Section 6.6 Factoring Trinomials

# Objective 1: Factoring Trinomials of the Form $x^{2}+bx+c$

Consider the quadratic expression $x^{2}+3x-10$. Since $\left(x-2\right)\left(x+5\right)=x^{2}+3x-10$, we say that $(x-2)(x+5)$ is a **factored form** of $x^{2}+3x-10$.

The factored form of a quadratic expression is the product of two linear factors and possibly a constant. If a quadratic expression cannot be factored over the integers, then we say that it is **prime**.

Factor each trinomial.

|  |  |
| --- | --- |
| a. $a^{2}-2a-48$ | b. $5t^{2}-60t+160$ |

# Objective 2: Factoring Trinomials of the Form $ax^{2}+bx+c$ (Where $a\ne 1)$

When the leading coefficient, $a$, is not equal to one, we will use one of two methods to factor the expression. The first is trial and error. Trial and error can be an efficient choice when $a$ and $c$ do not have many factor pairs.

Factor each trinomial.

|  |  |
| --- | --- |
| a. $3r^{2}+16r+5$  | b. $4x^{2}+3x-1$ |

Another method that can be used is factoring by grouping by first rewriting the trinomial as a four-term polynomial. This method is sometimes referred to as splitting the linear term.

**Steps For Factoring a Trinomial of the Form** $ax^{2}+bx+c$ **by Grouping:**

**Step 1:** Find two numbers that have a product of $a⋅c$ and a sum of $b$.

**Step 2:** Write the term $bx$ as a sum using the numbers found in Step 1.

**Step 3**: Factor by grouping.

Factor each trinomial.

|  |  |
| --- | --- |
| c. $7m^{2}-19m-6$  | d. $8w^{2}-18w+9$ |

When factoring remember to always look for a greatest common factor first.

e. Factor the trinomial.

$12x^{3}+10x^{2}+2x$

# Objective 3: Factoring by Substitution

Sometimes expressions that are not quadratic can be made to resemble a quadratic expression by using a substitution. Expressions of this type are said to be quadratic in form or “disguised quadratics.”

Use substitution to factor each polynomial.

|  |  |
| --- | --- |
| a. $x^{4}+x^{2}-12$ | b. $b^{6}-9b^{3}+20$ |