### Lesson 8 Practice Problems

1. A pattern of dots grows exponentially. The table shows the number of dots at each step of the pattern.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * step number
 | * 0
 | * 1
 | * 2
 | * 3
 |
| * number of dots
 | * 1
 | * 5
 | * 25
 | * 125
 |

* 1. Write an equation to represent the relationship between the step number, $n$, and the number of dots, $y$.
	2. At one step, there are 9,765,625 dots in the pattern. At what step number will that happen? Explain how you know.
1. A bacteria population is modeled by the equation $p(h)=10,​000⋅2^{h}$, where $h$ is the number of hours since the population was measured.
* About how long will it take for the population to reach 100,000? Explain your reasoning.
1. Complete the table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| * $x$
 |  |  | * -2
 | * 0
 | * $\frac{1}{3}$
 | * 1
 |  |  |
| * $10^{x}$
 | * $\frac{1}{10,000}$
 | * $\frac{1}{1,000}$
 | * $\frac{1}{100}$
 |  |  |  | * 1,000
 | * 1,000,000,000
 |

1. Here is a graph of $y=3^{x}$.
* What is the approximate value of $x$ satisfying $3^{x}=10,​000$? Explain how you know.
* 
1. One account doubles every 2 years. A second account triples every 3 years. Assuming the accounts start with the same amount of money, which account is growing more rapidly?
2. How would you describe the output of this graph for:
	1. inputs from 0 to 1
	2. inputs from 3 to 4
* 
* (From Unit 4, Lesson 1.)
1. The half-life of carbon-14 is about 5730 years.
	1. Complete the table, which shows the amount of carbon-14 remaining in a plant fossil at the different times since the plant died.
	2. About how many years will it be until there is 0.1 picogram of carbon-14 remaining in the fossil? Explain how you know.

|  |  |
| --- | --- |
| * years
 | * picograms
 |
| * 0
 | * 3
 |
| * 5730
 |  |
| * $2⋅5730$
 |  |
| * $3⋅5730$
 |  |
| * $4⋅5730$
 |  |

* (From Unit 4, Lesson 7.)



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