Section 7.1 Greatest Common Factor and Factoring by Grouping

In the product $2⋅3=6$, the numbers $2$ and $3$ are called **factors** of $6$ and $2⋅3$ is a **factored form** of $6$. This is true of polynomials also. Since $\left(x+2\right)\left(x+3\right)=x^{2}+5x+6$, $(x+2)$ and $(x+3)$ are factors of $x^{2}+5x+6$, and $\left(x+2\right)\left(x+3\right)$ is a factored form of $x^{2}+5x+6$.

Writing a number or polynomial expression in factored form is the reverse process of multiplying the factors.

# Objective 1: Factoring Out the GCF of a Polynomial’s Terms

The first step to factoring a polynomial is to check to see if there is a **greatest common factor** (GCF) that can be factored out of each term. The GCF of a list of terms or monomials is the product of the GCF of the numerical coefficients and each GCF of the variable factors.

Factor each polynomial by factoring out the GCF.

|  |  |
| --- | --- |
| a.$ 14t+21$ | b. $-6x^{2}+3x$ |

|  |  |
| --- | --- |
| c.$ x^{4}-8x^{3}$ | d. $12x^{2}y^{3}-20xy^{2}+10x^{3}y^{4}$ |

|  |  |
| --- | --- |
| e.$ y\left(x-4\right)+3(x-4)$ |  |

# Objective 2: Factoring Polynomials by Grouping

Sometimes it is possible to factor a polynomial by grouping the terms of the polynomial and looking for common factors in each group. This method of factoring is called factoring by grouping. In particular, look to see if factoring by grouping will work when the polynomial has four terms.

Factor each polynomial.

|  |  |
| --- | --- |
| a. $ab+6a+2b+12$ | b. $x^{3}-x^{2}-5x+5$ |