Science Planning

**Unit 2: Energy Affects Matter (7-9 weeks)**

**Week 4 Big Idea: Adding or removing thermal energy changes the arrangement and motion of molecules within a substance and causes the substance to change.**

Week 4 –12/2- 12/6

12/3 - YWBAT understand how substances change from a solid to a liquid or a liquid to a gas.

Success is: constructing an explanation and using a model to describe what happens when thermal energy is added to a solid and a liquid at a visible and molecular level.

Phenomena: Ice melts in a pan and becomes water; the water boils and becomes steam.

* Students observe what happens to an ice cube in a pan on a hot plate.
  + Students observe as it melts into a different state of matter: liquid. Continue observing until students see water boil and become steam.
* Students draw 4 models to show what they think is happening.
  + Visible change from solid to liquid
    - Molecular change from sol. to liquid
  + Visible change from liquid to gas
    - Molecular change from liquid to gas
* Students write cause and effect statements concerning what happens to states of matter when heat energy is added.
  + Discuss/argue statements
  + Come to a consensus about what is happening to cause a change in the system. (HEAT!)
* Watch Brainpop "Matter Changing States" <https://www.brainpop.com/science/matterandchemistry/matterchangingstates/>
  + changes in states of matter triangle
* Exit ticket: construct an explanation and use a model to describe what happens when thermal energy is added to a solid and a liquid at a visible and molecular level.

12/4 - YWBAT understand how heat affects the density of molecules.

Success is: Making a claim about inversions that includes hot and cold air masses

Phenomena: Hot water is less dense than cold water.

* Prepare two beakers: one with ice cold water and one with hot water.
* Add blue/red food coloring let students watch.
  + Ask: are they dissolving at the same rate? Why not?
* Discuss molecular activity when heat energy is added.
* Pour both beakers at same speed into divided tank. Students predict what will happen when divider is removed.
* Discuss why blue is at the bottom and red is at the top; density.
  + Ask is the cold water trapped?
* Revisit inversion picture and models/ explanations students made.
* Recall what each demo taught us:
  + Density affects whether something sinks or floats
  + Temperature affects molecular movement and density
* On the back of the original model, students draw a new model to add what has been learned. Label.
* In table groups, students revise explanations which should discuss both density and temperature getting at why inversions occur mostly in the wintertime.
* Students make a claim about inversions in the SL Valley that is based on the evidence they have seen/collected.
  + Claims should reflect that inversions are caused by density and temperature differences. Inversions happen when cold air gets trapped under warm air and fills with pollutants. Can be natural or human caused

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