How to go about writing your short report:

1 -- Think about WHAT is being taught to you. In this case, it is thermodynamics and heats of solution.

2 -- Think about WHAT equations were emphasized during the lab talk. In this case,

$$C_{cal} = -\left[(m_{(cool\ water)} \times \rho_{water} \times \Delta T_{calorimeter\ /\ cool\ water}) + (m_{warm\ water} \times \rho_{water} \times \Delta T_{warm\ water})\right] / \Delta T_{calorimeter\ /\ cool\ water}$$

and

$$q_{solution} = -\left[(m_{solvent/solute} \cdot \rho_{solvent/solute} \cdot \Delta T_{solvent/solute}) + (C_{cal} \cdot \Delta T_{cal})\right]$$

3 – Think about WHAT data you obtained. In this case, when you calibrated the calorimeter, you obtained $\Delta T_{warm\ water}$ and $\Delta T_{calorimeter\ /\ cool\ water}$. Which equation requires these values?

And for the heats of solutions portion you obtained $m_{solvent/solute}$, $\Delta T_{solvent/solute}$, ΔT_{cal}. Which calculations require this data?

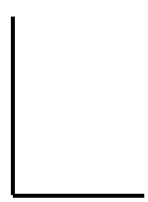
4 – If a discussion question asks you for the MOLAR HEAT of SOLUTION – what information is missing to obtain that? Hint: you have a mass and you need to use moles, what value would allow you to calculate moles?

5 – Once you have your FOUR molar heat values for each salt, average the values and compare them to the accepted values we've provided.

6 – What sign does the heat of solution have for each salt – does it make sense? Why would the endothermic salt still dissolve? Think about how much energy is available in terms of "warm water"

7 – "Plot the molar heat of solution calculated for each trial vs. the molarity of the salt solution used to obtain it" means that you will make a graph

molar heat of solution



vs

MOLARITY

Remember that to obtain MOLARITY (mol/L) you must use the calculated amount of moles AND volume that you used for the experiment.

8 – When calculating the % uncertainty look at the equation you used, for example,

$$q_{solution} = -\left[(m_{solvent/solute} \cdot \rho_{solvent/solute} \cdot \Delta T_{solvent/solute}) + (C_{cal} \cdot \Delta T_{cal})\right]$$

which of these values did you weigh or measure? You will want to obtain the % uncertainty for each and add them up.

$$\text{Unc} = \left[(0.22\text{g/mass of solution}) + (0.04^{o}\text{C}/\Delta T) + (\text{unc } C_{cal}) + (0.04^{o}\text{C}/\Delta T)\right] \; ***$$

*** the first uncertainty include the uncertainty of the scale PLUS the uncertainty of the graduated cylinder (multiplied by the density of water to convert into a mass). The unc C_{cal} is shown below.

As an example-- for the calibration step in which a 50 mL (or 100 mL) graduated cylinder was used as well as a thermometer if:

Initial cold water = 22.0°C, 15.0 mL

Initial hot water = 78.0 °C, 20.0 mL

Final temperature = 46.0 °C

Remember that you're using this equation to determine the heat capacity of the calorimeter

$$\mathbf{C_{cal}} = -\left[(m_{(cool\ water)} \times \rho_{water} \times \Delta T_{calorimeter\ /\ cool\ water}) + (m_{warm\ water} \times \rho_{water} \times \Delta T_{warm\ water})\right] / \Delta T_{calorimeter\ /\ cool\ water}$$

Then your % uncertainty of the calorimeter would be determined by finding the uncertainty for each term in the equation:

NOTE: THESE VALUES MAY NOT BE CORRECT! GO LOOK UP YOUR UNCERTAINTY VALUES FOR EACH PIECE OF EQUIPMENT USED!!!!

$$\text{unc } C_{cal} = \left[(0.2\text{ mL} / 15.0\text{ mL}) + (0.2\,^{o}\text{C}/24\,^{o}\text{C}) + (0.2\text{ mL} / 20.0\text{ mL}) + (0.2\,^{o}\text{C}/32^{o}\text{C}) + (0.2\,^{o}\text{C}/24\,^{o}\text{C})\right] *100\%$$

$$= \left[0.0133 + 0.00833 + 0.01 + 0.00625 + 0.00833\right]$$

$= 0.04621$ J/g•°C → Count your decimal places and match them to your answer.