

## Exponential Growth &amp; Decay / Compound Interest Date \_\_\_\_\_ Period \_\_\_\_\_

**Determine whether each function represents exponential growth, or exponential decay. Then, determine the y-intercept (initial value) of each.**

1)  $y = 129 \cdot 1.63^x$

2)  $y = 2 \cdot 0.65^x$

3)  $y = 12 \cdot \left(\frac{17}{10}\right)^x$

4)  $y = 0.8 \cdot \left(\frac{1}{8}\right)^x$

5)  $f(x) = 4 \cdot \left(\frac{5}{6}\right)^x$

6)  $s(t) = 1.5^t$

7)  $f(x) = \frac{1}{100} \cdot \left(\frac{4}{3}\right)^x$

8)  $y = 2^{-x}$

**Suppose you deposit \$2000 in a savings account that pays interest at an annual rate of 4%. If no money is added or withdrawn from the account, answer the following questions:**

9) How much will be in the account after 3 years?

10) How much will be in the account after 18 years?

11) How many years will it take for the account to contain \$2,500?

12) How many years will it take for the account to contain \$3,000?

**Write an exponential function to model each situation. Then, find each amount after the specified time.**

13) A population of 120,000 grows 1.2% per year for 15 years.

14) A population of 1,860,000 decreases 1.5% each year for 12 years.

**Before a basketball game, a referee noticed that the ball seemed under-inflated. She dropped it from 6 feet and measured the first bounce as 36 inches and the second bounce as 18 inches**

15) Write an exponential function to model the height of the ball.

16) How high was the ball on its fifth bounce?

**Your friend invested \$1000 in an account that pays 6% annual interest. How much interest will your friend have after her college graduation in 4 years?**

17) Is an exponential model reasonable for this situation?

18) What equation should you use to model the situation?

19) Is the solution to the equation the final answer to the problem? (How much interest was there after 4 years?)

**The function  $y = 20 \cdot 0.975^x$  models the intensity of sunlight beneath the surface of the ocean. The output  $y$  represents the percent of surface sunlight intensity that reaches a depth of  $x$  feet. the model is accurate from about 20 feet to about 600 feet below the surface.**

20) Find the percent of sunlight 50 feet beneath the surface of the ocean.

21) Find the percent of sunlight at a depth of 370 feet.

**COMPOUND INTEREST:**

**If Mr. Allen-Black invests \$1,200 in an account that pays 4% APR, how much would he have after 10 years if...**

22) The interest was compounded annually.

23) The interest was compounded quarterly.

24) The interest was compounded monthly.

25) The interest was compounded daily.

26) The interest was compounded CONTINUOUSLY.

**Find the amount in a continuously compounded account for the given conditions.**

27) Principal: \$2000  
APR: 5.1%  
Time: 3 years

28) Principal: \$400  
APR: 7.6%  
Time: 1.5 years

29) Principal: \$950  
APR: 6.5%  
Time: 10 years

**Half-Life Problems:**

- 30) The half-life of a radioactive substance is the time it takes for half of the material to decay. Phosphorus-32 is used to study a plant's use of fertilizer. It has a half-life of 14.3 days. Write the exponential decay function for a 50-mg. sample. Find the amount of phosphorus-32 remaining after 84 days.
- 31) Archaeologists use carbon-14, which has a half-life of 5730 years, to determine the age of artifacts in carbon dating. Write the exponential decay function for a 24-mg. sample. How much carbon-14 remains after 30 millennia? (1 millennium = 1000 years)