

Name _____ Date _____ Per _____

Use the simple interest formula to answer the following. ($I = Prt$)

1. What is the interest due if \$500 is borrowed for 6 months at a simple interest rate of 6% per annum?

2. If you borrow \$5,000 and, after 9 months pay off the loan in the amount of \$5,500, what per annum rate of interest was charged?

Find the amount that results from each investment.

3. \$100 invested at 4% compounded quarterly after a period of 2 years.

4. \$300 invested at 12% compounded monthly after a period of $1\frac{1}{2}$ years.

5. \$5000 invested at 5% compounded daily after a period of 3 years.

6. \$4500 invested at 3.2% compounded continuously after a period of 5 years.

Find the principal that must be invested now to get each amount; that is, find the present value.

7. To get \$100 after 2 years at 6% compounded annually.

8. To get \$600 after $3\frac{1}{4}$ years at 2.3% compounded quarterly.

9. To get \$4000 after 10 years at 4% compounded semiannually.

10. To get \$750 after 4 years at 8% compounded continuously.

Solve the problem.

11. What rate of interest compounded annually is required to double an investment in 3 years?

12. What rate of interest compounded annually is required to triple an investment in 5 years?

13. a) How long does it take for an investment to double in value at 6% compounded monthly?

b) How long does it take for the investment to double in value at 6% compounded continuously?

14. If Tanisha has \$100 to invest at 8% per annum compounded quarterly, how long will it be before she has \$150? If the compounding is continuous, how long will it be?

15. Jerome will be buying a used car for \$15,000 in 3 years. How much money should he ask his parents for now so that, if he invests it at 5% compounded continuously, he will have enough to buy the car?

Growth & Decay Applications

16. The size P of a certain insect population at time t (in days) obeys the function $P(t) = 500e^{0.02t}$.

a) Determine the number of insects at $t = 0$ days.

b) What is the growth rate of the insect population?

c) What is the population after 10 days?

d) When will the population reach 800?

e) When will the insect population double?

17. Strontium 90 is a radioactive material that decays according to the function $A(t) = A_0 e^{-0.0244t}$, where A_0 is the initial amount present and A is the amount present at time t (in years). Assume that a scientist has a sample of 500 grams of strontium 90.

a) What is the decay rate of strontium 90?

b) How much strontium 90 is left after 10 years?

c) When will 400 grams of strontium 90 be left?

d) What is the half-life of strontium 90?

18. The population of a colony of mosquitos obeys the law of inhibited growth.

a) If N is the population of the colony and t is the time in days, express N as a function of t .

b) If there are 1000 mosquitos initially and there are 1800 after day 1, what is the size of the colony after 3 days?

c) How long is it until there are 10,000 mosquitos?

19. The population of a southern city follows the exponential law.

a) If N is the population of the city and t is the time in years, express N as a function of t .

b) If the population doubled in size over an 18-month period and the current population is 10,000, what will the population be 2 years from now?

20. The population of a Midwestern city follows the exponential law.

a) If N is the population of the city and t is the time in years, express N as a function of t .

b) If the population decreased from 900,000 to 800,000 from 2008 to 2010, what will the population be in 2012?

21. The half-life of radioactive potassium is 1.3 billion years. If 10 grams is present now, how much will be present in 100 years? In 1000 years?