

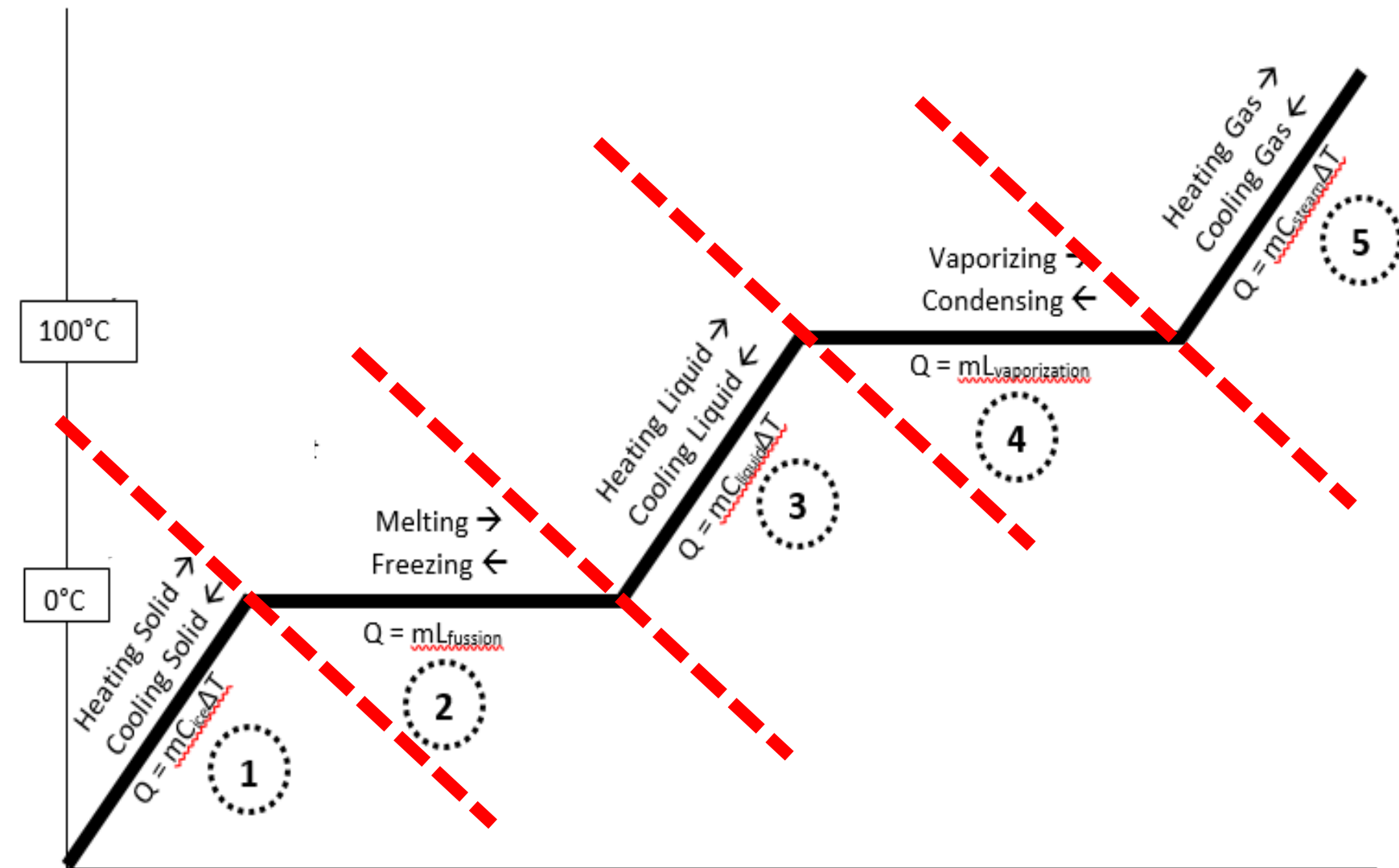
Heating Curve Calculation Notes

No KCQ required

YouTube Link to Presentation:

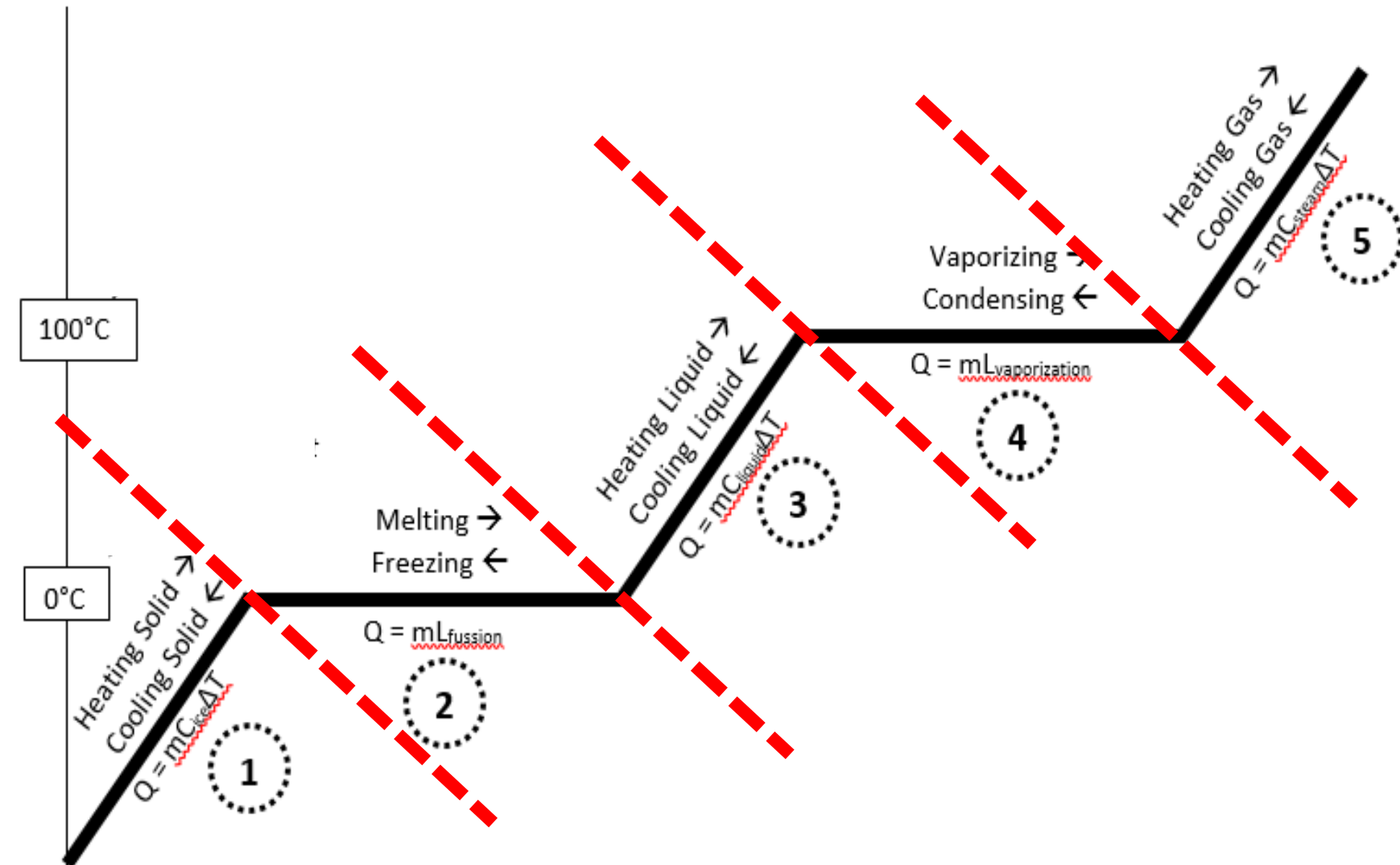
<https://youtu.be/AjGaZUKRIDU>

Calculate ONE line segment at a time!!!



Calculate everything separately and then add up your answers. You could have up to five Q values to add up!

Careful with ΔT Values!



Use ONLY the temperature change on the ONE LINE you are working with at a time!

You will see this on our practice problems in a minute...

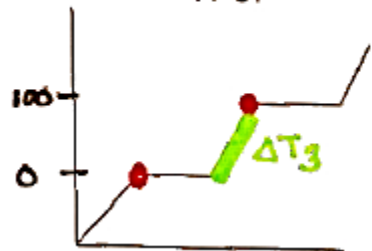
Practice Problems

- **Glue the questions in your notebook**
- **Show your work the way I do!**
- **Annotate the practice problems with comments, tips, warnings, explanations, etc! These are NOTES not just practice problems!**

Practice Problems

- 1. What is the energy needed to melt 326 grams of ice and heat it to 100°C?**
- 2. Determine the energy required to convert 21.1 grams of ice at -6°C to steam at 100°C**
- 3. What is the heat transfer involved when you convert 51 grams of water 0°C to ice at -20.3°C?**
- 4. What is the energy absorbed when you melt 75 grams of ice at -5°C to water at 90°C?**

1. What is the energy needed to melt 326 grams of ice and heat it to 100°C?



- ② melt ice
- ③ heat liq.

$$Q_2 = mL = (326g)(334 \text{ J/g}) = 108884 \text{ J}$$

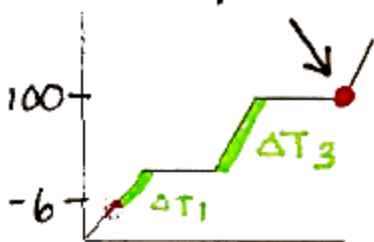
$$Q_3 = m\Delta T = (326g)(4.18 \text{ J/g}^\circ\text{C})(100^\circ - 0^\circ) = 136268 \text{ J}$$

$$Q_T = Q_2 + Q_3$$

$$= \boxed{245152 \text{ J}}$$

2. Determine the energy required to convert 21.1 grams of ice at -6°C to steam at 100°C

Steam @ 100°! Have to vaporize



- ① heat ice
- ② melt ice
- ③ heat liq.
- ④ vaporize

$$Q_1 = m\Delta T = (21.1g)(2.09 \text{ J/g}^\circ\text{C})(0^\circ - (-6^\circ)) = 264.59 \text{ J}$$

$$Q_2 = mL = (21.1g)(334 \text{ J/g}) = 7047.4 \text{ J}$$

↖ double negative!
be careful!

$$Q_3 = m\Delta T = (21.1g)(4.18 \text{ J/g}^\circ\text{C})(100^\circ - 0^\circ) = 8819.8 \text{ J}$$

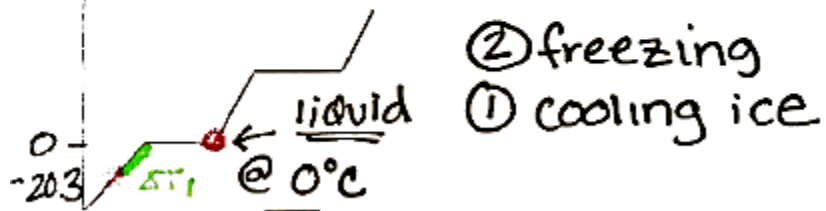
$$Q_4 = mL = (21.1g)(2260 \text{ J/g}) = 47686 \text{ J}$$

$$Q_T = Q_1 + Q_2 + Q_3 + Q_4$$

$$= \boxed{63817.79 \text{ J}}$$

3. What is the heat transfer involved when you convert 51 grams of water 0°C to ice at -20.3°C ?

going backwards!
L will be negative!



$$Q_2 = mL = (51\text{g})(-334\text{J/g}) = -17034\text{J}$$

$$Q_1 = mC\Delta T = (51\text{g})(2.09\text{J/g}^{\circ}\text{C})(-20.3^{\circ} - 0^{\circ}) = -2163.78\text{J}$$

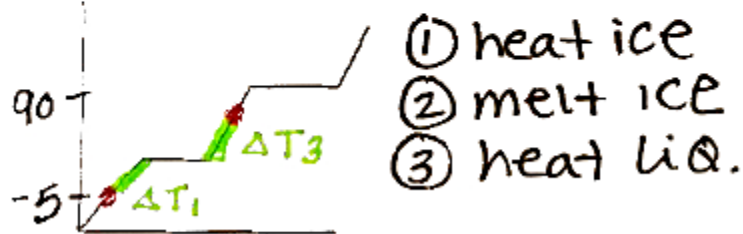
$$Q_T = Q_2 + Q_1$$

$$= \boxed{-19197.78\text{J}}$$

↑ negative b/c energy is released!

4. What is the energy absorbed when you melt 75 grams of ice at -5°C to water at 90°C ?

you aren't "finishing"
line 3! stop early!
careful w/ ΔT



$$Q_1 = mC\Delta T = (75\text{g})(2.09\text{J/g}^{\circ}\text{C})(0^{\circ} - (-5^{\circ})) = 783.75\text{J}$$

$$Q_2 = mL = (75\text{g})(334\text{J/g}) = 25050\text{J}$$

↑ double negative!

$$Q_3 = mC\Delta T = (75\text{g})(4.18\text{J/g}^{\circ}\text{C})(90^{\circ} - 0^{\circ}) = 28215\text{J}$$

$$Q_T = Q_1 + Q_2 + Q_3$$

$$= \boxed{54048.75\text{J}}$$

↑ only going to 90°C !