

EXPLORING WAVES

Grades 5-8

Key idea:

A wave is a conceptual model to understand a way for energy to get from one place to another.

Specific Learning Objectives

Unit 1: Waves and Wave Motion

Exploration 1: The Human Wave

- Transverse waves consist of two different motions: the direction of travel of the wave is perpendicular to the motion of the medium through which the wave is traveling.

Exploration 2: The Wave Machine

- Sound, which can be modeled usefully as a wave phenomenon, needs a medium, such as air, to propagate, or travel.
- Light, which can be modeled usefully as a wave phenomenon, does not need a medium to propagate.

Exploration 3: Waves on a Rope

- A wave is a rhythmic disturbance (a vibration) that moves.
- For transverse waves (such as the human wave, waves on the wave machine, and rope waves), the wave motion moves at right angles to the motion of the medium.

Unit 2: Water Waves

Exploration 4: What Do Water Waves Look Like?

- Water waves move outward in all directions from a disturbance in the water.

Exploration 5: Building the ARIES Ripple Tank

- A ripple tank allows for scientific observation of the behavior of waves in a controlled situation.

Exploration 6: What Can You See with a Ripple Tank?

- The wave images cast by a ripple tank are representative of the wave motion in the tank.
- When water waves hit an obstacle, the waves rebound, or reflect, from it.

Exploration 7: Will the Boat Move?

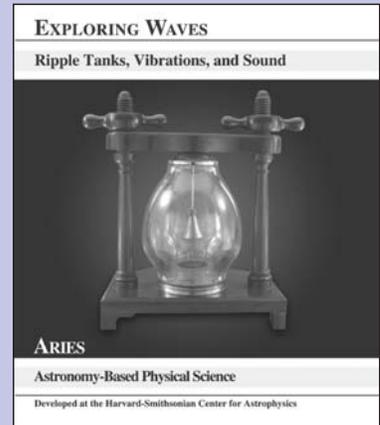
- A floating object will bob up and down and move slightly forward and backward on the water, but will not have any net motion in the direction of the waves.

Exploration 8: Waves, Barriers, and Collisions

- Waves can flow around obstacles.
- Waves can overlap and pass through each other.

Important content:

- The nature of waves
- How water waves behave
- Sound waves
- Transmitting sound through various media
- Sound patterns, pitch, and music



Unit 3: Sounds Like Sound

Exploration 9: Thinking About Sound

- Sound is usually modeled, or described, as waves moving in a medium.
- Although most of the sound we hear is transmitted to our ears through the air, sound is transmitted through other materials as well.
- Sound can travel in all directions from its source.

Exploration 10: The Big Ear

- Hearing can be enhanced with a device that uses a large surface area to direct more sound to the ear.

Exploration 11: Can You “See” Sound?

- Sound is usefully modeled as the vibrations of the air or solid objects.
- Sound can be transmitted from solid objects to other objects or to air.
- Sound can also be blocked, or absorbed, by solid objects.

Exploration 12: Hangers and Harps

- Characteristics of sound depend on the medium through which the sound travels.
- Air does not “conduct” sound as well as most solids, such as metals.

Exploration 13: The String Telephone

- Air does not “conduct” sound as well as many solids.

Unit 4: The Sound of Music

Exploration 14: When Does Sound Become Music?

- Musical sound is most often characterized by regular patterns.
- Noise is characterized by a lack of pattern.

Exploration 15: The Glass Xylophone and the Bottle Organ

- The range of notes available on a musical instrument can be altered by changing such variables as the length of the column of air (wind instrument) or the length of the string (string instrument).

Exploration 16: The Straw Oboe

- The length of a wind instrument (the length of the column of air) can affect its pitch.

Exploration 17: The Mini-Washtub Bass

- Increased tension on a string results in a higher pitched sound when the string is plucked.

Exploration 18: The ARIES Banjo (Optional)

- Increased tension on a string results in a higher pitched sound when the string is plucked.
- The longer a string, the lower the pitch of the sound produced when the string is plucked.