Application of Exponential Functions

Use the following formulas:

$y = ab^x$ $\quad$ $Growth: y = P(1+r)^t$ $\quad$ $Decay: y = P(1-r)^t$

Compound Interest: $A = P\left(1+\frac{r}{n}\right)^{nt}$

Write an equation for each problem to help you answer the question.

1. A bacteria population doubles every hour. The Petri dish starts with 10 bacteria, how many bacteria will there be in 24 hours?

2. A used car was purchased for $12,329 this year. Each year the car's value decreases 8.5%. What will the car be worth in 2020?

3. A type of insect doubles every 12 hours. The population starts with 16 insects. How many insects will you have in 3 days?

4. The half-life of a radioactive substance is the time it takes for half of the substance to decay. The half-life of one form of rhodium, Rh-106, is about 30 seconds. If you start with 100 grams of Rh-106, how much will be left after 5 minutes?

4. Jeremiah owns a business. His first year he made $11,212, each of the following years his profit increased 12%. What will he make in 20 years?

5. If you end with 1920 bacteria in a petri dish and the population doubled every hour, how many bacteria did you start with 6 hours ago?

6. Find the final amount of the investment. $1000 at 6% interest compounded annually for 20 years.

7. Find the final Amount of the investment. $750 at 10% interest compounded quarterly for 10 years.

8. An investment doubles in value every 9 years. What was the starting value of the investment if it is worth $4,800 after 27 years?

9. The house down the street has a termite problem. The exterminator estimates that there are about 800,000 termites. The pesticide they use to kill the termites kills about half the termites each day. How many termites are left after:
    a. 2 days

    b. 3 weeks

10. A 5th grade class is raising meal worms for an experiment. They start with 10 meal worms. The population triples every 8 hours. How many meal worms does the class have after 72 hours?

11. Dianna just bought a home. She paid $240,000. She is able to pay 20% of the loan off each year. What will she owe in 10 years?

12. The population of a city doubles every 10 years. If the population today is 3,400, how many people will live in the city in 50 years?

13. Find the final amount of the investment. $1800 at 5.65% interest compounded daily for 3 years.

14. You buy a commemorative coin for $110. Each year the value increases by 4%. Find the value of the coin after 6 years.

15. The mice population is 25,000 and is decreasing by 20% each year. What will be the mice population after 3 years?

16. The number of mosquitoes at the beach has tripled every year since 1999. In 1999, there were 2,500 mosquitoes. How many mosquitoes would you predict were at the beach in 2005?

17. Alex bought a car for $25,000, but its value is depreciating at a rate of 10% per year. How much will my car be worth after 8 years?