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

q = total heat flow
m = mass
c = specific heat
ΔT = change in temp.

<u>Example #1:</u> Calculate the number of Joules required to warm 100.0 g of water from 25.0°C to 80.0°C.

$q = m \times \Delta T$
$q = (100.0\ g)(4.1840\ J/g\ °C)(80.0\ °C - 25.0\ °C) = 23,012\ J = 2.30 \times 10^4\ J$

<u>Example #2:</u> Calculate the number of Joules released when 72.5 grams of water at 95.0°C cools to 20.0°C.

$q = m \times \Delta T$
$q = (72.5g)(4.1840)(20.0\ °C - 95.0\ °C) = -26123.7\ J = -2.61 \times 10^4\ J$

<u>Practice Problems:</u>

1. Calculate the heat required to warm 25.3 grams of water from 14.0°C to 22.3°C?
Answer: q = 906 J

2. Determine the heat released when 75.0 grams of water are cooled from 100.0°C to 27.3°C. Answer: $q = -2.27 \times 10^4\ J$

3. The specific heat of gold is 0.128 J/g °C. How much heat would be needed to warm 250.0 grams of gold from 25.0°C to 100.0°C?
Answer: $q = 2.40 \times 10^4\ J$

4. The specific heat of zinc is 0.386 J/g °C. How much heat would be released when 454 grams of zinc at 96.0°C were cooled to 20.0°C?
Answer: $q = -1.20 \times 10^4\ J$