7.1 Adding and Subtracting Polynomials *(pp. 357–364)*

Find $(2x^3 + 6x^2 - x) - (-3x^3 - 2x^2 - 9x)$.

$$(2x^3 + 6x^2 - x) - (-3x^3 - 2x^2 - 9x) = (2x^3 + 6x^2 - x) + (3x^3 + 2x^2 + 9x)$$
$$= (2x^3 + 3x^3) + (6x^2 + 2x^2) + (-x + 9x)$$
$$= 5x^3 + 8x^2 + 8x$$

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

1. $6 + 2x^2$
2. $-3p^3 + 5p^6 - 4$
3. $9x^7 - 6x^2 + 13x^5$
4. $-12y + 8y^3$

Find the sum or difference.

5. $(3a + 7) + (a - 1)$
6. $(x^2 + 6x - 5) + (2x^2 + 15)$
7. $(-y^2 + y + 2) - (y^2 - 5y - 2)$
8. $(p + 7) - (6p^2 + 13p)$

7.2 Multiplying Polynomials *(pp. 365–370)*

Find $(x + 7)(x - 9)$.

$$(x + 7)(x - 9) = x(x - 9) + 7(x - 9)$$ Distribute $(x - 9)$ to each term of $(x + 7)$.
$$= x(x) + x(-9) + 7(x) + 7(-9)$$ Distributive Property
$$= x^2 + (-9x) + 7x + (-63)$$ Multiply.
$$= x^2 - 2x - 63$$ Combine like terms.

Find the product.

9. $(x + 6)(x - 4)$
10. $(y - 5)(3y + 8)$
11. $(x + 4)(x^2 + 7x)$
12. $(-3y + 1)(4y^2 - y - 7)$

7.3 Special Products of Polynomials *(pp. 371–376)*

Find each product.

a. $(6x + 4y)^2$

$$(6x + 4y)^2 = (6x)^2 + 2(6x)(4y) + (4y)^2$$ Square of a binomial pattern
$$= 36x^2 + 48xy + 16y^2$$ Simplify.

b. $(2x + 3y)(2x - 3y)$

$$(2x + 3y)(2x - 3y) = (2x)^2 - (3y)^2$$ Sum and difference pattern
$$= 4x^2 - 9y^2$$ Simplify.

Find the product.

13. $(x + 9)(x - 9)$
14. $(2y + 4)(2y - 4)$
15. $(p + 4)^2$
16. $(-1 + 2d)^2$

Solving Polynomial Equations in Factored Form *(pp. 377–382)*

Solve $(x + 6)(x - 8) = 0$.

$(x + 6)(x - 8) = 0$	Write equation.
$x + 6 = 0$ $\quad or \quad$ $x - 8 = 0$	Zero-Product Property
$x = -6$ $\quad or \quad$ $x = 8$	Solve for x.

Solve the equation.

17. $x^2 + 5x = 0$ **18.** $(z + 3)(z - 7) = 0$ **19.** $(b + 13)^2 = 0$ **20.** $2y(y - 9)(y + 4) = 0$

Factoring $x^2 + bx + c$ *(pp. 385–390)*

Factor $x^2 + 6x - 27$.

Notice that $b = 6$ and $c = -27$. Because c is negative, the factors p and q must have different signs so that pq is negative.

Find two integer factors of -27 whose sum is 6.

Factors of −27	−27, 1	−1, 27	−9, 3	−3, 9
Sum of factors	−26	26	−6	6

The values of p and q are -3 and 9.

▶ So, $x^2 + 6x - 27 = (x - 3)(x + 9)$.

Factor the polynomial.

21. $p^2 + 2p - 35$ **22.** $b^2 + 18b + 80$ **23.** $z^2 - 4z - 21$ **24.** $x^2 - 11x + 28$

Factoring $ax^2 + bx + c$ *(pp. 391–396)*

Factor $5x^2 + 36x + 7$.

There is no GCF, so you need to consider the possible factors of a and c. Because b and c are both positive, the factors of c must be positive. Use a table to organize information about the factors of a and c.

Factors of 5	Factors of 7	Possible factorization	Middle term	
1, 5	1, 7	$(x + 1)(5x + 7)$	$7x + 5x = 12x$	✗
1, 5	7, 1	$(x + 7)(5x + 1)$	$x + 35x = 36x$	✓

▶ So, $5x^2 + 36x + 7 = (x + 7)(5x + 1)$.

Factor the polynomial.

25. $3t^2 + 16t - 12$ **26.** $-5y^2 - 22y - 8$ **27.** $6x^2 + 17x + 7$

28. $-2y^2 + 7y - 6$ **29.** $3z^2 + 26z - 9$ **30.** $10a^2 - 13a - 3$