#16 Exponential Growth & Decay

Name_____

Determine whether the function shows GROWTH or DECAY. Then match to the correct graph.

1. $f(x) = 12(0.5)^x$

a= 12 b= .5

Growth or Decay

Graph: C

2. $f(x) = 0.5(1.2)^x$

a= .5 b= 1.2

Growth or Decay

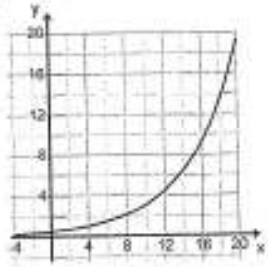
Graph: A

3. $f(x) = \left(\frac{3}{4}\right)^x$

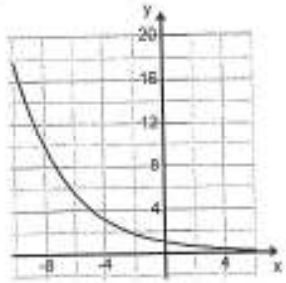
a= 1 b= 3/4

Growth or Decay Graph: B

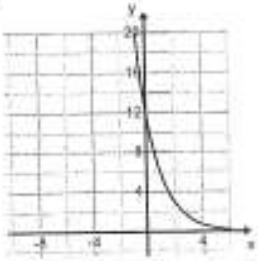
A)




B)




C)




Use the information to write a function and answer the questions.

4. An acidophilus culture containing 150 bacteria doubles in population every hour. Predict the number of bacteria after 12 hours.

Starting bacteria (a) 150

Rate (base, b) 2

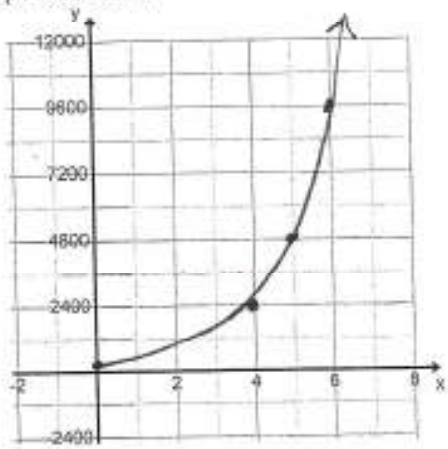
Write the function representing the bacteria population for every hour that passes.

$P(x) =$ $150(2)^x$

Predict the population number of bacteria after 12 hours.

614,400

Graph the function.




Write an exponential function to model each.

5. An initial investment of $40,000 increases by 8% per year. What will the value of the investment be in 6 years?

a= 40,000 r= 1.08 f(t)= $40,000(1.08)^t$

value in 6 years f(6)= 63,475

Approximate $t$ when $f(t)$=60,000.

$t \approx 5.3$ yrs

6. A $25,000 car depreciates (decreases in value) at 6.5% each year. What will the car be worth in 5 years? When will the value of the car fall below $2500?

a= 25,000 r= .935 V(t)= $25,000(.935)^t$

value in 5 years f(5)= 17,865

Approximate value when $f(t)$=2,500.

$t \approx 34.3$ yrs

Name _____ Date _____ Class _____

LESSON 7-1

# Practice A

## Exponential Functions, Growth, and Decay

**Complete each statement.**

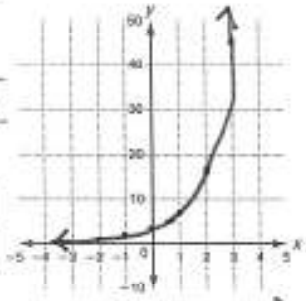
1. A function of the form $f(x) = ab^x$ is called an exponential growth function when $b$ is greater than 1.
2. A function of the form $f(x) = ab^x$ is called an exponential decay function when $b$ is a number between 0 and 1.

**Tell whether the function shows growth or decay. Then graph.**

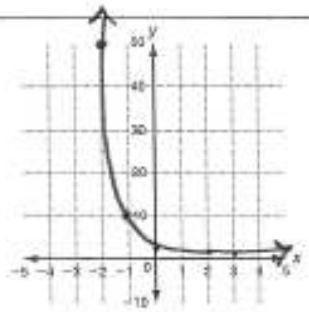
3. $f(x) = 3(2.5)^x$
   a. Find the value of the base. 2.5
   b. Does the function show growth or decay? growth
   c. Make a table of values for the function.

| $x$ | −2 | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $f(x)$ | .48 | 1.2 | 3 | ~~18.75~~ 7.5 | 18.75 | 46.9 |

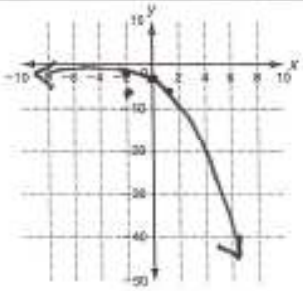
   d. Graph the function.



4. $g(x) = 2(0.2)^x$ decay



5. $j(x) = -(1.5)^x$ growth (flip)



**Solve.**

6. Some real estate agents estimate that the value of a house could increase about 4% each year.
   a. Write a function to model the growth in value for a house valued at $100,000.
   $f(x) = 100{,}000(1.04)^x$
   b. Graph the function.
   c. A house is valued at $100,000 in 2005. Predict the year its value will be at least $130,000.
   2005 + 7 = 2012