3.06 Exponential Growth and Decay Additional Practice Key

**Solve the problems below. Then, compare your answers and work to the 3.06 Exponential Growth and Decay Additional Practice Key.**

1. A new car is priced at $22,000. It depreciates at a rate of 18% a year. What is the value of the car after 10 years?

Identify the following:

 Initial amount: $22,000

 Annual rate of loss: 18%

 Time: 10 years

Write a model with V representing the car’s value after 10 years using the depreciation formula $y=a(1-r)^{t}$

 $V=22000(1-.18)^{10}$

 V = 3023.86

 The car will be worth $3,023.86 after 10 years.

2. A type of bacteria increases by the given model, where *t* is the time measured in hours. Find the amount of bacteria cells after 5 hours.

 $A=500e^{0.354t}$

Identify the following:

 Initial amount: 500

 Growth factor: 0.354

 Time: 5 hours

 $A=500e^{0.354(5)}$

 A = 2,935.427

3. The population of a town is 17,000 and is predicted to increase at a rate of 3.5% per year during the coming years. According to this prediction, what will the population of the town be in 10 years?

Identify the following:

 Initial population: 17,000

 Growth factor: 3.5%

 Time: 10 years

Write a model with P being the population after 10 years using the formula $y=ab^{x}$

 $P=17000(1+.035)^{10}$

 P = 23,980

4. Match each answer choice below to the question it answers.

 A. Compute the compound interest for $10,500 at 7% for 15 years at 4 times a year.

 B. Compute the compound interest for $20,000 at 2% for 10 years at 12 times a year.

 C. Compute the compound interest for $15,000 at 1.5% for 5 years at 2 times a year.

Answer choices:

 I. $16,163.74

 II. $24,423.99

 III. $29,734.07

Answers: A: III. $A=10,500(1+\frac{.07}{4})^{60}=29,734.07$

 B. II. $A=20,000(1+\frac{.02}{12})^{120}=24,423.99$

 C. I. $A=15,000(1+\frac{.015}{2})^{10}=16,163.74$

5. Match each answer choice below to the question it answers.

A. You deposit $5000 in an account that pays 4% annual interest. Find the balance after 5 years if the interest is compounded continuously.

B. You deposit $3000 in an account that pays 5% annual interest. Find the balance after 10 years if the interest is compounded continuously.

Answer choices:

 I. $4,946.16

 II. $6,107.01

Answers: A: II. $A=pe^{rt}=5,000e^{(.04)(5)}=\$6,107.01$

 B. I. $A=pe^{rt}=3,000e^{(.05)(10)}=\$4,946.16$

6. Match each answer choice below to the question it answers.

A. A new car is priced at $35,000. It depreciates at a rate of 15% per year. What is the value of the car after 10 years?

B. A new car is priced at $28,000. It depreciates at a rate of 20% per year. What is the value of the car after 5 years?

C. A new car is priced at $25,000. It depreciates at a rate of 18% per year. What is the value of the car after 3 years?

Answer choices:

 I. $6,890.60

 II. $9,175.04

 III. $13,784.20

Answers: A. I. $V=a(1-r)^{t}=35,000(1-0.15)^{10}=\$6,890.60$

 B. II. $V=a(1-r)^{t}=28,000(1-0.20)^{5}=\$9,175.04$

 C. III. $V=a(1-r)^{t}=25,000(1-0.18)^{3}=\$13,784.20$