Name: _____

Lab Quiz 01: Estimates and Measurements

Answer each of the following questions using the information you collected during the lab. Please submit your completed quiz before you leave the lab. No papers will be accepted after the end of the lab period.

1. (1 point) Why would we practice making estimates in a science class?
   A) We shouldn't. Science is about making specific measurements, so estimating is a waste of time.
   B) If you can make good estimates, it can help you decide whether a measuring tool is appropriate to use for the measurement you need to make.
   C) Having an estimate, or a feel for the numbers, might help you recognize if you have measured or recorded something incorrectly.
   D) Since you estimate things every day, you might as well do it well. It's never a bad idea to improve your skills.
   E) All of the above, except A. Answers B, C, and D are all really good reasons to practice making estimates.

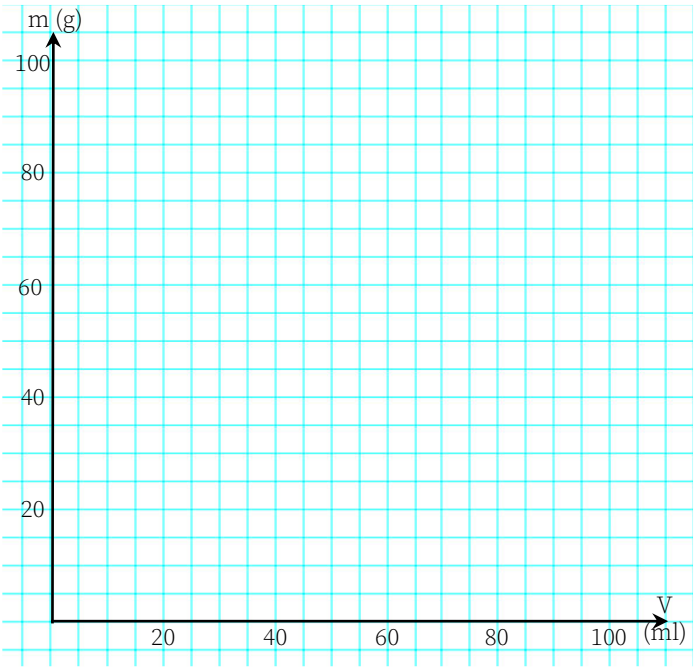
2. (1 point) Your estimates in inches turned out to be more accurate than your estimates in centimeters. However, your lab partner (who is an international student) made more accurate estimates in centimeters than inches. Why?
   A) Centimeters are smaller. The smaller the unit, the less accurate it will be.
   B) Inches are simply a much more accurate system of units to use than centimeters.
   C) Estimates are inherently inconsistent. No one can expect to be able to estimate anything accurately.
   D) You are more used to using inches, and therefore have a better idea of the size of the unit. Your partner is more used to using centimeters.

3. (8 points) Fill in the table below with two examples of objects which you estimated, then subsequently measured.

Object	Estimate (inches)	Measurement (inches)	Estimate (centimeters)	Measurement (centimeters)

4. (3 points) Choose **one** of the examples above, and calculate the **percent error** in your estimate. Select an example which does not have a zero percent (one which you did not estimate the value perfectly), and please show your work.

VOLUME (ml)	MASS (g)	DENSITY (g/ml)
20		
40		
60		
80		
100		



5. (10 points) Complete the table above with the masses you measured and the densities you calculated.

6. (5 points) Plot the graph, using the grid above on the right. Use a ruler to draw a best-fit line.

7. (4 points) Using two points that fall exactly on your line, calculate the slope, ρ. Don't forget your units!

$$\rho = \left(\frac{m_2 - m_1}{V_2 - V_1}\right)$$

8. (1 point) What does it mean if the points you graphed do not all fall exactly on the best-fit line you drew?
   A) Bad news. It means that your data are no good, and somebody really messed up the experiment.
   B) If the points are close to the line, but not exactly on it, the data are probably valid. It's possible that no one made any mistakes, but that there are limits to your accuracy even when everyone is careful.

9. (1 point) **True or false:** The density of water is not a constant. It decreases linearly, as shown by your data.

10. (1 point) What is the mass of 650 ml of water? Based on your own data, what would you predict?
    A) 0.650 g
    B) 325 g
    C) 650 g
    D) 1000 g
    E) Because the data only goes to 100ml, there is no way to predict the mass of 650 ml of water.