

## LESSON

## 5

LAB

# All That Glitters

## Density

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

**Purpose**

To use density to determine whether the gold-colored penny is solid gold.

**Materials**

- balance
- gold-colored penny

**Part I: Calculating Density**

- Density is mass divided by volume. Use the mass and volume measurements in this table to calculate the density of each object.

$$D = \frac{m}{V}$$

**Density**

Object	Mass	Volume (mL)	Density (g/mL)
5 cm gold-colored rod	55.4 g	6.6 mL	
5 cm silver-colored rod	17.8 g	6.6 mL	
10 cm silver-colored rod	35.6 g	13.2 mL	
10 cm crayon	3.2 g	13.3 mL	

- Which object has the highest density?
- Which object has the lowest density?
- What does it mean to say that a substance has a high density?
- Two of the objects have the same density. Explain how two objects with different masses and volumes can have the same density.
- If you had a 1 cm<sup>3</sup> cube of the gold-colored metal, what would its mass be? How do you know?
- The densities of several metals are given in the table on the next page. Based on your calculations, what are the identities of the gold-colored and silver-colored metals from your activity?

### Densities of Metals

Copper	Zinc	Gold	Aluminum	Brass
9.0 g/mL	7.1 g/mL	19.3 g/mL	2.7 g/mL	8.4 g/mL

8. The density of an iron nail is the same as the density of an iron frying pan. Explain how this can be true.

### Part 2: Comparing Densities

9. Find the mass of your gold-colored penny, then calculate the density. The volume of a penny is 0.36 mL.
10. Can you use the density value you just calculated to determine whether the gold-colored penny you made in class is gold? Explain.
11. You have a piece of metal with volume 30.0 mL and mass 81.0 g. What is its density? What kind of metal do you think it is?
12. **Making Sense** How can determining the density of an object help you figure out what it is made of?
13. **If You Finish Early** How much would 1 cubic meter of solid gold weigh in pounds? Here are some conversion factors:

$$1 \text{ lb} = 454 \text{ g} \quad 1 \text{ mL} = 1 \text{ cm}^3 \quad 1 \text{ m}^3 = 1,000,000 \text{ cm}^3$$