

Electromagnetic Waves  
Student Worksheet

Answer the following questions during or after your study of Electromagnetic Waves.

1. What is “waving” in an electromagnetic wave?
2. How fast do radio waves travel in a vacuum? How fast does red light travel in a vacuum? How fast do X-rays travel in a vacuum?
3. How is polarized light different from unpolarized light?
4. Which of the following are likely to act as a polarizing filter for radio waves: a picket fence consisting of long, thin slats made out of metal or wood?
5. What is the frequency of red light (650 nm) in a vacuum? What is the frequency in water, where the speed of light is only  $2.25 \times 10^8$  m/s?
6. How much energy does a photon of UV light (frequency =  $3.6 \times 10^{16}$  Hz) have?
7. Compare the energy, frequency, speed, and wavelength of microwaves and gamma rays.
8. Why can x-ray be used to take images of your bones and teeth, while infrared radiation cannot?
9. Which parts of the electromagnetic spectrum reach Earth’s surface from space?
10. Why can infrared and microwave observations sometimes be conducted from Earth’s surface, while X-ray and Gamma Ray measurements must be done from orbit?
11. Why might astronomers want to observe the same object in multiple wavelengths?