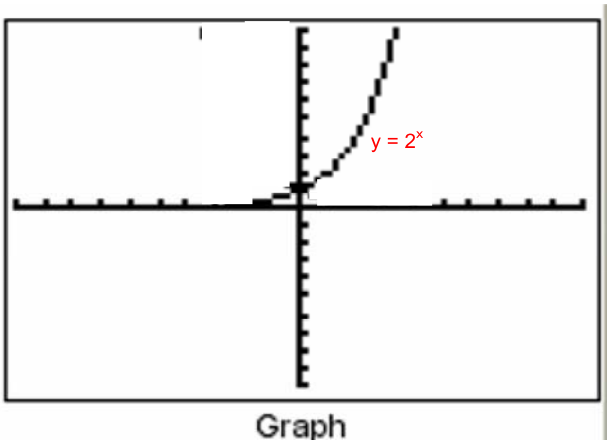
Graphs of Exponential Functions

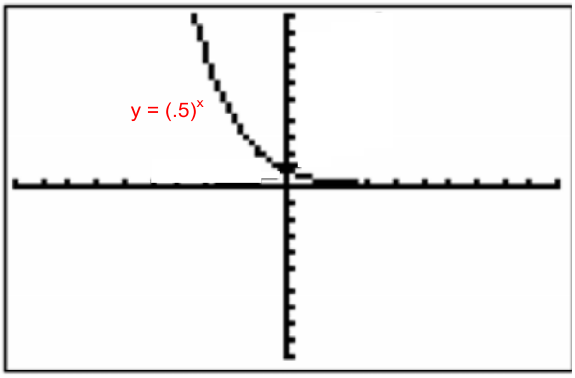
Exponential Functions ~ functions which have x as an exponent

Growth ~ the graph increases
~the base has a value > 1



Graph

Decay ~ the graph decreases
~the base is fractional (between 0 and 1)



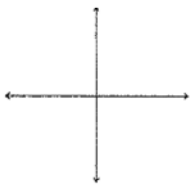
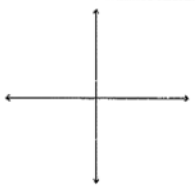
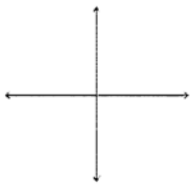
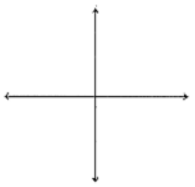
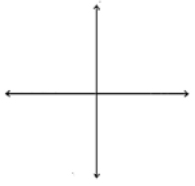
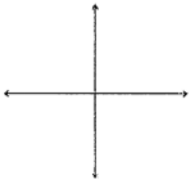
Graph

The BASIC exponential graph will not intersect the x-axis!!

Growth or Decay?

Name _____

Directions: Graph each of the equations stated in the table. Note the direction of the graphs. State the percent rate of change.

$y = a(1+r)^x$	$y = a(1-r)^x$
1. $y = 1.55^x$  $r =$ ____	4. $y = 0.9^x$  $r =$ ____
2. $y = 1.9^x$  $r =$ ____	5. $y = 0.55^x$  $r =$ ____
3. $y = 1.2^x$  $r =$ ____	6. $y = 0.4^x$  $r =$ ____

When the value being raised to the power of x is greater than 1, the graph will be:

When the value being raised to the power of x is between 0 and 1, the graph will be:

Label which column represents "Growth" and which column represents "Decay".

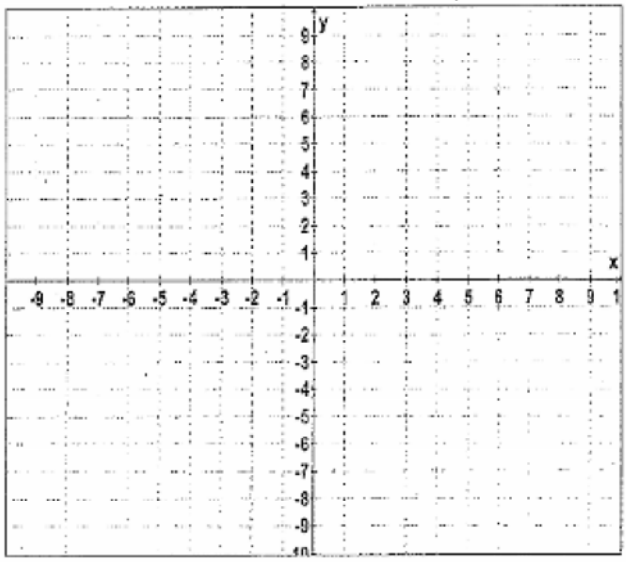
Taking a Closer Look!

Name _____

Directions: Supply answers for each of these items concerning the graph.

Graph: $y = 3^x$

x	y
-2	
-1	
0	
1	
2	
3	



1. Is it a function?
2. Domain:
3. Range:
4. x-intercept(s):
5. y-intercept(s):

7. Where is the graph increasing?
8. Where is the graph decreasing?
9. Where is $y < 0$?
10. Where is $y > 0$?
11. Where is $y = 0$?
12. Find y when $x = -3$.
13. For what x-value(s) is $y = 243$?
14. Maximum value of graph: (absolute maximum)
15. Minimum value of graph: (absolute minimum)
16. Asymptote(s): (state equation(s))

1. Amazon sales for a new video game during its first week of release (7 days) can be modeled by the function $S(x) = 2^x$, where $S(x)$ represents the number of sales (in hundreds) at the end of each day.

Find the average rate of change for each of the following

a) Day 1 to Day 2

b) Day 2 to Day 3

c) Day 1 to Day 3

d) Day 2 to Day 6

e) What do you notice?

2 Theresa is comparing the graphs of $y = 2^x$ and $y = 5^x$. Which statement is true?

(1) The y-intercept of $y = 2^x$ is (0,2), and the y-intercept of $y = 5^x$ is (0,5).

(2) Both graphs have a y-intercept of (0,1), and $y = 2^x$ is steeper.

(3) Both graphs have a y-intercept of (0,1), and $y = 5^x$ is steeper.

(4) Neither graph has a y-intercept.

3 The table below represents the function F.

x	3	4	6	7	8
$F(x)$	9	17	65	129	257

The equation that represents this function is

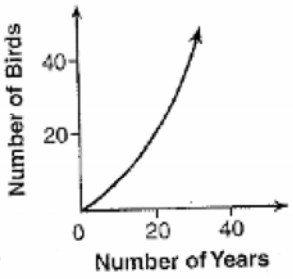
(1) $F(x) = 3^x$

(2) $F(x) = 3x$

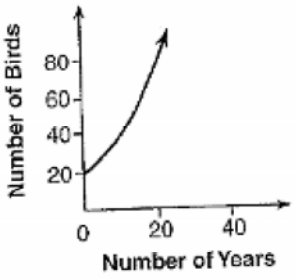
(3) $F(x) = 2^x + 1$

(4) $F(x) = 2x + 3$

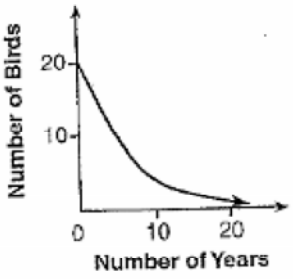
4 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?

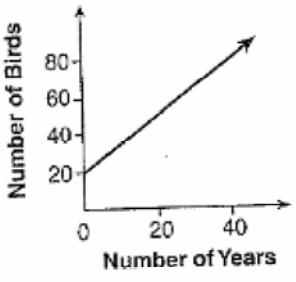


(1)



(3)





(4)

5. Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, y, of one account that was left inactive for a period of x years.

What is the y-intercept of this equation and what does it represent?

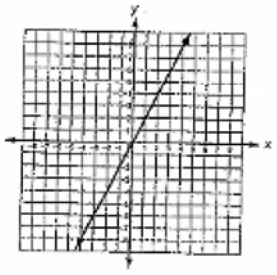
(1) 0.98, the percent of money in the account initially

(2) 0.98, the percent of money in the account after x years

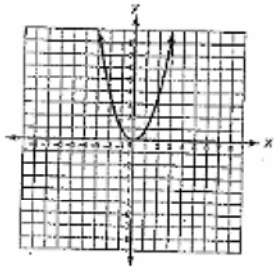
(3) 5000, the amount of money in the account initially

(4) 5000, the amount of money in the account after x years

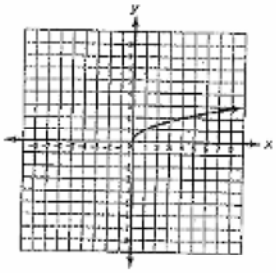
6. Which graph represents the function $y = 2^x$?



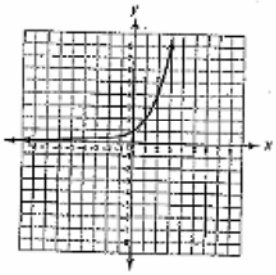
(1)



(3)



(2)



(4)

7 ***Multiple Choice*** Which function contains the point (0, 1)?

(A) $y = 3^x$ (B) $y = 2(3)^x$

(C) $y = 2\left(\frac{1}{3}\right)^x$ (D) $y = 3\left(\frac{1}{3}\right)^x$

(E) None of these

8 ***Multiple Choice*** Evaluate $y = 2(5)^x$ when $x = 2.2$. Round the answer to the nearest hundredth.

(A) 66.9 (B) 66.99

(C) 69.89 (D) 68.99

(E) 68.9

9 ***Multiple Choice*** Describe the domain and range of the function $y = -\left(\frac{1}{2}\right)^x$.

(A) domain: all real numbers;range: all positive real numbers

(B) domain: all negative real numbers; range: all negative real numbers

(C) domain: all real numbers; range: all negative real numbers

(D) domain: all positive real numbers; range: all positive real numbers

(E) domain: all real numbers;range: all real numbers

10 ***Multiple Choice*** Choose the equation of the curve shown.

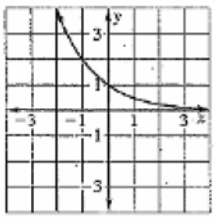
(A) $y = (-1)^x$

(B) $y = 2^x$

(C) $y = 3^x$

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

(E) $y = \left(\frac{1}{3}\right)^x$



11 ***Multiple Choice*** Choose the equation of the curve shown.

(A) $y = 3^x$

(B) $y = 5^x$

(C) $y = \left(\frac{1}{3}\right)^x$

(D) $y = \left(\frac{1}{5}\right)^x$

(E) $y = (-5)^x$