

Gr. 8 - Understanding Matter & Energy

Fluids

Hovercraft

Specific Expectations:

- 1.2 Assess the social, economic, and environmental impacts of selected technologies that are based on the properties of fluids.
- 2.1 Follow established safety procedures for working with apparatus, tools, and materials.
- 2.4 Investigate applications of the principles of fluid mechanics.
- 2.6 Use technological problem-solving skills to design, build, and test devices that use pneumatic or hydraulic systems.
- 3.3 Explain the difference between solids, liquids, and gases in terms of density, using the particle theory of matter.

Big Idea (for lesson):

Students explore a ways to overcome friction and fluid drag by looking at, designing, and building hovercrafts.

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 submit 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

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Delivering The Lesson:

| Portion & Timing | Grouping: | | | Introduction: | Materials |
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| Minds On: 5 mins | W <input checked="" type="checkbox"/> | S <input type="checkbox"/> | I <input type="checkbox"/> | <p>Teacher asks class some introductory questions:</p> <ul style="list-style-type: none"> -How can two surfaces have no friction between them? (<i>Answer: if they aren't touching.</i>) -Can you think of a some mechanism that eliminates friction during its motion by creating space between itself and other surfaces? (<i>Answer: Hovercrafts!</i>) <p>Show the LEGO hovercraft, and demonstrate its abilities on different surfaces.</p> | -Demo: LEGO Technic – Hovercraft (42002) |
| Action: 30 mins | W <input checked="" type="checkbox"/> | S <input checked="" type="checkbox"/> | I <input checked="" type="checkbox"/> | <p>Have students build their own hovercraft according to the instructions on the handout.</p> <p>Compare performances of hovercrafts and consider the differences in design: How did more or less holes affect the hovercraft's performance?</p> <p>Teacher can circulate and ask questions of the different groups:</p> <ul style="list-style-type: none"> -What are the advantages of multiple holes? (<i>Answer: Air escapes more quickly, so hovercraft is lifted higher and glides better.</i>) -What are the advantages of only one hole? (<i>Answer: Air escapes more slowly, so the balloon supply lasts longer.</i>) | -Hovercraft – Handout -Balloons, sticky tack, CDs, snappy cap, tape, toothpick. |
| Consolidate: 5 mins | W <input checked="" type="checkbox"/> | S <input checked="" type="checkbox"/> | I <input type="checkbox"/> | <p>Teacher prompts some open discussion with the following questions:</p> <ul style="list-style-type: none"> -Are any ways they could have improved their design? (<i>How about a way to keep air flowing because the balloon runs out quickly?</i>) -What changes could be made for a hovercraft to carry heavy cargo? -Teacher can show the class a video of the Hovercraft ferries that crossed the English Channel until 2000. -For homework, ask students to | Hoverspeed- Hovercraft- Arriving-in- Calais.mp4 |

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| | | | | brainstorm and create a blueprint of a new hovercraft design that can lift heavy loads. | |
| Extension! Several Days/1 Period | W <input checked="" type="checkbox"/> | S <input type="checkbox"/> | I <input type="checkbox"/> | <p>Building Project: Work as a class to make your own, RIDEABLE hovercraft! The following websites outline the procedure very easily.</p> <p>1. http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p036.shtml#summary</p> <p>2. http://spaceflight.nasa.gov/brainbite/rocketscience/hovercraft/</p> <p>3. Important Hovercraft Safety Guidelines are at the bottom of the following website http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p036.shtml#procedure</p> <p>Research Project: -Who was Christopher Cockerell? -How did he make his first model of a hovercraft? -How have the uses of hovercrafts changed over the years?</p> | <p>-Requires adult supervision always. -Safety goggles -Power Tools -For materials list, refer to websites. -Refer to “Important Hovercraft Safety Guidelines”.</p> |