**Exponential Growth and Decay**

You learned about exponential growth and decay in Algebra 1. Here are some videos to refresh your memory. We will be doing some practice problems in class, but you need to watch these videos **BEFORE** you get to class because I will not be teaching an official lesson.

Exponential Growth and Decay

<https://www.youtube.com/watch?v=Lj9qNmLRmJ8>

Exponential Decay: Half Life

<https://www.youtube.com/watch?v=Jhn_vc7av7A> (first 8 minutes)

Need another example?

<https://www.youtube.com/watch?v=sqfRSJBhgfY> (first 4 minutes)

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| ExponentialGrowth & Decay |
| $$f\left(x\right)=3^{x}$$ |  |

You can model a **growth** or **decay** by a constant **percent increase or decrease** with the following formula.

Identify what each variable represents:

$y=A(1\pm r)^{t}$

Exponential Growth:

Ex 3: The population of Fruit Bud, NY is increasing at a steady pace of 2.5% per year. In order to plan for school growth, the town board would like to mathematically model the future population of the town. At the end of 2005, Fruit Bud had a population of 6500 residents.

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| a) Determine the equation for Fruit Bud’s population is a function of the number of years, t, since the end of 2005. | b) Sketch a graph of Fruit Bud’s population for 50 years following 2005. |
| c) Use your model from (a) to predict the number of residents at the end of 2010.  | d) Graphically determine the year that the population reaches 10,000 residents.  |

Exponential Decay

Hydrologists have found the amount of water that soil can absorb, in inches per hour, decreases by 30% for each hour that the soil is flooded with water. A particularly dry soil is initially able to absorb 4 inches of water per hour.

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| a) Determine the equation for the amount of water A(t), in inches per hour, that this soil can absorb if t represents the number of hours since the soil was flooded. | b) Sketch a graph of the function you wrote in part (a) on the interval [0, 10].  |
| c) A steady Rainfall of 0.5 inches per hour is flooding this soil. Water will runoff this soil when the rainfall exceeds the rate at which is can absorb the rain. At what time, to the nearest tenth of an hour, will runoff start?  |

Growth or Decay?

How can you determine whether an exponential function represents a growth or a decay?

Write down one example of each and explain your reasoning.

Half – Life

$$A=A\_{0}(.5)^{\frac{t}{h}}$$

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| The half - life of Zn -71 is 2.4 minutes. If one had 100 g at the beginning, how many grams would be left after 7.2 minutes has elapsed? |
| Pd – 100 has a half - life of 3.6 days. If one had 6.02 x 1023 atoms at the start, how many atoms would be present after 23 days? |

Glue Here