

# Grade Level Expectations (Grades 3 & 4) Physics of Sound

DRAFT

FOSS Investigations	Essential Learning Indicators Targeted
<p><b>Investigation 1: Dropping In</b> Part 1 – Drop Challenge Part 2 – Drop Codes Part 3 – Sound and Vibrations</p> <p><b>Investigation 2: Good Vibrations</b> Part 1 – Vibration and Pitch Part 2 – Length and Pitch Part 3 – Tension and Pitch</p> <p><b>Investigation 3: How Sound Travels</b> Part 1 – Sounds Through Air and Water Part 2 – Sounds Through Solids</p> <p><b>Investigation 4: Sound Challenges</b> Part 1 – Sound Challenges Part 2 – Choosing Your Own Investigation</p>	<p>*1.1.1 Understand how to use properties to sort natural and manufactured materials and objects .W</p> <ul style="list-style-type: none"> <li>• Identify, describe, and sort objects and materials using observed physical properties such as hardness, shape, state of matter, smell, temperature, texture, weight, and magnetic properties.</li> <li>• Sort and classify natural and manufactured materials and objects according to various physical properties.</li> </ul> <p>*1.1.3 Understand the behavior of sound in terms of vibrations and pitch and the behavior of light in terms of bouncing off, passing through, and changes in direction. W</p> <ul style="list-style-type: none"> <li>• Explain that when an object vibrates the object may produce sound that people can hear and give an example.</li> <li>• Explain the relationship between the pitch of a sound and the vibrations of the object causing the sound.</li> <li>• Describe experiences with sound (i.e. vibrations, echoes, and pitch)</li> </ul> <p>*1.1.4 Understand that energy comes in many forms. W</p> <ul style="list-style-type: none"> <li>• Describe the forms of energy present in a system (i.e. energy of motion (kinetic), heat energy, sound energy, light energy, electrical energy, chemical energy, and food energy).</li> </ul> <p>*1.2.1 Analyze how the parts of a system go together and how these parts depend on each other. W (Part 3)</p> <ul style="list-style-type: none"> <li>• Identify the parts of a system and how the parts go together.</li> <li>• Describe the function of a part of a system.</li> <li>• Describe a simple system that can perform a task and illustrate how the parts depend on each using common classroom materials.</li> <li>• Explain how one part of a system depends upon other parts of the same system.</li> </ul> <p>*1.2.2 Understand that energy can be transferred from one object to another and can be transformed from one form of energy to another. W</p> <ul style="list-style-type: none"> <li>• Identify where or when a part of a simple system has the greatest or least energy.</li> <li>• Describe transfers of energy.</li> <li>• Identify sources of energy.</li> <li>• Describe transformations of energy.</li> </ul> <p>*2.1.1 Understand how to ask a question about objects, organisms, and events in the environment. W</p> <ul style="list-style-type: none"> <li>• Identify the question being answered in an investigation</li> <li>• Ask question about objects, organisms, and events based on observations of the natural world.</li> </ul> <p>*2.1.2 Understand how to plan and conduct simple investigations following all safety rules. W (Investigations 2,3 &amp; 4)</p> <ul style="list-style-type: none"> <li>• Make predictions of the results of an investigation.</li> <li>• Generate a logical plan for, and conduct a simple controlled investigation.</li> <li>• Identify and use simple equipment and tools to gather data and extend the senses</li> <li>• Follow all safety rules during investigations.</li> </ul> <p>*2.1.3 Apply evidence to construct a reasonable explanation using data.</p> <ul style="list-style-type: none"> <li>• Generate a scientific conclusion including supporting data from an investigation.</li> <li>• Describe a reason for a given conclusion using evidence from an investigation.</li> <li>• Generate a scientific explanation of observed phenomena using given data.</li> </ul> <p>*2.1.5 Understand how to report investigations and explanations of objects, events, systems, and processes. W (Investigations 2, 3 &amp; 4)</p> <ul style="list-style-type: none"> <li>• Report observations or data of simple investigations without making inferences.</li> <li>• Summarize an investigation by describing reasons for selecting the investigation plan, materials used, observations, data, results, explanations and conclusions and safety procedures used.</li> </ul> <p>2.2.1 Understand that all scientific observations should be reported accurately and honestly even when observations contradict expectations.</p> <ul style="list-style-type: none"> <li>• Explain why scientific observations are recorded accurately and honestly.</li> </ul>

FOSS Investigations	Essential Learning Indicators Targeted
	<ul style="list-style-type: none"> <li>• Explain why scientific records of observations are not changed even when the records do not match initial expectations.</li> <li>• Explain why honest acknowledgement of the contributions of others and information sources are necessary.</li> </ul> <p>2.2.3 Understand why similar investigations may not produce similar results. (Investigations 2, 3 &amp; 4)</p> <ul style="list-style-type: none"> <li>• Describe reasons why two similar investigations can produce different results (identify possible sources of error).</li> <li>• Explain whether sufficient information has been obtained to make a conclusion.</li> </ul> <p>2.2.4 Understand how to make the results of scientific investigations reliable. (Investigations 2, 3 &amp; 4)</p> <ul style="list-style-type: none"> <li>• Describe how the method of investigation insures reliable results.</li> <li>• Identify and describe ways to increase the reliability of the results of an investigation (e.g. multiple trials of an investigation)</li> </ul> <p>3.1.1 Understand problems found in ordinary situations in which scientific design has been used to design solutions. W (Investigation 4 only)</p> <ul style="list-style-type: none"> <li>• Describe an appropriate question that could lead to a possible solution to a problem.</li> <li>• Describe how science and technology could be used to solve human problems.</li> <li>• Describe the scientific concept, principle, or process used in a solution to a human problem.</li> <li>• Describe how to scientifically gather information to develop a solution.</li> </ul> <p>*3.1.2 Understand how the scientific design process is used to develop and implement solutions to human problems. W (Investigation 4 only)</p> <ul style="list-style-type: none"> <li>• Propose, implement, and document a scientific design process used to solve a problem or challenge.</li> <li>• Describe possible solutions to a problem.</li> <li>• Describe reasons for the effectiveness of a solution to a problem or challenge.</li> </ul> <p>3.1.3 Analyze how well a design or a product solves a problem. W (Investigation 4 only)</p> <ul style="list-style-type: none"> <li>• Identify the criteria for an acceptable solution to a problem or challenge.</li> <li>• Describe the reason(s) for the effectiveness of a solution to a problem or challenge using scientific concepts and principles.</li> <li>• Describe the consequences of the solution to a problem or challenge.</li> <li>• Describe how to change a system to solve a problem or improve a solution to a problem.</li> <li>• Test how well a solution works based on criteria, and recommend and justify, with scientific concepts or principles and data, how to make it better.</li> </ul> <p>3.2.1 <i>Understand that science and technology have been practiced by all peoples throughout history.</i></p> <ul style="list-style-type: none"> <li>• <i>Describe how individuals of diverse backgrounds have made significant discoveries or technological advances.</i></li> <li>• <i>Describe how advancements in science and technology have developed over time and with contributions from diverse people</i></li> </ul> <p>3.2.2 <i>Understand that people have invented tools for everyday life and for scientific investigations.</i></p> <ul style="list-style-type: none"> <li>• <i>Describe tools (technology) invented to advance scientific investigations</i></li> <li>• <i>Describe how scientific tools help people design solutions to human problems</i></li> </ul> <p>3.2.3 <i>Understand how knowledge and skills of science, mathematics, and technology are used in common occupations.</i></p> <ul style="list-style-type: none"> <li>• <i>Identify science, math, and technology skills used in a career.</i></li> <li>• <i>Identify occupations using scientific, mathematical, and technological knowledge and skills.</i></li> </ul>

\* GLE's assessed in formative assessments found in WA Assessment Folio.  
 GLE's in italics are not currently addressed in the investigations but could be addressed with extension activities, FOSS Science Stories, and other resources.