POLYNOMIALS

7.1

What does each prefix mean?

mono	one
bi	two
tri	three
poly	more than one

Monomials

A **monomial** is a number, a variable, or a product of a number and one or more variables with whole number exponents.

Monomials
-4
$\frac{1}{2}y^2$
$2.5x^2y$

Not monomials	Reason
$x^{1.5}$	Monomials must have whole number exponents.
$-\frac{2}{z}$	Monomials cannot have variables in the denominator.
7^y	Monomials cannot have variable exponents.

The **degree of a monomial** is the sum of the exponents of the variables in the monomial.

EXAMPLE 1 Finding the Degrees of Monomials

Find the degree of each monomial.

a. $5x^2$

The exponent of x is 2.
So, the degree is 2.

b. $-\frac{1}{2}xy^3$

The exponent of x is 1.
The exponent of y is 3.
1 + 3 is 4. So, the degree is 4.

c. -3

You can rewrite -3 as $-3x^0$.
The exponent of x is 0.
So, the degree is 0.

On Your Own

Find the degree of the monomial.

1. $-3x^4$ Degree is 4.

2. $7c^3d^2$ Degree is 5.

3. $\frac{5}{3}y$ Degree is 1.

4. -20.5 Degree is 0.

Polynomials

A **polynomial** is a monomial or a sum of monomials. Each monomial is called a *term* of the polynomial.

A polynomial with two terms is a **binomial**.

$5x + 2$

Degree is 1.

A polynomial with three terms is a **trinomial**.

$x^2 + 5x + 2$

Degree is 2.

The **degree of a polynomial** is the greatest degree of its terms. A polynomial in one variable is in *standard form* when the exponents of the terms decrease from left to right.

EXAMPLE 2 Classifying Polynomials

Write each polynomial in standard form. Identify the degree and classify each polynomial by the number of terms.

Polynomial	*Standard Form*	*Degree*	*Type of Polynomial*
a. $-3z^4$			
b. $4 + 5x^2 - x$			
c. $8q + q^5$			

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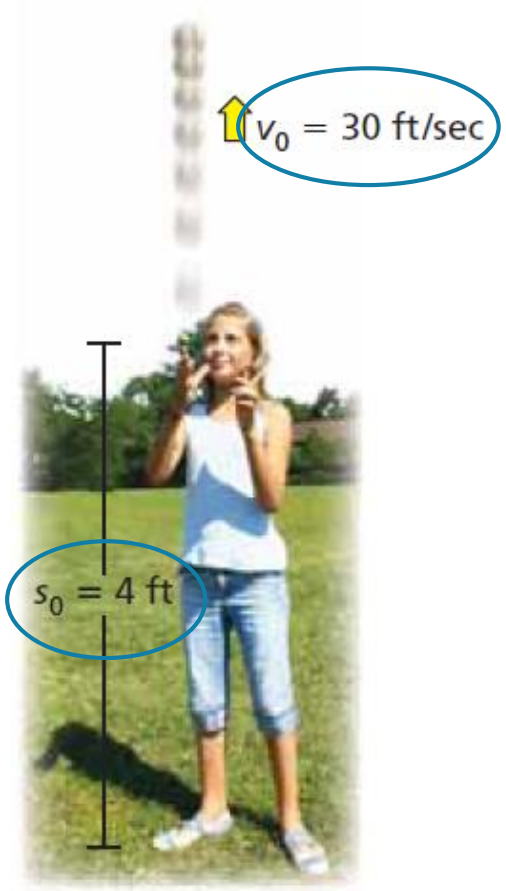
c.	$8q + q^5$	$q^5 + 8q$	5	binomial

EXAMPLE 3 Real-Life Application



The polynomial $-16t^2 + v_0t + s_0$ represents the height (in feet) of an object, where v_0 is the initial vertical velocity (in feet per second), s_0 is the initial height of the object (in feet), and t is the time (in seconds).

a. Write a polynomial that represents the height of the baseball.

$$-16t^2 + 30t + 4$$

b. What is the height of the baseball after 1 second?

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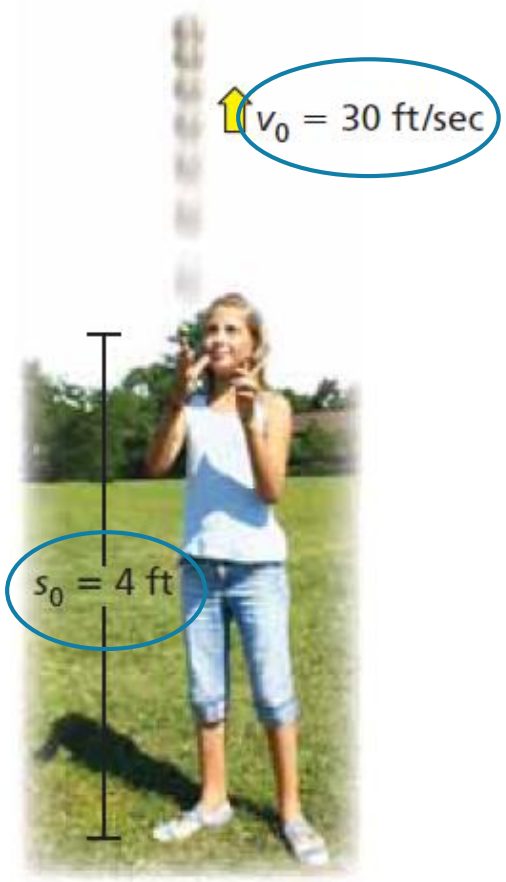

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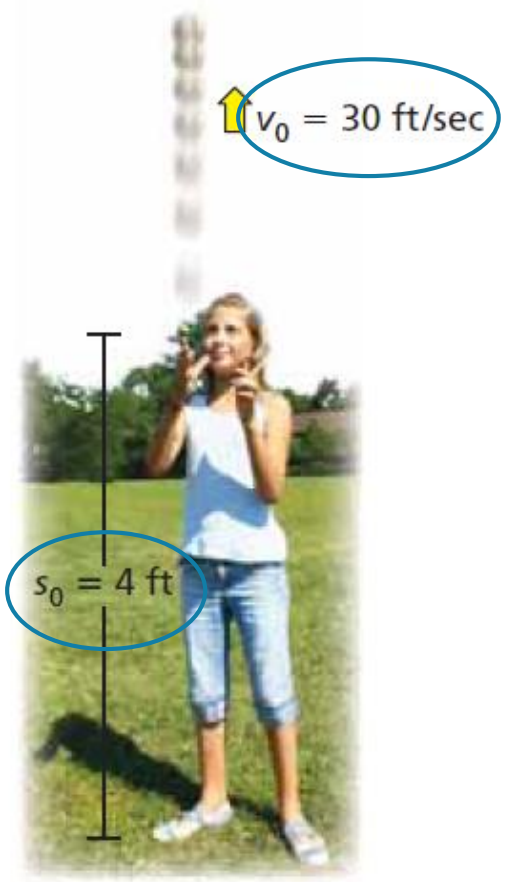

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$$= -16 + 30 + 4$$

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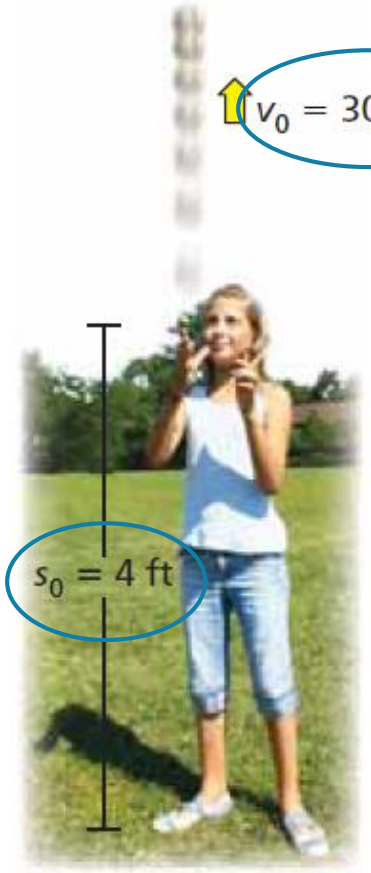

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b. What is the height of the baseball after 1 second?

$$\begin{aligned} -16t^2 + 30t + 4 &= -16(1)^2 + 30(1) + 4 \\ &= -16 + 30 + 4 \\ &= 18 \end{aligned}$$

∴ The height of the baseball after 1 second is 18 feet.

On Your Own

Write the polynomial in standard form. Identify the degree and classify the polynomial by the number of terms.

5. $4 - 9z$

$-9z + 4$

Degree is 1

Binomial

6. $t^2 - t^3 - 10t$

$-t^3 + t^2 - 10t$

Degree is 3

Trinomial

7. $2.8x + x^3$

$x^3 + 2.8xt$

Degree is 3

Binomial

8. In Example 3, the initial height is 5 feet. What is the height of the baseball after 2 seconds?

$-16t^2 + 30t + 5 = -16(2)^2 + 30(2) + 5$

$= -64 + 65$

$= 1$

The height of the baseball after 2 seconds is 1 foot.