Density by Displacement Lab, done right.

Use this as a guide for this lab (and all the other labs). You need to learn to write these better, review this against your work.

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Cover includes a title for lab. This must be scientific, so Density Lab, Penny Density Lab, or Density by Displacement Lab would be good.

A funny sub title is optional. The main scientific title goes in bigger letters.

Add a picture, drawing, diagram, poem, etc. You only get graded on the NON-optional material.

Also the cover gets your name and your class period (1, 3, 6, or 8).

Objective: needs to be short and to the point. No more than a few sentences. Use the lab objective for a guide.

For this lab: the point of this lab was to measure densities of old and new pennies, and to use the data to determine the unknown metal in the newer pennies.

Everything else in the objective is extra (fluff).

Data tables: write neatly. measure mass to the 100th gram as provided to you by our fantastic electronic balances. Measure mL to the 10th place (each line is one mL, so you measure one more place by estimating how many tenths of an mL are present). You MUST measure to the 10th mL with our graduated cylinders.

Since you're measuring correctly, use proper Significant Figures. In this lab, you always get at least 2 SF, which limits your math later on to just 2 SF. Sig figs count, and from now on big X's will be placed where your significant figures don't jive with your data.

Your Graph:

Your title must be descriptive. Density of old and new pennies, or, Mass and Volume Comparison with old and new pennies, or, something smart like that. Penny Graph is not good. Old and New Pennies is just as vague.

Most of you had good labels and units, which are MANDATORY.

The lines must be straight. Straight lines here represent constant density of two different metals. They must be straight, or else density is no longer a constant.

The lines should not cross, or miss the 0,0 point on the graph. They might, but they shouldn't. If the lines cross that means that at some point one density = a different density, which it can't. If you miss 0,0, that means that you might have no volume with a mass, or the reverse, no mass taking up volume. Any mistakes in your measurements will allow for both of these errors. Use your data, do not fudge around this.

Use different colors, as the directions call for. At least properly label lines and data points. If all the points are the same (dots, for example), how will anyone (I) know which dots go to which line? Neat this up.

The lines must each be BEST FIT, which means if your dots are not perfectly lined up, your line is the best representation of your dots. Some dots are off the line due to your errors in measurement. Sometimes NO DOTS hit the line, but your line must be drawn to be the "average" line for your data. The only way around this problem would be to re-measure properly.

Questions...

1. The slope of the old penny line is to be calculated from two points on your line. Hopefully you will use your data points that are ON the line. Don't use points of yours OFF the line, they won't give the slope of a line if they're not part of that line. If you use points on the line, but not in your data table, use proper SF or else you give away your accuracy. Proper SF and units always count. You must do the slope math, not some density averages, not using just one point of data.

Show math close to your answers. Do not write a neat: "the slope of my old penny line is 8.7 g/mL and have the math three pages away, that makes it very hard to grade your reports.

Show a formula, show data points you are subtracting and dividing. Do the math.

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2. Same as question one. Label answers too. This one should start out with: "Slope of new penny line".

Slope is density in our lab (if your graph is correct with mass as function of volume).

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3. Label this Percent Error between density of old pennies and copper, or rather "%E old vs. Cu" for short. Now do the math right there, with proper SF and units!

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4. Make a chart of ALL ELEMENTS with a density of +/- 0.5 g/cm^3 as your new penny slope = new penny density value. All the elements, with density values, as asked for.

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5. Label this one %E new penny density vs. zinc. Don't just do math, without connecting it. Imagine reading your work unlabeled. What would it mean?

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6. This is a tougher question, it's math theory, but NO BLANKS are ever allowed. Ask or even call me. If your graph was volume as a function of mass (which is backwards) you'd still have straight lines, and still get slopes, but since your slope would be volume over mass this is not density. It would be the reciprocal of density, otherwise recognized as gobbledygook.

7. If you splash your pennies you would lose water and get the wrong volumes. You would not get inaccurate calculations, you're not calculating until later on, using this data. Your data would be flawed, your calculations could still be correct (giving you inaccurate answers).

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8. Learn this formula. Practice the algebra. Either you know the formula changes to mass = density x volume, or you come in and learn it. Significant figures here are NEVER GIVEN AWAY. 84.00 mL does not equal 84 mL.

Your answer gets 4 SF, be careful here with this stuff, this is the third lab report already.

Conclusions are the hardest part. You are required to think, condense your thoughts, sound smart, sound interested, and conclude. I looked up "conclude" and this is what I got:

1. To bring to an end; close.
2. To bring about (a final agreement or settlement).
3. **To reach a decision or form an opinion about.**
4. **To arrive at (a logical conclusion or end) by the process of reasoning; infer on the basis of convincing evidence**.

This means you need to state things such as:

I measured the masses and volumes for 25 old pennies and for 25 new pennies.

I drew a graph representing this data.

I calculated the slopes of these two data sets to **determine** the density of the old pennies and of the new pennies.

My measured density for the old pennies was _____ g/cm^3. The actual density of the copper is 8.960 g/cm^3. **My percent error for this was _____ %**. It is most likely due to (come up with something smart here, for example, error in reading the graduated cylinder).

My measured density for the new pennies was _____ g/cm^3. Comparing that to all the elements in table S, =?- 0.5 g/cm^3, therefore I conclude that the element that is in the new penny core is _____. I know that the metal in the new pennies is zinc, with a density of 7.133 g/cm3. **My % Error on this density calculation was ___%,** most likely due to (be smart again: your errors in volume measurement of new pennies in graduated cylinders).

In a conclusion you MUST come to some conclusion. Don't tell stories, humor is wonderful, but only when it's in conjunction with great thoughts of the questions at hand. Don't use bad grammar, or forget units here either. Never use unsupported data, or words like about. Data is, equal means exactly one thing, not some wishy- washy vague something or another.

You measure, you calculate, you determine. State the facts as facts. Don't hint at what you think, or worse, what you hope for. Own your data like a dog on a leash. Commit to it, then, explain your errors with facts that you know but didn't measure.

No one is perfect (including me, first). You need to learn, you need practice, you need to see what you've done wrong so you can do it right in the future. The start of every year is like this, hard for us all.

Please come see me if you don't understand my comments. I go to great lengths to point things out, so I can highlight for you what I think you're missing. If you miss my comments, or find them confusing, no learning is going on.

If I mark your work with an X and deduct points, but you think you're right anyway, you're invited into defend your thoughts. I make mistakes sometimes too. I love the challenge, and so should you. I hope if I misunderstand your work, you can still be right if you show me what I missed.

This is a long and drawn out learning process. I will work hard as I can to help you learn chemistry. You need to keep up your end too, and don't just accept back what I give you without a good going over. Learn, that's your job. Teach, that's mine. It's a complementary process. See you later, alligators.