

How is the speed of the wave affected by the depth of the water through which it travels?

In this activity, you are expected to:

1. Make accurate measurements of length and time.
2. Calculate for wave speed.
3. Plot a graph of the wave speed versus depth of water.
4. Understand the relationship between wave speed and depth.

Procedure:

1. Take a rectangular tray and measure the length of the tray. Then pour water into it to a depth of a **few millimeters** (less than 1 cm) and measure this depth.

Length of tray, L = _____ cm

Depth of water, d = _____ cm

2. Raise one end of the tray about a centimeter from its initial position. Observe the ripple which moves from that end, across the water and back. Use a stopwatch to measure the time it takes for a ripple to travel from one end to the other, and back.

Time, t = _____ s

Repeat this several times and work out an average reading. (See table below.)

3. Calculate the speed at which the ripple is traveling, in cms^{-1} .

$$\text{speed} = \frac{\text{total distance travelled}}{\text{total time taken}} = \frac{2 \times L}{t}$$

4. Put more water into the tray and measure the new depth. Repeat steps 2 and 3.
5. Continue adding more water and repeat steps 2 and 3 until you have **six** sets of data.

Data Table:

Depth/cm	Time/s				Speed/ cms^{-1}
	Trial 1	Trial 2	Trial 3	Average	

6. Plot a graph of the speed (y-axis) versus depth (x-axis). Make a smooth curve.

Questions

1. How does the depth of the water affect the speed of the wave?
2. What would you expect to happen to the speed of an ocean wave as it approaches the shore?
3. Is the wave that you produced a longitudinal wave or a transverse wave? Explain your answer.
4. Do you think your results are really accurate? Discuss two (2) sources of error in your experiment.
 - (a)
 - (b)