

$$y = ab^x$$

# Exponential Growth and Decay

Day 3

Name Key

Date \_\_\_\_\_ Period \_\_\_\_\_

$b > 1$   $0 < b < 1$

1. Identify each of the following as exponential growth or decay.

a.  $y = (0.258)^x$   
decay

b.  $y = 13^x$   
growth

c.  $y = 0.7(5)^x$   
growth

d.  $y = 16(2)^x$   
growth

e.  $y = 15\left(\frac{1}{8}\right)^x$   
decay

f.  $y = 10(0.10)^x$   
decay

2. Identify each of the following as exponential growth, exponential decay, linear increase, or linear decrease.

constant factor (%)

constant (+/-)

a. Each year, enrollment increased by 20%. Exponential growth

b. The temperature fell 6° each hour. Linear decrease

c. The value of the copy machine depreciates 12% each year. Exponential decay

d. Each year, the company's profit increases by \$40,000. Linear increase

e.  $y = 4(1.05)^x$  Exponential growth

f.  $y = 8 - 2x$  Linear decrease

g.  $y = 3(0.5)^x$  Exponential decay

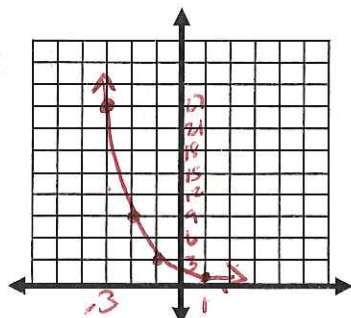
h. Because of poor economic conditions recently, a company's workforce has been decreasing by 2% each year. Exponential decay

Graph the following and state whether it's exponential growth or decay.

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

Growth or Decay

x	y
-3	27
-2	9
-1	3
0	1
1	$\frac{1}{3}$

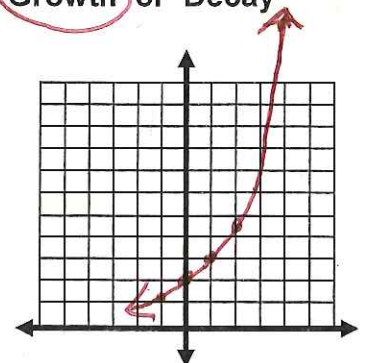


$y = 2^{2x}$  table

4.  $y = 2(1.5)^x$

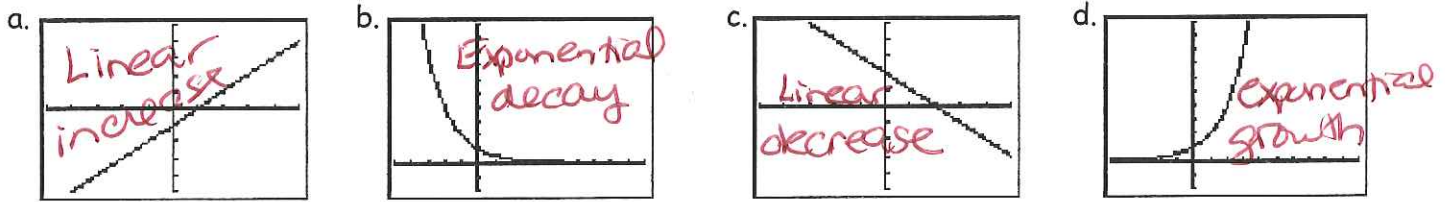
Growth or Decay

x	y
-1	1.3
0	2
1	3
2	4.5
3	11.8



Exponential Equations EE3

Use the following graphs for #5-8.



Match the equation with its graph and identify as exponential growth, exponential decay, linear increase, or linear decrease.

5.  $y = -x + 2$   
 $m = -1$   
C Linear Decrease
6.  $y = 5(1.6)^x$   
 $b > 1$   
D Exponential Growth
7.  $y = x - 1$   
 $m = 1$   
A Linear Increase
8.  $y = 5(0.6)^x$   
 $0 < b < 1$   
B Exponential Decay

Circle whether the situation is exponential growth or decay. Justify your decision by circling the key word. Write an equation and solve.

9. John has a job that pays \$7.50 per hour and will get a 2% raise every 3 months. What will his rate of pay be in 2 years? Growth or Decay

$a = 7.50$   
 $b = (1 + 0.02) = 1.02$   
 $x = 2 \times 12 = 24 \div 3 = 8$

$y = 7.50(1.02)^8$   
 $y = 8.787$

$\approx 88.79$

10. In 1980 the population of Warren, Michigan was 161,000. Since then the population has decreased 1% per year. If the current trend continues, predict the population of Warren in 2010. Growth or Decay

$a = 161,000$   
 $b = (1 - 0.01) = 0.99$   
 $x = 2010 - 1980 = 30$

$y = 161,000(0.99)^{30}$   
 $y = 119,091.7$

$\approx 119,092$   
 pop

11. Since 1985, the daily cost of patient care in community hospitals in the US has increased by 8.6% per year. In 1985 hospital costs were an average of \$460 per day. Find the approximate cost per day in 2005. Growth or Decay

$a = 460$   
 $b = (1 + 0.086) = 1.086$   
 $x = 2005 - 1985 = 20$

$y = 460(1.086)^{20}$   
 $y = 2395.269$

$\approx 2395.27$   
 a day

12. A certain pesticide kills half of the bug population in half an hour. The pesticide has been working for 6 hours. If there are currently 165 bugs, how many bugs were there when the pesticide was first sprayed? Growth or Decay

$a = 165$   
 $b = \frac{1}{2}$   
 $x = \frac{-6}{\frac{1}{2}} = -12$

$y = 165\left(\frac{1}{2}\right)^{-12}$   
 $y = 675840$

675840 bugs