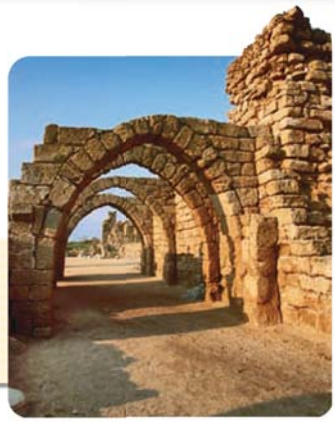
5.4 Factor and Solve Polynomial Equations

TEKS 2A.1.A, 2A.2.A; P.3.A, P.3.B



Before You factored and solved quadratic equations.

Now You will factor and solve other polynomial equations.

Why? So you can find dimensions of archaeological ruins, as in Ex. 58.

Key Vocabulary
- **factored completely**
- **factor by grouping**
- **quadratic form**

In Chapter 4, you learned how to factor the following types of quadratic expressions.

Type	Example
General trinomial	$2x^2 - 3x - 20 = (2x + 5)(x - 4)$
Perfect square trinomial	$x^2 + 8x + 16 = (x + 4)^2$
Difference of two squares	$9x^2 - 1 = (3x + 1)(3x - 1)$
Common monomial factor	$8x^2 + 20x = 4x(2x + 5)$

You can also factor polynomials with degree greater than 2. Some of these polynomials can be *factored completely* using techniques learned in Chapter 4.

KEY CONCEPT *For Your Notebook*

Factoring Polynomials

Definition

A factorable polynomial with integer coefficients is **factored completely** if it is written as a product of unfactorable polynomials with integer coefficients.

Examples

$2(x + 1)(x - 4)$ and $5x^2(x^2 - 3)$ are factored completely.

$3x(x^2 - 4)$ is *not* factored completely because $x^2 - 4$ can be factored as $(x + 2)(x - 2)$.

EXAMPLE 1 Find a common monomial factor

Factor the polynomial completely.

a. $x^3 + 2x^2 - 15x = x(x^2 + 2x - 15)$ Factor common monomial.

$= x(x + 5)(x - 3)$ Factor trinomial.

b. $2y^5 - 18y^3 = 2y^3(y^2 - 9)$ Factor common monomial.

$= 2y^3(y + 3)(y - 3)$ Difference of two squares

c. $4z^4 - 16z^3 + 16z^2 = 4z^2(z^2 - 4z + 4)$ Factor common monomial.

$= 4z^2(z - 2)^2$ Perfect square trinomial