

# Assignment

## Write

Match each definition with its corresponding term.

- |                           |  |
|---------------------------|--|
| 1. polynomial             | a. a polynomial with only 1 term   |
| 2. term                   | b. the degree of the term with the greatest exponent   |
| 3. coefficient            | c. a mathematical expression involving the sum of powers in one or more variables multiplied by coefficients |
| 4. monomial               | d. a polynomial with exactly 3 terms   |
| 5. binomial               | e. any number being multiplied by a power within a polynomial expression                                     |
| 6. trinomial              | f. each product in a polynomial expression   |
| 7. degree of a term       | g. a polynomial with exactly 2 terms   |
| 8. degree of a polynomial | h. the exponent of a term in a polynomial  |

## Remember

- The difference of two squares is an expression in the form  $a^2 - b^2$  that has factors  $(a + b)(a - b)$ .
- A perfect square trinomial is an expression in the form  $a^2 + 2ab + b^2$  or in the form  $a^2 - 2ab + b^2$  that has the factors  $(a + b)^2$  and  $(a - b)^2$ , respectively.

## Practice

1. Ramona and James each build a rocket launcher. They launch a model rocket using Ramona's launcher and on its way back down it lands on the roof of a building that is 320 feet tall. The height of the rocket can be represented by the equation  $H_1(x) = -16x^2 + 200x$ , where  $x$  represents the time in seconds and  $H_1(x)$  represents the height. Ramona and James take the stairs to the roof of the building and re-launch the rocket using James's rocket launcher. The rocket lands back on the ground. The height of the rocket after this launch can be represented by the equation  $H_2(x) = -16x^2 + 192x + 320$ .
  - a. Compare and contrast the polynomial functions.
  - b. Use technology to sketch a graph of the functions.
  - c. Does it make sense in terms of the problem situation to graph the functions outside of Quadrant I? Explain your reasoning.
  - d. Explain why the graphs of these functions do not intersect.
  - e. Ramona believes that she can add the two functions to determine the total height of the rocket at any given time. Write a function  $S(x)$  that represents the sum of  $H_1(x)$  and  $H_2(x)$ . Show your work.

- f. Is Ramona correct? Explain your reasoning.
- g. Subtract  $H_1(x)$  from  $H_2(x)$  and write a new function,  $D(x)$ , that represents the difference. Then, explain what this function means in terms of the problem situation.
2. Determine whether each expression is a polynomial. If so, identify the terms, coefficients, and degree of the polynomial. If not, explain your reasoning.
- a.  $-2b^4 + 4b - 1$                       b.  $6 - g^{-2}$   
 c.  $8h^4$                                       d.  $9w - w^3 + 5w^2$   
 e.  $x^{\frac{1}{2}} + 2$                                 f.  $\frac{4}{5}y + \frac{2}{3}y^2$
3. Given  $A(x) = x^3 - 5x + 4$ ,  $B(x) = 2x^2 + 5x - 6$ , and  $C(x) = -x^2 + 3$ , determine each function. Write your answer in general form.
- a.  $D(x) = B(x) + C(x)$                       b.  $E(x) = A(x) + B(x)$   
 c.  $F(x) = A(x) - C(x)$                       d.  $G(x) = C(x) - B(x)$   
 e.  $H(x) = A(x) + B(x) - C(x)$             f.  $J(x) = B(x) - A(x) + C(x)$
4. Determine each product.
- a.  $(x - 7)(x - 7)$                       b.  $(x + 10)(x - 10)$   
 c.  $(x + 6)^2$                                 d.  $(2x + 5)^2$   
 e.  $(2x - 5)(2x - 5)$                       f.  $(2x - 5)(2x + 5)$

## Stretch

Consider the binomials  $(x + 3)$ ,  $(2x + 1)$ , and  $(x - 4)$ .

- Without multiplying, make a conjecture about the degree of the product of these binomials. Explain how you determined your answer.
- Without multiplying, make a conjecture about the number of terms in the product of these binomials. Explain your reasoning.
- Two students determine the product of the 3 binomials using two different methods. Student 1 uses a multiplication table, and Student 2 uses the distributive Property. Their work is shown below. Determine which student multiplied correctly and identify the mistake the other student made. Explain how you determined your answer.

**Student 1**

•	$x$	$3$	$2x$	$1$
$x$	$x^2$	$3x$	$2x^2$	$x$
$-4$	$-4x$	$-12$	$-8x$	$-4$

The product is  $3x^2 - 8x - 16$ .

**Student 2**

$$\begin{aligned} (x + 3)(2x + 1)(x - 4) &= (2x^2 + 7x + 3)(x - 4) \\ &= 2x^3 - x^2 - 25x - 12 \end{aligned}$$

The product is  $2x^3 - x^2 - 25x - 12$ .

## Review

- Alfonzo is building a deck on his house. He was originally going to make it a square with a side length of  $x$  feet. Alfonzo decides to make it a rectangular deck, with 1 foot added to one pair of opposite sides and 2 feet added to the other pair of opposite sides.
  - Determine the expressions for the length and width of the new deck in terms of  $x$ , the length of the sides of the original deck.
  - Write the function for the area of the new deck,  $A(x)$ , in terms of  $x$ , the length of the sides of the original deck. Does this function have a minimum or maximum? Explain your answer.
- Analyze each pair of representations. Then, answer each question and justify your reasoning.
  - Which function's axis of symmetry has a greater  $x$ -value?
  - Which function has a greater absolute minimum?

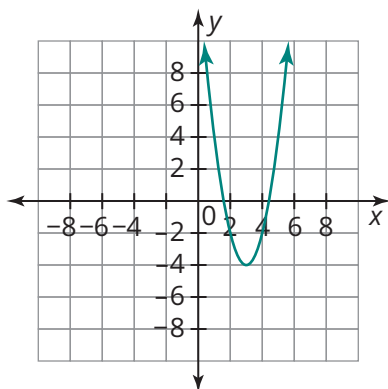
### Function A

$$f(x) = x^2 - 4x + 9$$

### Function A

$$f(x) = 3(x - 2)^2 - 6$$

### Function B



### Function B

$x$	$y$
1	2
3	5
5	18

- Write the equation of the function,  $g(x)$ , whose graph transforms the graph  $f(x) = x^2$  by reflecting it across the  $x$ -axis, vertically stretching it by a factor of 2, and translating it up 5 units.
- Graph the function,  $g(x)$ , whose graph transforms the graph  $f(x) = x^2$  by vertically compressing it by a factor of  $\frac{1}{3}$  and translating it down 7 units.