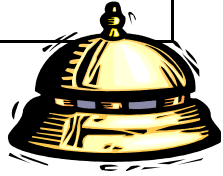# Exponential Regression

When you ring a bell or clang a pair of cymbals, the sound seems really loud at first, but the sound becomes more quiet very quickly indicating exponential decay. This sound can be measured in several different ways. The most famous, the decibel, was named after Alexander Graham Bell – inventor of the telephone. We can also use pressure to measure sound.

While conducting an experiment with a clock tower bell it was discovered that the sound from that bell had an intensity of 40 lb/in^2 four seconds after it rang and 4.7 lb/in^2 seven seconds after it rang.

1. Using this information, what would you consider to be the independent and dependent values in the experiment?

2. What two points would be a part of the exponential curve of this data?

3. Use an exponential regression to find the initial value of the sound.

4. Write an equation that would fit this exponential curve.

Examples

1) The intensity of light also decays exponentially with each additional colored gel that is added over a spotlight. With three gels over the light, the intensity of the light was 900 watts per square centimeter. After two more gels were added, the intensity dropped to 600 watts per square centimeter.
    a. Write an equation for the situation.

    b. Use your equation to determine the intensity of the light with 7 colored gels over it.

2) When the brown tree snake was introduced to Guam during World War II by the US military it devastated the local ecosystem when its population grew exponentially. One snake was accidentally brought to Guam in 1945 and it was estimated that there were 625 snakes in 1949. Write an equation for the situation and use it to predict how many snakes there were in 1955. In your equation, let x=number of years after 1945. That is, 1945 → x = 0.

3) The water hyacinth that was introduced to North Carolina from Brazil ended up clogging our waterways and altering the chemistry of the water. We're not certain exactly when the water hyacinth was introduced, but there were 76.9 square miles of water hyacinths in 1984. Ten years later, there were 80793.6 square miles of watch hyacinth. Using this information, calculate when there was less than 0.1 square miles of this invasive plant in our waterways. (Hint: Use the Intersection Tool)