

### Quiz #7: Using Energy and Thermal Properties of Matter

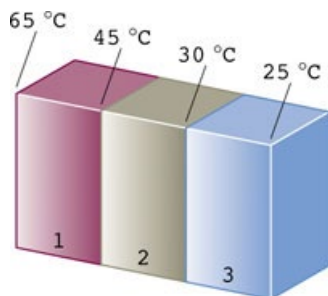
**Problem 1** (2 points)

Helium gas at  $20\text{ }^{\circ}\text{C}$  is confined within a rigid vessel. The gas is then heated until its pressure is doubled. What is the final temperature of the gas?

- a)  $10\text{ }^{\circ}\text{C}$
- b)  $20\text{ }^{\circ}\text{C}$
- c)  $40\text{ }^{\circ}\text{C}$
- d)  $313\text{ }^{\circ}\text{C}$
- e)  $586\text{ }^{\circ}\text{C}$

**Problem 2** (2 points)

The drawing shows a composite slab consisting of three materials through which heat is conducted from left to right at a constant rate. The materials have identical thicknesses and cross-sectional areas.



Which material (1, 2, or 3) has the largest thermal conductivity?

Which material (1, 2, or 3) has the smallest thermal conductivity?

**Problem 3** (2 points)

Walking at a brisk pace uses energy at a rate of about  $380\text{ W}$ . How many Calories would the human body burn while walking for 45 minutes? Take into account the efficiency of the human body.

**Problem 4** (4 points)

A 125.0-kg block of ice has a temperature of  $-10.0\text{ }^{\circ}\text{C}$ . The block of ice then absorbs  $6.20 \times 10^7\text{ J}$  of heat. What is the final phase (solid, liquid or gas) and temperature?

$$c_{\text{water}} = 4186\text{ J/(kg }^{\circ}\text{C)}$$

$$c_{\text{ice}} = 2.00 \times 10^3\text{ J/(kg }^{\circ}\text{C)}$$

$$L_f = 3.33 \times 10^5\text{ J/kg}$$

$$L_v = 22.6 \times 10^5\text{ J/kg}$$