## Unit 4 Lesson 17: Logarithmic Functions

### 1 Which One Doesn’t Belong: Functions (Warm up)

#### Student Task Statement

Which one doesn’t belong? Be prepared to explain your reasoning.

### 2 How Long Will It Take?

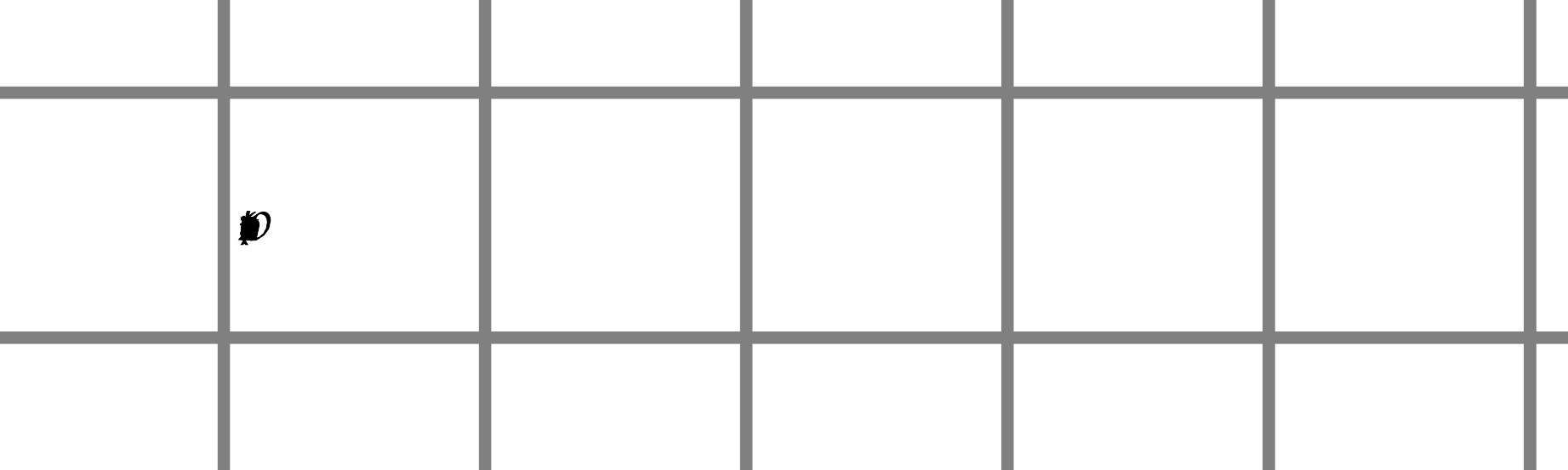
#### Student Task Statement

A colony of 1,000 bacteria doubles in population every hour.

1. Explain why we can write to represent the number of hours, , it takes for the one thousand bacteria to reach a population of  thousand.
2. Complete the table with the corresponding values of .

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| * (thousands) | * 1 | * 2 | * 4 | * 8 | * 16 | * 50 | * 80 |
| * (hours) |  |  |  |  |  |  |  |

1. Plot the pairs of values on the coordinate plane. Make two observations about the graph.

* 

1. Use the graph to estimate the missing values in the table.

|  |  |  |  |
| --- | --- | --- | --- |
| * (thousands) | * 10 | * 24 | * 72 |
| * (hours) |  |  |  |

### 3 Another Logarithmic Function

#### Student Task Statement

Earlier we saw that represents the number of hours for 1 thousand bacteria, doubling every hour, to reach a population of , in thousands.

1. Suppose the function , defined by , represents the number of days it takes 1 thousand of another species of bacteria to reach a population of , in thousands. How is this population of bacteria growing?
2. Graph using graphing technology. Make two observations about the graph.
3. Use your graph to estimate the values of and . (Adjust your graphing window as needed.) Explain what each value means in this situation.
4. Estimate or find the population after 5 days.



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