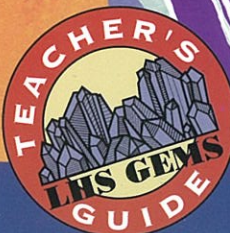


# INVISIBLE UNIVERSE

Grades 6-8

*The Electromagnetic Spectrum  
from Radio Waves  
to Gamma Rays*





# What You Need for the Whole Unit

## Activity 1: Comparing Wave Makers

- 6 copies of the News Flashes (master on page 11)
- 32 handouts, *Comparing Wave Makers* (master on page 16)
- 2 overhead projectors
- 2 slinkies
- 2 metal "snaky" springs—about 5-8 meters
- 2 ropes—thick, heavy, about 5 meters long
- 2 coiled telephone cords—about 5 meters long
- 2 flexible rubber or plastic hoses—about 5-8 meters long
- 1 pitcher for water
- 2 ripple tanks (flat-bottomed clear plastic tray, dowels, medicine dropper, clear ruler)
- 1 compass
- 1 magnet
- 8 meter sticks

## Activity 2: Invisible Light Sources and Detectors

- 1 overhead transparency of *Invisible Light Sources, Detectors, and Shields* student sheet
- 1 X-ray film image
- 6-12 Station Number Signs
- 6-12 sets of shields/transmitters—one for each station in manila folder or envelope.  
Each set has: blank overhead transparency, aluminum foil, plain white paper, cloth, metal screen, plastic screen, black plastic, plastic baggie, wax paper
- \_\_ Station 1—flashlight with batteries, plain white paper, optional color filters
- \_\_ Station 2—infrared bulb with ceramic socket, optional digital or video camera
- \_\_ Station 3—remote control with batteries, TV monitor or other device, optional digital or video camera
- \_\_ Station 4—FM radio with batteries
- \_\_ Station 5—AM radio with batteries
- \_\_ Station 6—black light—fluorescent, assortment of: "bright" paper; styrofoam peanuts, detergent, tonic water with quinine in cup, index card with UV paint, glow-in-the-dark stars, UV beads.

## Activity 3: Putting Together the Electromagnetic Spectrum

- 2 sets of the Electromagnetic Spectrum Cards one on card stock and the other as overheads
- 1 videotape player, monitor, and videotape: *The Infrared World: More Than Your Eyes Can See*
- sources and detectors from Activity 2
- 1 overhead projector
- 8 sets of the Electromagnetic Spectrum Cards on card stock (for each group)
- 32 copies of homework worksheet, *Invisible Emitters and Detectors*

## Activity 4: Tour of the Invisible Universe

- 1 set of the 12 composite overheads for the *Tour of the Invisible Universe*
- 1 overhead projector or computer projector
- Expert's Narration Cards for Tour of the Invisible Universe*
- 32 *Tour of the Invisible Universe* worksheets (one for each student).

## Activity 5: The Most Powerful Explosions in the Universe

- 1 transparency of *How Much Energy is That?*, of the *How Much Energy is in a Gamma-Ray Burst?* student worksheet, and of the Meteor Crater/Hiroshima images.
- 1 overhead projector
- 32 *How Much Energy is in a Gamma-ray Burst?* three-page student worksheets
- 32 copies of the article *The Mystery of the Gamma-Ray Bursts*