NAME DATE PERIOD

Exponential Functions and Equations: Mid-Unit Assessment

1. A bacteria population is growing exponentially with a growth factor of $\frac{1}{3}$ each hour. By what growth factor does the population change each half hour? Select **all** that apply.

   a. $\frac{1}{6}$

   b. $\sqrt{\frac{1}{3}}$

   c. $\frac{1}{1.5}$

   d. $\sqrt{3}$

   e. $\left(\frac{1}{3}\right)^{\frac{1}{2}}$

2. The tuition at a public university was $21,000 in 2008. Between 2008 and 2010, the tuition had increased by 15%. Since then, it has continued to grow exponentially.

   Select **all** statements that describe the growth in tuition cost.

   a. The tuition cost can be defined by the function $f(y) = 21,000 \cdot (1.15)^{\frac{y}{2}}$, where y represents years since 2008.

   b. The tuition cost increased 7.5% each year.

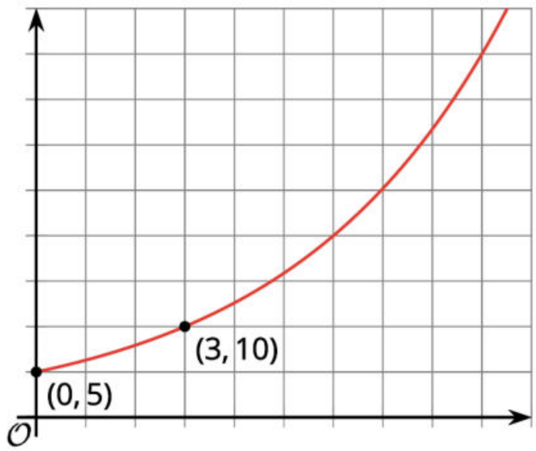
   c. The tuition cost increased about $\sqrt{15}$% each year.

   d. The tuition cost roughly doubles in 5 years.

   e. The tuition cost can be approximated by the function of $f(w) = 21{,}000 \cdot 1.15^{\frac{w}{104}}$ where w represents weeks since 2008.

3. Scientists measure a bacteria population and find that it is 5,000. Ten days later, they find that the population has doubled. Write a function f that could describe the bacteria population d days after the scientists first measured it, assuming it grows exponentially?

4. The value of a collectible toy is increasing exponentially. The two points on the graph show the toy's initial value and its value 3 years afterward.



a. Express the toy's value t, in dollars, as a function of time w, in weeks, after purchase.

b. Write an expression to represent the toy's value 40 weeks after purchase.

2. A sample of radium has a weight of 1.5 mg and a half-life of approximately 12 years.

a. How much of the sample will remain after 6 years? 3 years? 1 year?

b. Find a function f which models the amount of radium $f(t)$, in mg, remaining after t years.

6.

NAME DATE PERIOD

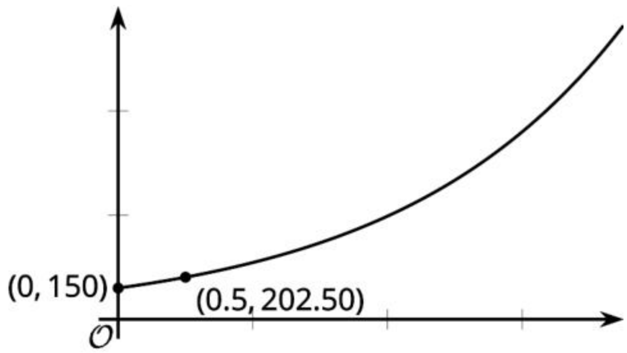
a. The area, in square meters, of a pond covered by an algae bloom decreases exponentially after a treatment is applied. Fill out the table, giving the area covered by the algae in square meters d days after the treatment is applied.

days	0	1	2	3	
area	250		125		

b. Another pond has an algae bloom that is also decreasing exponentially. The area of this bloom in square meters is given by the function $B(d) = 100 \cdot 2^{-\frac{d}{5}}$, where d is days since the first measurement of the bloom. Which of the two algae blooms was larger initially? Which is decreasing more quickly? Explain how you know.

7. The graph represents the cost of a medical treatment c , in dollars, as a function of time, d, in decades since 1978. The cost is increasing exponentially.

NAME DATE PERIOD



a. By what factor did the cost increase in the first 15 years? Explain how you know.

b. By what factor did the cost increase in the first 5 years? What about in the first decade? Explain how you know.

c. Write an equation relating c, the cost of a medical treatment the , and d, decades since 1978