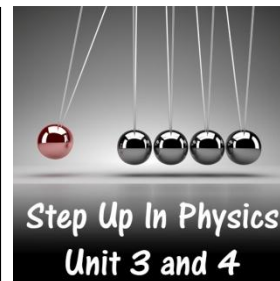


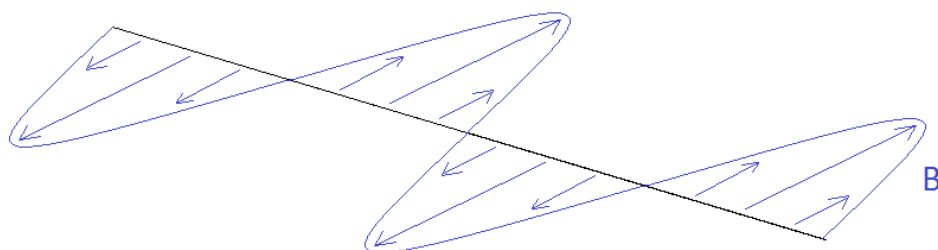
A Picture of Light

Problems Worksheet



1. What evidence suggests electromagnetic waves are not mechanical waves like sound is?

2. The diagram of an electromagnetic wave has been started below.



- Fill in the remainder of the diagram so that it shows the components that make up an electromagnetic wave. Clearly label the additions you make.
- On the diagram, clearly show and label the wavelength of the wave.
- On the diagram use an arrow to show the direction of wave propagation. Label the arrow.

3. There are many different types of electromagnetic radiation (radio, microwave, X-rays, etc.) which differ in wavelength.

- Other than wavelength, what property of electromagnetic waves can be used to identify one type from another?
- Which type of electromagnetic radiation has wavelengths around the width of a doorway?

4. Visible light is a type of electromagnetic radiation.
 - a. Describe and compare the electric field and magnetic field that make up electromagnetic radiation.

 - b. Compare the direction of propagation of electromagnetic radiation with the behaviour of the electric and magnetic fields.

5. A thin strip of metal has a low frequency electromagnetic radiation source incident upon it. Describe the behaviour of the electrons in the metal strip.

6. A proton enters into a magnetic field which causes it to move in a circular path. A Physicist picks up traces of electromagnetic radiation coming from the proton. Explain this observation.

7. State three uses for electromagnetic radiation and state which type of electromagnetic radiation is utilised for each of these uses.
8. A television network broadcasts its signal using a 38.7 MHz radiowave. Calculate the wavelength of the signal.
9. An electromagnetic wave has a 1.50×10^{-5} m wavelength.
- What type of electromagnetic radiation is this?
 - Calculate the frequency of the electromagnetic wave.
 - Describe how the frequency of the wave would change if the wavelength was doubled.
 - Describe how the speed of propagation would change if the wavelength was halved.

10. A stellar flare is where a sudden flash of brightness erupts from a star, usually accompanied by an ejection of solar material, in the form of a hot ion wind. The hot ion wind is ejected at velocities up to 1.00% of the speed of light. The stellar flares that occur on our Sun are called solar flares. A bright flash on the surface of the Sun, closest to the Earth, was detected by Earth based observers at 11:00 AM Sunday morning.

- a. When did the solar flare occur? Answer to the nearest minute.
- b. When is the earliest time observers on Earth will detect the ion wind ejected during this solar flare? Answer to the nearest minute.