## Unit 4 Lesson 8: Unknown Exponents

### 1 A Bunch of ’s (Warm up)

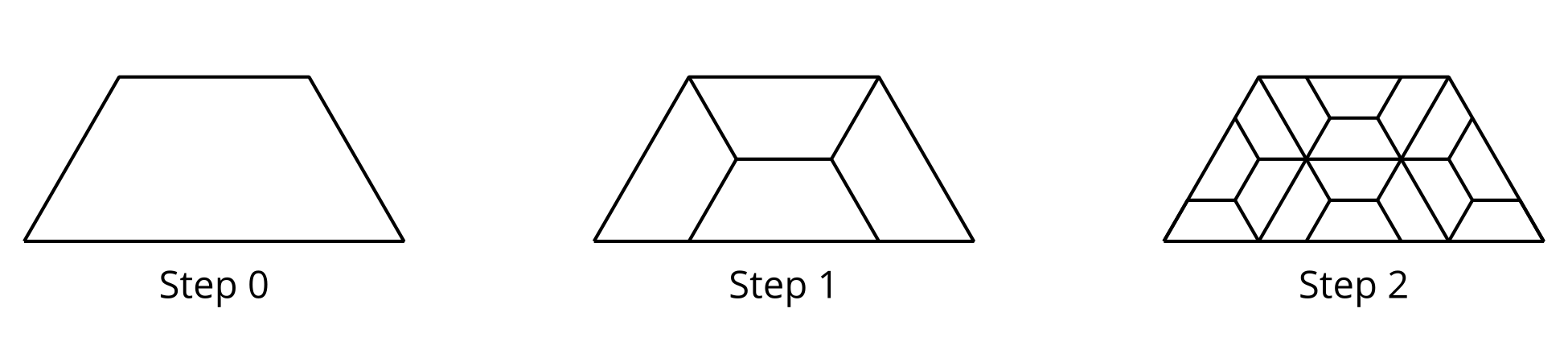
#### Student Task Statement

Solve each equation. Be prepared to explain your reasoning.

### 2 A Tessellated Trapezoid

#### Student Task Statement

Here is a pattern showing a trapezoid being successively decomposed into four similar trapezoids at each step.



1. If is the step number, how many of the smallest trapezoids are there when is 4? What about when is 10?
2. At a certain step, there are 262,144 smallest trapezoids.
   1. Write an equation to represent the relationship between and the number of trapezoids in that step.
   2. Explain to a partner how you might find the value of that step number.

### 3 Successive Splitting

#### Student Task Statement



In a lab, a colony of 100 bacteria is placed on a petri dish. The population triples every hour.

1. How would you estimate or find the population of bacteria in:
   1. 4 hours?
   2. 90 minutes?
   3. hour?
2. How would you estimate or find the number of hours it would take the population to grow to:
   1. 1,000 bacteria?
   2. double the initial population?

### 4 Missing Values (Optional)

#### Student Task Statement

Complete the tables.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | -1 | 0 |  | 1 |  |  | 5 |  |  |
|  |  |  |  |  |  |  | 4 | 16 |  | 256 | 1,024 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  | 1 |  |  | 5 | 125 | 625 | 3,125 |

Be prepared to explain how you found the missing values.



© CC BY 2019 by Illustrative Mathematics®