

Name _____ Period _____ Date _____

Q=mcΔT Worksheet

Specific Heat Capacities of Common Substances

MATERIAL	SPECIFIC HEAT J/kg°C		MATERIAL	SPECIFIC HEAT J/kg°C
alcohol	2450		ice	2060
aluminum	903		iron	450
brass	376		lead	130
carbon	710		silver	235
copper	385		steam	2020
glass	664		water	4180
gold	129		zinc	388

1. To raise the temperature of one kg of zinc, 1 °C, you must add _____ J of thermal energy.
2. Which metal will gain heat faster? brass or gold?
3. Which metal will cool off slower? copper or iron
4. Which substance on the chart has the highest specific heat capacity?
5. Why should you not wear gold or silver jewelry into the hot sauna?

$$Q=mc(T_f-T_i) \text{ or } Q=mc\Delta T$$

6. A block of brass is heated from 22°C to 78°C. The mass of the block is 15 kg. How much thermal energy must be added to the block of brass?
7. How much thermal energy is needed to raise the temperature of 25 kg of gold from 45°C up to 80°C?
8. What is the mass of a block of zinc that requires 1000 J of thermal energy to raise its temperature from 50°C to 60°C?
9. If 5000 J of thermal energy was added to a 100 kg block of silver at 45°C. What is the new temperature of the block of silver?
10. A block of copper that requires 2000 J of thermal energy to raise its temperature from 40°C to 75°C. What is the mass of the block of copper?

11. How much heat is needed to raise the temperature of 50.0 g of water from 4.5°C to 83.0°C?
12. How much heat must be added to 50.0 g of aluminum at 25°C to raise its temperature to 125°C?
13. A 500 g block of metal absorbs 5016 J of heat when its temperature changes from 20.0°C to 30.0°C. Calculate the specific heat of the metal.
14. A copper wire has a mass of 165 g. An electric current runs through the wire for a short time and its temperature rises from 21°C to 39°C. What minimum quantity of energy is converted by the electric current?
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15. A 100 g mass of tungsten at 100.0°C is placed in 200 g of water at 20.0°C. The mixture reaches equilibrium at 21.6°C. Calculate the specific heat of tungsten.
16. A 10 kg piece of zinc at 71°C is placed in a container of water. The water has a mass of 20.0 kg and has a temperature of 10.0°C before the zinc is added. What is the final temperature of the water and zinc?
17. A 200 g sample of brass at 100.0°C is placed in a calorimeter cup that contains 261 g of water at 20.0°C. Disregard the absorption of heat by the cup and calculate the final temperature of the brass and water.
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18. A person who eats 2400 food calories (2400 Calories) each day consumes 1.0×10^7 J of energy in a day. That amount of energy could raise the temperature from 0°C to 100°C for how much water?
19. A 750 kg car moving at 23 m/s brakes to a stop. The brakes contain about 15 kg of iron that absorb energy. What is the increase in temperature of the brakes?
20. A 4.2 g lead bullet moving at 275 m/s strikes a steel plate and stops. If all the kinetic energy is converted to thermal energy and none leaves the bullet, what is its temperature change?

6. 315840 J	7. 112875 J	8. 0.258 kg	9. 45.213 °C	10. 0.148 kg
11. 16406.5 J	12. 4515 J	13. 1003.2 J/kg °C	14. 1143.45 J	15. 170.6 J/kg °C
16. 12.7 °C	17. 25.2 °C	18. 23.9 kg	19. 29.3 °C	20. 291 °C