

**Karie Shaw**  
**Math 8 for Fredrick Douglass Middle School**

**Standards:** 8.A.8 Multiply a binomial by a monomial or a binomial (integer coefficients)

**Materials:** laptop  
Smart board  
TI-8x  
Overhead projector  
Worksheets (see attachment)

**Bell Work:** Teacher probe for prior knowledge/skills (see attachment).

**Essential Question:** How do we multiply polynomials?

**Teacher Directive Lesson:** Teacher will review the FOIL method. The teacher will also illustrate how to use the TI-8x to check their answer (see attachment).

**Work Time:** Students will first work independently on completing a worksheet on multiplying binomials. Students will be paired in groups of two where they will use the TI-8x to check their answer (see attachment).

**Summary:** Each pair will share their experiences with the entire class.

**Learning Extension:** Students will be asked to develop three sets of binomials and use the FOIL method to multiply each pair. Out of the three examples, students will be asked to share one example with the class.

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

Date: \_\_\_\_\_  
Bell Work

Evaluate:

1)  $5 + -3 =$  \_\_\_\_\_

2)  $-12 + 20 =$  \_\_\_\_\_

3)  $100 + 25 =$  \_\_\_\_\_

4)  $-132 + -17 =$  \_\_\_\_\_

5)  $5 - -15 =$  \_\_\_\_\_

6)  $-21 - -13 =$  \_\_\_\_\_

7)  $-7 - 109 =$  \_\_\_\_\_

8)  $-14 - -104 =$  \_\_\_\_\_

9)  $neg \bullet neg =$  \_\_\_\_\_

$pos \bullet pos =$  \_\_\_\_\_

$neg \bullet pos =$  \_\_\_\_\_

$pos \bullet neg =$  \_\_\_\_\_

10) What is the coefficient for  $x$ ? \_\_\_\_\_

11) What is the coefficient for  $3x$ ? \_\_\_\_\_

12) What is  $x \bullet x$ ? \_\_\_\_\_

13) What is  $x + x$ ? \_\_\_\_\_

14) What is  $-3x + 3x$ ? \_\_\_\_\_

15) What is  $-9x + x$ ? \_\_\_\_\_

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

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

1) Use the following example:  $(x - 12)(x + 3)$  to explain the FOIL method.

F: \_\_\_\_\_

O: \_\_\_\_\_

I: \_\_\_\_\_

L: \_\_\_\_\_

2a) Use the FOIL method to multiply the following two binomials.

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

**SHOW YOUR WORK!**

b) What mathematical operation are you using to get each term? \_\_\_\_\_

c) What are the two terms that you can combine? \_\_\_\_\_

d) What is your answer once you have combine like terms? \_\_\_\_\_

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

**SHOW YOUR WORK!**

3b) Compare your answer to problem 2a: Explain why the two answers are different?

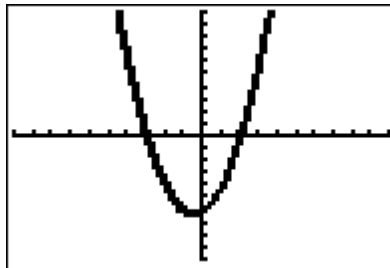
**NOW LET'S TAKE OUT OUR GRAPHING CALCULATOR TO SEE IF WE FOILED CORRECTLY!!!!!!!!!!!!**

**Calculator Instructions!!!!**

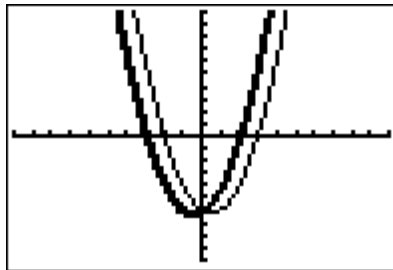
- Turn on your calculator.
- Hit the  $y =$  button.
- In  $Y1$  enter the 2 binomials being multiplied.
- In  $Y2$  enter your answer.
- Go to the left of  $Y2$ . Put your cursor on the dotted line. Hint enter for the thick dark line to appear.

```
Plot1 Plot2 Plot3
\Y1=(X-2)(X+3)
\Y2=X^2+X-6
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

- Hit the zoom button, arrow down to # 6 (ZStandard). Hit enter (once you hit enter the graph will appear. The dotted parabola represents  $Y1$ . The solid dark line parabola represents  $Y2$ , which is your answer. The two graphs should overlap if your answer is correct.



- Clear out Y1. Enter  $(x-3)(x+2)$ . Leave your answer for Y2 alone. Hit the graph button. When your answer is incorrect the parabolas do not overlap.



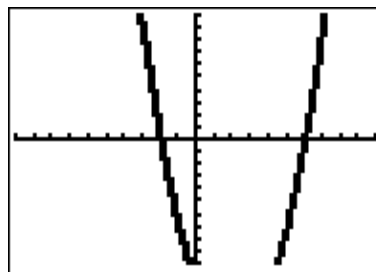
Now let us explore how to adjust your window when the full parabola does not appear on your view screen.

- In Y1 Enter  $(x-6)(x+2)$ . In Y2 enter  $x^2 - 4x - 12$ . Hit the graph button.

```

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1

```

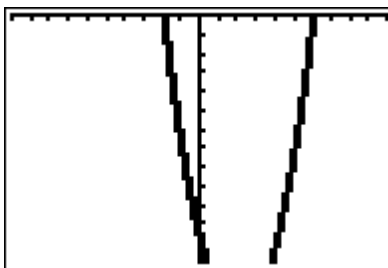


- Hit your window button. Looking at the position of the parabola ( see diagram above) we can determine that the parabola exceeds the y -min of -10. Remember when you select zoom standard both your x and y range goes from -10 to 10. Therefore we need to adjust the y range in order to see where the parabola turns. Make your y-max 0 and y-min less than your constant. Keep adjusting the number until you can see where your parabola turns within your window. (See diagrams below).

```

WINDOW
Xmin=10
Xmax=10
Xscl=1
Ymin=-13
Ymax=0
Yscl=1
Xres=1

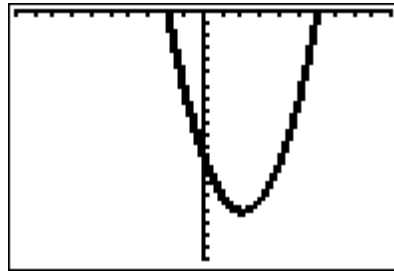
```



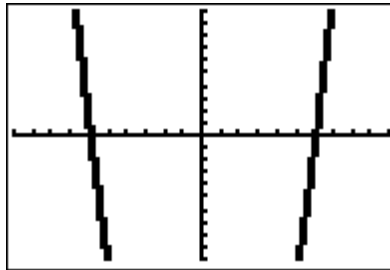
```

WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-20
Ymax=0
Yscl=1
Xres=1

```



- Enter  $(x+6)(x-6)$  in Y1 and  $x^2 - 36$  in Y2. Press the graph button.



Since we can not see a complete image of this parabola (shown above), what can we change our window to?

Take a few minutes to adjust your window. Write down some of your observations.

**On your own:**

Multiply:  $(x-12)(x+10)$  by using the FOIL method. Then check your answer with the calculator.

**Remember:**

- If the parabolas overlap your answer is correct!!!!!!
- If the parabolas do not overlap then your answer is wrong!!!!!!
- Adjust your window so that you can see where the parabola turns.

Name: \_\_\_\_\_  
Math 8

Date: \_\_\_\_\_  
Class work

Use the FOIL method to multiply the following polynomials.  
Once you have completed this work sheet, use your calculator to determine whether your answer is correct.

**SHOW YOUR WORK!!!!!!**

1a)  $(x - 3)(x - 4)$

b)  $(x - 4)(x - 3)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

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

b)  $(x - 1)(x + 6)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

3a)  $(x + 3)(x - 3)$

b)  $(x - 3)(x + 3)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

5a)  $(x - 2)(x - 2)$

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

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

6a)  $(x + 3)(x + 9)$

b)  $(x + 9)(x + 3)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

7a)  $(x + 10)(x - 3)$

b)  $(x - 3)(x + 10)$



Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

8a)  $(x + 5)(x - 7)$

b)  $(x + 7)(x - 5)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

9a)  $(x + 5)(x - 5)$

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

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

10a)  $(x - 2)(x + 12)$

b)  $(x - 12)(x + 2)$

Are your answers the same or different? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_