

Exponential Functions Study Guide

I can apply exponential functions to real world application

You buy a car for \$40,000. It depreciates 14% per year. How much is it worth in 10 years?

- a.) Identify the initial amount(a). 40,000 b.) Growth or Decay? Decay

- c.) Growth/Decay Factor (b)

$$r = 14\% \rightarrow .14$$

$$b = 1 - r = 1 - .14 = .86$$

- d.) Exponential Equation ($y = a \cdot b^x$)

$$y = 40,000(.86)^x$$

- e.) Original Problem Units: Years

Find the value of your car after 10 years. $\rightarrow y = 40,000(.86)^{10}$

- f.) Value of car after 10 years: 8852.06 (Answer needs to be in a complete sentence)

After 10 years the car is worth \$8852.06

A population of 3,000 ducks increases at an annual rate of 3%. How many ducks will there be in 15 months? Answer needs to be in a complete sentence

- a.) Identify the initial amount(a). 3,000 b.) Growth or Decay? Growth

- c.) Growth/Decay Factor (b)

$$r = 3\% \rightarrow .03$$

$$b = 1 + r \rightarrow 1 + .03 = 1.03$$

- d.) Exponential Equation ($y = a \cdot b^x$)

$$y = 3,000(1.03)^x$$

- e.) Original Problem Units: Years

Find the number of ducks after 15 months. $\rightarrow y = 3000(1.03)^{15/12}$

15 months = $15/12$ years

- f.) Number of ducks after 15 months: 3112 (Answer needs to be in a complete sentence)

After 15 months the population of ducks is 3112.

A bacteria doubles every hour. There are currently 15 bacteria. How much bacteria will there be in 45 minutes? Answer needs to be in a complete sentence

$$a: 15$$

$$b: 2 \text{ (Doubles)}$$

$$y = 15(2)^x$$

$$y = 15(2)^{45/60}$$

$$y = 25.22$$

$$45 \text{ minutes} = \frac{45}{60} \text{ Hours}$$

After 45 minutes there will be 25.22 bacteria.

You buy a diamond worth \$4,000. It appreciates in value at 4.5% annually. How much will the diamond be worth in 14 years? Answer needs to be in a complete sentence

$$a: 4,000$$

$$r: 4.5\% \rightarrow .045$$

$$b = 1 + r \rightarrow 1 + .045 = 1.045$$

$$y = 4000(1.045)^x$$

$$y = 4000(1.045)^{14} = 7407.78$$

After 14 years, the diamond is worth \$7407.78

Zeynab belongs to a super fancy country club. Every spring they have a super fancy tennis tournament. The tournament starts with 128 players. During each round, half of the players are eliminated. How many players are left after 5 rounds?

a: 128

b: $\frac{1}{2}$

$$y = 128 \left(\frac{1}{2}\right)^x$$

$$y = 128 \left(\frac{1}{2}\right)^5 = 4$$

After 5 rounds, there are 4 players left.

Jenna invests \$100 in an account that earns 5% interest per year. What is the account value after 6 months and after 1 year?

a: 100

b: $r = 5\% \rightarrow .05$

$$b = 1 + r = 1 + .05 = 1.05$$

$$y = 100(1.05)^x$$

original problem units: years

$$6 \text{ months} = \frac{6}{12} \text{ years}$$

$$y = 100(1.05)^{6/12} = 102.47$$

After 6 months, the account will have \$102.47

1 year

$$y = 100(1.05)^1 = 105$$

After 1 year, the account will have \$105

A population of bunnies started at 50,000 and decreases at a rate of 20% per year. What is the bunny population after 3 years?

a: 50,000

b: $r = 20\% \rightarrow .20$

$$b = 1 - r = 1 - .20 = .80$$

$$y = 50000(.80)^x$$

Original Problem units: years

$$y = 50000(.80)^3$$

After 3 years, the population of bunnies will be 25,600.

Abdullah bought a super fancy and super-fast car. He paid \$30,000 for the car. The car depreciates at a rate of 8% per year. What will his car be worth in 2 years?

a: 30,000

b: $r = 8\% \rightarrow .08$

$$b = 1 - r = 1 - .08 = .92$$

$$y = 30000(.92)^x$$

Original problem units: years

$$y = 30,000(.92)^2 = 25392.00$$

After 2 years, the car is

Worth \$25,392.00