# Unit 6 Lesson 4: Comparing Quadratic and Exponential Functions

## 1 From Least to Greatest (Warm up)

### Student Task Statement

List these quantities in order, from least to greatest, without evaluating each expression. Be prepared to explain your reasoning.

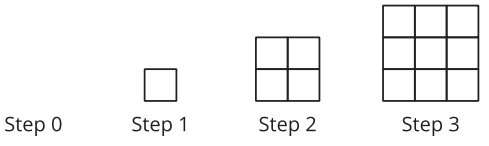
A. $2^{10}$ B. $10^2$ C. $2^9$ D. $9^2$

# 2 Which One Grows Faster?

## Student Task Statement

- In Pattern A, the length and width of the rectangle grow by one small square from each step to the next.
- In Pattern B, the number of small squares doubles from each step to the next.
- In each pattern, the number of small squares is a function of the step number, $n$.

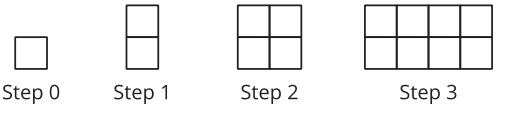
**Pattern A**




1. Write an equation to represent the number of small squares at Step $n$ in Pattern A.
2. Is the function linear, quadratic, or exponential?
3. Complete the table:

| $n$, step number | $f(n)$, number of small squares |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

**Pattern B**

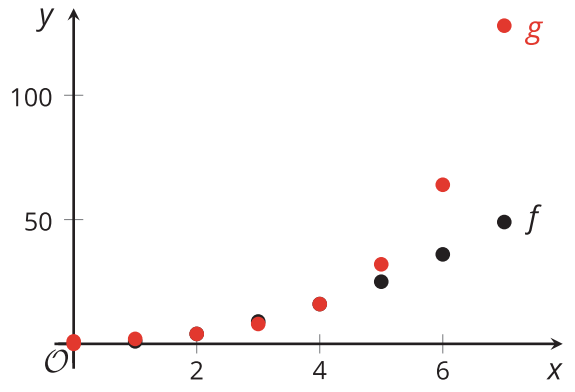



1. Write an equation to represent the number of small squares at Step $n$ in Pattern B.
2. Is the function linear, quadratic, or exponential?
3. Complete the table:

| $n$, step number | $g(n)$, number of small squares |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

How would the two patterns compare if they continue to grow? Make 1–2 observations.

**Activity Synthesis**



# 3 Comparing Two More Functions

## Student Task Statement

Here are two functions: $p(x) = 6x^2$ and $q(x) = 3^x$.

Investigate the output of $p$ and $q$ for different values of $x$. For large enough values of $x$, one function will have a greater value than the other. Which function will have a greater value as $x$ increases?

Support your answer with tables, graphs, or other representations.