

Name \_\_\_\_\_  
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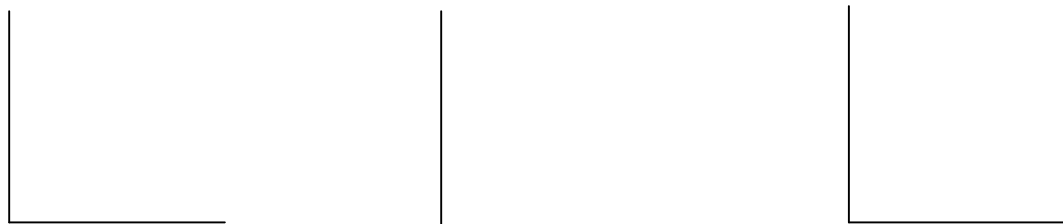
PS/ES Per. \_\_\_\_\_  
Mr. Landsman

# SETTLE DOWN!

## A Laboratory Investigation

**Background:** Most solid objects ( $D > 1\text{g/cm}^3$ ) will settle out of still water. The settling time depends on an object's properties. Complete the graphs below to predict the behavior of the objects based on their properties.

(Sphericity, Density, Size) Dependent Variable = \_\_\_\_\_



**Problem:** How do physical properties affect settling time?

### **Materials:**

Lead shot (00 & BBs)	Aluminum shot (00)	Steel shot (00)
Ring stand with cylinder	Copper (Steel) BBs	Steel Shards
Stopwatch	Mystery Fluid	Sediment Bin (canister)

### **Procedure:**

1. Obtain ring stand and sediment bin.
2. Determine the time it takes a particle to settle from line A to line B in the column of liquid and record the data in the table. Each group member should have two trials with each material.
3. Repeat step 2 for each variable (sphericity, size, density)
4. Remove the sediment from the cylinders and replace the dry particles back into their containers. Please take great care in replacing materials properly.
5. **Construct a line graph** of your data for each variable tested. All graphs must be on one sheet of paper (different axes). Use appropriate scale, units, axis labels, titles etc. Measurements of "Sphericity" are not attainable for this lab; therefore, plot locations indicating low and high on the Sphericity axis.

## Data Tables: include units

Material	Variable	Trial 1	Trial 2	Average
Lead Shot (Pb)	Density =			
Aluminum Shot	Density =			

Material	Variable	Trial 1	Trial 2	Average
Cu (Steel) BBs	Size = 4.5 mm			
Steel Shot	Size = 11 mm			

Material	Variable (H/L)	Trial 1	Trial 2	Average
Cu (Steel) BBs	Spherocity =			
Steel Shard	Spherocity =			

**Discussion Questions:** Please answer on separate paper in complete sentences.

1. a) Compare your results to your predictions (EACH OF THEM!!). Be specific.  
 b) Are the results of your trials consistent with *accepted* particle behaviors? **If not**, indicate the discrepancy and provide possible reasons for the outcome.
2. Retest any variables whose results were not consistent with accepted particle behaviors.
3. Based on accepted particle behavior, state the rule for how each variable affects the settling time of a particle.

Ex: *All other factors held constant, the greater the size of a particle...*

4. A stream is moving at 215cm/sec. The particles in suspension are all rounded quartz. Describe and illustrate the pattern of deposition as the stream enters a still lake. Include references to all particle sizes carried and deposited at specific velocities.