

This first introductory module presents students with an overview of what research is, and why it is done. Students learn about research in ultrasonics for the characterization of bone tissue through an activity where they try to find out the inside contents of an unknown structure. This module will be followed up by other lessons which will talk about the physics related to the research. Students will also follow and participate in the development of this research.

This module includes a lesson plan and an activity sheet.

Science Lesson Plan

Teacher:

Period:

Class: Mathematics/Physics

Date(s): Introduction

SETTING THE STAGE	
<u>Essential Question</u>	What role does Mathematics play in ultrasonics?
<u>Content Objective(s)</u> (Student-friendly)	<ol style="list-style-type: none"> 1. Students will define what research is, how it's applied. Students will also discuss its importance. 2. Students will make use of journals to organize information 3. Students will summarize/highlight steps in research
<u>Connection to previous or future lessons</u>	Students will apply research techniques to develop a plan for next lesson on what causes attenuation.
<u>Critical Thinking Questions</u>	<ul style="list-style-type: none"> • What can you say about the structure? • What facts can help you support your statement? • What do you think it looks like inside? • What approach would you use to see what's inside? • What if the structure was your leg? Would you use the same approach? Support your answer • What technology could you use?
<u>Key Vocabulary</u>	<ul style="list-style-type: none"> • Research • Technology • Journal keeping • Imaging • Experiment
<u>Materials Needed/Safety</u>	<ul style="list-style-type: none"> • 6 Sample structures (mailing tube 5in. covered with sponge and wrapped around with brown packing paper. Some tubes had packing peanuts taped inside) • journal
ACTIVE INSTRUCTION	
<ul style="list-style-type: none"> • Launch (Engage) 	<p>10-15 minutes</p> <p>I will begin by writing my name on the board followed with a question and possible answers.</p> <p>The question will be who am I? – Possible answers: a) student, b) student teacher, c) resident scientist, d) new principal.</p> <p>Students will be asked to choose one or more answers and they will have to write</p>

Science Lesson Plan

Teacher:

	<p>down their answer with a stating why they chose that particular choice. I will then explain what my role in the classroom is, what the expectations are and I will distribute the journals.</p> <p>15-20 minutes Students will be placed into groups and I will distribute the mystery structure. A small sealed tube with packing peanuts. Each tube will contain a different amount.</p>
<ul style="list-style-type: none"> • Investigation (Explore) 	<p>Once the mystery structure has been distributed I will proceed to ask the critical questions listed above.</p>
<p>TIME FOR REFLECTION</p>	
<ul style="list-style-type: none"> • Summarization (Explain & Extend) 	<p>We will talk about the importance of research and I will explain how their activity relates to my research and will give a brief description of my technical objective.</p>
<ul style="list-style-type: none"> • Assessment (Evaluate) 	<p>Students will be asked to write down an answer for the following question:</p> <ul style="list-style-type: none"> • Can you explain why it would be necessary to study the inner structure of a bone?
<ul style="list-style-type: none"> • Homework 	<p>What is ultrasound, why is it used? List your information source.</p>

Name: _____

Date: _____

Let's Investigate

1. How can you describe the structure?
2. What facts can help you support your statement?
3. What do you think it looks like inside?
4. What approach would you use to see what's inside if the structure was permanently sealed?
5. What if the structure was your leg? Would you use the same approach?
Support your answer.
6. What technology could you use to see what's inside the structure?

Words that may help:

Cylinder, cylindrical soft, hard, hollow, solid, surface, interior, exterior, imaging.