of these completely factored?

(c) Write each of these in completely factored form by factoring out the gcf of each unfactored binomial.

(d) What is true of both complete factorizations you found in part (c)?

In practicality, it is always easiest to completely factor by looking for a gcf of the expression first. Once removed, the factoring then either consists of the difference of perfect squares or standard trinomial techniques.

***Exercise* #3:** Write each of the following in its completely factored form. These should be relatively easy.

(a) $4x^2+12x-40$ (b) $6x^2-24$ (c) $2x^2+20x+50$ (d) $75-3x^2$

***Exercise* #4:** Completely factor each of the following. These will involve final trinomials that are more difficult to guess-and-check.

(a) $10x^2+55x-105$

(b) $12x^2+57x-15$

The concept of completely factoring an expression by first removing its gcf leads to a helpful factoring tip when working with the trinomial guess-and-check method. This tip will be developed in the next exercise.

***Exercise* #5:** Consider the trinomial $4x^2+5x-6$.

(a) Does this trinomial have a gcf that can be factored out?

(b) The two products listed below are not reasonable guesses for the factorization of this trinomial. Why?

$$(2x-3)(2x+2) \qquad (4x+6)(x-1)$$

(c) Could a binomial of the form $(2x-a)(2x+b)$, where a and b are divisors of 6, be a correct guess for the factorization of this trinomial? Why or why not?

(d) Factor this trinomial by intelligently guessing-and-checking.

***Exercise* #6:** Use the intelligent factoring tip developed in *Exercise* #5 to factor each of the following trinomials. Note that neither has a gcf to begin with.

(a) $6x^2-13x+6$

(b) $12x^2+29x-8$

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COMPLETE FACTORING
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Find each of the following products in their simplest ax^2+bx+c form.

   (a) $5(x-6)(x-2)$ (b) $3(2x-1)(2x+1)$ (c) $2x(x+4)(x+10)$

2. Write each of the following expressions in their completely factored form. These should be moderately easy to factor.

   (a) $2x^2-14x-36$ (b) $5x^2+70x+245$ (c) $3x^2-192$

   (d) $6x^3+36x^2-96x$ (e) $28x-7x^3$ (f) $8x^2+12x-8$

3. Write each of the following in completely factored form. These will involve *slightly more difficult* final trinomial expressions.

   (a) $15x^2-110x+120$ (b) $10x^3-26x^2-12x$

4. Use the factoring tip developed in *Exercise* #5 to write each of the following trinomials in its factored form. Note that neither has a gcf that can be first factored out.

(a) $8x^2 + 67x + 24$

(b) $12x^2 - 20x + 3$

5. More Practice – Write each of the following expressions in its completely factored form.

(a) $18x^2 - 39x - 15$

(b) $45x - 20x^3$

(c) $8x^2 + 30x + 28$

(d) $90x^3 - 90x^2 + 20x$

(e) $27x^2 - 3$

(f) $20x^2 + 112x - 48$