Exponential Word Problems

Use the exponential equation that models exponential growth or decay to answer the following questions.

1. **In 1990 the tuition at a private college was $15,000. The tuition increases by about 3.2% each year.**

    a. Write an equation giving the cost "y" of tuition at the college "x" years after 1990.

    b. What will the tuition cost be in the year 2014?

    c. Estimate the year the tuition is $40,000?

2. **$10,000 is invested at an annual interest rate of 5%.**

    a. Write an equation giving the value of the investment in "x" years.

    b. How much will your investment be worth after 10 years?

    c. How long will it take for this initial investment to double in value?

3. **The half-life of caffeine is 5 hours. This means the amount of caffeine in your bloodstream is reduced by 50% every 5 hours. A Grande French Roast has 330 milligrams of caffeine. Assume you consume the entire Grande French Roast instantly.**

    a. Write an equation to describe the amount of caffeine that remains in your body "x" hours after consumption.

    b. How many milligrams of caffeine will be in your system after 5 hours?

    c. How many milligrams of caffeine will be in your system after 20 hours?

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4. The number of cell phone users in the United States in 1990 was 55,350. Since that time the number of cell phone users has increased by 41% each year. How many people use cell phones in 2014?

5. A customer purchases a television for $800 using a credit card. The interest is charged on an unpaid balance at a rate of 18% per month. If the customer makes no payment for one year, how much is owed at the end of the year?

6. A house was purchased for $90,000 in 1995. If the value of the home increases 5% per year, what is it worth in the year 2025?

7. In 2006, about 1,000,000,000 people used the internet. The number increases about 19.5% annually. How many people use the internet in 2014?

8. A new car that sells for $18,000 depreciates 25% each year. Find the value of the car after 10 years.

9. The population of a certain animal species decreases at a rate of 3.5% per year. You have counted 80 of the animals in the habitat you are studying. Estimate the number of years until the population drops below 15 animals.