



Discussion Guide for

LIGHT, LENSES, AND LOSERS

OBJECTIVES

After viewing this program, students will be able to:

- Explain how electromagnetic waves are produced.
- List some of the waves making up the electromagnetic spectrum and describe their uses.
- Analyze how visible light is produced by the movement of electrons between energy levels.
- Contrast the reactions that emit radiation in incandescent lamps and in fluorescent lamps.
- Compare the images produced by concave and convex mirrors.
- Explain how parabolic mirrors can produce a beam of light.
- Discuss what the index of refraction tells about a substance.

This program is part of the AIMS Interactive Science Essentials Series. This twenty-four part series covers four subject areas- Earth Science, Biology, Physics, and Chemistry. There are six programs in each subject area. The individual programs are divided into randomly accessible sections. A glossary provides written definitions of terms used in the program, and in most cases will run a section of the video where the word is used in context.

A script of the narration is accessible, as well as a bulletin board containing a general introduction to the subject. A quiz allows the student to test their knowledge and the results are recorded for you. In the teacher's section you can view each student's test responses and edit or create your own quiz and test questions.

OVERVIEW

Light, Lenses, and Lasers is part five of the Physics Essentials series which examines modern day physics. The program explains how light is the visible part of the electromagnetic spectrum, which consists of a wide variety of waves-from radio waves to cosmic rays. Students will learn about different lenses as the use of concave and convex mirrors and lenses is explored, along with the concepts of diffraction and polarization. The program concludes by introducing students to the special qualities of laser light and how it is used in medicine, communications, and entertainment.

TEACHER'S PREPARATION

- Before the student uses the program set up the computer so that they can easily reach the mouse and the keyboard.
- Load the CD-ROM into the computer so that it is ready for the student to begin using.
- While students are able to work at their own pace, some students may benefit from using the program more than once.

Suggested Discussion Questions

1. Briefly explain how electromagnetic waves are produced.
2. List some of the types of radiation making up the electromagnetic spectrum. How does the amount of energy in these waves change as the wavelength becomes shorter and the frequency increases?
3. Make a chart describing the uses of the following types of electromagnetic radiation: microwaves, x-rays, ultraviolet radiation, and infrared radiation.
4. Analyze how visible light is produced by electrons moving between energy levels in individual atoms.
5. Why is producing incandescent light by burning wood or coal relatively inefficient?
6. Contrast incandescent bulbs and fluorescent bulbs.
7. Compare the images produced by concave and convex mirrors.
8. Make a mind map explaining how parabolic mirrors produce beams of light.
9. What does the index of refraction tell us about a substance?
10. Analyze what happens when light strikes a substance at an angle greater than the critical angle.
11. Describe how mirages are created.
12. Color addition in televisions uses three basic colors. List them.
13. Explain how focal length is determined.
14. Describe what causes nearsightedness.
15. What are diffraction gratings?
16. Discuss some of the common applications of polarizing filters.
17. How is laser light produced?
18. List some of the ways laser beams may be used in industry, seismology, medicine and entertainment.



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VOCABULARY

color addition	concave
convex	critical angle
diffraction grating	electromagnetic
electrons	fluorescent light
focal length	gamma rays
gas discharge tube	incandescence
laser	lidar
mirage	normal
polarizer	prism
radio waves	reflection
refraction	ultraviolet rays
visible light	x-rays

ADDITIONAL BENEFITS

Students will be able to:

- Describe how mirages are created.
- Explain the use of color addition in televisions.
- Draw a diagram indicating how focal length is determined.
- Define polarized light.
- Explain how laser light is produced.

PROGRAMS DETAILS

LENGTH:

26 minutes

SUBJECT AREAS:

Physics

AUDIENCE LEVELS:

Junior/Senior High

ORDER NUMBER:

1-9097SG

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