Today's Learning Goal(s):

Date: ______________________

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

a) use exponential functions to model exponential growth and decay.

Last day's work: pp. 251-253 #1 – 5, 9, 10 [12 – 14]

(text quesons on following screens)

4.7 Applications Involving Exponential Functions

Date: Nov. 5/15

Ex.1 You invest $1000 at 8% /a compounded annually.
How much will you have after 20 years?

# of years	0	1	2	3			n
Amount	1000	1080	1166.4				

1000

$1000(1.08)^1$ $1000(1.08)^2$ $1000(1.08)^3$

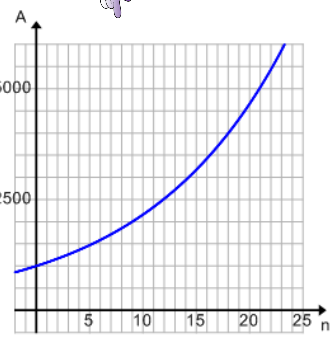
$I = Prt$
$= 1000(0.08)(1)$
$= 80$

$A = P + I$
$= 1000 + 108$
$= 1080$

$A_1 = 1000(1.08)$

$A_2 = 1080(1.08)$
$= 1166.4$

or $A_2 = 1000(1.08)(1.08)$
$= 1166.4$
or $= 1000(1.08)^2$



Initial Amount 1000

Growth Rate .08

Growth Factor 1.08

$$A = 1000(1.08)^n$$

Initial Amount

Growth Factor

20 years: $A = 1000(1.08)^{20}$
$= \$4660.96$

$4660.96

Ex.2 A superball loses 10% of its height after each bounce. It was dropped from 12 *m*.

Model the bounce height with a decay function.

Initial Amount	12
Decay Rate	0.1
Decay Factor	1-0.1 = 0.9

$$H = 12(0.90)^n$$

Initial Amount

Decay Factor

$1 \pm r$

Each bounce is 90% of the previous bounce.

The function $f(x) = a(b^x)$ can be used as a model to solve problems involving exponential growth and decay.

$$f(x) = a\,(b^x)$$

Where a is the initial value,
b is the growth factor and
x is the number of compounding periods.

Ex.3 A hockey card is purchased in 1990 for \$5.00.
The value increases by 6% each year.
Write an equation and determine it's value in 2011.

$$f(x) = 5(1.06)^{21}$$

$n = 2011 - 1990$
$= 21$

$= 16.997$

$= \$17.00$

Ex.4 In 1980 the population of the town of St. Albert, Alberta was 20 000.
If the town grows at a rate of 2% a year, what was the population in 2014?

$A = 20\,000(1.02)^{34}$

$\doteq 39213.5$

$\doteq 39213$ is the population.

There are growth and decay applications that involve doubling times or half-lives. The formula can be altered to:

$$N(t) = N_o(2)^{\frac{t}{d}}$$

t ← total time

d ← doubling time

$$N(t) = N_o\left(\frac{1}{2}\right)^{\frac{t}{d}}$$

t ← total time

d ← amount of time to have **50%** left **= half-life**

Ex.5 A biology experiment starts with 1000 cells.
After 4 hours the count is estimated to be 256 000.
What is the doubling period for the cells?

$N(t) = N_0(2)^{\frac{t}{d}}$

$256000 = 1000(2)^{\frac{4}{d}}$

$256 = 2^{\frac{4}{d}}$

trial/error

if $d = 1$

$2^4 = 8$ too low

if $d = 0.5$

$2^{\frac{4}{0.5}}$

$= 2^8$

$= 256$

$4 \div \frac{1}{2}$

$= 4 \times 2$

$= 8$

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

Last day's work: pp. 251-253 #1 – 5, 9, 10 [12 – 14]
(text quesons on following screens)

Today's Homework Practice includes:

pp. 261-262 # 1 – 8