Today's Date:

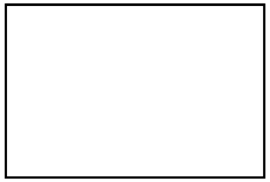
February 27, 2008

(8.5) & (8.6) - Exponential Growth and Decay

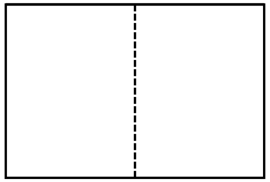
Exponential Growth

increases by the same percent
in each unit of time.

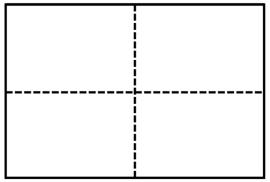
Paper Folding Activity



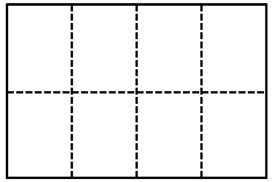
0 folds
1 rectangle



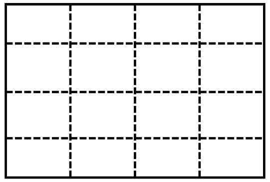
1 folds
2 rectangles



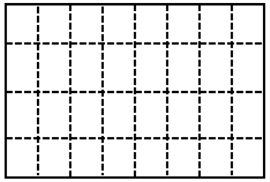
2 folds
4 rectangles



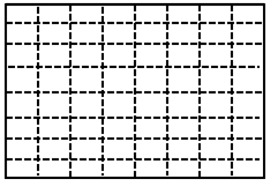
3 folds
8 rectangles



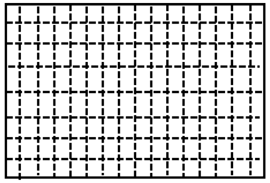
4 folds
16 rectangles



5 folds
32 rectangles



6 folds
64 rectangles



7 folds
128 rectangles

Exponential Growth Model

$$y = c(1+r)t$$

Exponential Growth Model

Exponential Growth

$$y = c(1+r)t$$

Exponential Growth Model

Initial Amount

Exponential Growth

$$y = c(1+r)t$$

Exponential Growth Model

Initial Amount

Exponential Growth

$$y = c(1+r)^t$$

*(1+r) is the Growth Factor
always greater than 1

* r is the growth rate(%)

Exponential Growth Model

Initial Amount

Time Period

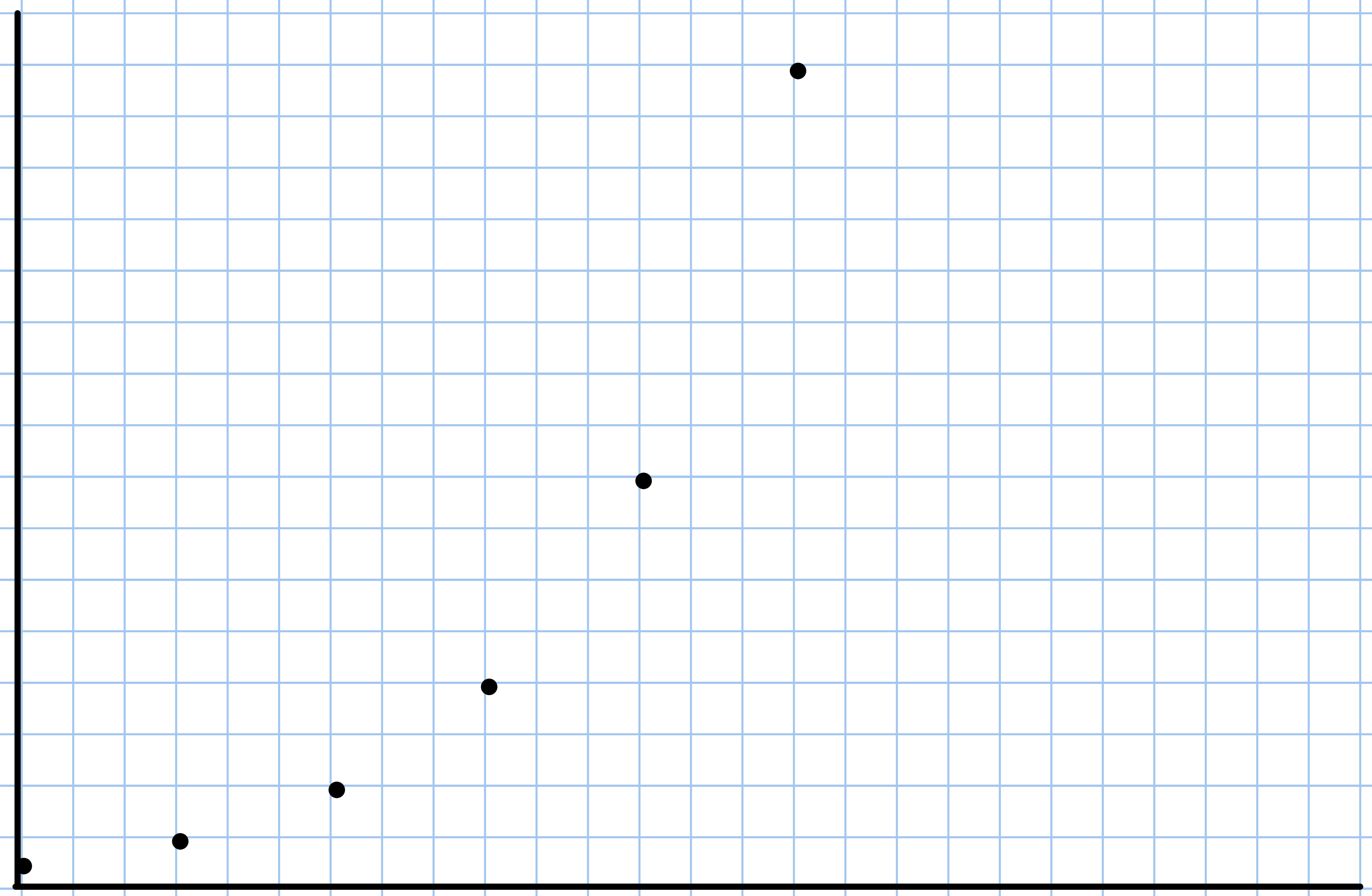
Exponential Growth

$$y = c(1+r)^t$$

*(1+r) is the Growth Factor always greater than 1

* r is the growth rate(%)

Graph of Exponential Growth :



Exponential Decay -

decreases by the same percent
in each unit of time.

<u>M-Ms Activity</u>:

85 M-Ms

44 M-Ms

Exponential Decay Model

$$y = c(1-r)t$$

Exponential Decay Model

Exponential
Decay

$$y = c(1-r)t$$

Exponential Decay Model

Initial Amount

Exponential Decay

$$y = c(1-r)^t$$

Exponential Decay Model

Initial Amount

Exponential Decay

$$y = c(1-r)^t$$

*(1-r) is the Decay Factor
always less than 1
* r is the decay rate (%)

Exponential Decay Model

Exponential Decay

Initial Amount

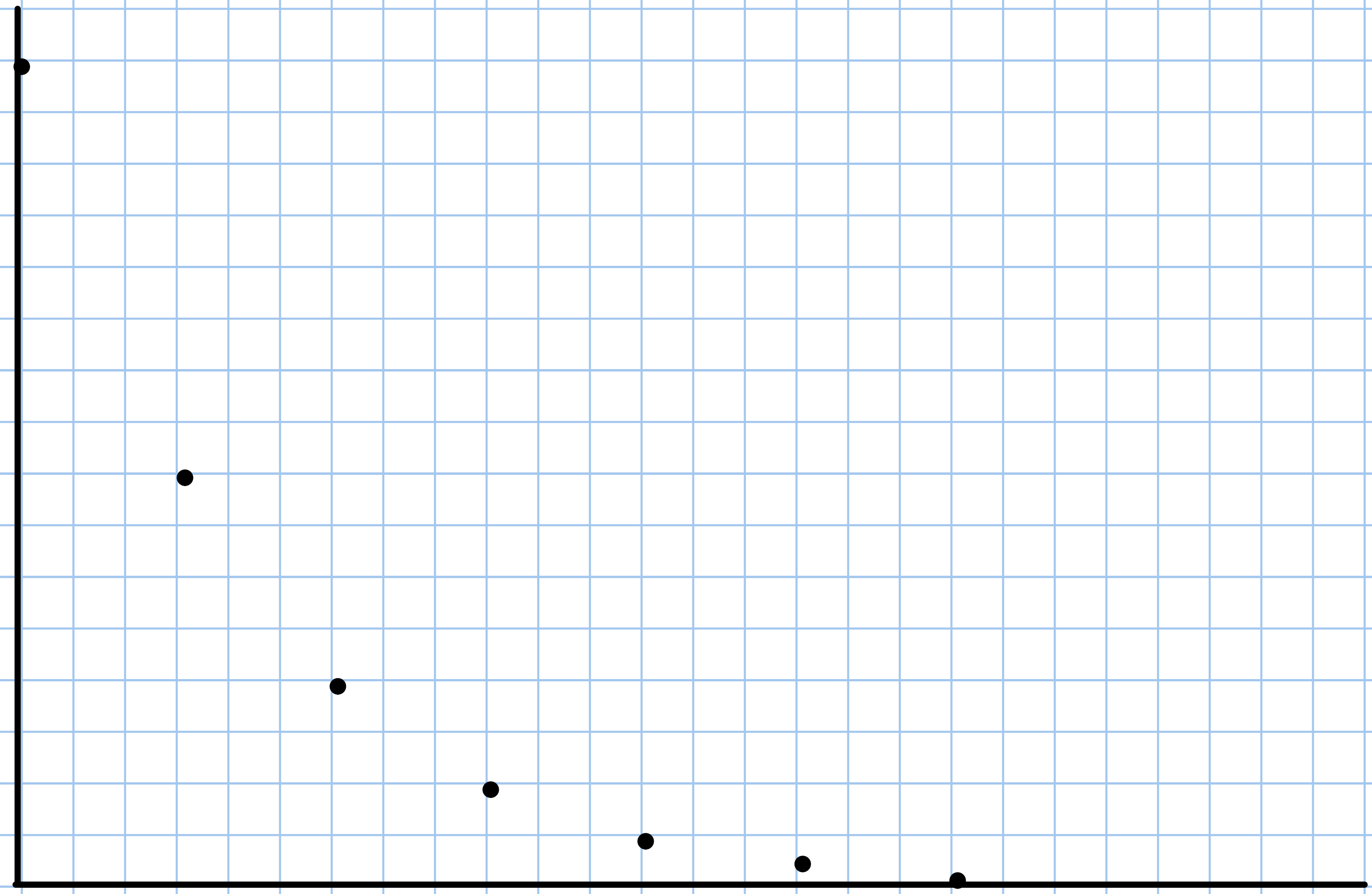
Time Period

$$y = c(1-r)^t$$

*(1-r) is the Decay Factor always less than 1

* r is the decay rate (%)

Graph of Exponential Decay :



Directions: Classify as Exponential Growth or Decay. Identify the growth or decay factor and the % increase or decrease.

1. $y = 15(1.5)^t$ → Exp. Growth; 1.5; 0.5 ≈ 50%

   >1

   1+r

2. $y = 3(\frac{1}{2})^t$ → Exp. Decay; 1/2; 1/2 ≈ 50%

   1 − 1/2 = r

3. $y = 57(1.009)^t$ → Exp. Growth; 1.009; 0.009

4. $y = 0.044(0.23)^t$ → Exp. Decay; 0.23; 0.77

   1 − 0.23 = r (%)

Directions Solve using an exponential Growth or Decay Model.

5. A savings certificate of $1000 pays 6.5% annual interest compounded yearly. What is the balance when the certificate matures after 5 years?

$$y = c(1+r)^t$$

$$y = 1000(1+0.065)^5$$

$$y = 1000(1.065)^5$$

$$y = 1000(1.37)$$

$$y = \$1370$$

6. From 1997 to 2007, the ratio of students per computer at a school has dropped by about 16.8% per year. If there were 7.8 students per computer in 1997, what is the average number of students per computer in 2007?

$$y = c(1-r)^t$$

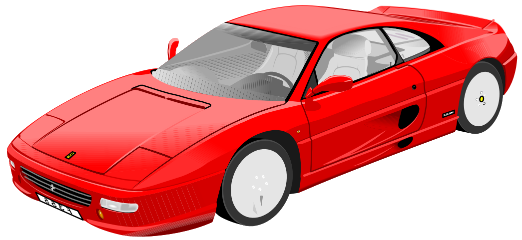
$$y = 7.8(1-0.168)^{10}$$

$$y = 7.8(0.832)^{10}$$

$$y = 7.8(0.16)$$

$$y = 1.25 \text{ students/PC}$$

7. You bought a used car for $2300. The value of the car depreciates at a rate of 8% per year. Find the value of the car in two years.



$$y = c(1-r)^t$$

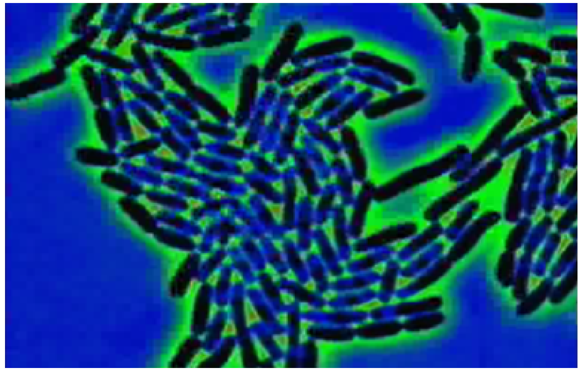
$$y = 2300(1-0.08)^2$$

$$y = 2300(0.92)^2$$

$$y = 2300(0.85)$$

$$\boxed{y = \$1955}$$

8. An experiment started with 100 bacteria. They double in number every hour. Write a model for the # of bacteria after 8 hours.



$$y = c(1+r)^t$$

$$y = 100(1+1)^8$$

$$y = 100(2)^8$$

$$y = 100(256)$$

$y = 25{,}600$ bacteria

Tonight's Assignment

p.480

10,14,16, 22

p. 488

12, 17-22, 26