

NAME: _____

DATE: ___

PERIOD: ___

Penny Lab

Background: The students of my class will determine the density of an unknown solid substance. The students will calculate the mass, volume and use their known measurements to calculate the density of each object.

Materials: 1 per student:

2 graduated cylinder of different sizes, 10 old pennies, 10 new pennies, 10 marbles balls, 1 triple beambalances, and this lab worksheet.

Extras: water source, paper towels,

Procedures:

1. Tare each scale to zero and get a 10 count of 3 different metals.
2. Measure the mass of each individual solid object and record the measurement in the data table.
3. Add all the mass you weight for that object and divide by 10 to calculate the average mass of each penny.

Total Average mass= total mass of all the pennies / total # of pennies.

4. Measure the volume.
 - a. By using water displacement
 - b. Fill a graduated cylinder to a selected number (30mL works great) and record your BEFORE volume.
 - c. **Place all the pennies in the graduated cylinder and take an average volume of all the pennies because the volume of one penny is too hard to calculate.** It's **much** easier to calculate the volume of all the pennies because the water displacement is much larger than just one penny. Reocrd your AFTER volume.
 - d. **Subtract the AFTER minus the BEFORE and then divide by 10 to get the average.**
5. **Next calculate the Density and record your results.**

AVE. DENSITY= Average Mass (g) / Average Volume (mL).

6. **Repeat the procedures using the second metal and the third metal. Not all the metals or objects are NOT the same mass or volume; so don't assume that they are.**

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DENSITY CHART

Lead = 11.36 g/mL

Aluminum = 2.7 g/mL

Brass = 2.34 g/mL

Copper = 8.92 g/mL

Mercury = 13.57 g/mL

Platinum = 21.45 g/mL

Steel = 7.85 g/mL

Tungsten (W) = 19.25 g/mL

Zinc = 7.140 g/mL

Gold = 19.3 g/mL

Iron (cast) = 7.00 g/mL

Iron (Fe) = 7.784 g/mL

Magnesium (alloy) = 1.77 g/mL

Nickel = 8.908 g/mL

Silver = 10.49 g/mL

Tin = 7.31 g/mL

Acrylic = 1.18 g/mL

Teflon = 2.2 g/mL

Glass = 2.5 g/mL

Stainless Steel = 7.5 to 8.0 g/mL

Water (distilled) = 0.997 g/mL

Water (distilled@20 °C) = 0.998 g/mL

Water (distilled@4 °C) = 1.000 g/mL

Water (Ice) = 0.900 g/mL

Water (Sea @ 13 °C) = 1.024 g/mL

Water (Steam@100 °C) = 0.600 g/mL

ROCKS

Limestone = 2.0 g/mL

Marble = 2.7 g/mL

Granite = 2.6 g/mL

Minerals

Quartz = 2.6 g/mL

Sulfur = 1.96 g/mL

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Metal#1	Metal#2	Metal#3
TOTAL	TOTAL	TOTAL
Ave. Mass=	Ave. Mass=	Ave. Mass=

After

BEFORE

Metal#1	Metal#2	Metal#3
Ave. vol=	Ave. vol=	Ave. vol=

Metal#1	Metal#2	Metal#3
Mass	Mass	Mass
Vol	Vol	Vol
Density =	Density =	Density=