Simplify.

1. $(5b)^4(6c)^2$
2. $(13x - 1)(x + 3)$
3. $(3x^2 - 5x + 2) - (x^2 + 12x - 7)$
4. $(8x^3 + 9x^2 + 2x - 10) + (10x - 9)$
5. $(x^4 - x^3 - 10x^2 + 4x + 24) \div (x - 2)$
6. $(2x^3 + 9x^2 - 2x + 7) \div (x + 2)$

Given a polynomial and one of its factors, find the remaining factors of the polynomial. Some factors may not be binomials.

7. $x^3 - x^2 - 5x - 3; x + 1$
8. $x^3 + 8x + 24; x + 2$

Factor completely. If the polynomial is not factorable, write *prime*.

9. $3x^3y + x^2y^2 + x^2y$
10. $3x^2 - 2x - 2$
11. $ax^2 + 6ax + 9a$
12. $8r^3 - 64s^6$
13. $x^2 - 14x + 45$
14. $2r^2 + 3pr - 2p^2$

For Exercises 15–18, complete each of the following.
a. **Graph each function by making a table of values.**
b. **Determine consecutive integer values of x between which each real zero is located.**
c. **Estimate the x-coordinates at which the relative maxima and relative minima occur.**

15. $g(x) = x^3 + 6x^2 + 6x - 4$
16. $h(x) = x^4 + 6x^3 + 8x^2 - x$
17. $f(x) = x^3 + 3x^2 - 2x + 1$
18. $g(x) = x^4 - 2x^3 - 6x^2 + 8x + 5$

Solve each equation.

19. $a^4 = 6a^2 + 27$
20. $p^3 + 8p^2 = 18p$
21. $16x^4 - x^2 = 0$
22. $r^4 - 9r^2 + 18 = 0$
23. $p^{\frac{3}{2}} - 8 = 0$
24. $n^3 + n - 27 = n$

25. **TRAVEL** While driving in a straight line from Milwaukee to Madison, your velocity is given by $v(t) = 5t^2 - 50t + 120$, where t is driving time in hours. Estimate your speed after 1 hour of driving.

Use synthetic substitution to find $f(-2)$ and $f(3)$ for each function.

26. $f(x) = 7x^5 - 25x^4 + 17x^3 - 32x^2 + 10x - 22$
27. $f(x) = 3x^4 - 12x^3 - 21x^2 + 30x$
28. Write $36x^{\frac{2}{3}} + 18x^{\frac{1}{3}} + 5$ in quadratic form.
29. Write the polynomial equation of degree 4 with leading coefficient 1 that has roots at $-2, -1, 3,$ and 4.

State the possible number of positive real zeros, negative real zeros, and imaginary zeros for each function.

30. $f(x) = x^3 - x^2 - 14x + 24$
31. $f(x) = 2x^3 - x^2 + 16x - 5$

Find all rational zeros of each function.

32. $g(x) = x^3 - 3x^2 - 53x - 9$
33. $h(x) = x^4 + 2x^3 - 23x^2 + 2x - 24$
34. $f(x) = 5x^3 - 29x^2 + 55x - 28$
35. $g(x) = 4x^3 + 16x^2 - x - 24$

FINANCIAL PLANNING For Exercises 36 and 37, use the following information.
Toshi will start college in six years. According to their plan, Toshi's parents will save $1000 each year for the next three years. During the fourth and fifth years, they will save $1200 each year. During the last year before he starts college, they will save $2000.

36. In the formula $A = P(1 + r)^t$, $A =$ the balance, $P =$ the amount invested, $r =$ the interest rate, and $t =$ the number of years the money has been invested. Use this formula to write a polynomial equation to describe the balance of the account when Toshi starts college.
37. Find the balance of the account if their investment yields 6% annually.