

Math 3: Exponential applications

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. If you invest \$400 at 5% compounded annually, how many years (to the nearest tenth) would it take for your investment to grow to \$1000? 1. \_\_\_\_\_

2. Suppose that, due to inflation, prices are rising at a rate of 6% per year. How long does it take a car initially costing \$12,315 to reach a cost of \$15,250 due to the inflationary factor alone? 2. \_\_\_\_\_

3. You have decided to invest \$1000 at a 10% annual rate of interest. How much will you have accumulated after two years if the interest is compounded 3. a) \_\_\_\_\_

a) annually?

b) quarterly?

c) daily?

d) continuously?

b) \_\_\_\_\_  
c) \_\_\_\_\_  
d) \_\_\_\_\_

4. The present population of a town  $P$  is related to the initial population of the town at time  $t = 0$  by the formula  $P = 125(3)^{0.05t}$  where  $t$  is measured in years. The town was founded in 1900. 4. a) \_\_\_\_\_

a) What was the population of the town in 1900?

b) What will be the population of the town in 2020?

b) \_\_\_\_\_

5. Suppose a \$125,000 piece of heavy machinery is depreciating at 8% per year. 5. a) \_\_\_\_\_

a) How much is it worth after 5 years?

b) How much is it worth after 7 years?

c) How long will it take to be worth less than \$50,000?

b) \_\_\_\_\_  
c) \_\_\_\_\_

6. Suppose a Thunderbird depreciates at 25% a year. 6. a) \_\_\_\_\_

a) How long does it take for the car to be worth only half of its original price?

b) How much of its original price is it worth after 4 years?

b) \_\_\_\_\_

7. The population of a small town is increasing at a rate of 8% per year. If the town's population was 12,250 in 2016, what was the population in 2011? 7. \_\_\_\_\_
8. The profits of a law firm have been increasing at a rate of 6% per year. This year, the firm's profits are \$152,400. What were the firm's profits 6 years ago? 8. \_\_\_\_\_
9. The population of a particular bacteria triples every hour. Initially there are 100 bacteria. How many bacteria will there be 6 hours later? 9. \_\_\_\_\_
10. The population in a particular town has been doubling every 20 years since 1900. In 1900, there were 25 residents. How many residents will there be in 2000? 10. \_\_\_\_\_
11. Two types of savings plans are offered at the Highcrest Savings and Loan. The Thrifty plan pays 9% compounded annually and the Miser plan pays 9% compounded quarterly. If \$2000 are deposited in each account type, which would have the highest account balance after 2 years? What would be the difference in account balances after 2 years? 11. \_\_\_\_\_
12. The half-life of an isotope is 8.1 days. If there is originally 220 g of the isotope, how long will it be before only 30 g remain? 12. \_\_\_\_\_
13. A radioactive material has a half-life of 60 months. How much of a 1000 g sample would remain after 42 months? 13. \_\_\_\_\_

1.  
Answer: 18.8 years
2.  
Answer:  $\approx 4$  yrs
3.  
Answer: \$1210; \$1218; \$1221.37; \$1221.40
4.  
Answer: 125, 375, 5,846, 69,240; 91,125
5.  
Answer: \$82,385, \$69,731; 11 yrs
6.  
Answer: 2.4 yrs, 31.64%
7.  
Answer: 8,337
8.  
Answer: \$107,436
9.  
Answer: 72900
10.  
Answer: 800
11.  
Answer: Miser; \$13.46
12.  
Answer: 23.3 days
13.  
Answer: 616 g