

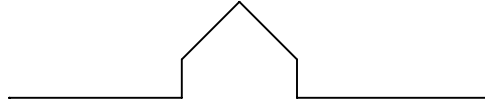
Homework Set #12 Solutions (11/17 - 11/21):

Chapter 15: **Questions** 11, 31, 53 **Exercises** 11, 17, 23

Questions:

11. Because it takes 60 seconds for the second hand to go around once, it has a period of 60 seconds. The frequency is the reciprocal of the period so its frequency is $1/(60 \text{ s}) = 0.017 \text{ hertz}$.

31.



53. There would be a maximum, or an antinode, at the mid-point.

Exercises:

$$11. T = 2\pi \sqrt{\frac{L}{g}} = 2\pi \sqrt{\frac{5 \text{ m}}{10 \text{ m/s}^2}} = 4.45 \text{ s}$$

$$17. v = \lambda f = (25 \text{ cm})(3 \text{ Hz}) = 75 \text{ cm/s}$$

$$23. \lambda = \frac{6}{1} \text{ m}, \frac{6}{2} \text{ m}, \frac{6}{3} \text{ m}, \frac{6}{4} \text{ m}, \frac{6}{5} \text{ m}, \dots$$

Chapter 20: **Questions** 1, 5 **Exercises** 2, 7

Questions:

1. Because the charge does not flow along the object, the object must be an insulator.

5. On a humid day the moisture in the air allows some of the accumulated charge to leave the balloon.

Exercises:

$$2. (92 \text{ protons})(1.6 \times 10^{-19} \text{ C/proton}) = 1.47 \times 10^{-17} \text{ C}$$

$$7. E = \frac{F}{Q} = \frac{2 \text{ N (north)}}{5 \text{ m C}} = 400 \text{ N/C (north)}$$

$$F = QE = -20 \text{ mC}[400 \text{ N/C (north)}] = 8 \text{ N (south)}$$