

## 6.2 Factoring Trinomials with Leading Coefficient 1

If we have a polynomial of the form  $x^2 + bx + c$ , we can try to factor it using the "product-sum" method.

Say that we have a factored polynomial written as  $(x + r_1)(x + r_2)$ . We can FOIL this product and make a comparison with  $x^2 + bx + c$ .

$$\begin{aligned}(x + r_1)(x + r_2) &= x^2 + r_2x + r_1x + r_1r_2 \\ &= x^2 + (r_1 + r_2)x + r_1r_2 \\ &= x^2 + bx + c\end{aligned}$$

Looking at the above work, we can determine that  $b = r_1 + r_2$  and  $c = r_1r_2$ . This gives us the "product-sum" method of factoring.

### Factoring with "Product-Sum"

1. Find two numbers that multiply to  $c$  and that add to  $b$ .
2. Determine the signs of each.
3. Write as the product of two binomials.

#### Example 6.2.1

Factor  $x^2 + 5x + 6$

#### Example 6.2.2

Factor  $x^2 - 6x + 8$

**Example 6.2.3**Factor  $x^2 + 3x - 10$ **Example 6.2.4**Factor  $x^2 + x - 7$ **Example 6.2.5**Factor  $x^2 - 4xy + 3y^2$ 

Multiple types of factoring can be combined. In almost every case of factoring, you should attempt the GCF method first and then apply some other method.

**Example 6.2.6**Factor completely:  $2x^3 + 6x^2 - 56x$

**Example 6.2.7**

Factor completely:  $-2y^2 - 10y + 28$