**LESSON PLAN- Gas Law Exploration**

**Teachers:** Mitchel Chartrand, Martin Tang, KhaledaYesmin

**Subject:** Chemistry **Grade/Class:** Grade 11 Chemistry “U” Semestered

**Date:** *\_\_\_\_\_\_\_\_\_\_\_\_\_n/a\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* **Time:** *\_\_\_n/a\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Duration \_\_\_\_\_\_\_\_\_75 min \_\_\_\_\_\_\_**

**Lesson Topic:** Exploring the Gas Laws, and thus the relationships within.

**CURRICULUM EXPECTATIONS:**

A1.5 conduct inquiries, controlling relevant variables, adapting or extending procedures as required, and using appropriate materials and equipment safely, accurately, and effectively, to collect observations and data

F2.2 determine, through inquiry, the quantitative and graphical relationships between the pressure, volume, and temperature of a gas [PR, AI]

**SPECIFIC EXPECTATIONS***:*

**By the end of the lesson students should/will be able to:**

1. **Identify the relationship between pressure and temperature.**
2. **Identify the relationship between volume and temperature.**
3. **Identify the relationship between volume and pressure.**
4. **Explain the Demo’s from a logical reasoning.**
5. **Apply these laws to everyday examples.**

**Learning/Teaching RESOURCES:**

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| **-Projector, computer (with speakers), LAC support tool presentation, Likely vs. Unlikely Handout** |

**Lesson Sequence**

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| **A) INTRODUCTORY ACTIVITY.**   * **Talk about modern day phenomenon that occurs due to the gas laws, and ask the question why does this occur?** * **some examples to bring up-**    + **Scuba divers (the benz), deep sea fish dying when swimming too high, tires deflating during in the winter months. (5 min)** |

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| **B) DEVELOPMENT STRATEGIES:**  **Activity 1- After the conclusion of the group discussion the students will then receive the Likely vs. Unlikely hand out and complete it to show understanding of the material taught by the tool. This handout explores phenomena that occur, and whether the gas laws are being used in the various situations. (10 min)**    **Activity 2- After a brief class conversation about the anticipatory questions, the LAC tool will be used. This tool shows three different demos exploring the gas laws. After each demo an explanation is given by the tool that shows which law is employed and the various relationships between the different quantities (P, V, T). (~35 min)**    **Activity 3- After the tool has been employed the class will be split into groups of 3-4 to readdress the phenomenon introduced at the beginning of the class. The students will converse about what they learnt from the tool and apply it to these everyday occurring events. (~15 min)**    **Activity 4- Two questions will be placed on the board reflecting the lesson material taught. The students will have to answer these questions using the knowledge of the relationships between the different quantities. This serves as an “exit card” to check the students’ immediate understanding of the material. (10 min)** |

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| **C) Differentiated Instructional Strategies:**   * **Many different instructional strategies are used throughout this lesson. The tool provides visual, verbal, and written explanations of the various Gas laws being portrayed. The students will also be writing down the explanation slides of the tool.** * **Students will be participating in group discussions throughout this lesson and therefore will be gaining and sharing ideas with one another.** |

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| 1. **Culminating Activity**  * **Students will be assigned homework questions that will be checked the following day for understanding. Any difficulties with the homework will be addressed the following day at the beginning of class.** * **The culminating activity will be mainly done through the unit test and in-class unit assignment.**    + **This will assess the students’ knowledge the material taught in this lesson.** |

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| **E) On-going Assessment/Evaluation:**  **- Homework Check, Unit assignment and Unit Test.** |

**Reflection & Self-Evaluation:**

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| **To be done post lesson.** |

**Follow-up activities/ideas or next steps:**

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| * **Follow-up with homework check and address all the difficulties that the student had with the topic.** * **Students will then learn the ideal gas law (more in depth) and and what “ideal” means as well as how to quantitatively solve problems using this law and all quantities involved (P, V, n, R, T).** |

**Praxis Paper:**

**Utilizing Anticipatory questions:**

We decided to use anticipatory questions meant to probe students’ prior knowledge about the gas laws. The anticipatory questions we decided to use ask the students whether they feel the particular scenario is likely/unlikely related to the gas laws based on their preconceptions about gases. As a teacher, addressing students’ preconceived knowledge of a subject area (right/ wrong) is crucial in order to build new knowledge on top of it or rebuild it if there are misconceptions. Using this, the teacher can assess students’ current knowledge of the gas laws and the teacher can connect students with new content accordingly. This has great value for students as the students can fix their “foundation” of what they believe to be the gas laws and then build on this topic. By giving students open ended questions about the world around them, it gives them opportunities to think in different ways through inquiry-based learning.

Since the anticipation guide addresses preconceptions, there are no right or wrong guesses. However, if a guess is not supported by the gas laws, it is the responsibility of the teacher to guide the student in the right direction and then follow up by reinforcement of the tool. This anticipatory set of questions brings students into the critical thinking process and this motivates the students to discover more about the topic of gas laws. This will engage the students in a group discussion and allow the students to identify what they **Know**, what they **Want** to know, and what they want to **Learn** (**KWL**) (Vacca, pg 210). After this has been done the teacher uses the tool (presentation) to help them develop their understanding of the gas laws.

The practical utilization of this tool is quite simple and can be a whole lesson in and of itself. Since the tool opens up with questions about the forthcoming topic, some time can be taken to first discuss with students to assess any preconceptions they may have about the gas laws. The next part of the tool is a series of demos and explanations that answer the questions posed in the beginning. This part can be presented in different ways, either by just going through the videos or having the students conduct the demos themselves to better understand the relationships of the variables. The final part of the tool consolidates the students with a summary of everything that is learned through an entertaining rap. This is not only an entertaining way for students to finish the subject but also a great way for students to remember what they learned since the rap summarizes everything that was taught throughout the lesson. As for when the tool should be used, it can be an effective lesson for students who are encountering the gas laws for the first time or it can be a great way to review the unit since it compresses the information down into a short and entertaining presentation for the students.

**References:**

* Vacca, Richard T., Jo Anne L. Vacca, and Maryann Mraz. *Content Area Reading*. 11th ed. Toronto: Pearson, 2014. Print.

**Anticipatory questions:**

Are these everyday occurrences explained by the Gas Laws:

Tire pressure decreases during the winter months Unlikely or Likely

Scuba divers getting the “Benz” Unlikely or Likely

Soda making you burp Unlikely or Likely

The water cycle Unlikely or Likely

Feeling full after a large feast Unlikely or Likely

Volcano eruption Unlikely or Likely

The formation of a hurricane Unlikely or Likely

Hydraulic operating systems Unlikely or Likely

High altitude breathing differences Unlikely or Likely