T-2 ANSWERS Define the following terms:

thermo-chemistry	the study of chemistry and how energy is gained and lost in a reaction (often as heat)
energy	something having the potential to do work or provide heat
chemical potential energy	energy stored inside chemical bonds, it can be released in a reaction
law of conservation of energy	like matter, energy cannot be created or destroyed in any chemical or physical reaction or process
exothermic	a reaction that gives off heat, has a -ΔH
endothermic	a reaction that absorbs energy or heat, from the environment, has a +ΔH
calorie	the amount of energy it takes to raise the temperature of 1.0 grams of pure water by 1.0 Kelvin
Calorie	a "food calorie", is actually a kilo-calorie, or 1000 calories
Joule	the metric unit for energy, as a conversion, 4.18 Joules = 1 calorie
specific heat capacity	is a constant, it is the amount of energy it takes to move the temperature of 1.0 grams of a substance by 1.0 Kelvin. The "C", or specific heat capacity for pure liquid water is 4.18 Joules/g·K.
heat capacity	the amount of energy it takes to change the temperature of a substance by 1.0 K, this is NOT A CONSTANT, it depends upon what stuff it is, and how much of this stuff you have

The basic heat formula $q = mC\Delta T$ must be recognized from Table T in the regent's reference chart. What do each of these letters stand for q, m, C, and ΔT.

q = the amount of energy, in joules

m = mass, in grams

C = the specific heat capacity, which is a constant for every substance

ΔT = the change in temperature, in centigrade degrees

Answers to Problems:

3. If 870. Joules of heat is added to 6.8 grams of olive oil at 293 K, the temperature rises to 323 K. What is the specific heat of olive oil?
   SUBSTITUTE IN WHAT YOU KNOW, SOLVE FOR "C"

$q = mC\Delta T$	870. J = (6.8g)(C)(64 K)	C = 2.0 J/g·K

4. How much heat in Joules is required to raise the temperature of one pound of Hg from 293 K to 323 K? (the specific heat of Hg = 0.14 J/g·K)
   SUBSTITUTE IN WHAT YOU KNOW, SOLVE FOR "q"

$q = mC\Delta T$	q = (454g)(0.14 J/g·K)(30.0 K)	q = 1910 J

5. How much heat in Joules is required to raise the temperature of one pound of water from 293 K to 323 K? (the specific heat of water is 4.18 J/g·K)
   SUBSTITUTE IN WHAT YOU KNOW, SOLVE FOR "q"

$q = mC\Delta T$	q = (454g)(4.18 J/g·K)(30.0 K)	q = 56,900 J

NOTE: question #2 and #3 have the same number of grams of substances (Hg, then H_2O) and the same overall temperature change.

They have an incredibly different number of Joules it takes to warm them both up by the same 30.0 K. Water is hard to warm up because of its very high specific heat capacity.

A swimming pool of Hg would warm up fine. Disregarding your health risks, it could be quite fun to jump in feet first straight down. A person's density is much less than liquid mercury, so the liquid metal would squeeze you so hard you'd pop out (and up) into the air. Unfortunately you'd probably splat onto the surface of the metal, hurting yourself.

If you slipped carefully into the pool on your back, you'd float very high up, baking nicely in the sun. It would make an awesome photograph.