

Thumb Wrestle Wars Grade 8 – Fluids

Post Activity – Devising Devices	Cross Curricular	
	Safety Notes	Liquid can spill easily.

<p>Big Ideas</p> <p>Fluids are an important component of many systems. (Grade 8)</p> <p>Fluids have different properties that determine how they can be used. (Grade 8)</p> <p>The interactions between structures and forces is predictable. (Grade 7)</p>	<p>Specific Expectations</p> <p>Explain the difference between liquids and gases in terms of their compressibility and how their compressibility affects their usage.</p> <p>Identify the magnitude, direction, point of application and plane of application of the forces applied to a structure.</p>
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Description
 Students learn about hydraulics and pneumatics, and how they can be used to lift loads in our school program “Devising Devices”. In this post activity, students will battle each other with syringes and see who will win a thumb wrestle war.

<p>Materials</p> <p>Per pair of students: 2 plastic syringes – 30 ml preferable 50 – 100 cm of plastic tubing – aquarium tubing works well Water – avoid food colouring</p>	<p>Accommodations/Modifications</p> <p>Larger syringes may be easier to hold.</p> <p>Students/classroom might get wet.</p>
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Introduction

In our school program “Devising Devices”, students learn about hydraulics and pneumatics, and how they can be used to lift loads. Water and air are both fluids, but they have different properties. Gases are compressible whereas liquids essentially are not compressible. This will make a difference in how pneumatic and hydraulic systems respond and function.

Action

1. Attach a syringe to each end of the plastic tubing. The syringes should both be full of air – pull the plungers out to the last measurement marking.
2. Each student will hold a syringe, plunger pointing up, in one hand. They will place their thumb over the plunger.
3. At the count of three, both students will try to push the plunger all the way down, using their thumb.
4. The winner is the student who gets their plunger all the way down first.
5. Repeat the “war” several times with different starting volumes of air in the syringes to determine the ideal volume for a competitive experience.
6. Next, fill one syringe with water, and keep one syringe empty of air or water. Reattach the two syringes to the tubing.
7. Do not start with a competition, but observe what happens to the empty syringe when you push down the plunger on the syringe filled with water.
8. If you choose to have a thumb wrestle war with water-filled syringes, make sure to do it over a basin or sink. You might want to put the tubing and base of the syringes inside a plastic bag before the competition. Why do you think you need these precautions?

Consolidation/Extension

Instead of having a pushing competition with the syringes, the students can experiment with holding one plunger steady while pushing the second plunger. Notice the difference between air-filled syringes and water-filled syringes.

Assessment

Questions:

What is the ideal volume of air for a competitive thumb wrestle war?

Which size of syringe works best?

Why did you need to take precautions with the water-filled syringes when doing the thumb wrestle war?

Explain what we need to consider when making hydraulic and pneumatic systems?

What are the pros and cons of each type of system?

List where you think you would use hydraulic and pneumatic systems? Why would you use one instead of the other?
