NAME: _____

TEACHER: I MADARANG

SUBJECT: ALGEBRA 1 WEEK 2 Due: May 8th

PERIOD _____

NOTE: If you plan to take pictures of these and send the work to me in an email, please WRITE your name on each page.

TOPIC 1: FACTORING TRINOMIALS

EXAMPLE 1: Factor $x^2 + 9x + 16$

To factor $x^2 + bx + c$, you need to find two factors of c whose sum is b.

Factoring $x^2 + bx + c$	
WORDS	**EXAMPLE**
To factor a quadratic trinomial of the form $x^2 + bx + c$, find two factors of c whose sum is b. If no such Integers exist, the trinomial is not factorable.	To factor $x^2 + 9x + 18$, look for factors of 18 whose sum is 9. Factors of 18 — Sum 1 and 18 — 19 — x 2 and 9 — 11 — x 3 and 6 — 9 — ✓ $x^2 + 9x + 18 = (x + 3)(x + 6)$

Note here that 18 is the constant term of the trinomial and 9 is the coefficient of the middle term.

So, to factor $x^2 + 9x + 18$, your answer should be (x + 3)(x + 6)

Now let's try another example:

EXAMPLE 2: Factor $x^2 + 11x + 30$. The first thing you are going to do is to identify what the constant term is, and then what the coefficient of the middle term is.

In this example, the constant term is 30. So you are going to list down all the factors of 30, and find out which of those factors add up to 11. Fill in the table below.

Factors of 30	Sum of factors
1 x 30 = 30	1 + 30 = 31
2 x 15 = 30	2 + 15 = 17
3 x 10 = 30	3 + 10 = 13
5 x 6 = 30	5 + 6 = 11

So which pair of factors of 30 will you choose for your answer?

The answer is the pair 5 and 6. 5 x 6 = 30 (constant term) and 5 + 6 = 11 (coefficient of the middle term)

You will write your answer like this: $x^2 + 11x + 30 = (x + 5)(x + 6)$

How will you check if your answer is correct? All you have to do is multiply back the binomials $(x + 5)(x + 6)$ to see if it results in the original trinomial. Use last week's lesson in multiplying binomials:

CHECK: $(x + 5)(x + 6) = x(x + 6) + 5(x + 6)$ → **Apply distributive property**

$= x^2 + 6x + 5x + 30$ → **Apply distributive property one more time**

$= x^2 + 11x + 30$ → **Combining like terms**

NAME: _____ **PERIOD:** _____

Your turn.

Factor the following trinomials. Remember to check your answers by multiplying the binomials to see if it results in the original trinomial.

1) $x^2 + 17x + 72$

2) $x^2 + 11x + 24$

3) $x^2 + 13x + 36$

4) $x^2 + 10x + 16$

5) $x^2 + 5x + 6$

6) $x^2 + 9x + 20$

7) $x^2 + 14x + 45$

8) $x^2 + 8x + 12$

9) $x^2 + 13x + 42$

10) $x^2 + 16x + 60$

EXAMPLE 3: What if ONE OR BOTH of the numbers that you're trying to match is/are negative, like for example:

$x^2 + 13x - 30$?

Then you will consider the (-) sign in listing all factors of -30

Factors of -30	Sum of the factors
1 and – 30	1 + (-30) = -29
2 and – 15	2 + (-15) = -13
3 and – 10	3 + (-10) = -7
5 and – 6	5 + (-6) = -1
- 1 and 30	-1 + 30 = 29
-2 and 15	-2 + 15 = 13
-3 and 10	-3 + 10 = 7
-5 and 6	-5 + 6 = 1

Which pair should you choose? You should choose -2 and 15 because they both add up to 13.

Your answer should look like this:

$$x^2 + 13x - 30 = (x - 2)(x + 15)$$

EXAMPLE 4:

Now check this out. Factor $x^2 - 10x + 21$

Ok, fill the table below.

Factors of 21	Sum of the factors
1 and 21	1 + 21 =
3 and 7	3 + 7 =
-1 and -21	-1 + (-21) =
-3 and -7	-3 + (-7) =

Which pair should you choose? _____

Write your final answer here: _____

NAME: _____ PERIOD: _____

Factor the following trinomials. Remember to check your answers by multiplying the binomials to see if it results in the original trinomial.

11) $x^2 - 14x + 48$

12) $x^2 + 2x - 80$

13) $x^2 + 3x - 54$

14) $x^2 - 6x + 5$

15) $x^2 - 6x - 7$

16) $x^2 + x - 42$

17) $x^2 - 3x - 18$

18) $x^2 - x - 2$

19) $x^2 - 2x - 48$

20) $x^2 - 11x + 18$

TOPIC 2: SOLVING QUADRATIC EQUATIONS BY FACTORING:

In the previous topic, you were asked to factor the trinomials. Now that you already know how to factor, you will be asked to solve the quadratic equation. What's the difference? You will now go one step further by finding the value of x that will fit into the quadratic equation.

EXAMPLE 1: Solve the equation: $x^2 + 11x + 30 = 0$

Step 1: Since you already know how to factor $x^2 + 11x + 30 = (x + 5)(x + 6)$**, you can now substitute the factors in place of the trinomial.**

$$x^2 + 11x + 30 = 0$$
$$(x + 5)(x + 6) = 0$$

Step 2: Then you will make each of these factors EQUAL TO ZERO, then solve for x in each new equation.

$x + 5 = 0$ and $x + 6 = 0$

$x + 5 - 5 = 0 - 5$ $\quad$ $x + 6 - 6 = 0 - 6$

$x = -5$ $\quad$ $x = -6$

You will have two answers/solutions for this quadratic equation because you have two distinct factors.

To check if you got the correct answer, substitute each value of x into the original equation. Your result should be zero because the entire equation is given to be equal to zero.

a. Check $x = -5$ **(substitute -5 into the equation)**

$(-5)^2 + 11(-5) + 30 = 25 - 55 + 30 = 0$

b. Check $x = -6$ **(substitute -6 into the equation)**

$(-6)^2 + 11(-6) + 30 = 36 - 66 + 30 = 0$

Since both numbers check out, then the solutions to the equation $x^2 + 11x + 30 = 0$ **are -5 and -6**

NAME: _____ PERIOD: _____

EXAMPLE 2: Solve the equation: $x^2 + 13x - 30 = 0$

Ok, let's do the same thing we did in EX 1:

Step 1: Factor

Step 2: Make each factor equal to zero, then solve for x.

$x^2 + 13x - 30 = 0$

$(x - 2)(x + 15) = 0$ → factor

$x - 2 = 0$ →make $x - 2$ equal to 0

$x - 2 + 2 = 0 + 2$ → solve for x

$x = 2$

$x + 15 = 0$ →make $x + 15$ equal to 0

$x + 15 - 15 = 0 - 15$ → solve for x

$x = -15$

Check your work!! Substitute your answers into the original equation. It should equal to zero.

a. Check $x = 2$

$(2)^2 + 13(2) - 30 = 4 + 26 - 30 = 0$ ★

b. Check $x = -15$

$(-15)^2 + 13(-15) - 30 = 225 - 195 + 30 = 0$ ★

Since both numbers check out, then the solutions to the equation $x^2 + 13x - 30 = 0$ **are 2 and 15**

Solve each equation by factoring. Show your work and be sure to check your answers!

21) $x^2 - 5x - 24 = 0$

22) $x^2 - 2x - 48 = 0$

23) $x^2 - x - 56 = 0$

24) $x^2 - x - 20 = 0$

25) $x^2 + 8x + 7 = 0$

26) $x^2 + 2x - 24 = 0$

27) $x^2 + 10x + 21 = 0$

28) $x^2 - 3x + 2 = 0$

29) $x^2 - 9x + 8 = 0$

30) $x^2 + 11x + 24 = 0$