Major Steps in Calculating the Heat Capacities of Samples:

1) Rewrite the information given in the text to restate the **Total Amount of Heat (Q); Specific Heat Capacity (S)** of the sample; the **Weight (W)** of the sample; and the **Change in Measured Sample Temperature (ΔT)** a simple equations.
2) If required, convert the **Total Amount of Heat (Q)** of the sample in Joules (J).
3) If required, convert the **Specific Heat Capacity (S)** of the sample into J/g° and/or look them up from a reference source such as Table 3.2 from the Text (below).
4) If required, convert the **Weight (W)** of the sample into grams (g).
5) If required, calculate the **Change in Measured Sample Temple (ΔT)** of the sample into degrees Celsius (°).
6) Write down which of the parameters you are looking for (i.e., **Q**, **S**, **W**, or **ΔT**).
7) Choose & write down the appropriate equation to give the known parameters on the right hand side of the equation and the variable you or looking for on the left hand side of the equals sign.
8) Copy the known parameters from steps 2 through 5 into the equation and then carry out the calculation.
9) Ensure that your final answer has the correct number of significant figures.

$Q = S \times W \times \Delta T$	$W = Q / (S \times \Delta T)$	$S = Q / (W \times \Delta T)$	$\Delta T = Q / (S \times W)$

Note #1: Show all work for all questions.

Note #2: Clearly describe all assumptions you use.

Note #3: Use the number of significant figures in your final answer that is justified by the number of significant figures of the data you were given.

Note #4: For objects made out of more then one material, you can, with care, calculate the changes for each part and then add them together.

Note #5: To simplify these calculations and for this class, we will ignore the energies given off or absorbed when materials go from Solid⇒Liquid⇒Gas (even though they often dominate real world examples).

Table 3.2 The Specific Heat Capacities of Some Common Substances

Substance	Specific Heat Capacity (J/g °C)
water (*l*)* (liquid)	4.184
water (*s*) (ice)	2.03
water (*g*) (steam)	2.0
aluminum (*s*)	0.89
iron (*s*)	0.45
mercury (*l*)	0.14
carbon (*s*)	0.71
silver (*s*)	0.24
gold (*s*)	0.13

*The symbols (*s*), (*l*), and (*g*) indicate the solid, liquid, and gaseous states, respectively.

1. **Calculate the total amount of heat that would be required to raise the temperature of a 24 g sample of iron 52°.**

---

2. **Calculate the amount of heat that it would late to raise the temperature of a 1.2 Kg block of Aluminum by 35°.**

3. **Calculate the amount of heat that it would take to raise 321 g of water from just above its freezing point to just below its boiling point.**

4. **What is the weight of a sample of iron to which was applied 343 J which caused its temperature to change by 420°?**

5. **A sample of Aluminum was heated by 25 J and its temperature subsequently increased from 120° to 136°. What was its weight?**

6. **When a pot of molten iron was dropped in a container of liquid water it delivered a total heat of 12,342 J which raised the water temperature by 12°. What is the weight of the water in that container.**

7. **Calculate the specific heat for a new allow make out of Silver, Gold, Mercury, & Iron based on the fact that a 6.2 g sample was heated with 84 J and its temperature rose from 4° till 15°.**

8. **A 1.23 Kg block of Tofu was heated by 378 J and its temperature raised by 0.045°. What is the Specific Heat Capacity of that Tofu?**

9. **If one took a 400 Kg block of iron and applied 23,440 J of heat to it, how much would it heat up?**