

To change a quadratic from standard to intercept form, we will use a process called factoring. We will factor using the "box method".

FLASHBACK: How would we multiply  $x + 6$  and  $x + 1$  using the box method?

	$x$	$6$
$x$	$x^2$	$6x$
$1$	$x$	$6$

 $x^2 + 7x + 6$

Now we will do the reverse of that to convert an equation from standard to intercept form.

**Steps:**

1. Determine the two numbers that will multiply to equal  $a \cdot c$  and add to equal  $b$ .
2. Use those two numbers to replace the  $b$  term.
3. Create your box and fill it in with the  $4$  terms.
4. Figure out what must have been multiplied to create the terms inside of the box and complete the outside of the box.
5. Use the outside of the box to write your final answer.

**Example 1.** Write  $y = x^2 + 7x + 6$  in intercept form.

$$\frac{6}{a \cdot c} = \frac{1}{b}$$

$$\frac{6}{6} + \frac{1}{1} = \frac{7}{b}$$

$$y = x^2 + 6x + x + 6$$

	$x$	$6$
$x$	$x^2$	$6x$
$1$	$x$	$6$

$$y = (x+1)(x+6)$$

**Example 2.** Write  $y = x^2 + 5x + 6$  in intercept form.

$$\frac{2}{a \cdot c} = \frac{3}{b}$$

$$\frac{2}{2} + \frac{3}{3} = \frac{5}{b}$$

$$y = x^2 + 2x + 3x + 6$$

	$x$	$2$
$x$	$x^2$	$2x$
$3$	$3x$	$6$

$$y = (x+2)(x+3)$$

**Example 3.** Write  $y = x^2 - 5x + 6$  in intercept form.

$$\underline{-2} \cdot \underline{-3} = \frac{6}{a \cdot c}$$

$$\underline{-2} + \underline{-3} = \frac{-5}{b}$$

$$y = x^2 - 2x - 3x + 6$$

	$x$	$-2$
$x$	$x^2$	$-2x$
$-3$	$-3x$	$6$

$$y = (x-2)(x-3)$$

**Example 4.** Write  $y = 2x^2 + x - 6$  in intercept form.

$$\underline{-3} \cdot \underline{4} = \frac{-12}{a \cdot c}$$

$$\underline{-3} + \underline{4} = \frac{1}{b}$$

$$y = 2x^2 - 3x + 4x - 6$$

	$2x$	$-3$
$x$	$2x^2$	$-3x$
$2$	$4x$	$-6$

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

**Example 5.** Write  $y = 4x^2 - 19x + 12$  in intercept form.

78  
2-24  
3-16

$$\underline{-3} \cdot \underline{-16} = \frac{48}{a \cdot c}$$

$$\underline{-3} + \underline{-16} = \frac{-19}{b}$$

$$y = 4x^2 - 3x - 16x + 12$$

	$4x$	$-3$
$x$	$4x^2$	$-3x$
$-4$	$-16x$	$12$

$$y = (4x-3)(x-4)$$

**Example 6.** Write  $y = -6x^2 + 15x + 36$  in intercept form.

1-24  
2-12  
3-8  
4-6

$$\underline{3} \cdot \underline{-8} = \frac{-24}{a \cdot c}$$

$$\underline{3} + \underline{-8} = \frac{-5}{b}$$

$$y = -3(2x^2 + 3x - 8x - 12)$$

$$y = -3(2x^2 - 5x - 12)$$

	$2x$	$3$
$x$	$2x^2$	$3x$
$-4$	$-8x$	$-12$

$$y = -3(2x+3)(x-4)$$

**Practice Problems:** Write each of the following in intercept form. Complete this work on a SEPARATE sheet of notebook paper and label this assignment #23.

- |                         |                         |                         |
|-------------------------|-------------------------|-------------------------|
| 1. $y = x^2 - x - 6$    | 3. $y = 9x^2 + 12x + 4$ | 5. $y = x^2 + 4x - 32$  |
| 2. $y = 2x^2 - 4x - 16$ | 4. $y = -6x^2 - x + 2$  | 6. $y = 3x^2 - 3x - 90$ |