**Exercise #1**

*Background: The data shown at left were measured on a flat grassy area of a college campus in the photos on the right.* Each of the three shown seismic waves - known as '***traces***' - were created by striking a steel plate on the ground with a hammer, and measuring the trace at three distances from the hammer: x=0.75 m, x=1.5 m, and x=2.5 m. The traces were measured using a ***geophone***, similar to a microphone that is attached to the ground.

**Assignment**:

Using the equation in the red box below, calculate the frequency (*f*) of each wave based on the provided velocity (v) and wavelength (λ), then make an X/X scatterplot of the frequency on the y-axis against the distance from the hammer location on the x-xis. Describe the relationship you observe: is the line curved or straight? which way is it sloping?

**Recall**:

--> The wavelength may be measured between any two equivalent points on the wave, e.g., peak-to-peak, trough-to-trough, zero-crossing to zero-crossing.

--> The traces are recorded in units of *time*, however you need the *distance in meters* of the wavelength. Use the given velocity to convert.

**Procedure**:

1. First, you will look at each trace and identify any two equivalent points on the wave, e.g., peak-to-peak, trough-to-trough, zero-crossing to zero-crossing. Example values are shown for Trace 1.
2. Next, you need to calculate the difference between time 1 and 2: do this by filling out subtraction formulae on row 26 for each trace.
3. Now, you can calculate the wavelength, which is the time difference multiplied by the velocity. In this case, the velocity is provided to you, so just add a formula on row 30 to multiply the velocity by the time difference.
4. Then, you can calculate the frequency - also known as 'cycles per second' - by dividing the velocity by the wavelength. Add a formula on row 32 to do this.
5. Finally, copy the frequency results and geophone offsets (x=#.# at the top) into two new columns, and insert a new scatterplot into the workbook.