Calculation of Heat Required/Released during a temperature change.

$Q = mc\Delta T$

Where Q is the heat required (+) or released (−) (J)

m is the mass of the water (g)

c is the specific heat capacity of liquid water $\left(4.18 \frac{J}{g \cdot °C}\right)$

ΔT is the temperature change (°C)

$(\Delta T = T_f - T_i)$

Example

How much heat energy is needed to increase 252g of water from 22.3°C to 95.8°C?

$m = 252g$
$T_i = 22.3°C$
$T_f = 95.8°C$
$c = 4.18 \frac{J}{g \cdot °C}$
$Q = ??$

$Q = mc\Delta T$

$Q = mc(T_f - T_i)$

$Q = (252g)\left(4.18 \frac{J}{g \cdot °C}\right)(95.8°C - 22.3°C)$

$Q = (252g)\left(4.18 \frac{J}{g \cdot °C}\right)(73.5°C)$

$Q = 77421.96\ J$

$Q = +7.74 \times 10^4\ J$

absorbed

$7.74 \times 10^4 J$ was required to heat the water.

What if you had to solve for m?

$Q = mc\Delta T$

$m = \frac{Q}{(c\Delta T)}$

* BE CAREFUL!! (with products in the denominator)