Gr. 8 – Understanding Matter & Energy

Fluids

Cartesian Diver

Specific Expectations:

2.1 Follow established safety procedures for using apparatus, tools, and materials.

2.3 Investigate and compare the density of a variety of liquids.

2.4 Investigate applications of the principles of fluid mechanics.

3.2 Describe the relationship between mass, volume, and density as a property of matter.

3.3 Explain the difference between solids, liquids, and gases in terms of density, using the particle theory of matter.

3.5 Determine the buoyancy of an object, given its density, in a variety of fluids.

Big Idea (for lesson):

Students will explore the different densities of fluids, their properties, and their effect on the buoyancy of objects through building and observing a Cartesian Diver.

Accommodations:

- ☒ Increase time
- ☒ Visual Aids
- ☒ Manipulatives
- ☒ Chunking
- ☒ Step-by-Step
- ☒ Scaffolding
- ☒ Copy of Notes
- ☒ Student Grouping

Differentiated Instruction:

- ☒ Content: Use demo to show the content as you offer verbal descriptions.
- ☒ Process: Have students work in pairs and support each other if physical impediments exist.
- ☒ Product: Students may show their final product in pairs, and communicate their findings either verbally, visually, or through written means.
- ☐ Other: _____

Bloom's Taxonomy:

- ☒ Knowledge
- ☒ Comprehension
- ☒ Application
- ☒ Analysis
- ☐ Synthesis
- ☐ Evaluation

Multiple Intelligence:

- ☒ Verbal/Linguistic
- ☒ Logical/Mathematical
- ☒ Visual/Spatial
- ☒ Bodily/Kinesthetic
- ☒ Naturalist
- ☐ Musical/Rhythmic
- ☒ Interpersonal
- ☒ Intrapersonal

Delivering The Lesson:

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Portion & Timing	Grouping:			Introduction:	Materials
Minds On: 10 mins	W ☒	S ☐	I ☐	Teacher can show a demonstration of a Cartesian Diver before students make their own. As an alternative, the video may also be shown.	Cartesian Diver - Sick Science! #142.mp4
Action: 15 mins	W ☒	S ☒	I ☒	Have students build their own Cartesian Diver according to the instructions on the handout. Teacher can circulate and ask questions of the different groups: -Would this still work with a different fluid? How about pop? How about syrup? (*Answer: Results will vary since the densities of these liquids and divers are all different as well. It's worth doing a couple "test" bottles with these liquids!)* -Do you think this experiment depends more on buoyancy or on density? (*Answer: These two properties are interrelated. As long as the density of the diver is less than the density of the water, the diver will remain buoyant.*) -How is the density of the diver changing when you're just squeezing the bottle? (*Answer: The effect of compressing the air in the bottle also squeezes the air in the diver, since water will not compress and there is nothing else to make smaller.*)	Cartesian Diver Handout (Materials listed) Various liquids
Consolidate: 15 mins	W ☒	S ☒	I ☐	After students have figured out their own Cartesian Divers, give them the Hook Challenge to see if they can successfully manipulate the physical properties of fluids.	Cartesian Diver - Hook Challenge! – Sick Science! #187.mp4 (Water, 16 oz cup, scissors, 2 hex nuts, 2 pipettes, 1L bottle, 10" piece of wire, 6" piece of wire)