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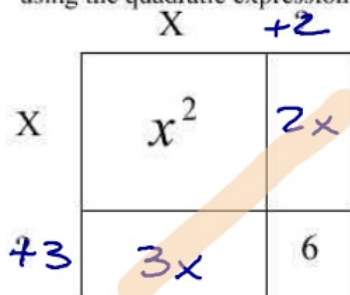
Day 2 In Class Factoring Quadratic expressions

Area Model:

Let's first investigate the one from your warm up quiz:

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

The following diagram can be used to help us distribute a quadratic expression like $(x+2)(x+3)$. It can also help us to "undistribute" or factor a quadratic expression. So using the quadratic expression from our quiz lets work backwards.



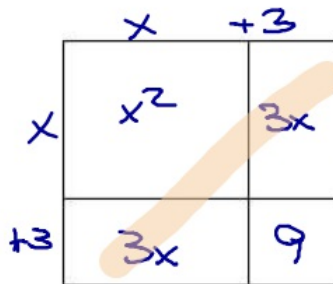
I know that when I **multiply** the two question marks I have to get 6

I also know that when I **add** the two question marks I have to get 5

So what are the two question marks?

For the following expressions use Area Models to convert the quadratic functions from standard form to factored form.

1. $x^2 + 6x + 9$

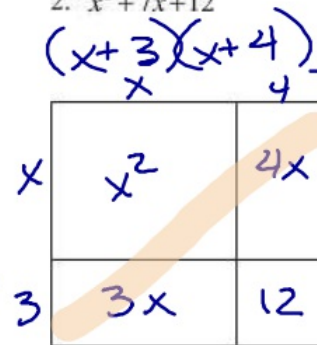


$$\begin{array}{r} 9 \\ 1 \ 9 \\ \hline 3 \ 3 \end{array}$$

$$\begin{array}{l} 3 + 3 = 6 \\ 3 \cdot 3 = 9 \end{array}$$

factored form
 $(x+3)(x+3)$
 $(x+3)^2$

2. $x^2 + 7x + 12$

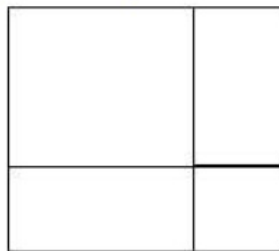


$$\begin{array}{r} 12 \\ 1 \ 12 \\ \hline 2 \ 6 \\ 3 \ 4 \end{array}$$

$$\begin{array}{l} 3 + 4 = 7 \\ 3 \cdot 4 = 12 \end{array}$$

3. $x^2 + 9x + 14$

$$(x+2)(x+7)$$

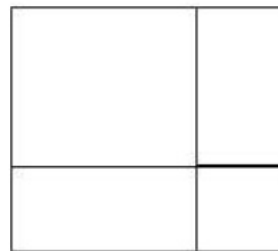


$$\begin{array}{r} 14 \\ 1 \ 14 \\ \hline 2 \ 7 \end{array}$$

$$\begin{array}{l} 2 + 7 = 9 \\ 2 \cdot 7 = 14 \end{array}$$

4. $x^2 + 12x + 35$

$$(x+5)(x+7)$$



$$\begin{array}{r} 35 \\ 1 \ 35 \\ \hline 5 \ 7 \end{array}$$

$$\begin{array}{l} 5 + 7 = 12 \\ 5 \cdot 7 = 35 \end{array}$$

Name _____

5. $x^2 - x - 6$

$$(x+2)(x-3) \rightarrow \begin{array}{r} 6 \\ 1 \ 6 \\ \hline 2 \ 3 \end{array}$$

$$(x-3)(x+2) \quad \begin{array}{r} 2 + -3 = -1 \\ 2 \cdot -3 = -6 \end{array}$$

Period _____

6. $x^2 + 4x + 4$

$$(x+2)(x+2) \quad \begin{array}{r} 4 \\ 1 \ 4 \\ \hline 2 \ 2 \end{array}$$

or

$$(x+2)^2 \quad \begin{array}{r} 2 + 2 = 4 \\ 2 \cdot 2 = 4 \end{array}$$

7. $x^2 - 3x - 10$

$$(x-5)(x+2) \quad \begin{array}{r} 10 \\ 1 \ 10 \\ \hline 2 \ 5 \end{array}$$

$$\begin{array}{r} -5 + 2 = -3 \\ -5 \cdot 2 = -10 \end{array}$$

8. $x^2 - 9x + 8$

$$(x-1)(x-8) \quad \begin{array}{r} 8 \\ 1 \ 8 \\ \hline 2 \ 4 \end{array}$$

$$\begin{array}{r} -1 + -8 = -9 \\ -1 \cdot -8 = 8 \end{array}$$

9. $x^2 - 10x + 24$

$$(x-4)(x-6) \quad \begin{array}{r} 24 \\ 1 \ 24 \\ \hline 2 \ 12 \\ 3 \ 8 \\ 4 \ 6 \\ \hline -4 + -6 = -10 \\ -4 \cdot -6 = 24 \end{array}$$

10. $x^2 - 1 = x^2 + 0x - 1$

$$(x+1)(x-1) \quad \begin{array}{r} 1 \\ 1 \end{array}$$

$$\begin{array}{r} 1 + -1 = 0 \\ 1 \cdot -1 = -1 \end{array}$$

11. $x^2 - 25$

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

$$\begin{array}{r} 5 + 5 = 0 \\ 5 \cdot -5 = -25 \end{array}$$

12. $x^2 + 25 = x^2 + 0x + 25$

Prime factored

~~$$(x-5)(x-5)$$

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

$$x^2 - 10x + 25$$~~

Difference of squares: $(x-1)(x+1)$

$(x-5)(x+5)$ $(x-6)(x+6)$

Conjugates

$(x+3,486)(x-3,486)$

Secondary 2 Honors - Quad Prep Unit

Day 2 In Class

Factor the following quadratic expression completely.

1) We haven't factored yet when the leading coefficient is anything other than 1. Is there a GCF from each term in the expression? If so, take it out, then try to factor completely.

$$\frac{3x^2 + 15x + 18}{\frac{3}{3} \quad \frac{15}{3} \quad \frac{18}{3}} \quad \begin{matrix} 3 \\ 3 \end{matrix} \begin{matrix} (x^2 + 5x + 6) \\ (x+2)(x+3) \end{matrix} \quad \begin{matrix} 6 \\ 1 \quad 6 \\ 2 \quad 3 \end{matrix}$$

$$\underline{3(x^2 + 5x + 6)}$$

Factor the GCF from each quadratic expression below if needed, then factor each completely.

$$2) \frac{-a^2 - 1}{\frac{-1}{-1} \quad \frac{-1}{-1}} \quad \boxed{-1(a^2 + 1)}$$

$$-(a^2 + 1)$$

$$3) \frac{-p^2 - 6p + 7}{\frac{-1}{-1} \quad \frac{-6}{-1} \quad \frac{7}{-1}} \quad \begin{matrix} 7 \\ 1 \quad 7 \end{matrix}$$

$$-1(p^2 + 6p - 7) \quad \begin{matrix} 7 + -1 = 6 \\ 7 \cdot -1 = -7 \end{matrix}$$

$$-1(p+7)(p-1)$$

$$4) \frac{-x^2 + 13x - 27}{\frac{-1}{-1} \quad \frac{13}{-1} \quad \frac{-27}{-1}} \quad \begin{matrix} 27 \\ 1 \quad 27 \\ 3 \quad 9 \end{matrix}$$

$$\boxed{-1(x^2 - 13x + 27)}$$

$$\boxed{-1(x^2 - 13x + 27)}$$

Prime

$$5) v^2 + 5v + 4$$

$$(v+1)(v+4)$$

$$6) p^2 - 4p - 5 \quad \begin{matrix} 5 \\ 1 \quad 5 \end{matrix}$$

$$(p-5)(p+1)$$

$$\begin{matrix} -5 + 1 = -4 \\ -5 \cdot 1 = -5 \end{matrix}$$

$$7) \frac{x^2 + 2x}{\cancel{x} \quad x}$$

$$x(x+2)$$

$$\begin{array}{l} x^2 + 2x + 0 \\ (x+2)(x+0) \quad \begin{matrix} 2+0=2 \\ 2 \cdot 0=0 \end{matrix} \end{array}$$

$$8) b^2 - b - 6$$

$$(b+2)(b-3)$$

$$\begin{array}{r} 6 \\ 1 \ 6 \\ 2 \ 3 \end{array}$$

$$9) x^2 - x - 30$$

$$(x+5)(x-6)$$

$$\begin{array}{r} 30 \\ 1 \ 30 \\ 2 \ 15 \\ 3 \ 10 \\ +5 \ -6 \end{array}$$

$$10) a^2 - 5a - 14$$

$$(a+2)(a-7)$$

$$\begin{array}{r} 14 \\ 1 \ 14 \\ +2 \ -7 \end{array}$$

$$11) x^2 + 2x - 80$$

$$(x-8)(x+10)$$

$$\begin{array}{r} 80 \\ 1 \ 80 \\ 2 \ 40 \\ 4 \ 20 \\ 5 \ 16 \\ \rightarrow 8 \ 10 \\ -8 \ +10 = 2 \\ -8 \cdot 10 = -80 \end{array}$$

$$12) r^2 + 17r + 72$$

$$(r+8)(r+9)$$

$$\begin{array}{r} 72 \\ 1 \ 72 \\ 2 \ 36 \\ 3 \ 24 \\ 4 \ 18 \\ 6 \ 12 \\ 8 \ 9 \end{array}$$

$$13) 3n^2 + 21n$$

$$3n(n+7)$$

$$14) 4x^2 + 28x + 24$$

$$4(x^2 + 7x + 6)$$

$$4(x+1)(x+6)$$

$$15) 2k^2 + 6k - 56$$

$$2(k^2 + 3k - 28)$$

$$2(k-4)(k+7)$$

$$\begin{array}{r} 28 \\ 1 \ 28 \\ 2 \ 14 \\ 4 \ 7 \end{array}$$

$$16) 3x^2 + 12x + 12$$

$$3(x^2 + 4x + 4)$$

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

$$17) -6n^2 - 24n$$

$$-6n(n+4)$$