**Determining Density Lab**

***Modified using the ES Template***

**Planning and Carrying Out Investigations**

1. Identifying the phenomenon to be investigated
   1. Students describe the phenomenon under investigation, question to be answered, or design solution to be tested.

*Teacher shows a demonstration where a cube of ice is placed in a beaker of water then a second cube of ice is placed in a beaker of alcohol. The students are unaware of the contents of the second beaker. They are asked to explain in their journals possible reasons as to why the ice did not float in the second beaker. The teacher steers discussion to arrive at the explanation of density….buoyant force…..and balanced and unbalanced forces.*

***“How does density, buoyant force, balanced and unbalanced forces play a role in the ice not floating in the second beaker?”***

***“What is the connection between buoyant force and density of matter?”***

1. Identifying the evidence to answer this question
   1. Students describe:
      1. The evidence from data to be collected.
      2. How the evidence will be relevant to the purpose of the investigation.

*Students are asked to brainstorm and/or research information about what data is necessary to support the explanation of a difference in density and a lessoned buoyant force in the second beaker (alcohol). This work is done in groups and students will decide how the research will be performed.*

*In their journals they will explain the connection of the research to the problem to be investigated.* Planning for the investigation

* 1. Students develop an investigation plan that details how the data will be indicated, collected, and/or measured, including the variables to be tested or controlled.
  2. Students indicate whether the investigation will be conducted individually or collaboratively
  3. When given an investigation plan, students identify how:
     1. The data will be collected
     2. The methods are relevant to the purpose of the investigation

*Students develop a plan for collecting the data of mass and volume of the two substances in the beakers. As part of the rubric for scoring the teacher explains/reminds:*

* *all data must include units*
* *plan must include details for limiting measurement error*
* *precision of measurement is displayed through use of significant figures*

*Students develop a plan for using mathematical and computational reasoning from their brainstorming/research.*

* *the equation (D=M/V) is evident within this plan*
* *students indicate the liquid with a density less than ice would allow the ice to sink*

1. Collecting the data
   1. Students perform the investigation, collecting and recording data systematically.

*Students individually or collaboratively perform the investigation by following their plans. Data is gathered and recorded in their journals in a systematic table of their creation.*