UNIT 9: WAVES -- USEFUL DISTURBANCES

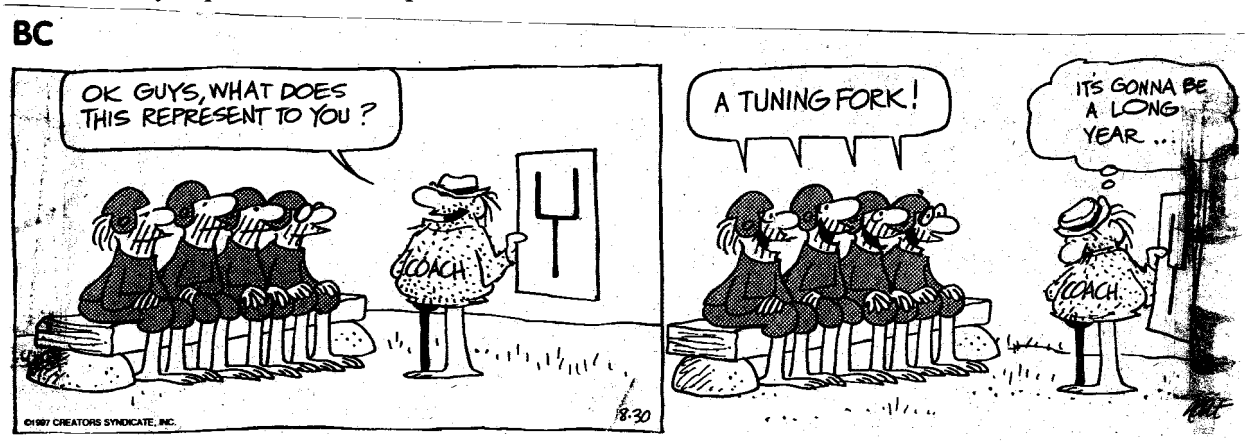
At the completion of this unit, the student should be able to:

1. Distinguish between a mechanical wave and an electromagnetic wave.
2. Define the following terms: wave, pulse, crest, trough, amplitude, wavelength, period, frequency, and propagation speed.
3. Distinguish between frequency and period, and calculate one from the other.
4. Given two of the following, calculate the third: wavelength, frequency, and speed.
5. State the factors which affect the speed of a mechanical wave.
6. Distinguish between transverse and longitudinal (compressional) waves.
7. Distinguish between standing and traveling waves.
8. Describe the motion of a pulse in a medium with a fixed or free end.
9. Describe a pulse as it passes from one medium to another, including how partial reflection can be eliminated at an interface.
10. Describe a standing wave, pointing out the nodes and antinodes.
11. Distinguish between constructive and destructive interference. Apply the principle of superposition to predict the result of two passing waves at any instant of time.
12. Describe what resonance is, how it occurs, and examples of it in the real world.
13. Define the following terms: fundamental frequency, harmonic, pitch, and octave. Calculate the harmonics for strings and open and closed tubes.
14. Apply wave theory to explain the following: the production of sound, beats, shock wave, polarization, and the Doppler effect.
15. Explain how lasers work and the characteristics of light produced by lasers.
16. Explain how holograms are made and the three conditions necessary.

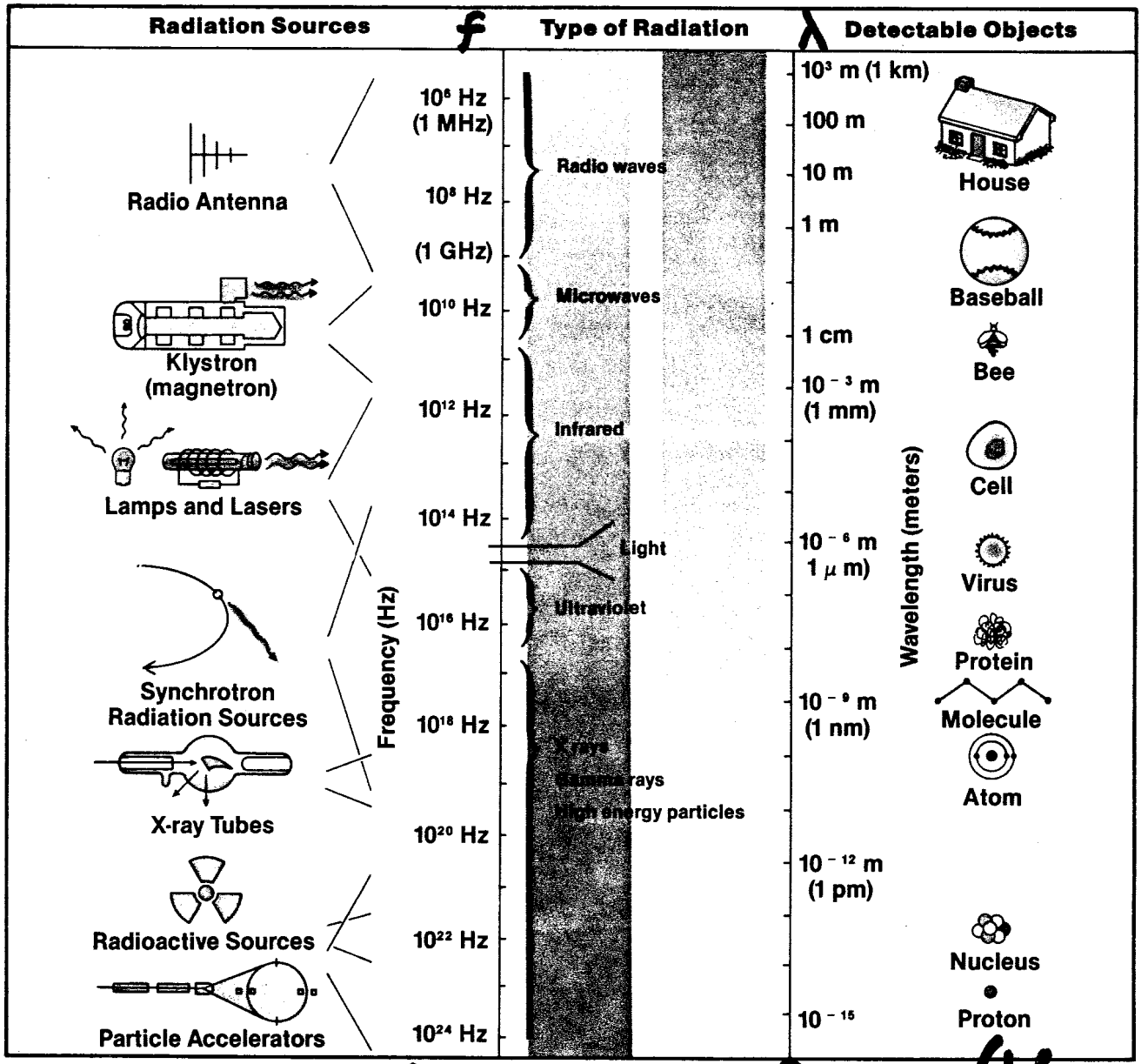
Reference: Holt Physics (Serway/Faughn), chapters 11-12

Homework: Wave Study Sheet

Labs: Slinky, Speed of Sound, polarization



REPRESENTATIVE ELECTROMAGNETIC SPECTRUM



$C = \lambda f = 3 \times 10^8$ m/s (Vacuum)

ROY G BIV