## 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



Pattern B



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

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
 | * $g\left(n\right)$, 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: $p\left(x\right)=6x^{2}$ and $q\left(x\right)=3^{x}$.

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.



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