

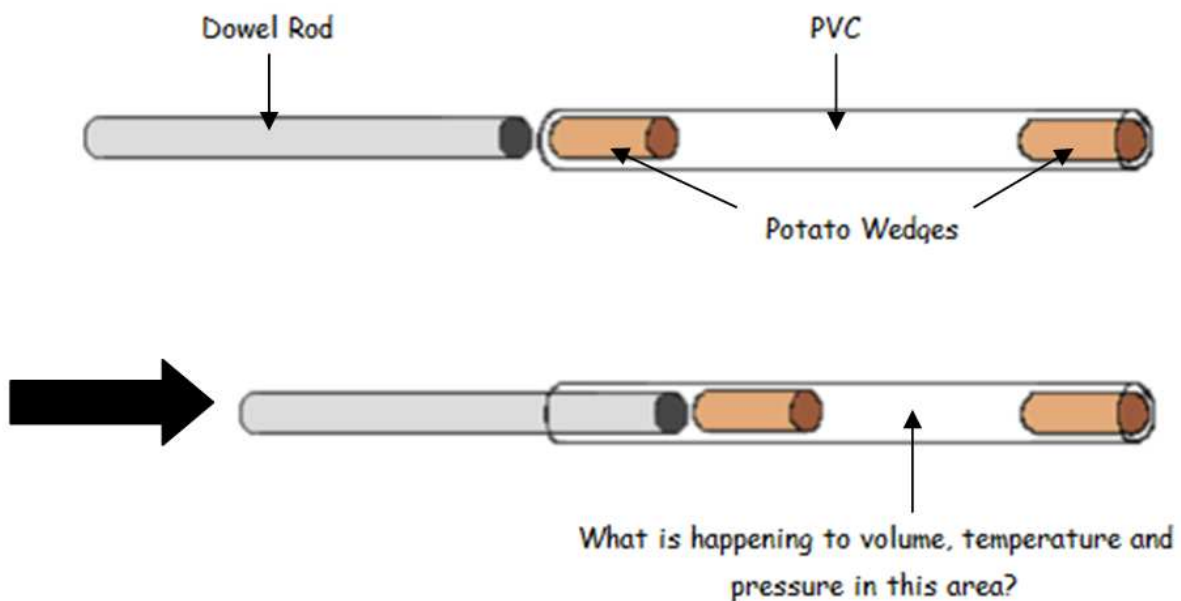
Scott McQuerry
Rocketry – It's a Gas!
Summative and Formative Assessments

Summative Assessments

Activity one: French Fry Launcher

While working in collaborative groups, students will visually represent their inferences through observations pertaining to the potato launcher. Two drawings will be completed: The first will include a detailed description of the device prior to the launch; and, the second drawing will describe the changes to volume, temperature and pressure inside the tube at the time of the launch.

Answer: Student drawings should resemble something similar to this:



Activity two: Speeding Up the Rockets

Prior to the beginning of this activity, students will construct a hypothesis from the following problem statement: How does a change in water temperature affect the pressure of a sealed film canister to which has been added an effervescent tablet?

After completion of a demonstration involving this problem statement, students will record the time for the launching of three film canisters, each containing different temperatures of water. This data will be placed in chart and graph form by each student and will be analyzed to determine its support or non-support of their hypotheses.

Answer: Student lab sheets should contain the problem statement, hypothesis, data table, graph and conclusion. A suitable hypothesis for this activity would be:

If the temperature of water in the film canisters is increased, then the time it takes for the canisters to blow their top will increase.

Students will be graded using the scoring guide on the attached page.

Activity three: Drinking Bottle Rockets

Prior to the beginning of this activity, students will construct a hypothesis from the following problem statement: How does the amount of effervescent tablets inside a pull-top drinking bottle affect the pressure of the bottle?

After completion of a demonstration involving this problem statement, students will record the time for the launching of three water bottles, each containing different amounts of effervescent tablets. This data will be placed in chart and graph form by each student and will be analyzed to determine its support or non-support of their hypotheses.

Answer: *Student lab sheets should contain the problem statement, hypothesis, data table, graph and conclusion. A suitable hypothesis for this activity would be:*

If the amount of effervescent tablets in the bottles is increased, then the time it takes for the bottles to launch into the air will increase.

Students will be graded using the scoring guide on the attached page.

Scientific Inquiry Lab Sheet Checklist

Points	Points Earned	
		Problem Statement
1		Problem is stated as a question
1		Question reflects the dependent variable (i.e. "What is the effect of several magnets on its ability to move a paper clip?")
1		Question cannot be answered with a yes/no
		Hypothesis
1		Hypothesis written as an "If...then..." statement
2		Hypothesis includes both the independent (IV) and dependent (DV) variables
1		Both the IV and DV are quantitative
		Data Table
2		All data is completed and placed in the appropriate areas of the table
2		All data have units
2		IV and DV are labeled in the appropriate areas of the table
		Graph
1		Appropriate type of graph used
2		Graph has title with iv and dv included
2		Graph is labeled with IV on the x-axis and the DV on the y-axis
2		Labels contain units (i.e. gram, liter, meter, etc.
2		Appropriate scale used/evenly spaced intervals on both axes
		Conclusion
1		Constructed response is provided
1		Hypothesis is re-stated in conclusion
2		Two pieces of evidence (data) to support/not support the hypothesis is provided
Total points = 26		

Formative assessments:

Activity one: French Fry Launcher

Students will be asked to orally state their predictions prior to the launching of the potato slices. Each answer will be expected to include an explanation as to the changes in volume, temperature and pressure inside the launcher throughout the demonstration. These oral predictions will first be discussed among student partners working within collaborative groups using a think-pair-share from the following question: When the plunger drives one piece of potato through the tube, what is happening to the volume, temperature and pressure between the two potato wedges in the launcher?

Answer: *As the volume of the air in-between the potato wedges are decreasing, the pressure of the air is increasing. This is because of the inverse relationship between volume and pressure.*

Activity two: Speeding Up the Rockets

The instructor will walk through the classroom prior to beginning the demonstration and check for student understanding. More specifically, the instructor will examine student papers for successful completion of a hypothesis, labeled data table and a properly labeled and titled graph.

After completion of the demonstration, students will return to their original collaborative groups to read and discuss their conclusions. The instructor will then provide the following question for a think-pair-share to the groups:

How did the data identify the relationship between volume, temperature and pressure?

Answer: *The canisters with the warmer water should explode long before the room temperature and ice water canisters. This occurrence supports the hypothesis that warmer temperatures increase the rate of reaction inside the canisters and subsequently increases the pressure at a faster rate as well. The second fastest canister to pop should be the room temperature and finally the ice water canisters.*

Activity three: Drinking Bottle Rockets

The instructor will walk through the classroom prior to beginning the demonstration and check for student understanding. More specifically, the instructor will examine student papers for successful completion of a hypothesis, labeled data table and a properly labeled and titled graph.

After completion of the demonstration, students will complete their data table, graph and conclusion.

Answer: *As the amount of effervescent tablets is increased, the amount of gas that is being produced should increase. This will cause the pressure to increase as well. The water bottle with the most tablets should launch well before the other bottles.*