

Warm Up

Take out your homework from yesterday

Homework Quiz


*NO TALKING

*When finished, flip your paper over

Warm Up

Extra Examples wkst #1-4

Homework Questions?


17.  **BICYCLE RACING** In the Chapter Opener you learned that there is a relationship between the breathing rate of a cyclist and the bicycle speed.

Bicycle speed, x	0	5	10	15	20
Breathing rate, y	6.4	10.7	18.1	30.5	51.4

Let x represent the speed of the bike in miles per hour, and let y represent the cyclist's breathing rate in liters of air taken into the lungs per minute. The breathing rate of a cyclist can be modeled by $y = 6.37(1.11)^x$. What is the cyclist's breathing rate if the bike is traveling 19 miles per hour? 25 miles per hour?

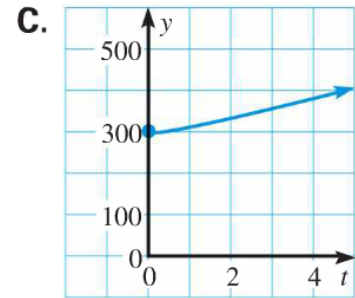
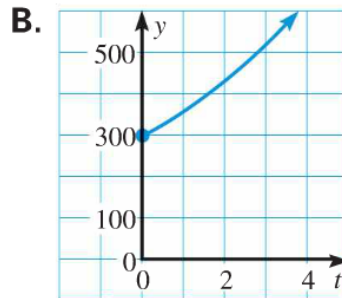
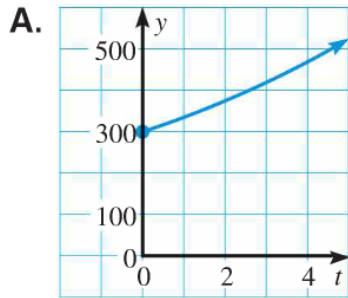
$$y = 6.37(1.11)^{19} \approx$$

$$y = 6.37(1.11)^{25} \approx$$

24.  **POPULATION GROWTH** A population of 30 mice is released in a wildlife region. The population doubles each year for 4 years. What is the population after 4 years?

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

$$= 30(2)^4$$

MATCHING THE GRAPH Match the description with its graph.

18. Deposit: \$300
Annual rate: 6%

19. Deposit: \$300
Annual rate: 12%

20. Deposit: \$300
Annual rate: 20%

15. **INVESTING** How much must you deposit in an account that pays 3.5% interest compounded yearly to have a balance of \$400 after 6 years? .035
16. **INVESTING** How much must you deposit in an account that pays 6% interest compounded yearly to have a balance of \$1000 after 8 years?

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

$$\frac{400}{((1.035)^6)} = \frac{c(1.035)^6}{(1.035)^6}$$

$$\frac{1000}{(1+.06)^8}$$

Self Scoring Scale

4- I can *summarize* the concepts and explain it to others.

3- I can *apply* the concepts to answer questions correctly.

2- I can *apply* the concepts but with some *mistakes*.

1- I *need help* to know how to apply the concepts.

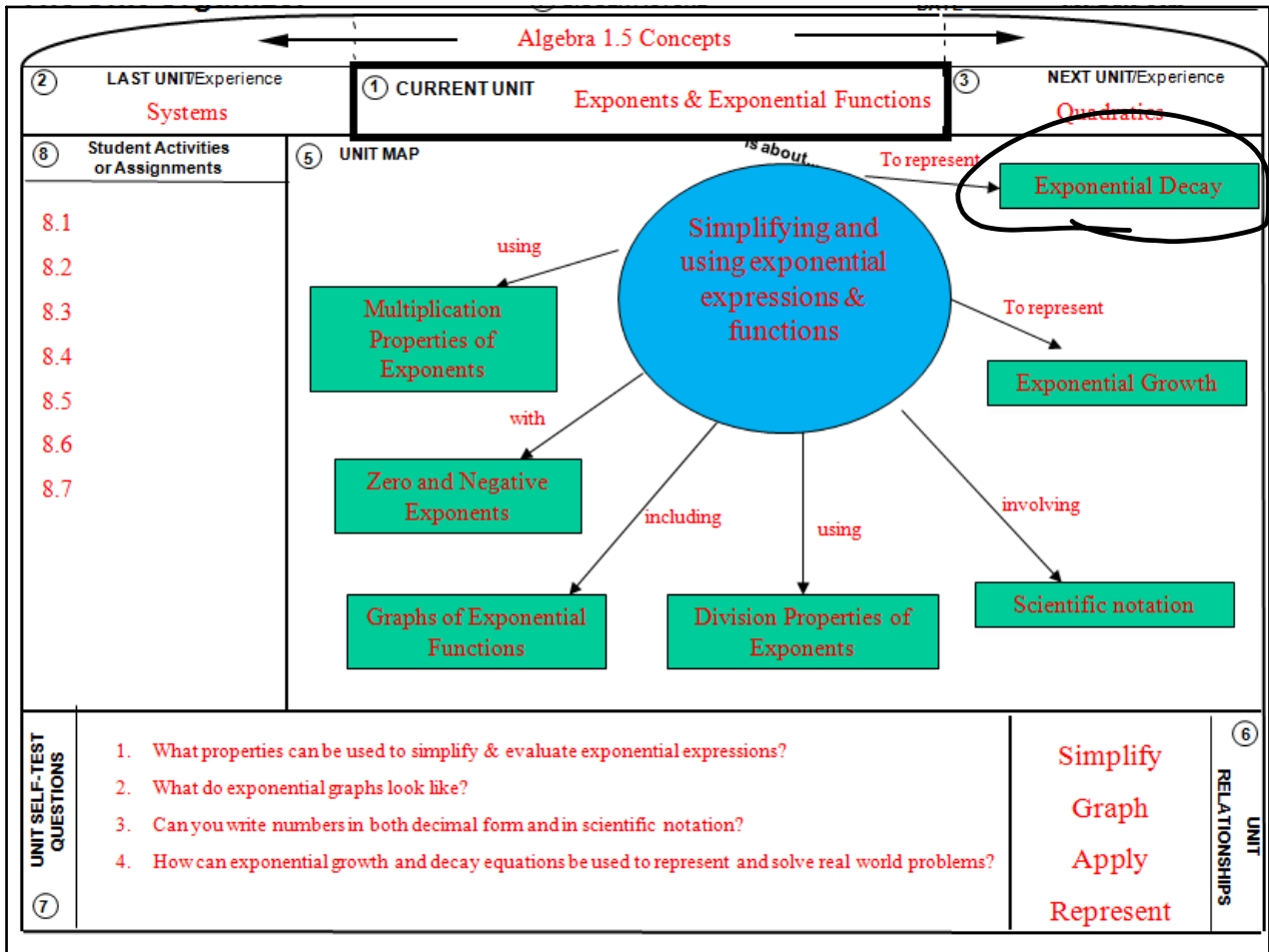
0- I *can't* apply the concepts even with help.

8.6 Exponential Decay Functions

Goals:

- Write and use models for exponential decay
- Graph models for exponential decay

EQ: What is the model for exponential decay?
(write formula and label the variables)



Vocabulary

Exponential decay:
 quantity that is decreasing for the same %
 for each time period

EXPONENTIAL DECAY MODEL

C is the initial amount. begin

t is the time period.

Total Balance $\rightarrow y = C(1 - r)^t$

The percent of decrease is $100r$.

Rate $\frac{r}{100} \rightarrow$ Dec.

$(1 - r)$ is the decay factor,
 r is the decay rate. To assure
 $1 > (1 - r) > 0$, it is
 necessary that $0 < r < 1$.

✓ P. 487

Growth $(R) > 1$

Decay $(R) < 1$

Example 1: Writing an Exponential Decay Model

Depreciation – A car is purchased for \$20,000. The value of the car will be less each year because of depreciation. The car depreciates (loses value) at the rate of 25% per year. Write an exponential decay model to represent the situation

$t = \text{time}$

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

$$y = 20000(1 - .25)^t$$

$$y = 20000(.75)^t$$

Example 2: Using an Exponential Decay Model

Use the model in Example 1 to estimate the value of the car in 5 years.

Depreciation – A car is purchased for \$20,000. The value of the car will be less each year because of depreciation. The car depreciates (loses value) at the rate of 25% per year. Write an exponential decay model to represent the situation.

$$y = 20000(1 - .25)^t$$

$$y = 20000(.75)^5$$

$$\approx 4746.09375$$

$$\$4746.09$$

Try It

1. Verify the model you found in Example 1. Find the value of the car for each year by multiplying the value in the previous year by the decay factor.

$$y = 20000(.75)^t$$

Year	Value
0	20000
1	$20000(.75) = 15000$
2	$20000(.75)^2 = 11250$
3	$20000(.75)^3 = 8437.5$
4	6328.13
5	4746.09

2. A used boat costs \$3200. The value of the boat will be less each year because of depreciation. The boat depreciates at the rate of 13% per year.

- a) Write an exponential decay model to represent this situation.

$$y = 3200(1 - .13)^t$$

$$y = 3200(.87)^t$$

- b) Estimate the value of the boat in 3 years.

$$y = 3200(.87)^3$$

$$\$2107.21$$

by your name write the FORMULA for Exponential Decay & Label it

8.6 p.488 #10-30

(1.57) Growth
 Growth Factor: 1.57
 % increase: 57%

(0.2) Decay
 $1 - .2 = .8$
 Decay Factor: 0.2
 % Decrease: 80%

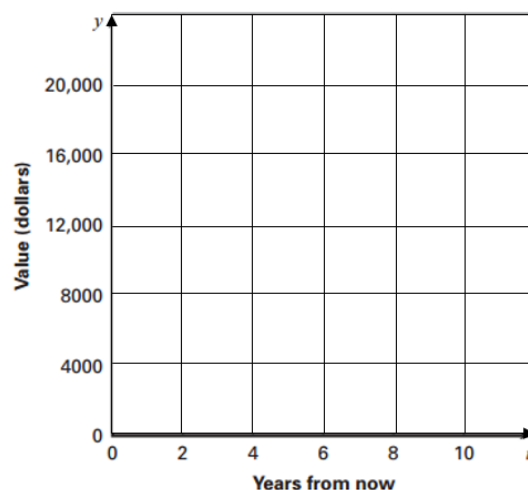
Example 3: Graphing an Exponential Decay Model

a) Graph the exponential decay model in Example 1.

Depreciation – A car is purchased for \$20,000. The value of the car will be less each year because of depreciation. The car depreciates (loses value) at the rate of 25% per year. Write an exponential decay model to represent the situation.

**HINT: Use the table of values from Try It #1. Plot the points in the coordinate plane. Then draw a smooth curve through the points.*

b) Use the graph to estimate the value of the car in 8 years.

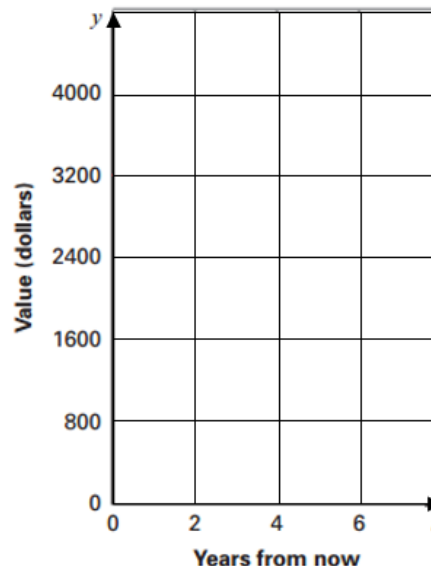


Try It

3. a) Graph the exponential decay model in **Try It #2**

A used boat costs \$3200. The value of the boat will be less each year because of depreciation. The boat depreciates at the rate of 13% per year.

b) Estimate the value of the boat in 5 years.



Summary

EQ: What is the model for exponential decay?
(write formula and label the variables)

8.6 Homework