

HEAT TRANSFER WORKSHEET

DIRECTIONS: using the following formulas, solve the problems below:

$$\Delta T = T_f - T_i$$

$$Q = mC\Delta T$$

1. A large pan on the stove holds a volume of 50 cm^3 of water. How much heat is needed to increase the temperature of the water from 10°C to 100°C ? The mass of the water is 250 g. The specific heat of water is $1 \text{ cal/g } ^\circ\text{C}$. How much heat transfer is required to raise the temperature of the water from 10°C to 100°C ?
2. A 5.5kg brass ball at 120°C is placed in an insulated container of water at 20°C . When the ball and the water reach thermal equilibrium, their temperature is 50° . The Specific Heat for brass is $0.091 \text{ kcal/kg } ^\circ\text{C}$.
 - a.) What amount of heat is transferred between the ball and water?
 - b.) What is the mass of the water in the container?
3. A teakettle holds 400g of water. How much heat is needed to increase the temperature of the water from 5°C to 100°C ? What is the amount of heat transfer in calories needed to raise the temperature of the water from 5°C to 100°C . (HINT: use table 1.7, pg 71.)
4. A 200g block of gold has a temperature of 20°C . How much heat is needed to melt the gold so that it can be placed in a gold bar mold? (HINT: use Table 1.8, pg 75.)
5. The temperature of 500g of water is 20°C . How much heat is needed to vaporize all of the water? (HINT: use Table 1.8, pg 75.)
6. A 20g ice cube has a temperature of -10°C . How much heat is needed to melt the ice cube and warm the resulting water to room temperature? This is a phase change problem and requires four steps: (HINT: use Tables 1.7 & 1.8)
 - a.) Calculate the heat Q_1 to increase the temperature of the ice cube to the melting point, from -10° to 0°C . For ice, $C = 0.49 \text{ cal/g } ^\circ\text{C}$.
 - b.) Calculate the heat Q_2 needed to melt the ice.
 - c.) Calculate the heat Q_3 needed to raise the temperature of the water from 0°C to 20°C .
 - d.) Determine the total (sum) of heat required.