NAME _____ DATE _____

# 15 Polynomials

## 15-1 Simplifying Polynomials

**Objective:** To simplify polynomials.

### Terms to Know

**Polynomial** A variable expression that consists of one or more terms.

**Monomial** A polynomial that has one term.

**Binomial** A polynomial that has two terms.

**Trinomial** A polynomial that has three terms.

**Standard form** The form of a polynomial in which the terms are arranged in order from the highest to the lowest power of one of the variables.

***Example 1*** Write the polynomial $-4x^2 + 1 - 5x + x^3 - 2x^4$ in standard form.

***Solution***
$-4x^2 + 1 - 5x + x^3 - 2x^4$
$= -2x^4 + x^3 - 4x^2 - 5x + 1$
Notice that the powers of $x$ are now arranged in the order 4, 3, 2, and 1.

**CAUTION** When you rearrange the terms of a polynomial, be sure that the sign of the term stays the same. For example, rewrite $1 - 2x^4 - x$ as $-2x^4 - x + 1$.

**Write each polynomial in standard form.**

1. $-2x + x^2 + 5$
2. $3 - 4a$
3. $n^5 + 1 - 2n^2 - 3n^4$
4. $x^4 + 2x^2 - x^3 - 2 - 7x$
5. $7c - 2c^4 + 3c^2 - 8c^3$
6. $x - 4 + x^3 - 5x^2$
7. $5n + 4n^3 - 1 + 6n^2$
8. $2a - 3a^2 + a^3$
9. $-2x^3 + x^2 + 1 - 4x + x^4$
10. $d^2 + 8d - d^5 + 4d^3$
11. $3y^2 - 2y + 4 + 5y^4$
12. $p + 7p^2 - 6p^3 + 5p^4$
13. $5v - 3 + v^4$
14. $3 + x - x^2$

NAME _____ DATE _____

## 15-1 Polynomials *(continued)*

***Example 2*** Simplify $2a - 3a^2 + a^3 - 5a + a^2 + 4a^3 + 1$.

***Solution*** Combine like terms and write the resulting polynomial in standard form.

$2a - 3a^2 + a^3 - 5a + a^2 + 4a^3 + 1$

$= \overbrace{2a - 5a} - \overbrace{3a^2 + a^2} + \overbrace{a^3 + 4a^3} + 1$ ← Group like terms.

$= -3a - 2a^2 + 5a^3 + 1$ ← Combine like terms.

$= 5a^3 - 2a^2 - 3a + 1$ ← Write in standard form.

**Simplify.**

**15.** $7y^2 - 3y - y - 4y^2$

**16.** $6m^2 - 14 - 7m^2 + 24 + 3m^2$

**17.** $5x^2 - x + 3 + 2x^3 - 4x - 3x^2 - 5$

**18.** $-2t^2 - 12 - 7t + 5t^2$

**19.** $5a + 7 - 4a^2 + 2a - 6a^2 + 3$

**20.** $5x - x^2 - x + 4x^2$

**21.** $8f^2 - 3f + 12 + f^2 - 1 + 5f + 4f^3$

**22.** $4w^2 - 5w^3 + 3w - 5 + 8w^3 + 7$

**23.** $3z^3 + 4z^2 - 2 - 7z^3 - 7z - 2z^2 + 3z + 4$

**24.** $8h^3 - 9h^2 + 7h^2 + 6h^3 + 10h^2 - 5h^3$

**25.** $7x^5 - 5 - 4x^2 + 3x^5 + 10$

**26.** $8a - 4 + 9a^2 + 8 - 5a + 12a^2$

**27.** $7c - 8c^2 + 6c + 8c^2$

**28.** $2r^2 + 6r^2 - 11 - 2r + 12r + 4$

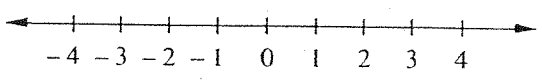
**29.** $5x^2 - 11x + 8 + 19x - 23 - 7x^2 + 12x^4$

### Spiral Review

**30.** Find the volume of a sphere whose radius is 7 in. *(Lesson 14-6)*

**31.** Simplify: $3a^2 - 2a + a^3 + 6 - a^2 - 5a^3 + 5a - 2$ *(Lesson 15-1)*

**32.** Solve and graph: $7n > -21$. Use the number line at the right. *(Lesson 13-6)*




**33.** Find $\sqrt{121}$. *(Lesson 10-10)*