Heat

$q=mc\Delta T$

1. The specific heat capacity of water is c = 4200 J/kg°C.

   a) How much energy does it take to raise 1 kg of water by 1°C?
   b) How much energy does it take to raise 500g of water from 25°C to 80°C?
   c) A kettle uses 200 kJ of energy to accomplish b). What is the efficiency of the kettle?

2. It takes 20 kJ of energy to raise the temperature of a 1kg unknown object from 17°C to 80°C. What is the specific heat capacity of this material?

3. A 1000W water heater with 45% efficiency takes 5 mins to heat water from 10°C to 65°C. How much water was heated (in kg)?

4. A 3.2 kg block of copper (c=385 J/kg°C) is thrown in a tub with 5kg of water at 25°C. After a short time, the copper's temperature changed from 200°C to 30°C. What is the final temperature of the water? Assume the system is thermally isolated.

5. A block of copper is thrown in a tub with 3 kg of water. After a short time, the copper's temperature changed from 250°C to 50°C, while the water's temperature changed from 25°C to 50°C. What is the mass of the copper block?