

CHAPTER 5

Let Us Entertain You

Chapter Overview

Chapter Challenge

Students are challenged to produce a two–to four–minute sound and light show to entertain their peers. They are expected to use sounds from human voices or musical instruments that they build themselves, and use lights from conventional household lamps. They are allowed to play some prerecorded sounds during the show. They can even use lasers if you approve. *Let Us Entertain You* challenges students to use sound and light production techniques that are not generally used by musicians and TV producers. They are encouraged to be creative and entertaining.

A follow-up of the show requires students to explain the physics principles behind the techniques they use. The show is evaluated for both scientific content and creativity, and the oral or written report is evaluated for how each physics principle is used. Sound and light are the basis of much of the entertainment industry. A sound and light show is an excellent opportunity for your students to show what they have learned while also having fun at the same time.

Chapter Summary

Students investigate how sound and light waves travel. They understand how tension and mass of a string affect the pitch of the sound produced, and how different images are formed using mirrors and lenses of different shapes. Students

- Learn how tension and string length affect the pitch of a sound in a vibrating string.
- Understand that waves carry energy and learn how wavelength, frequency, and speed of a wave are related.

- Understand the meaning of direct and inverse relationships between different variables. Investigate how wave speed, wavelength and frequency are related.
- Understand how sound is produced by longitudinal compressional waves.
- Learn that light travels in straight lines and study how shadows are formed.
- Explore how light rays are reflected by a flat mirror. Study the changes in the patterns of reflection and collect evidence to show the relationship between the angle of incidence and the angle of reflection.
- Learn the difference between real and virtual images, and apply their knowledge of reflection to define focal length of a curved mirror.
- Learn what happens to light when it goes from air to another substance. Study the relationship between the angle of incidence, the angle of refraction, and relate them to the index of refraction to understand Snell's law.
- Explore color addition by observing the effect of mixing different colored lights and mixing paints of different colors.

