8 Algebra CC **HW # _____________**

Representing Exponential Relationships Symbolically

1. The population of fish in a local stream is decreasing at an alarming rate. The original population was 48, 000. After 1 year, the population was 28,800. After the 2^{nd} year the population was 17,280. Write an exponential function, ***P*(*t*)** that models this situation where ***t*** represents time in years. If this trend continues, how many fish are expected to be living in the stream after the 10^{th} year?

a = 48,000
b = 0.6

28,800/48,000 = 0.6

$p(t) = 48,000(0.6)^t$

t	p(t)
0	48,000
1	28,800
2	17,280

$p(t) = 48,000(0.6)^t$
$p(10) = 48,000(0.6)^{10}$
$= 290.2376448\ldots$

About 290 fish will be left in the stream after 10 years.

2. A painting is sold to an art gallery. Over time, the painting increases in value exponentially. After 1 year, the painting is worth $1540. After the second year, the painting is worth $1694. Write an exponential function that models this situation. What will the painting be worth after seven years?

a = 1400
b = 1.1

1694/1540 = 1.1

1540/1.1 = 1400

x	f(x)
0	?
1	1540
2	1694

$f(x) = 1400(1.1)^x$
$f(7) = 1400(1.1)^7$
$= 2728.20394\ldots$

The painting will be worth about $2728.20 after seven years.

$f(x) = 1400(1.1)^x$

3. The breakdown of a sample of a chemical compound is represented by the function **p(*t*) = 300(0.5)^t**, where **p(*t*)** represents the number of milligrams of the substance and ***t*** represents the time, in years. In the function **p(*t*)**, explain what 0.5 and 300 represent.

a = 300 *initial value*
b = 0.5 *common ratio*

There is **300 mg** of the chemical compound to start with (*no time has passed*).

As each year passes, **half the amount** of the compound is left.

4. Write an exponential function that models the table of values below.

x	*0*	1	2	3	4
f(x)	*¼*	1	4	16	64

a = ¼ *y-int.*
b = 4 *common ratio*

$f(x) = ab^x$

$f(x) = \frac{1}{4}(4)^x$

Equivalent Function

Geometric Sequence Rule
$a_n = a_1 \bullet r^{n-1}$

$f(x) = 1 \bullet 4^{x-1}$