

## Problem-Based Task: Building Houses and Comparing Functions

### Coaching Sample Responses

- a. What are key features for the function that represents Company A?

The function does not have a common difference or a common ratio, so it is not linear or exponential. However, each term appears to be the square of an integer.

- b. What are key features for the function that represents Company B?

The graph has a constant slope of 3. We know this because the line crosses the origin and (2, 6).

Using the slope formula, we get  $\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 0}{2 - 0} = \frac{6}{2} = 3$ .

- c. Is the function of Company A linear, quadratic, or exponential?

Each term is the square of an integer, so the function is quadratic. You can also verify that the function is quadratic by checking the second difference between terms:

$x$	$f(x)$	First difference	Second difference
1	1	—	—
2	4	3	—
3	9	5	2
4	16	7	2

The second difference is constant, so the function is quadratic.

- d. Is the function of Company B linear, quadratic, or exponential?

The function of Company B is linear, because the slope is constant.

- e. Write the function that matches the table of Company A.

$$f(x) = x^2$$

- f. Write the function that matches the graph of Company B.

$$g(x) = 3x$$

- g. Based on the functions, which company will be more successful, and why?

Company A will be more successful than Company B, because its function follows a quadratic pattern that will continue to increase faster than Company B's function.

### Recommended Closure Activity

Select one or more of the essential questions for a class discussion or as a journal entry prompt.