UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

PH 125 / LeClair Spring 2009

Quiz 9: Temperature, Heat, & Thermodynamics

$$Q = cm\Delta T \qquad c_{\text{ice}} = 2.22\,\text{kJ/kg}\cdot\text{K}$$
$$Q = Lm \quad \text{phase change} \qquad c_{\text{water}} = 4.19\,\text{kJ/kg}\cdot\text{K}$$
$$T[K] = T[C] - 273.15 \qquad L_{F,\text{ice}} = 333\,\text{kJ/kg}$$

1. How much heat must be absorbed by ice of mass $m = 0.72\,\text{kg}$ at $T_i = -20°\text{C}$ to bring it to a liquid state at $T_f = 15°\text{C}$?

- ■ 317 kJ
- □ 187 kJ
- □ 207 kJ
- □ 97 kJ

2. In the previous question, which step in the melting and heating process requires the *greatest* heat input?

- □ warming the ice
- ■ melting the ice
- □ warming the liquid

3. In the previous question, which step in the melting and heating process requires the *smallest* heat input?

- ■ warming the ice
- □ melting the ice
- □ warming the liquid

4. A $0.050\,\text{kg}$ ingot of metal is heated to 200°C and dropped into a beaker containing $0.400\,\text{kg}$ of water initially at 20.0°C. If the final equilibrium temperature is 22.4°C, what is the specific heat c of the metal? Ignore heat transferred to the beaker and boil-off of the water. Assume the system is isolated. (Note: $c_{\text{water}} = 4186\,\text{J/kg}\cdot\text{K}$.)

- □ 279 J/kg·°C
- □ 148 J/kg·°C
- □ 721 J/kg·°C
- ■ 453 J/kg·°C

5. The temperature of a silver bar rises by 10°C when it absorbs 1.23 kJ of energy by heat. The mass of the bar is 525 g. Determine the specific heat c of silver.

- ■ 234 J/kg· K
- □ 1240 J/kg· K
- □ 1.95 J/kg· K
- □ 8820 J/kg· K