Factoring a Trinomial

Part 2: The trinomial has the form $x^2 + bx + c$. ($a = 1$)

Example: Factor $x^2 + 17x + 60$.

$x^2 + 17x + 60 \Leftrightarrow x^2 + bx + c \quad (a = 1)$ 1, 2, 3, 4, 5, 12, 6, 10, 15, 20, 30, 60

1. Find two numbers (m & n) whose sum is equal to the coefficient of the second term (b), and whose product is equal to the value of the third term (c).

$$\left.\begin{array}{l} m = 5 \\ n = 12 \end{array}\right\} \begin{array}{l} 5 + 12 = 17 \\ 5 \times 12 = 60 \end{array}$$

2. Create the product of two binomials: the first term in each binomial is x (or whatever variable is used); the second term of each binomial are the two values found in step 1.

$$x^2 + 17x + 60 = (x + 5)(x + 12)$$

Example: Factor $y^2 + 8y - 20$

$-1, 20$ ×

$-2, 10$ ✓

$m \times n = -20$ $m + n = 8$

$$(y - 2)(y + 10)$$

Factor the following polynomials.

1. $x^2 - x - 12 = (x-4)(x+3)$

$m \times n = -12$, $m+n = -1$ $\}$ $-4, 3$

2. $x^2 + 12x + 35$ ($m+n$, $m \times n$)

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

3. $x^2 + 10x + 25 = (x+5)^2$

4. $x^2 - 13x + 40$ ($m+n$, $m \times n$)

$(x-5)(x-8)$

5. $x^2 + 4x - 45 = (x+9)(x-5)$ ($m+n$, $m \times n$)

Factor the following polynomials.

1. $x^2+4x-32$

2. $3x^2+4x+1$

3. $x^2-5x-36$

4. $6x^2-7x+1$

$(x-1)(6x-1)$

5. $3x^3-12x$ – common factor? $3x$

$3x(x^2-4)$

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

6. $4x^3+12x^2+8x$

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

$4x(x+1)(x+2)$

$m\times n=2$, $m+n=3$: $1, 2$

The volume of a prism is expressed by the polynomial $2x^3+5x^2-28x-15$. If $2x+1$ represents the height of this prism, what two binomials could represent the dimensions of the base?

$V = 2x^3+5x^2-28x-15$

$V = A_b \cdot h$

$h = 2x+1$

$A_b = V \div h$

$$2x+1 \overline{)\,2x^3+5x^2-28x-15}$$

$x^2+2x-15$

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

$4x^2-28x$

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

$-30x-15$

$-(-30x-15)$

0

$A_b = x^2+2x-15$ factor

$(x+5)(x-3)$

$m \times n = -15$

$m+n = 2$

$5, -3$