Date: ____________________

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) graph exponential functions using transformations.

Last day's work: pp. 261-262 # 1 – 8

1cd 8c
6f
3d
4d

Hwk p. 261 #1

1. Solve each exponential equation. Express answers to the nearest hundredth of a unit.

a) $A = 250(1.05)^{10}$

b) $P = 9000\left(\frac{1}{2}\right)^8$

c) $500 = N_0(1.25)^{1.25}$

$\frac{500}{1.25^{1.25}} = \frac{N_0\cancel{(1.25)^{1.25}}}{\cancel{1.25^{1.25}}}$

$N_0 = \frac{500}{1.25^{1.25}}$

$\doteq 378.296$

$\doteq 378.30$

$64 = N_0\cancel{(2)^3}$

$\frac{64}{2^3} \quad \frac{}{\cancel{2^3}}$

d) $625 = P(0.71)^9$

$\frac{625}{(0.71)^9} = P$

$P \doteq 13631.852$

$\doteq 13631.85$

Hwk p. 261 #3d

3. The growth in population of a small town since 1996 is given by the function $P(n) = 1250(1.03)^n$.

a) What is the initial population? Explain how you know.

b) What is the growth rate? Explain how you know.

c) Determine the population in the year 2007.

d) In which year does the population reach 2000 people?

d) $2000 = 1250(1.03)^n$

$$\frac{2000}{1250} = (1.03)^n$$

$$1.6 = 1.03^n$$

n	
2	1.0609
3	1.092
8	1.26
11	1.38
14	1.5
17	1.65
16	1.604
15.99	1.604
15.9	1.599

$n \doteq 15.9$

$\therefore 1996 + 16$

$\doteq 2012$

Check $1.03^{15.9}$

$\doteq 1.5999$

$\doteq 1.6$

* Using Logs

$$1.6 = 1.03^n$$

$$\log(1.6) = \log(1.03)^n$$

$$\log 1.6 = n \log 1.03$$

$10 = n(2)$

$$\frac{\log 1.6}{\log 1.03} = n$$

$n \doteq 15.900$

Hwk p. 261 #4d

4. A computer loses its value each month after it is purchased. Its value as a function of time, in months, is modelled by $V(m) = 1500(0.95)^m$.

a) What is the initial value of the computer? Explain how you know.

b) What is the rate of depreciation? Explain how you know.

c) Determine the value of the computer after 2 years.

d) In which month after it is purchased does the computer's worth fall below \$900?

4d) $900 = 1500(0.95)^m$

$$\frac{900}{1500} = 0.95^m$$

$$0.6 = 0.95^m$$

$$\log 0.6 = \log 0.95^m$$

$$\log 0.6 = m \log 0.95$$

$$\frac{\log 0.6}{\log 0.95} = m$$

$$9.958 \doteq m$$

$$m = 9.96$$

Hwk p. 262 #6

6. A species of bacteria has a population of 500 at noon. It doubles every 10 h. The function that models the growth of the population, P, at any hour, t, is

$$P(t) = 500\left(2^{\frac{t}{10}}\right).$$

a) Why is the exponent $\frac{t}{10}$?
b) Why is the base 2?
c) Why is the multiplier 500?
d) Determine the population at midnight.
e) Determine the population at noon the next day.
f) Determine the time at which the population first exceeds 2000.

$$2000 = 500\left(2^{\frac{t}{10}}\right)$$

$$\frac{2000}{500} = 2^{\frac{t}{10}}$$

$$4 = 2^{\frac{t}{10}}$$

$$2^{2} = 2^{\frac{t}{10}}$$

$$\therefore 2 = \frac{t}{10}$$

$$t = 20$$

Using logs is <u>not</u> a great idea in this case:

$$\rightarrow \text{or } \log 4 = \log 2^{\frac{t}{10}}$$

$$\log 4 = \frac{t}{10} \log 2$$

$$10\left(\frac{\log 4}{\log 2}\right) = \left(\frac{t}{\cancel{10}}\right)\cancel{10}$$

$$\frac{10 \log 4}{\log 2} = t$$

Hwk p. 262 #8

8. A town with a population of 12 000 has been growing at an average rate of 2.5% for the last 10 years. Suppose this growth rate will be maintained in the future. The function that models the town's growth is

$$P(n) = 12(1.025^n)$$

where $P(n)$ represents the population (in thousands) and n is the number of years from now.

a) Determine the population of the town in 10 years.

b) Determine the number of years until the population doubles.

c) Use this equation (or another method) to determine the number of years ago that the population was 8000. Answer to the nearest year.

d) What are the domain and range of the function?

c) $\cancel{8000} = 12(1.025)^n$

c) $8 = 12(1.025)^n$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 261-262 # 1 – 8

Today's Homework Practice includes:

pp. 251-253 #(1,2)cd, 4c, 5cd, 10 [12 – 14]
(*Optional Wkst 4.6 Extra Practice*)

Tomorrow's Review: pp. 267-269 #(1 – 17)ace