

# PSI:

## PHYSICAL SCIENCE INVESTIGATION



### Teacher's Lesson Description

Title	<b>What's the Point?</b>
Brief Description of Videos	In these videos, students will watch as Danté demonstrates that there is a relationship between temperature, volume, and pressure in a closed system.
Time Needed	1 or more class periods, depending upon discussion and questions.
Ohio Science Benchmarks Addressed	Earth and Space Sciences, 6-8 Benchmark C Science and Technology, 6-8 Benchmark A Scientific Ways of Knowing, 6-8 Benchmark A, B, and C
Ohio Grade Level Indicators Addressed	Earth and Space Sciences Benchmark C <ul style="list-style-type: none"><li>• 7<sup>th</sup> Grade Earth Systems Indicator 1</li></ul> Science and Technology Benchmark A <ul style="list-style-type: none"><li>• 6<sup>th</sup> Grade Understanding Technology Indicator 1 and 2</li><li>• 7<sup>th</sup> Grade Understanding Technology Indicators 1, 2, and 3</li><li>• 8<sup>th</sup> Grade Understanding Technology Indicators 1 and 2</li></ul> Scientific Ways of Knowing Benchmark A <ul style="list-style-type: none"><li>• 6<sup>th</sup> Grade Nature of Science Indicators 1 and 2</li><li>• 8<sup>th</sup> Grade Nature of Science Indicator 1</li></ul> Scientific Ways of Knowing Benchmark B <ul style="list-style-type: none"><li>• 8<sup>th</sup> Grade Ethical Practices Indicator 2</li></ul> Scientific Ways of Knowing Benchmark C <ul style="list-style-type: none"><li>• 6<sup>th</sup> Grade Science and Society Indicator 3 and 4</li><li>• 7<sup>th</sup> Grade Science and Society Indicator 3</li></ul>

Concepts Developed	<p>Students will be able to explain how:</p> <ul style="list-style-type: none"> <li>• it is important to examine data objectively and not let bias affect observations.</li> <li>• repetition of an experiment may reduce bias.</li> <li>• technological advances, influenced by scientific knowledge, affect the quality of life.</li> </ul> <p>The concepts developed enable students to think about observation, inference, investigation, gathering evidence, and making connections between pressure, temperature and volume.</p>
Lesson Rationale	<p>This video could be used as the introduction to or the continued development of the concepts that:</p> <ul style="list-style-type: none"> <li>• Air has mass</li> <li>• Air has volume.</li> <li>• Mass and volume can be manipulated to create pressure in different ways.</li> </ul> <p>Students need to have extensive experience with how the body of scientific knowledge is developed. It must be based on evidence, be predictive, logical, subject to modification and limited to the natural world.</p>
Background Knowledge for Teachers	<p>Review the “teacher video” segment and student video segments.</p> <ul style="list-style-type: none"> <li>• Boiling is not just a function of temperature.</li> <li>• Boiling temperature will decrease as the air pressure decreases.</li> <li>• Temperature of boiling as related to cooking must take into consideration the atmospheric conditions.</li> </ul> <p>The video can be used to introduce an unexpected event that challenges student beliefs about what they experience in daily life. “What’s the Point?” will force students to grapple with the need to use processes of science to investigate and answer difficult questions.</p>
Classroom Procedures	<p>This video segment will create an anomaly that will surprise students.</p> <p>Before observing the video, have a class discussion about the boiling point of water? Ask students what causes water to boil? (In case someone suggests microwaves, accept this but point them to the addition of heat.) Once we get the word heat, write this on the board. Then ask what the boiling point of water is? Write this boiling point on the board as 212 degrees Fahrenheit and 100</p>

	<p>degrees Celsius.</p> <p>Now show the video. There are a number of times when students are asked to make predictions and observations. Be certain they record all information as the video suggests.</p> <p>Students should do research by investigating the International Boiling Point Project as found at: <a href="http://www.k12science.org/curriculum/boilproj/download.html">www.k12science.org/curriculum/boilproj/download.html</a> Have students investigate the correlation between the elevation of the city and the boiling point that has been recorded.</p>
Materials Needed	<p>Note: Do not try this in your classroom! This activity can be dangerous because you are using heat and pressure. As such, we have provided the experience for students on the video. No materials are needed.</p>
Science Connections	<p>This lesson allows teachers the opportunity to connect science and technology. We know that atmospheric pressure changes the “look of boiling” water. Connect this to temperature and the use of pressure cookers or longer cooking times at higher altitudes.</p>
Additional Web Resources	<p>Pressure Cooking and Canning: <a href="http://www.k12science.org/curriculum/boilproj/download.html">www.k12science.org/curriculum/boilproj/download.html</a></p> <p>Boiling Point Calculator: <a href="http://www.csgnetwork.com/h2oboilcalc.html">http://www.csgnetwork.com/h2oboilcalc.html</a></p> <p>How Stuff Works: High Altitude Cooking <a href="http://recipes.howstuffworks.com/question63.htm">http://recipes.howstuffworks.com/question63.htm</a></p> <p>Search for more Web pages related to this topic at the Ohio Resource Center <a href="http://www.ohiorc.org/for/science/Default.aspx">http://www.ohiorc.org/for/science/Default.aspx</a></p> <p>Classroom Safety:</p>

[http://membership.acs.org/c/ccs/pubs/chemical\\_safety\\_manual.pdf](http://membership.acs.org/c/ccs/pubs/chemical_safety_manual.pdf)

Search the National Science Digital Library:

<http://nsdl.org/>

Find more science teaching lessons at Teacher's Domain:

<http://www.teachersdomain.org/>

Ohio Science Standards Abbreviations:

ES – Earth/Space Science

SI – Scientific Inquiry

LS – Life Sciences

ST – Science and Technology

PS – Physical Sciences

SW – Scientific Ways of Knowing

