

Understanding Equations of Exponential Functions

1. In the United States the population growth for the next five years can be predicted by the equation

$$Y = 248718301(1.08)^5.$$

- What is the starting population?
- What is the growth rate?
- Find the population in five years as predicted by this equation. Show your work.

2. The equation below also predicts a population for a certain country.

$$Y = 756400000(0.997)^{10}.$$

- Is the population growing or decaying? How can you tell?
- What is the original population?
- At what rate is the population changing?
- If you solve this equation, in how many years will be predicting the population for this country?
- Using the equation above, what will the population be for this country?

3. The equation below predicts the balance of someone's bank account.

$$Y = 500(1.055)^{12}$$

- Does this equation represent a loan or an investment? How can you tell?
- What is the starting amount? How can you tell?
- What is the annual interest rate?
- We are considering the balance of this account after how many years?

4. Samantha invests \$2000 at 4.5% compounded annually. Write an equation to represent the balance after three years.

5. In the equation $y = 30(0.85)^x$ y represents the milligrams of caffeine in an adults' body per hour and x represents the time in hours.

- What is the caffeine level originally?
- Is the caffeine level increasing or decreasing how can you tell?
- At what rate is the caffeine increasing or decreasing?

6. Caffeine is eliminated from a child's bloodstream at a rate of 25% per hour. Write an equation to represent the amount of caffeine in the child's blood stream after 8 hours if he starts with 25mg.

Understanding Equations of Exponential Functions--ANSWERS

1. In the United States the population growth for the next five years can be predicted by the equation

$$Y = 248718301(1.08)^5.$$

- What is the starting population? (248718301)
- What is the growth rate? (8%)
- Find the population in five years as predicted by this equation. Show your work. (approx 365448783)

2. The equation below also predicts a population for a certain country.

$$Y = 756400000(0.997)^{10}.$$

- Is the population growing or decaying? How can you tell? (decaying)
- What is the original population? (756400000)
- At what rate is the population changing? ($1 - 0.997 = 0.003$)
- If you solve this equation, in how many years will be predicting the population for this country? (10)
- Using the equation above, what will the population be for this country? (approx. 734011904)

3. The equation below predicts the balance of someone's bank account:

$$Y = 500(1.055)^{12}$$

- Does this equation represent a loan or an investment? How can you tell? (investment; $1.055 > 1$)
- What is the starting amount? How can you tell? (500)
- What is the annual interest rate? (5.5%)
- We are considering the balance of this account after how many years? (12)

4. Samantha invests \$2000 at 4.5% compounded annually. Write an equation to represent the balance after three years. ($y = 2000(1.045)^3$)

5. In the equation $y = 30(0.85)^x$ y represents the milligrams of caffeine in an adults' body per hour and x represents the time in hours.

- What is the caffeine level originally? (30)
- Is the caffeine level increasing or decreasing how can you tell? (decreasing because $0.85 < 1$)
- At what rate is the caffeine increasing or decreasing? ($1 - 0.85 = 0.15$ or 15%)

6. Caffeine is eliminated from a child's bloodstream at a rate of 25% per hour. Write an equation to represent the amount of caffeine in the child's blood stream after 8 hours if he starts with 25mg.