Measuring the Density of Pennies

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Grade Level: 8

Topic:

- Physics
- Mathematics
- Data Organization

Time: 2 class periods

Overview: This lab introduces the students to density by measuring the mass and volume of United States pennies minted in several years.

Objectives:

- Use an arithmetic series to predict the density of groups of pennies
- Determine and compare the densities of pennies minted before and after 1982.

Key Vocabulary:

- Mass
- Volume
- Density
- Copper
- Zinc
- Meniscus
- Slope

NJCCCS: 4.1.A, 4.1.C, 4.2.D, 4.2.E, 4.3.A, 4.3.B, 4.3.C, 4.3.D, 4.3.E, 4.3.F, 5.1.A, 5.1.B, 5.3.A, 5.3.B, 5.3.C, 5.3.D

Materials/ Resources:

- 40 pre – 1982 pennies per group
- 40 post – 1982 pennies per group
- Balances

- 50 mL graduated cylinders
- Paper towels
- 20 colored pencils

Procedures:

1. Have the student find the mass of increments of five pennies using the balance. Record the data in table 1 in the enclosed data and observation sheet.
2. Fill a 50 mL graduated cylinder around the 20 mL mark, and record the initial volume. Have students read the volume using the bottom of the meniscus.
3. Drop five pennies into the cylinder and record the new volume. Do this for increments of five pennies until all 40 pennies have been added.
4. Record the net volume of 40 pennies by subtracting the initial volume from the final volume. Enter the net volume for each group of pennies in column 4 of data table 1
5. Repeat mass and volume procedures for the post 1982 pennies and record the data in table 2.
6. Have students predict the equation that describes both sets of data. Predict the values for more groups of pennies.
7. Graph results for both sets of pennies on the same graph. Have students find and discuss the slope of each line. Have them explain why the slope represents the density of the pennies.
8. Have the students investigate the density of copper vs. the density of zinc.

Accommodations made for students with disabilities and English language learners:

- Students are put into groups and assigned specific tasks
- Activity is hands-on and kinesthetic
- Diagrams and data tables are provided

Assessment:

- Students will turn in their data tables and graphs to be graded
- Instructor will be actively participating to gauge understanding