

# 31 DIFFRACTION AND INTERFERENCE

## Objectives

- Describe what Huygens stated about light waves. (31.1)
- Describe what affects the extent of diffraction. (31.2)
- Explain how interference affects wave amplitudes. (31.3)
- Describe what Young's interference experiment demonstrated. (31.4)
- Explain how the colors seen in thin films are produced. (31.5)
- Describe how laser light is emitted. (31.6)
- Explain how a hologram is produced. (31.7)

## discover!

**MATERIALS** construction paper, container of water, clear nail polish

**EXPECTED OUTCOME** Students will see a pattern of iridescent colors on the nail polish film.

### ANALYZE AND CONCLUDE

1. A pattern of iridescent colors
2. Different colors will be observed at different viewing angles.
3. Light incident on thin films is reflected from the top and bottom surfaces of the film. The interference of the reflected light as it exits the film gives rise to the iridescent colors.

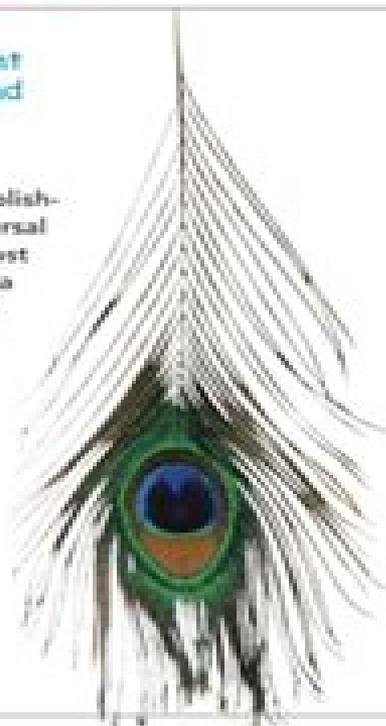
# 31 DIFFRACTION AND INTERFERENCE



## THE BIG IDEA

The wave model of light explains diffraction and interference.

Today Isaac Newton is most famous for his accomplishments in mechanics—his laws of motion and universal gravitation. Early in his career, however, he was most famous for his work on light. Newton pictured light as a beam of ultra-tiny material particles. With this model he could explain reflection as a bouncing of the particles from a surface, and he could explain refraction as the result of deflecting forces from the surface acting on the light particles. In the eighteenth and nineteenth centuries, this particle model gave way to a wave model of light because waves could explain reflection, refraction, and everything else that was known about light at that time. In this chapter we will investigate the wave aspects of light to explain two important phenomena—diffraction and interference.



## discover!

### What Produces Iridescent Colors in Thin Films?

1. Submerge a piece of construction paper in a container of water.
2. Apply one drop of clear nail polish to the surface of the water and watch it spread out over the surface of the water.
3. After the nail polish has stopped spreading, slowly lift the construction paper out of the water. The nail polish should adhere to the surface of the paper.
4. Allow the paper to dry.

### Analyze and Conclude

1. **Observing** What do you observe as you view the dried film on the surface of the paper?
2. **Predicting** What do you think you will see if you view the film from various angles?
3. **Making Generalizations** How would you explain the colors produced by thin films?

# Chapter 31 Diffraction And Interference Exercises Answers

**Richard Wolfson**



## Chapter 31 Diffraction And Interference Exercises Answers:

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