For You to Do

Expand each expression. Combine like terms to get a polynomial answer. Be careful of negative signs!

10. $3x^2 - 7x + 1 - 2(10x^3 - x^2 + 3x)$

11. $(3x - 1)(x^2 + 2x + 5)$

In-Class Experiment

Develop two theorems that answer the following questions.

12. How is the degree of the product of two nonzero polynomials related to the degrees of the polynomials that you are multiplying?

13. How is the degree of the sum of two nonzero polynomials related to the degrees of the polynomials that you are adding?

Here are some polynomials that you can use to develop your theorems.

- $x^2 + 4x + 5$
- $-2x^5 + 7x - 1$
- $3x + 7$
- $7x^3 - 2x^2 + 1$
- $2x^5 + 5$
- $14x$
- 9
- $x^9 + x^3 + 1$
- $4x^3 + 2x + 1$

Why is it important that the polynomials be nonzero?

Check Your Understanding

1. Find two polynomials with a sum and product that have the following degrees. If you cannot find the polynomials, explain why.

   a. The sum has degree 3 and the product has degree 6.

   b. The sum has degree 4 and the product has degree 2.

   c. The sum has degree 4 and the product has degree 4.

   d. The sum has degree 2 and the product has degree 1.

2. **Take It Further** Find two polynomials with a sum that has degree 1 and a product that has degree 4. If you cannot find the two polynomials, explain why.

3. a. Find two polynomials with the same degree that have a sum of $3x^2 + 7x + 4$.

   b. Find two polynomials with different degrees that have a sum of $3x^2 + 7x + 4$.

   c. Find two polynomials that have a sum of 4.

   d. Find two polynomials that have a product of $x^2 - 1$.

4. **Write About It** How does the degree of a polynomial compare to the degree of that polynomial squared? Support your conjecture with at least three examples.

5. Find two polynomials that meet each condition.

    a. The product has degree 6.

    b. The product has degree 1.

    c. The sum has degree 4 and the product has degree 6.

6. a. Use $p(x) = x^2 + 4x + 9$. Find a polynomial $r(x)$ such that
    $p(x) + r(x) = 2x^2 - 6x + 14$.

    b. Find a polynomial $s(x)$ such that $p(x) + s(x) = 2x^2 + 14$.

    c. Find a polynomial $t(x)$ such that $p(x) + t(x)$ has degree 2 and $p(x) \cdot t(x)$
    has degree 3.

7. Find the value of a such that
$(x + a)(x + 3) = x^2 + 5x + 6$ is an identity.
Copying and completing the expansion
box at the right may be helpful.

	x	$+3$
x	■	■
a	■	■

8. Standardized Test Prep Use $q(x) = 2x - 3$ and
$r(x) = 2x^2 + 3x - 5$. Find $s(x) = q(x) + r(x)$ and $p(x) = q(x) \cdot r(x)$.

    A. $s(x) = 2x^2 + 5x + 8$ and $p(x) = 4x^3 + 12x^2 - 19x + 15$

    B. $s(x) = 2x^2 + 5x + 8$ and $p(x) = 4x^3 - x + 15$

    C. $s(x) = 2x^2 + 5x - 8$ and $p(x) = 4x^3 - 19x + 15$

    D. $s(x) = 2x^2 + 5x - 8$ and $p(x) = 4x^3 - 19x - 15$

9. Write About It Suppose you need to explain the phrase *like terms* to a
student who has never heard it before. Write a definition of like terms.
Explain how you add and subtract them. Be as precise as possible.

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