

4.3 - Exponential Growth and Decay

Given the growth/decay percentage, determine the multiplier.

1) 5% Growth

2) 12% Decay

3) 200% Growth

4) 0.85% Decay

State whether each of the following equations represents growth or decay.

5) $f(x) = 3^x$

6) $f(x) = 0.25^x$

7) $f(x) = 1.01^x$

8) $f(x) = 0.033^x$

9) $f(x) = 6 \cdot 5^x$

10) $f(x) = 6 \cdot \left(\frac{1}{2}\right)^x$

Identify the necessary information and solve.

11) Movie Tickets now average \$9.75 a ticket, but are increasing 15% per year. How much will they cost 5 years from now?

- Growth or Decay?
- What is your multiplier?
- Is \$9.75 your zero term or first term?
- Write the explicit equation.
- Solve.

12) A powerful computer is purchased for \$2000, but loses 20% of its value each year. How much will it be worth 4 years from now?

- Growth or decay?
- What is your multiplier?
- Is \$2000 your zero term or first term?
- Write the explicit equation.
- Solve

- 13) Dinner at your grandfather's favorite restaurant now costs \$25.25 and has been increasing at 4% each year. How much did it cost him 35 years ago?
- Growth or decay?
 - What is your multiplier?
 - Write explicit equation.
 - What is the value of n in this case?
 - Solve.
- 14) If a gallon of milk costs \$3 now and the price is increasing 10% each year, how long before a gallon of milk costs \$10?
- Growth or decay?
 - What is the multiplier?
 - Write the explicit equation.
 - Where does 10 go?
 - Solve.

Write the explicit equation for each and solve.

- 15) The number of bacteria present in a colony is 180 at noon and the bacteria grows at a rate of 22% per hour. How many will be present at 8 p.m.? Round to the nearest whole bacteria.
- 16) A 1970 comic book originally sold for \$0.35 has appreciate 10% per year. What will it be worth in 2020? Round to the nearest cent.
- 17) Inflation is at a rate of 7% per year. Today, Janelle's favorite bread costs \$3.79. What would it have cost ten years ago?
- 18) Ryan's motorcycle is now worth \$2500. It has depreciated 12% each year since it was purchased. If he bought it four years ago, what did it cost brand new? Round to the nearest dollar

19) A bank account starts with \$100 and earns 4% interest annually. How much money will be in the account after 12 years assuming no transactions have occurred. Round to the nearest cent.

20) Jim received a \$2000 loan from his bank. The loan accrues 3% interest every 3 months. How much will Jim owe the bank after 4 years? Round to the nearest cent.

21) Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

22) John is curious how much money he can make in a month. He makes one penny on March 1st. He hopes to double the amount he makes each day. How much money would he have made on March 31st?

Answers to 4.3 - Exponential Growth and Decay

- 1) $105\% = 1.05$ 3) $300\% = 3.0$ 5) Growth; $3 > 1$ 7) Growth; $1.01 > 1$
9) Growth; $5 > 1$ 11) a. Growth; b. 1.15; c. Zero term;
d. $f(x) = 9.75 \cdot 1.15^x$; e. $f(5) = \$19.61$
13) a. Growth; b. 1.04; c. $f(x) = 25.25 \cdot 1.04^x$; 15) $f(x) = 180 \cdot 1.22^x$; $f(8) = 883$
d. $n = -35$; e. $f(-35) = \$6.40$
17) $f(x) = 3.79 \cdot 1.07^x$; $f(-10) = \$2.36$ 19) $f(x) = 100 \cdot 1.04^x$; $f(12) = \$160$
21) $f(x) = 128 \cdot \left(\frac{1}{2}\right)^x$; $f(5) = 4$ people