

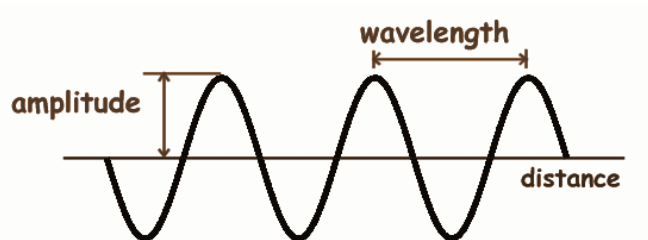


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P14 Properties of waves

P14.02 Describing waves

1. Wavelength and amplitude



- wave is made up of **crests** and **troughs**
- **wavelength λ** - distance between two crests
- **amplitude A** - height of a crest

2. Frequency and period

- **frequency**; the number of waves sent out each second
 - unit: **Hertz(Hz)**
 - 1 Hz = 1 wave is completed per second
- **period**; time taken for one complete wave to pass a point
 - unit: second

$$\text{Frequency}(f) = \frac{1}{\text{Period}(T)}$$

3. Wave speed

wave speed = number of waves passing per second times the length of each wave

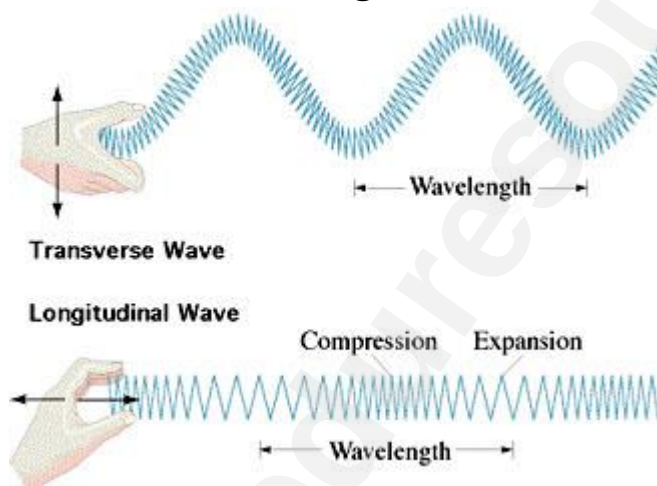
speed(m/s) = frequency(Hz) x wavelength(m)

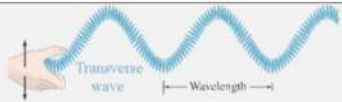
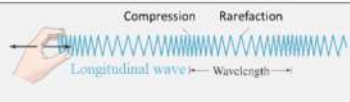
$$v = f \times \lambda$$

4. Waves and energy

- wave is moving and carrying energy
- the matter itself is not transferred from place to place

5. Transverse and longitudinal waves



TRANSVERSE WAVES	LONGITUDINAL WAVES
	
• Travelling waves in which oscillation is perpendicular to direction of travel • Has crests and troughs • For example, light, water waves and vibrating string	• Travelling waves in which oscillation is parallel to direction of travel. • Has compressions and rarefactions • For example, sound waves

- **longitudinal wave**: sound
- **transverse wave**: light, electromagnetic wave

6. Changing material, changing speed

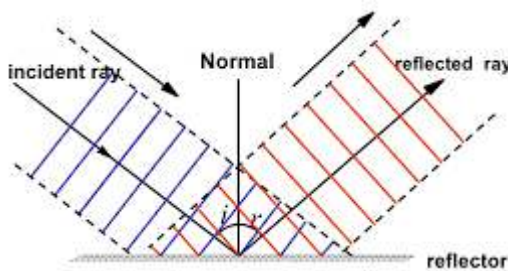
when speed changes, **frequency remains & wavelength changes**

- sound: solid > liquid > gas
- light: gas > liquid > solid

P14.04 Explaining wave phenomena

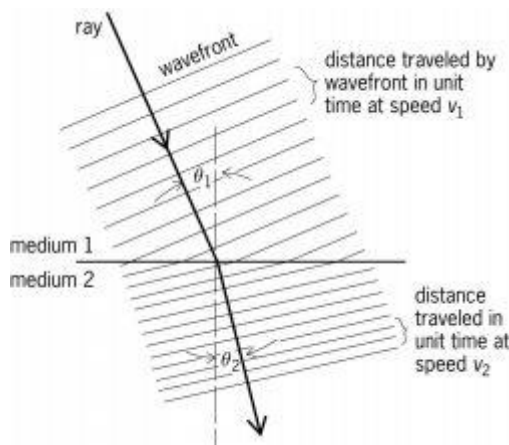
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1. Reflection of ripples(잔물결)



- **wavefront** - the tops of the ripples
- one wavefront = one wavelength
- angle of incidence = angle of reflection

2. Refraction of ripples

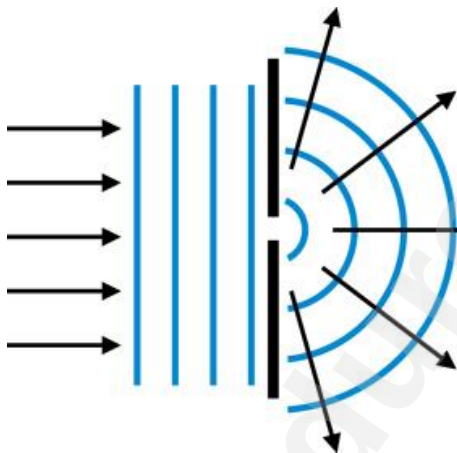


- occurs when speed of light changes
 - in deep water, speeds goes **fast**
 - in shallow water, speed goes **slow**
- as it goes to shallow place direction, speed, wavelength are changed
 - direction: toward the normal
 - speed: decreases
 - wavelength: shorter

3. Diffraction of waves

diffraction: as ripples pass through a gap in a barrier, they spread out into the space

- effect is biggest when the width of the gap = wavelength



- ripples arrive at the gap in the barrier
- the water at the edge of the gap moves up and down
- it makes new circular ripples, which spread out behind the barrier

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