

Key Physics Concepts and Skills

Activity Summaries

Physics Principles

Activity 1: Using Waves to Communicate

Observing wave motion in water and in Slinkies focuses students on the use of pulses to communicate messages. They test this idea by creating a simple code, then sending a message. This concept is reinforced with a review of how a simple can and string phone works.

- Wave motion
- Frequency and wavelength

Activity 2: Signals and Noise

In this activity, students try to replicate a structure, relying only on verbal communication, without the benefit of the original structure or its image. This highlights dilemmas that occur in communication and information exchange between people with different experiences, ages, or language.

- Signal to noise ratio

Activity 3: The Electricity and Magnetism Connection

Students now begin exploring magnets, compasses, and simple electric circuits, finally constructing electromagnets. They then send simple messages using a digital code with all of these materials, and consider which could also use an analog code.

- Electricity
- Magnetism
- Electromagnets

Activity 4: Making the Connection

Designing and building a telegraph system is the first step in this activity. Students practice sending and interpreting messages in Morse code and consider how to keep such messages private.

- Electric circuits
- Telegraphy

Activity 5: Voice Signals

In this activity, students make a simple microphone/speaker and use it to send and listen to signals from a radio. They then explore how solar cells convert light into electricity, applying this information to send signals by shining a beam of light in code on the solar cell.

- Electronic sound
- Conversion of energy
- Solar cells

Activity 6: Sending a Message with Light

Students use an LED to observe the conversion of an electrical signal to light. They then add a solar cell and speaker to the system and observe the conversion of the electrical signal to sound. Use of this for communication over a distance is then explored.

- LEDs
- Electronic sound
- Conversion of energy
- Solar cells

Activity 7: Just the Fax

This activity introduces the codes with resulting white and dark squares, or pixels, that are used to transfer pictures and data via a fax. Students relate this to the zeroes and ones used in a digital code and practice how this can be used to communicate over large distances.

- Pixels
- Binary code
- Digital codes

Activity 8: Bar Codes

The bar code is the final code students explore, connecting the bars to numbers. They then consider how this, and the other codes could be used to meet the Chapter Challenge.

- Encoding information
- Digital and analog codes