

9.7 Investigating waves

Part A Waves on a String

Aim

To generate string waves and examine their characteristics and changes in motion.

Equipment

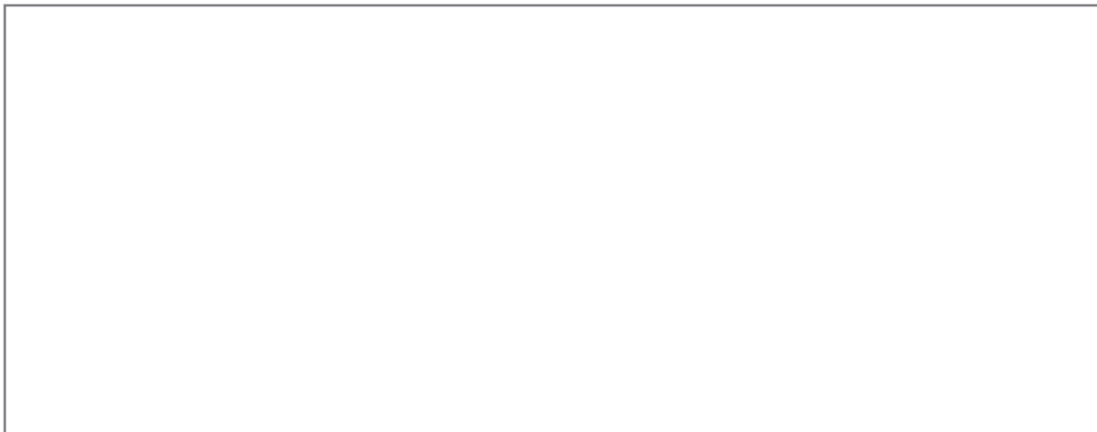
Long thick rope or spring with small ribbons tied on at various places

Method

- Lay the rope on a smooth floor and tie one end to a leg of a chair or have another student hold the end still on the floor. With the rope tight, generate sideways (transverse) waves with a sharp flick.

Questions

- Which way does the wave move?
- Which way does the tied on ribbons move?
- Note the size of the wave (length and amplitude). How can you change the size of the wave?
 - Amplitude?
 - Wavelength?
- How can you vary the speed of the wave?
- What happens to each wave when it reflects from the fixed end?
- Note also the size. Draw a diagram of moving wave and reflection below:



- Also try generating waves from both ends with both students producing a sharp flick.
 - What happens when they meet?
 - What happens afterwards?

Part B Water waves

Aim

To generate water waves and examine their characteristics and changes in motion.

Equipment

Tote tray or ripple tank
small electric fan

Method

- Fill the tray with water a few cm deep.
- By blowing across the water observe the path of the ripples.

Question

- What happens if you blow harder.
- You can also try an electric fan at different speeds.
- Draw the top view of the wave movement:



- Move gently sideways the whole tray and notice how the straight waves move from one side to another.

Questions

- What happens to waves when they hit a barrier?
- What did you notice after many reflections?

Part C Light waves

Aim

To investigate the amplitude of light with distance and reflection from a barrier

Equipment

Dark room or large cover
Small Light source (12 volt ray box lamp)
Light meter or sensor and data logger
metre rule
Ray box or narrow light beam source.
plane mirror

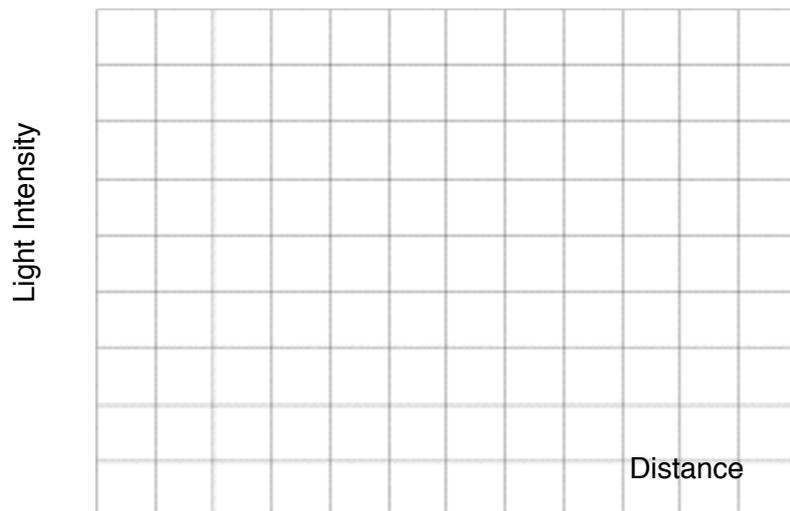
Method

1. Light Intensity

- Set up a small bright source of light that emits in all directions if possible
- Use as dark a room as possible or cover the top to reduce outside light
- use a light meter or light sensor and record intensity at varying distances.

Distance/ time									
Light Reading									

Show the graph of values as a curve.

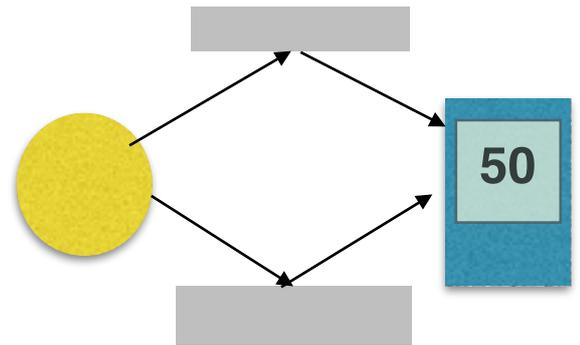


Question

What can you say about amplitude or Intensity of light versus distance?

2. Reflection

- Using your light meter/ sensor. Measure the intensity of the light bulb at 30cm without any mirrors.
 - Now try one mirror as shown
 - Now setup two mirrors shown



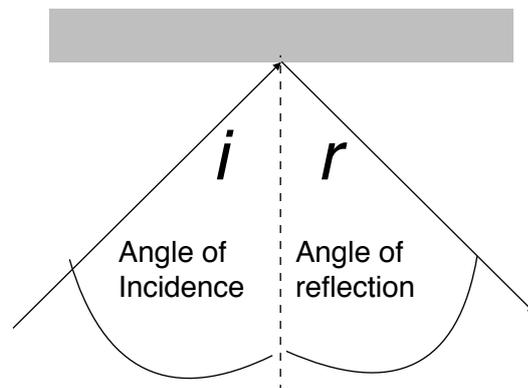
Setup	Intensity
no mirrors	
one mirror	
two mirrors	

Questions

- Do the mirrors add to the intensity?
- Is light absorbed also into the mirrors?

2. Angle of Incidence and Reflection

- Setup a light source with a single beam and shine on a plane mirror.
- Change the angle of incidence and explain how angle of incidence and reflection are related in the diagram below:



Question

Compare i and r