Understanding FOIL NAME:

The idea of this worksheet is to really understand why the FOIL system works for multiplying two binomials. We will investigate FOIL by looking at the area of a square. Recall, FOIL would be used in the following manner.

Say we want to multiply $(x+3)(x+3)$.

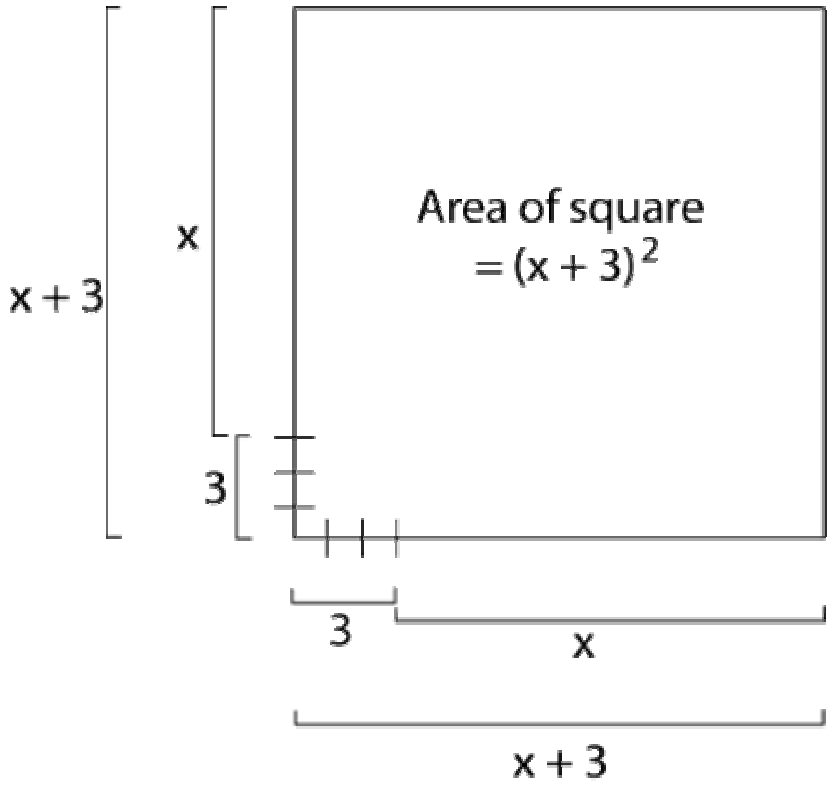
$$(x+3)(x+3)$$

$$= x^2 + 3x + 3x + 3^2$$

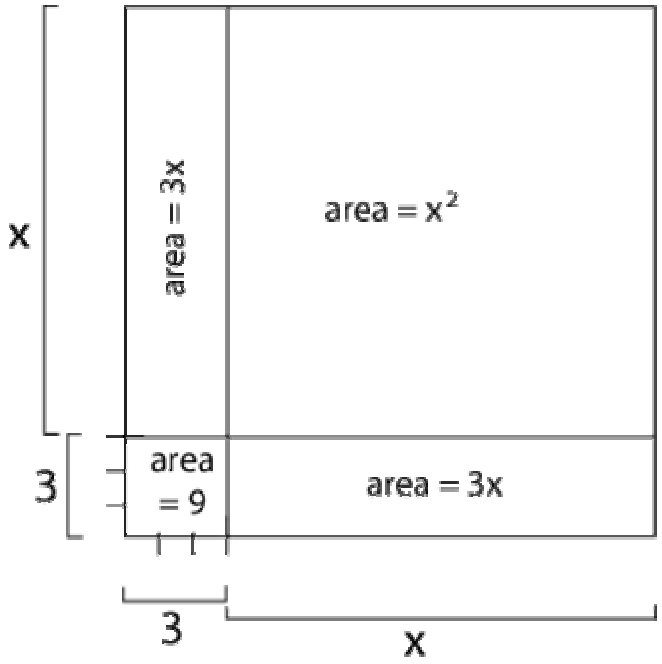
$$= x^2 + 6x + 9$$

Multiply the **FIRST** terms, the **OUTSIDE** terms, the **INSIDE** terms, and the **LAST** terms.

Let's examine the area of a square whose side has a length of $x+3$. The area of a square is found by squaring the side length, so the area of this square would be $(x+3)^2$.



Let's look at the square in pieces.



If we add the areas of the four interior pieces, we should get the whole area or $(x+3)^2$.

The sum of the four pieces is $x^2+3x+3x+9$ or x^2+6x+9.

Notice this is what you would get if you FOIL out $(x+3)^2$ or $(x+3)(x+3)$.

When we incorrectly say $(x+3)^2 = x^2+3^2$, we are ignoring the two longer pieces of area $3x$.

Simplify the following expressions by multiplying them using FOIL. Draw squares similar to the one above and label their pieces to show that you are correct.

1. $(x+4)^2$

2. $(5+x)^2$

3. $(2x+3)^2$ (Ooh, this one is tricky! Define a length x, then make your side twice that plus three more.)

4. $(x+2)(2x+3)$ (This will be a rectangle. Draw it out and then break it up into the four component pieces.)