



## Quarrybrook

EXPERIENTIAL EDUCATION CENTER

### Program Title: **Waves in Motion**

**Audience:** 6th-8th grade students

**Program Theme:** Waves behave in predictable ways, no matter their form. These behaviors can tell us a lot about our surroundings and have been used by humans in a variety of ways to improve our lives.

**Program Goals:** Students will understand how different types of waves are reflected, absorbed, or transmitted when traveling between mediums, by exploring a variety of instruments, models, and natural phenomena. Light and sound will be the focus, but other types of waves and wave terminology will be discussed while discovering human uses for these concepts.

#### **Next Generation/Common Core Connections:**

**Topic:** MS-PS4 Waves and Their Applications in Technologies for Information Transfer

#### **Program Outline:**

**Activity 1: WHAT ARE WAVES? (15-30 min.)** – Students will use ropes or Slinkys to form and model waves.



Teachers will be helpful in monitoring student groups to ensure they stay on task, and in checking for understanding by asking questions. Teachers are always welcome to make connections to the classroom and other learning experiences.

**Objective:** Students will know the parts of a wave and how they are formed.

**Intended Outcomes:** Students will have modeled the behavior of a simple wave using a rope or a Slinky. Students will be able to name the parts of a wave and discuss how waves are formed and how they can be changed.

**Terms to Know:** *These concepts/terms will be used during the lesson and it would be helpful if they were introduced before coming to Quarrybrook.*

1. Wavelength – The distance between successive crests of a wave, especially points in a sound wave or electromagnetic wave.
2. Frequency – The rate at which something occurs or is repeated over a particular period of time or in a given sample.
3. Amplitude – Maximum extent of vibration or oscillation, measured from the position of equilibrium.

Activity 2: REFLECTION, ABSORPTION, AND TRANSMITTANCE (30-60 min.) – Students will perform a variety of small group experiments and demonstrations modeling the behaviors of sound and light waves under different circumstances.



Teachers can help monitor small groups to ensure students stay on task, and ask clarifying questions during the activities.

**Objectives:** Students will use simulations, activities, and experiments to demonstrate how waves behave when interacting with matter. Students will understand how the behavior of waves can be used in technology and our daily lives.

**Intended Outcomes:** Through discussion and observation, students will be able to describe how waves behave when traveling through matter. Students will be able to describe how waves are used for transmitting information, and discuss how waves are useful for technology.

**Terms to Know:** *These concepts/terms will be used during the lesson and it would be helpful if they were introduced before coming to Quarrybrook.*

1. Reflection – When a wave strikes a reflective surface, it changes direction, such that the angle made by the incident wave and line normal to the surface equals the angle made by the reflected wave and the same normal line.
2. Absorption – If a kind of wave strikes a matter, it will be absorbed by the matter.
3. Transmittance – When the wave passes through a medium.

Activity 3: LIGHT HIKE (30-60 min.) – Students will explore along Quarrybrook’s trails, looking at the relationships and behaviors of light in the forest.



Teachers can help relate classroom concepts to the trail as we hike while also helping to monitor the group to ensure trail expectations are being met.

**Objective:** Students will look for and observe examples in Nature of the principles of light.

**Intended Outcome:** Through discussion and observation, students will be able to describe how wave properties are important for life in the forest.

**Successful completion of this program will help support your students’ proficiency in NGSS**

**Performance Expectations:**

**MS-PS4-1** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

**MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

**Common Core ELA-Literacy: Speaking & Listening**

**CCSS.ELA-LITERACY.SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.