

# Assignment

## Write

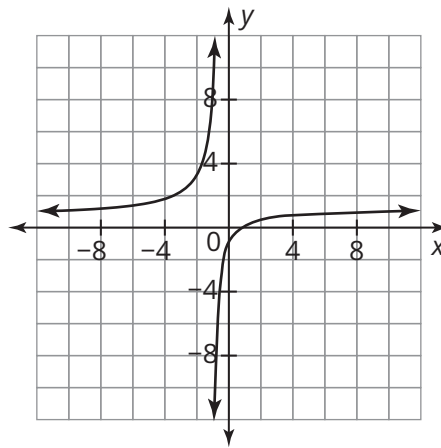
In your own words, explain what it means for a set to be closed under a certain operation.

## Remember

Polynomials are closed under addition, subtraction, and multiplication.  
Polynomials are not closed under division.

## Practice

1. Ralph builds a function by performing one of the 4 basic operations (addition, subtraction, multiplication, or division) on 2 polynomial functions. The graph of the resulting function is shown. Which of the 4 basic operations could Ralph have used on the 2 polynomial functions to build his function? Explain your reasoning.



2. Write 2 polynomial functions  $f(x)$  and  $g(x)$  such that  $h(x) = \frac{f(x)}{g(x)}$  and such that  $h(x)$  is a polynomial function. Does your solution prove that polynomial functions are closed under division? Explain your reasoning.

## Stretch

Given  $f(x) = x^4 - 625$ , determine all the possible polynomial functions for  $g(x)$  such that  $h(x) = \frac{f(x)}{g(x)}$  is a polynomial function.

## Review

- Determine whether  $x - 2$  is a factor of  $f(x) = x^4 - 8x^3 + 10x^2 + 2x - 4$ .
- Use the given information and the Remainder Theorem to sketch the graph of  $g(x)$ . Explain each step.

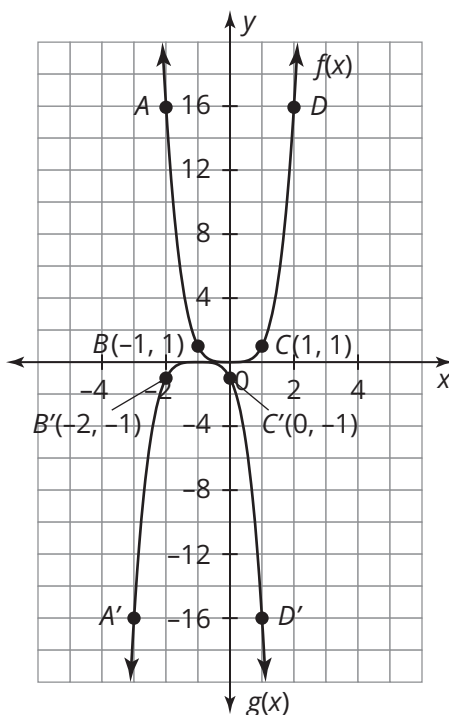
Given:  $\frac{g(x)}{x-1} = x^2 + x - 15 \ R - 15$

$$\frac{g(x)}{x+2} = x^2 - 2x - 12 \ R 24$$

$$\frac{g(x)}{x-4} = x^2 + 4x \ R 0$$

The function  $g(x)$  is cubic and its graph is symmetric about the origin.

- Analyze the graphs of the functions  $f(x)$  and  $g(x)$



- Write the equation for  $f(x)$ .
  - The function  $g(x)$  is a transformation of the function  $f(x)$ . Describe the transformations performed on  $f(x)$  that resulted in the function  $g(x)$ . Explain your reasoning.
  - Write the equation for  $g(x)$ .
  - Is the function  $g(x)$  even, odd, or neither? Explain your reasoning.
- Determine the product:  $(2x - 9)(-3x^2 + 8x - 15)$ .