

### Thermal Energy Worksheet (p. 1)

#### Honors Physical Science

Show "K-U-E-S" on your own paper where necessary. Otherwise answer completely on your own paper.

1. A 10.0 g piece of copper wire, sitting in the sun reaches a temperature of  $80.0^{\circ}\text{C}$ . How many Joules are released when the copper cools to  $40.0^{\circ}\text{C}$ ? The specific heat capacity of copper is  $0.377 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ .
2. The specific heat capacity of water is  $4.184 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ . How much thermal energy is required to change the temperature of 700.0 g of water from  $25.6^{\circ}\text{C}$  to  $75.4^{\circ}\text{C}$ ?
3. How much thermal energy is released when a 201 g piece of blown glass at an initial temperature of  $150^{\circ}\text{C}$  is cooled to  $25^{\circ}\text{C}$ ? The specific heat capacity of glass is  $0.837 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ .
4. If 2077 J are released to change the temperature of a block of ice initially at a temperature of  $-20^{\circ}\text{C}$  to  $0^{\circ}\text{C}$ , find the mass of the ice. Ice has a specific heat capacity of  $2.077 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ .
5. Mercury has a specific heat capacity of  $0.139 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ . How many Joules are required to change the temperature of a 50.0 g sample of Mercury from  $20.7^{\circ}\text{C}$  to  $100.4^{\circ}\text{C}$ .
6. A balloon is filled with 0.5 g of air, which has a specific heat capacity of  $1.046 \text{ J}/(\text{g}\cdot^{\circ}\text{C})$ . How many Joules are required to change the temperature from  $20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ ?
7. A 25 g block of sugar requires 781 Joules to change the temperature from  $25^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ . What is the specific heat capacity of sugar?
8. When a 400.0 g of ammonia is cooled from a temperature of  $25^{\circ}\text{C}$  to  $10^{\circ}\text{C}$ ; 13,054 Joules of thermal energy are released? Find the specific heat capacity of ammonia.
9. Does a substance that heats up quickly have a high or a low specific heat capacity? Does a substance that cools down quickly have a high or a low specific heat capacity? Explain both.
10. Why will a **watermelon** stay cool for a longer time than **sandwiches** when both are removed from the same cooler on a hot day?
11. The desert sand is very hot during the day and very cool at night. What does this tell you about the sand's specific heat?
12. How much thermal energy is necessary to melt 500.0 g of ice at its freezing point?
13. How much thermal energy is necessary to vaporize 36.00 g of water at its boiling point?
14. If 5,100 Joules are released when a sample of water freezes, what is the mass of the water?