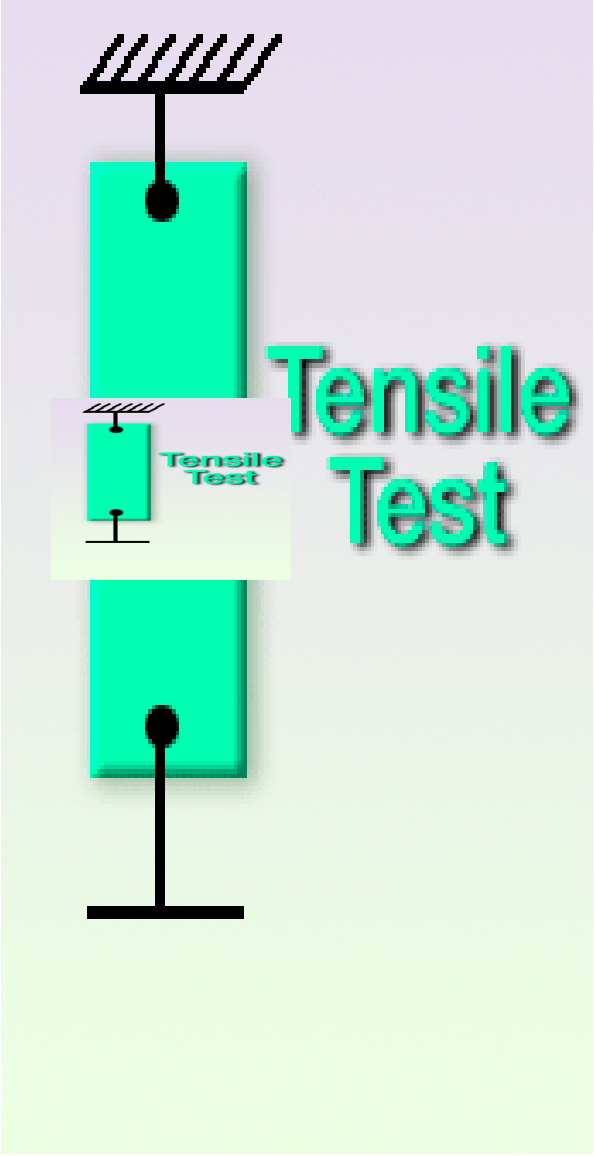
Name_____Period___ Date_____

You will use the concepts that you learned about corrosion to discover new characteristics of metals when related to tensile strength.



Procedure:

1.Gather the same five metals as previously used in the lab with corrosion. Measure the length, width and thickness of each piece. Record your data.

2. Punch two holes at each end of the sheet metal. If you are using wire make sure you secure it very tightly at the top so there is no slipping.

2.Using a ring stand or another method your teacher shows you hang one end of your material from a solid point that does not move, then you can hang weights/spring scale on the other end.

4. Add one weight.

5. Wait one minute and remeasure only the length.

6. Then add an additional weight. Set your timer for another minute. Remeasure only the length.

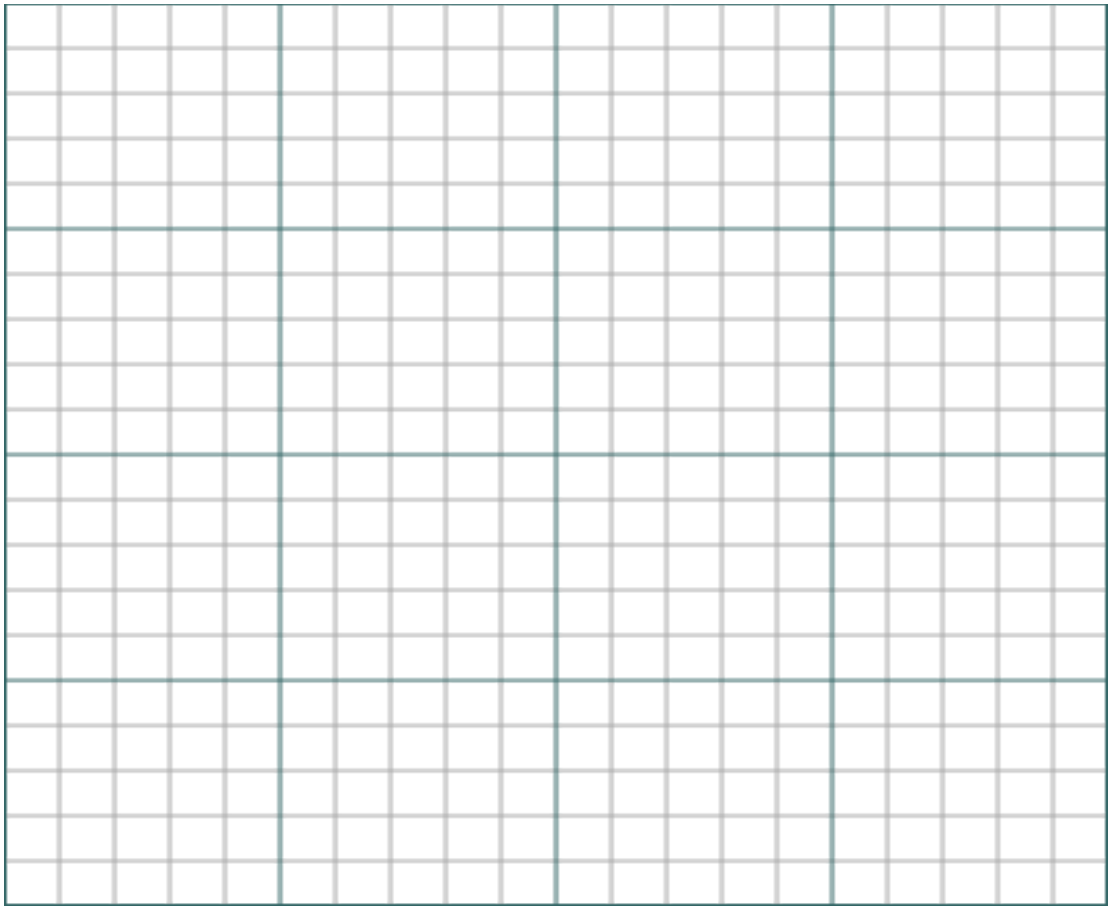
7. Add another weight and continue measuring length each minute until you have added all 5 weights.

Data Table:

List of Metals	Weight added (g)	Force (N) Weight (g) x 9.8	Area (mm^2) (width x thickness)	Length Stretched (mm)
1				
2				
3				
4				
5				

Stress $\frac{Force}{Area}$	**Strain (% Difference in length)** $\frac{Final\ Length - Initial\ Length}{Intial\ Length}$

8. Graph the strain(X-axis) and Stress (Y-axis)



Questions:

1. Do you see a linear relationship in the graph above?

2. The graph should have shown a linear relationship, if yours did not what were some sources of error that could have occurred?

3. Which metal stretched the most?

4. Which metal stretched the least?

5. How would you explain stress on a metal?

6. How would you explain strain on a metal?

Math Extension:

1. Determine the linear regression for each metal tested. Write the slope, equation and R^2 value for each metal. The slope of line is the tensile modulus (aka elasticity modulus) of the metal with units of N/mm^2.

Metal Type	Slope	Equation	R^2 value

2. For each metal, describe what your R^2 value indicated about the data you collected.

Metal Type	Explanation of R^2 value

3. Convert your tensile modulus to Million pounds per square inch (M Psi) using the following.

$$Mpsi = Slope * 0.00689476 * 10^{6}$$

Metal Type	MPa

4. Scan the QR code or click the link to view the Tensile (elasticity) Modulus (first column) for each metal. Then calculate the percent error for each metal tested.

SCAN ME

Metal	Experimental Tensile Modulus (Question 3)	Theoretical Tensile Modulus (Website)	Percent Error $\frac{\lvert Experimental - Theoretical \rvert}{Theoretical}$

5. Based on your percent errors, how trustworthy do you think your data and the experiment are?