

PURPOSE: To investigate the relationship of frequency, wavelength and velocity for waves passing from deep water to shallow water.

OBSERVATION:

1. On the diagram below, indicate waves in deep and shallow water showing the following:
(NOTE: IDEALIZE DRAWINGS AS NECESSARY)

(a) Relative wavelengths. Note: No actual measurements necessary. Caution: Be careful that you do not draw "extra" waves in the shallow section on the second diagram.

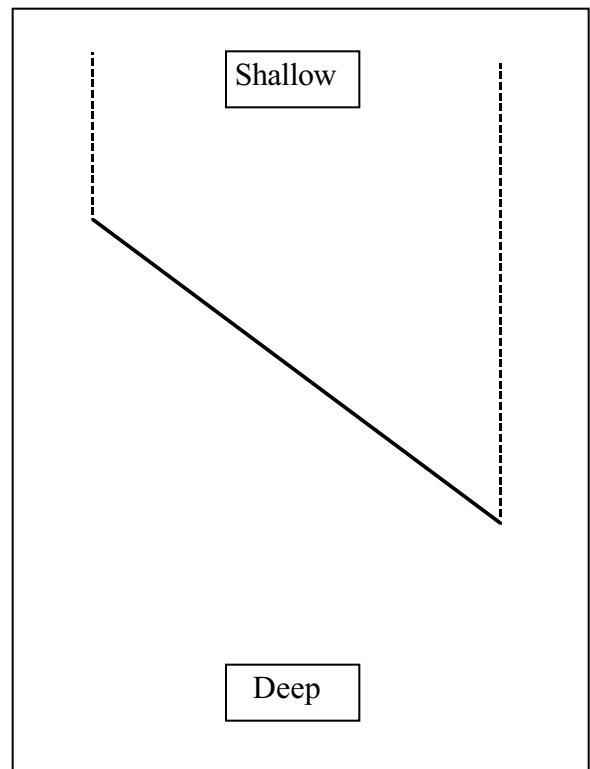
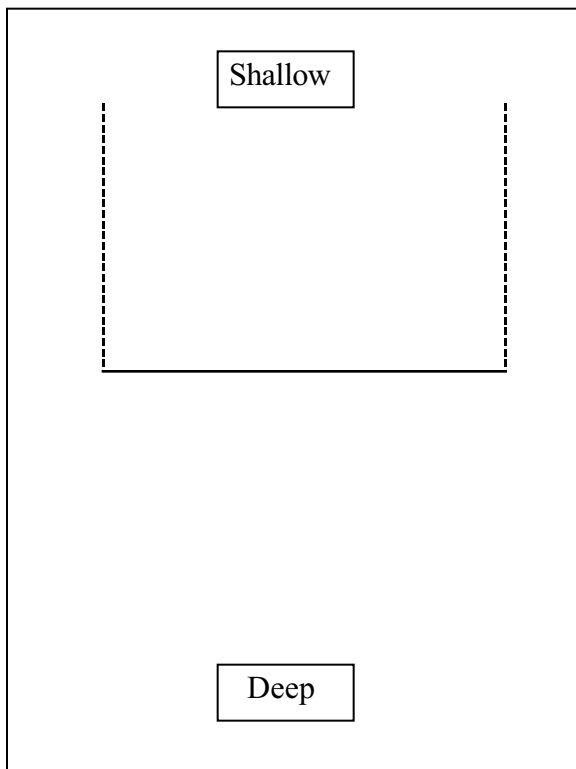
(b) Normal.

(c) Direction of travel of both incident and refracted waves.

(d) Angle of incidence and angle of refraction as measured between the normal and direction of travel. Label these as i and r . Note: No actual measurements necessary; relative relationship is sufficient.

(e) Angle of incidence and angle of refraction as measured between the wave and boundary. Label these as I and R . Note: No actual measurements necessary; relative relationship is sufficient.

2. Use the strobe to observe the frequency in deep and shallow water simultaneously. Note whether frequency is greater in shallow or deep water, or is the same in both.



ANALYSIS/CONCLUSION:

1. Compare frequency in deep vs. shallow water.

2. Compare wavelength in deep vs. shallow water.

3. Using the expression $v = f \lambda$, and your frequency relationship from question 1, derive a mathematical expression which relates velocity and wavelength. Note that separate expressions for $v = f \lambda$ may be written for shallow and for deep water by using subscripts: $v_s = f_s \lambda_s$ and $v_d = f_d \lambda_d$

4. Based on your expression from question 3 and your wavelength relation from question 2, draw a conclusion regarding velocity of the waves in deep water vs. shallow water. Specifically mention the parts that questions 2 and 3 play in formatting your conclusion.