The Perfect Storm Worksheet

The transmitter senses the water pressure (sensor's input), which is determined by the water height in the tank; the transmitter sends a representative signal (transmitter's output) to the plant's control system. The transmitter's *LINEAR* output signal represents water height in the tank, in such a way that a signal of 4 milliamps represents a water level of 0 feet, and a signal of 20 milliamps represents a level of 19.8 feet of water. We used this pressure pump to apply a precise pressure to the sensor at 5 points along its "input range" and we wrote down the output signal values for each step. We need to see if the sensor's output is within 2% tolerance, of the original input versus output signal range it was calibrated to represent.

Below are the data we gathered from the transmitter. Is this within tolerance? Use this worksheet to help us solve this problem.

Input (ft)	0	4.9	9.8	14.7	19.6
Actual Output (mA)	3.96	7.76	11.52	15.52	19.4
Expected Output(mA)					
Precent Error					

The **actual output** values are the actual values from the transmitter. We're not sure if they are accurate so we need to find the **expected output** values from a mathematical model. By comparing the expected and actual output values, we can determine if the transmitter is functioning correctly. To create a math model we need to know a little about the tank and the transmitter. The tank can have between 0 to 19.6 feet of water in it. The transmitter ranges from 4 to 20 mA. Thus if there is 0 feet of water in the tank, the transmitter should read 4mA. If there is 19.6 feet of water in the tank the transmitter should read 20mA. This will take a few steps. Are you ready?

Create a linear equation and then fill in the expected outputs.

1. Define your variables in a complete sentence and algebraically.

2. Determine the constants of the equation. For linear equations, this is the slope and the y-intercept.