

<p>75 min</p>	<p><b>Learning Goals</b></p> <ul style="list-style-type: none"> <li>• Examples of vibrations: Cantilever, Spring, Pendulum</li> <li>• Vibration Terminology: Period, Frequency, Amplitude, Damped, Forced</li> <li>• Simple Harmonic Motion: Linear Restoring Force proportional to displacement and towards equilibrium</li> <li>• Dependency of period of oscillation on medium's parameters</li> </ul> <p><b>Curriculum Expectations</b></p> <ul style="list-style-type: none"> <li>• E2.1 use appropriate terminology related to mechanical waves and sound, including, but not limited to: longitudinal wave, transverse wave, frequency, period, cycle, amplitude, ... .</li> <li>• E2.2 conduct laboratory inquiries or compute simulations involving mechanical waves and their interference (e.g., using a mass oscillating on a spring, a mass oscillating on a pendulum, ... .</li> </ul>	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>^ Bobs</li> <li>^ String and tape</li> <li>^ Student's Favourite Music on their device</li> <li>^ Springs</li> <li>^ Meter stick</li> <li>^ Handout: <a href="http://tinyurl.com/pendulumhandout">http://tinyurl.com/pendulumhandout</a></li> </ul>
<p><b>Minds On...</b></p> <p>3min</p>	<ul style="list-style-type: none"> <li>• While swinging keys on a long chain (or a bob hanging from a string), the teacher tells the class how Newton accurately found the speed of sound by using a pendulum.</li> </ul>	<p>Teacher reference:</p> <p><a href="#">Netwon – A Real Swinger</a></p>
<p><b>Action!</b></p> <p>20 minutes</p> <p>5 minutes</p> <p>25 minutes</p> <p>10 minutes</p>	<p><b>• Tune the Pendulum Activity:</b></p> <ul style="list-style-type: none"> <li>• The students are told it is time for them to make a pendulum that would oscillate to the beat of their favourite song.</li> <li>• They are shown the proper way of swinging a pendulum. (some students might have a tendency to force the pendulum oscillations).</li> <li>• They are told that two groups will be invited to demonstrate their work to the class.</li> <li>• They are asked to form groups of three and invited to take bobs, string, tape to make a pendulum oscillate to the tune of their favourite music.</li> </ul> <p>• Two groups are randomly selected to demonstrate their work to the classroom and explain the dependency of the period to string length and mass</p> <p><b>• Whiteboard Activity</b></p> <ul style="list-style-type: none"> <li>• Distribute Handout: <a href="http://tinyurl.com/pendulumhandout">http://tinyurl.com/pendulumhandout</a>. The same groups of three will now attempt graphing the displacement, velocity, acceleration versus time graphs (DVAT graphs) of a pendulum and discuss energy transformations.</li> <li>• Three groups selected to talk about the DVAT graphs</li> </ul>	<p>Teacher monitors group progress and offers hints as necessary.</p> <p>Teacher monitors progress and identifies misconceptions for further discussion.</p>
<p><b>Consolidate Debrief</b></p> <p>10 minutes</p>	<p>Teacher takes up the handout questions and addresses the misconceptions identified during the activity</p>	

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**Home Activity or Further Classroom Consolidation**

Prior to class: Watch Types of Vibrations and Waves Video  
Earl Hague Physics: <http://tinyurl.com/vibrations-period-frequency>