Name: _____ Date: _____

Identifying a Metal by Density

Plot mass vs volume to figure out what an unknown artifact is made of

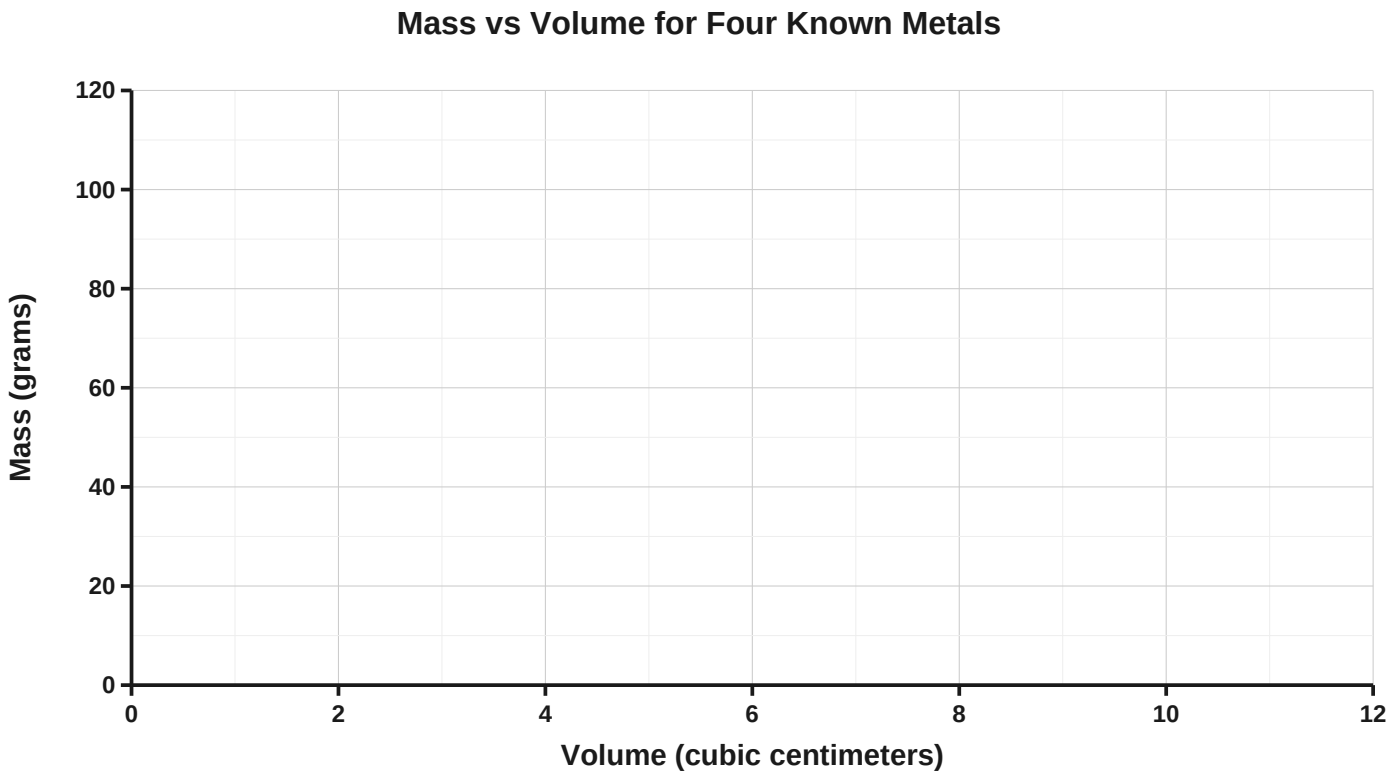
You are a **museum conservator**. An unlabeled metal artifact arrives at the museum. Lab tests have already confirmed it is made of a single pure metal element (not an alloy). The artifact has a volume of **5 cm^3** and a mass of **44.5 g**. Use the data below to figure out which metal the artifact is most likely made of.

Step 1: Plot the four reference metals AND the unknown artifact.

Plot all four metals AND the unknown artifact:

- Aluminum (solid line)
- Iron (dashed line)
- Copper (dotted line)
- Lead (dashdot line)
- **Unknown artifact (V = 5 cm^3, m = 44.5 g) -- BIG PURPLE STAR**

Volume (cm^3)	Aluminum (g)	Iron (g)	Copper (g)	Lead (g)
2	5.4	14.4	17.9	22.7
5	13.6	36.0	44.7	56.6
8	21.7	57.6	71.5	90.6
10	27.1	72.0	89.4	113.3



Step 2: Identify the unknown metal.

Use your graph to figure out which metal the artifact is most likely made of.

Look at the unknown star. Which of the four metal lines does the star sit on (or closest to)?

Calculate the density. The artifact has a mass of 44.5 g and a volume of 5 cm^3. Use density = mass ÷ volume to calculate its density. Compare to the four known metals.

Make a claim. Based on both your visual check and the calculation, which metal is the artifact most likely made of?

Step 3: Reflection questions

1. What is the calculated density of the unknown artifact? Show your math.

2. Which of the four reference metals has the density that is CLOSEST to the artifact's calculated density?

3. Looking at your graph, which metal's line has the STEEPEST slope? Why does that line have the highest slope?

4. Based on your graph, which metal is the unknown artifact most likely made of? Use specific numbers from the graph as evidence to support your answer.