

Name: _____ Date: _____ Period: _____

Calculating Heat and Specific Heat

Heat (q)

$$q = c \times m \times \Delta T$$

Specific Heat (c)

$$c = \frac{q}{m \times \Delta T}$$

Variable	Symbol	Unit
Heat	q	J
Specific heat	c	(J/g °C)
mass	m	g
Change in temperature	ΔT	°C

Specific Heat

Substance	(J/g °C)
Air	1.01
Aluminum	0.902
Copper	0.385
Gold	0.129
Iron	0.450
Mercury	0.140
NaCl	0.864
Ice	2.03
Water	4.18

Example:

50 g of gold with a specific heat of 0.129 is heated to **115 °C**; the gold cools until the **final temperature is 29.3 °C**

Calculate the **Heat** of the Metal

$$q = m \times c \times \Delta T$$

q metal = _____ J

Problems: Write the Formula, set up problem, and answer in correct units.

1. Ethanol which has a specific heat of 2.44 (J/gx°C). The temperature of 34.4 g of ethanol increases from 25 °C to 78.8 °C.
How much **Heat** was absorbed?

2. 3 grams of Aluminum was heated from 20 °C to 662 °C while absorbing 1728 J of heat. What is the **specific heat** of Aluminum?

3. A metal mass of 5 grams absorbs 240 J of heat temperature increases
Temperature increases by 200°C. What is the specific heat?

4. Calculate the total amount of heat a beaker of water would absorb sitting in the sun. The water has a mass of 500g, a specific heat of 4.184 (J/g \times $^{\circ}$ C), and had a change in temperature of 22 $^{\circ}$ C.

5. If the temperature of 100 g of water increases from 10 to 45 $^{\circ}$ C, how much heat is absorbed? (Specific heat of water = 4.184 J/g $^{\circ}$ C)

6. If the temperature of 15 g of aluminum increases from 20 to 350 $^{\circ}$ C, how much heat is absorbed (specific heat of aluminum = 0.897 J/g $^{\circ}$ C)

7. A 28 g coin absorbs 658 J of heat while it increases in temperature from 25 to 125 $^{\circ}$ C. What is the **specific heat** of the metal in the coin?

8. How much heat is required to raise the temperature of 854 g of water from 23.5 $^{\circ}$ C to 85 $^{\circ}$ C?
(HINT: use the specific heat for water)

9. How much heat is lost when 4110 gram metal bar whose specific heat is 0.2311 J/ g $^{\circ}$ C cools from 100 $^{\circ}$ C to 20 $^{\circ}$ C.

10. What mass of water will be needed to change its temperature 25 $^{\circ}$ C using 4,532 J of heat energy?