ACC. Coordinate Algebra—Section 12.3 (Day 2)

Exponential Growth and Decay

Write an exponential growth function to model each situation. Then find the value of the function after the given amount of time.

1. Annual sales for a fast food restaurant are $650,000 and are increasing at a rate of 4% per year; 5 years

$$650000(1+.04)^5$$
$$790824.39$$

2. The population of a school is 800 students and is increasing at a rate of 2% per year; 6 years

$$800(1+.02)^6$$
$$\approx 901$$

3. During a certain period of time, about 70 northern sea otters had an annual growth rate of 18%; 4 years

$$70(1+.18)^4$$
$$\approx 136$$

Write a compound interest function to model each situation. Then find the balance after the given number of years.

4. $50,000 invested at a rate of 3% compounded monthly; 6 years

$$50000\left(1+\frac{.03}{12}\right)^{12 \cdot 6}$$
$$59847.42$$

5. $43,000 invested at a rate of 5% compounded annually; 3 years

$$43000\left(1+\frac{.05}{1}\right)^{1 \cdot 3}$$
$$49777.88$$

6. $65,000 invested at a rate of 6% compounded quarterly; 12 years

$$65000\left(1+\frac{.06}{4}\right)^{12 \cdot 4}$$
$$132826.09$$

Write an exponential decay function to model each situation. Then find the value of the function after the given amount of time.

7. The population of a town is 2500 and is decreasing at a rate of 3% per year; 5 years

$$2500(1-.03)^5$$
$$\approx 2147$$

8. The value of a company's equipment is $25,000 and decreases at a rate of 15% per year; 8 years

$$25000(1-.15)^8$$
$$6812.26$$

9. The half-life of Iodine-131 is approximately 8 days. Find the amount of Iodine-131 left from a 35 gram sample after 32 days.

$$35(.5)^{32 \div 8} = 2.1875$$

Section 12.3—Problem Solving

Write the correct answer.

1. A condo in Austin, Texas, was worth $80,000 in 1990. The value of the condo increased by an average of 3% each year. Write an exponential growth function to model this situation. Then find the value of the condominium in 2005.

$$80000(1+.03)^{15}$$
$$= 134637.39$$

2. Markiya deposited $500 in a savings account. The annual interest rate is 2%, and the interest is compounded monthly. Write a compound interest function to model this situation. Then find the balance in Markiya's account after 4 years.

$$500\left(1+\frac{.02}{12}\right)^{12\cdot4}$$
$$= 541.61$$

3. The population of a small Midwestern town is 4500. The population is decreasing at a rate of 1.5% per year. Write an exponential decay function to model this situation. Then find the number of people in the town after 25 years.

$$4500(1-.015)^{25}$$
$$= 3084$$

4. Twelve students at a particular high school passed an advanced placement test in 2000. The number of students who passed the test increased by 16.4% each year thereafter. Find the number of students who passed the test in 2004.

$$12(1+.164)^{4}$$
$$= 22$$

Half-lives range from less than a second to billions of years. The table below

---

shows the half-lives of several substances. Select the best answer.

Half-Lives	
Nitrogen-16	7 s
Technetium-99	6 h
Sulfur-35	87 days
Tritium	12.3 yr
Uranium-238	4.5 billion yrs

5. About how many grams of a 500 g sample of Technetium-99 is left after 2 days?
A) 1.95 g   C) 31.25 g
B) 7.81 g   D) 62.5 g

$$500(.5)^{48/6} \quad \frac{48}{6}$$

6. Which equation can be used to find how much of a 50 g sample of Nitrogen-16 is left after 7 minutes?
F) $A = 50(0.5)^1$ H) $A = 50(0.5)^{42}$
G) $A = 50(0.5)^7$ J) $A = 50(0.5)^{60}$

$$7\text{ mins} = 420\text{ sec} \quad \frac{420}{7}$$

7. How many billions of years will it take 1000 grams of Uranium-238 to decay to just 125 grams?
A) 0.125   C) 9
B) 3   D) 13.5

$$\frac{125 = 1000(.5)^{t/4.5}}{1000}$$
$$.125 = (.5)^{t/4.5}$$
plug in answer choices

8. A researcher had 37.5 g left from a 600 g sample of Sulfer-35. How many half-lives passed during that time?
F) 4   H) 7
G) 5   J) 16

$$37.5 = 600(.5) \quad 4/87$$

9. Look at problem 8. How many days passed during that time?
A) 7   C) 348
B) 16   D) 435

$$4 \cdot 87$$