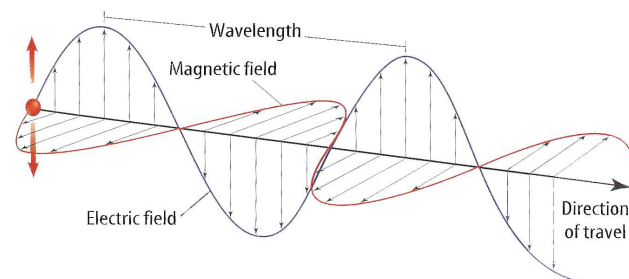
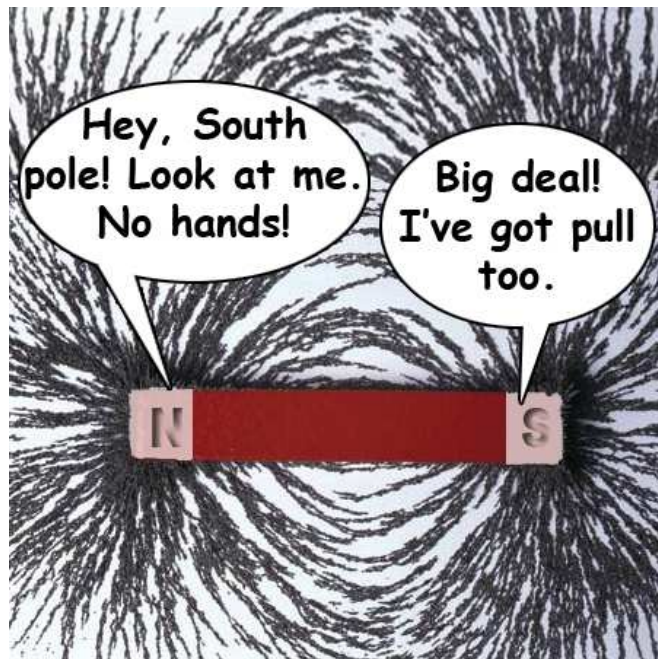


The Nature of Electromagnetic Waves

Like mechanical waves, electromagnetic waves can travel through matter, but they also can travel through empty space. Electromagnetic waves are produced by charged particles in motion. They consist of two force fields that enable them to exert forces on objects without touching them. Magnets are surrounded by a force field called a **magnetic field**. A magnetic field exerts a force on other magnets and magnetic materials that cause them to line up along the direction of the magnetic field. Charged particles are surrounded by a force field called an **electric field**. Electric fields exert forces on other charged particles within the field. Opposite charges attract, while like charges repel.

Electromagnetic waves are produced by the vibrations or oscillations of charged particles. The **frequency** is the number of times a particle vibrates per second. The vibrations produce a wave with a wavelength inversely proportional to the frequency (one vibration = one wavelength). The wave moves away from the vibrating particle. The electric field moves away in the same plane as the vibration. The magnetic field moves away at right angles to the plane of vibration. Energy carried by an electromagnetic wave is called radiant energy. The energy of the wave is determined by the frequency. The speed of all electromagnetic waves through space is about 300,000 km/s.



Answer the questions below based on the reading above, and on your knowledge of physics.

1. How is an electromagnetic wave different from a mechanical wave? _____

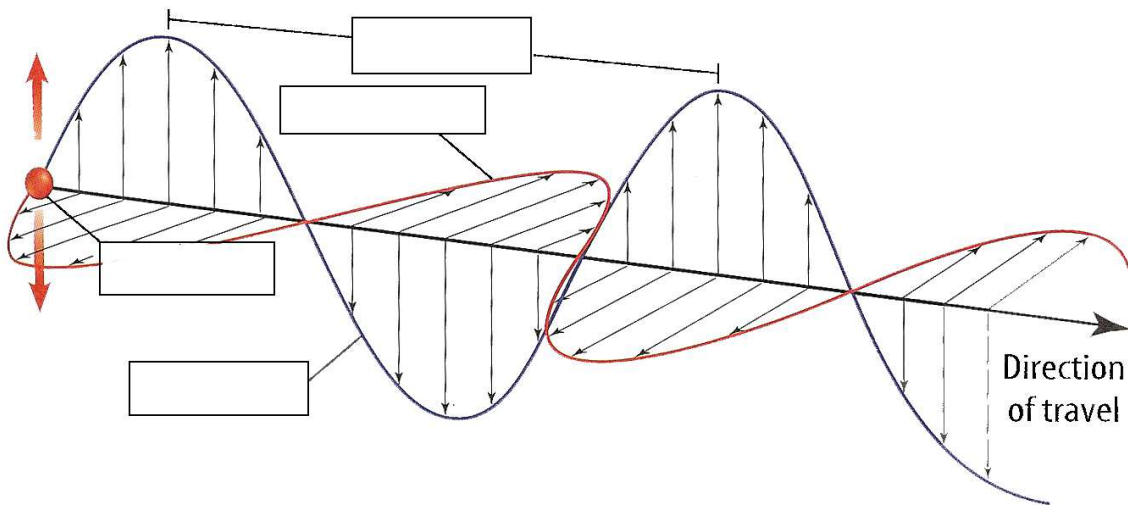
2. What causes electromagnetic waves? _____

3. What does an electromagnetic wave consist of? _____

4. What is a force field? _____

(CONTINUED ON THE NEXT PAGE)

5. If a magnet has a magnetic field, what must be happening inside the magnet? _____
- _____
6. What effect do the electric fields of charged particles have on each other when:
- a. The particles have the same charge? _____
- b. The particles have opposite charges? _____
7. What is the frequency of an electromagnetic wave? _____
- _____
8. Label the parts of the electromagnetic wave pictured below.



9. What is radiant energy? _____
- _____
10. What is the speed of an electromagnetic wave? _____
11. What are some examples of electromagnetic waves? _____
- _____
- _____