Name: _____ Date: _____ Period: _____

1. Factor each polynomial completely.

   a. $3x^4 + 12x^3 - 6x^2 - 15x$

   b. $4x^2 + 2x - 6$

   c. $3x^3 + 2x^2 - 12x - 8$

   d. $5x^6 - 25x^5 + 30x^4$

2. Use the Factor Theorem to determine whether $x - 8$ is a factor of $f(x) = 2x^3 - 15x^2 - 7x - 8$. Explain your reasoning.
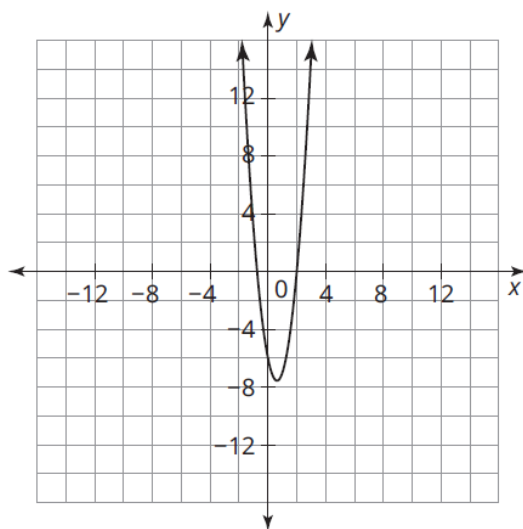
4. A function and one of its factors is given. Use long division to determine another factor.

   a. $f(x) = 70x^2 - 13x - 6; 5x - 2$

   b. $g(x) = 15x^2 + x - 6; 3x + 2$

5. The graph of $k(x) = 4x^2 - 5x - 6$ is shown. Use the graph and long division to determine the factors of the polynomial.

6. A function and one of its factors is given. Use synthetic division to determine another factor.

a. $f(x) = 2x^3 - 3x^2 - 24x + 45; x - 3$

b. $g(x) = x^3 - 6x^2 + 13x - 20; x - 4$

c. $k(x) = 6x^3 - 17x^2 + 32x - 30; 2x - 3$

7. Given $f(x) = 2x^4 - 15x^3 + 14x^2 + 27x - 30$, use synthetic division to determine $f(6)$.
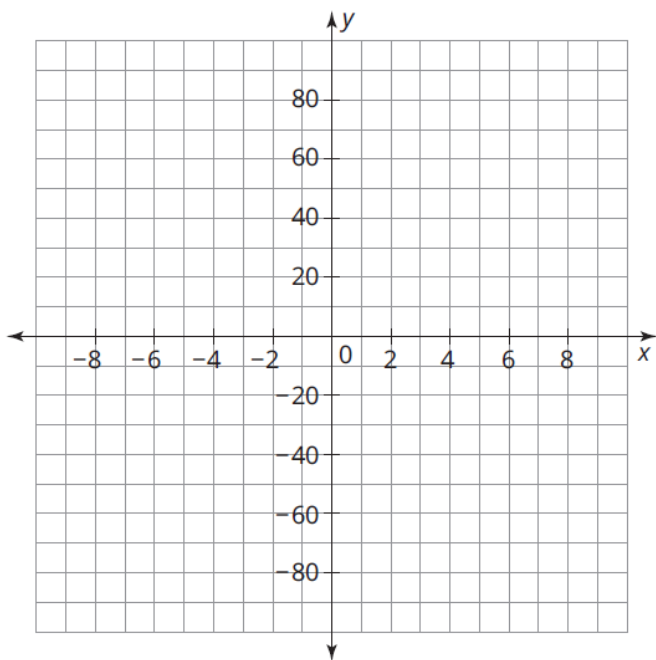
9. Solve each quadratic inequality.

a. $2x^2 + 7x < 30$

b. $3x^2 - x > 2$

11. Solve each inequality by factoring and sketching. Use the coordinate plane to sketch the general graph of the polynomial in order to determine which values satisfy the inequality.

b. $x^4 - 13x^2 + 36 \leq 0$

a. $-2x^3 + 2x^2 + 40x < 0$