PHYS1120

Summer 2025

1. Goal(s)

- Identify the material of an unknown object based on thermodynamics.

2. Materials

- 1000 mL beaker
- calipers
- hot plate
- metal object
- gloves
- styrofoam container
- scale
- *Logger Pro* temperature probe
- *Logger Pro* software

3. Equation(s)

$$Q = mc\,(T_f - T_i)$$

$$Q_{\text{gained}} = -Q_{\text{lost}}$$

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

Substance	Specific heat (J kg^{-1} °C)	Density (kg m^{-3})
Aluminum	900	2700
Copper	387	8800
Gold	129	19320
Iron, steel	452	7800
Lead	128	11300
Silver	235	10490
Brass	377	8440

4. Methodology

Devise a plan to determine what the object is made of. Be sure to zero the scale when recording masses and avoid direct contact between the metal object and hot plate when heating. Use the tongs and gloves whenever you are dealing with the hot plate.

5. Analysis

6. Conclusions

The material is: _____