Chapter 8
Mechanical Wave

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Curriculum

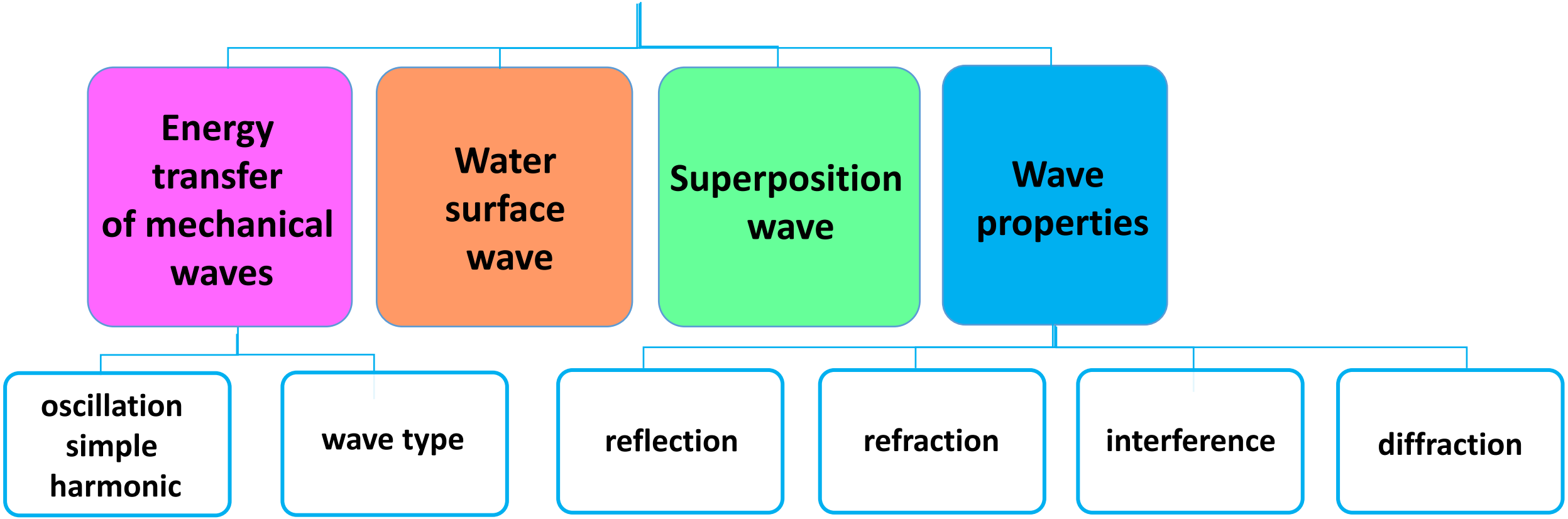
Strand 5: Energy

Standard Sc. 5.1 : Understanding relationship between energy and life; energy transformation interrelationship between substances and energy effects of energy utilization on life and the environment investigative process for seeking knowledge and communication of acquired knowledge that could be applied for useful purposes.

Indicators : Grade 10-12

Experiment and explain qualities of mechanical waves and explain relationship between speed, frequency and wavelength.

Mechanical Wave

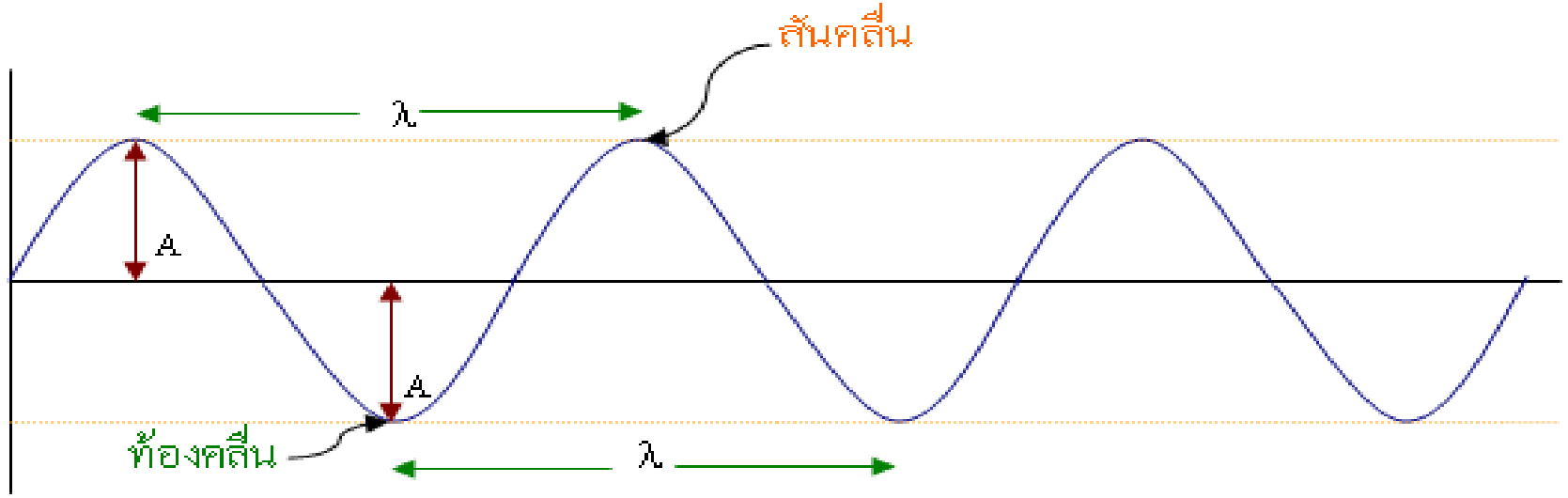


Mechanical Wave

The waves that rely on the medium to move what the waves bring along with the motion are energy.

Mechanical Wave

1. Energy transfer of mechanical waves.

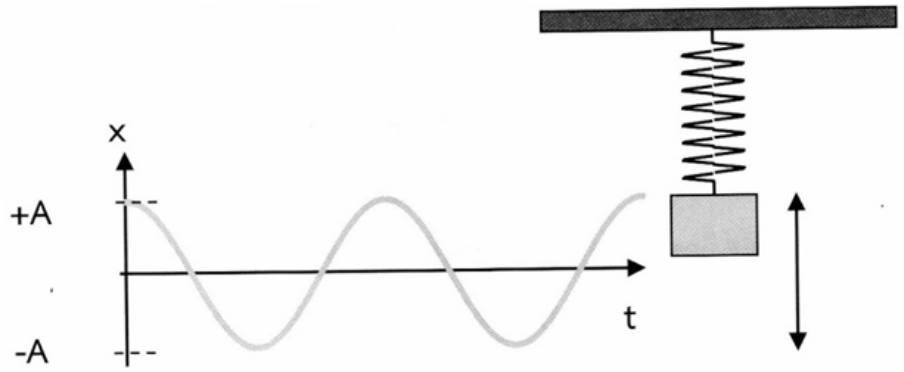


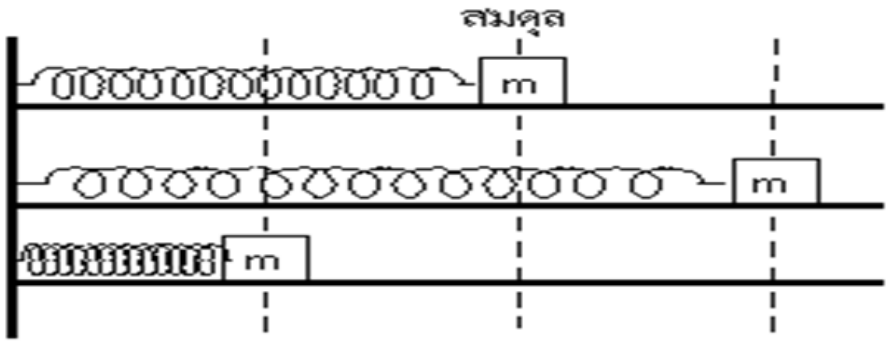
The interference will cause the transfer of energy from one location to another this interference may be mediated by or not.

Mechanical Wave

1. Energy transfer of mechanical waves.

- Oscillation Simple harmonic





Mechanical Wave

1. Energy transfer of mechanical waves.

- Oscillation Simple harmonic

Significant quantities of pendulum shocks.

$$T = 2\pi\sqrt{\frac{l}{g}},\ f = \frac{1}{2\pi}\sqrt{\frac{g}{l}},\ \omega = \sqrt{\frac{g}{l}}$$

T = period (s)
g = acceleration due to gravity
l = the rope is tied to the mass (m)
f = frequency (Hz)

Mechanical Wave

1. Energy transfer of mechanical waves.

- Oscillation Simple harmonic

Significant amount of mass oscillation, spring stiffness, stretch or spring shrinkage.

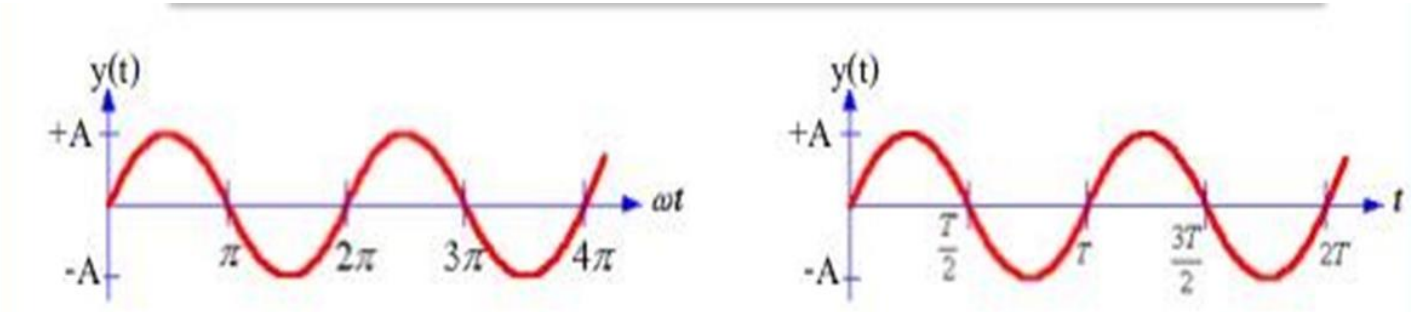
$$T = 2\pi\sqrt{\frac{m}{k}},\ f = \frac{1}{2\pi}\sqrt{\frac{k}{m}},\ \omega = \sqrt{\frac{k}{m}}$$

T = period (s)
k = spring value (N/m)
m = mass attached to the spring (kg)
f = frequency (Hz)

Mechanical Wave

1. Energy transfer of mechanical waves.

- Oscillation Simple harmonic



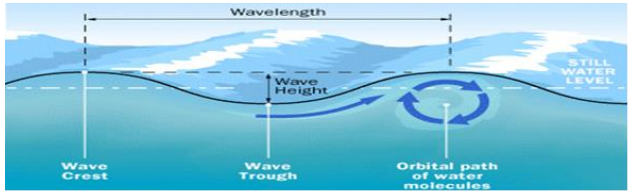
$$y = A\sin(\omega t + \theta)$$

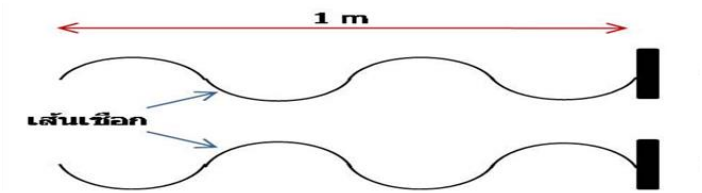
Wave from simple harmonic oscillations. By the displacement equation over time t.

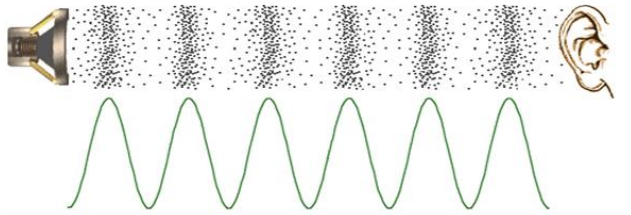
Mechanical Wave

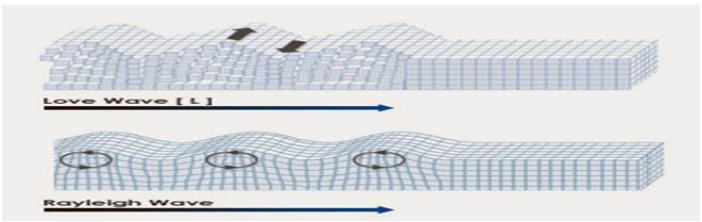
1. Energy transfer of mechanical waves.

- wave type









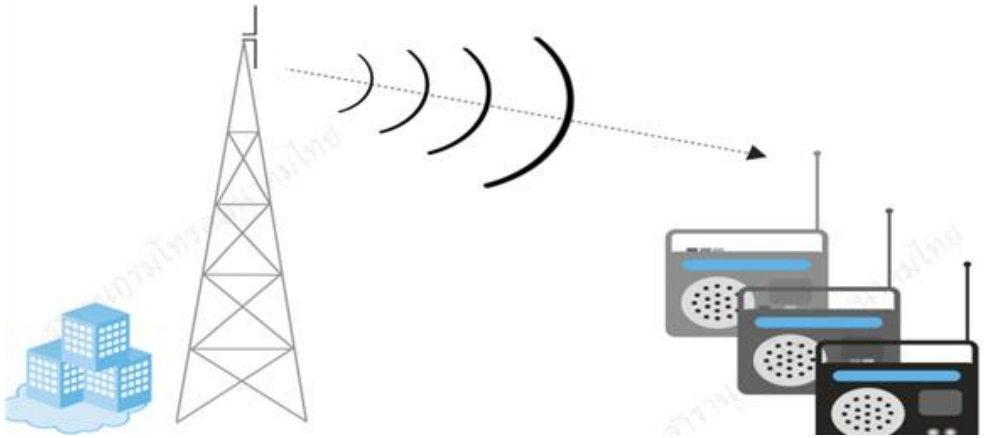
Mechanical waves

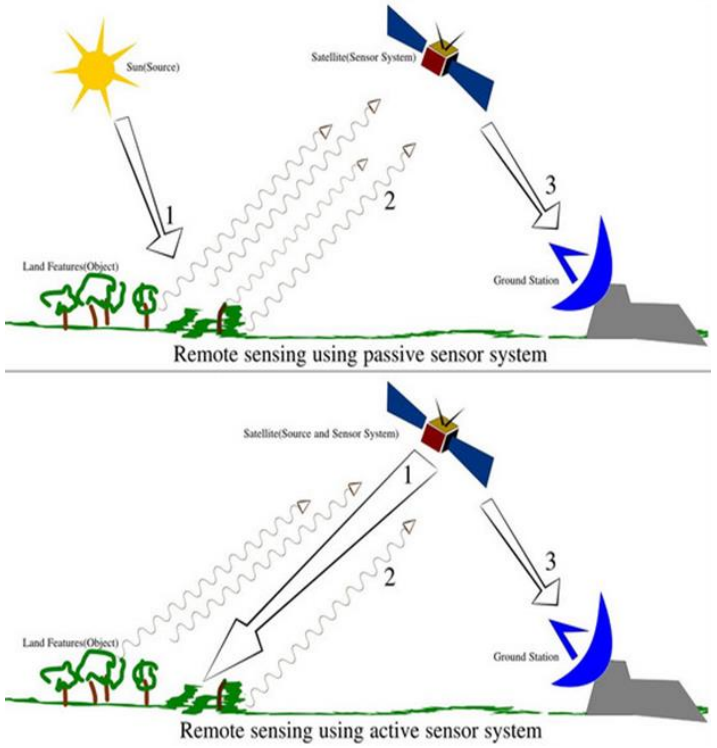
- Intermediaries are disturbed.
- Interference through intermediaries.

Mechanical Wave

1. Energy transfer of mechanical waves.

- **wave type**





Electromagnetic wave

- no intermediaries.

Mechanical Wave

1. Energy transfer of mechanical waves.

- wave type

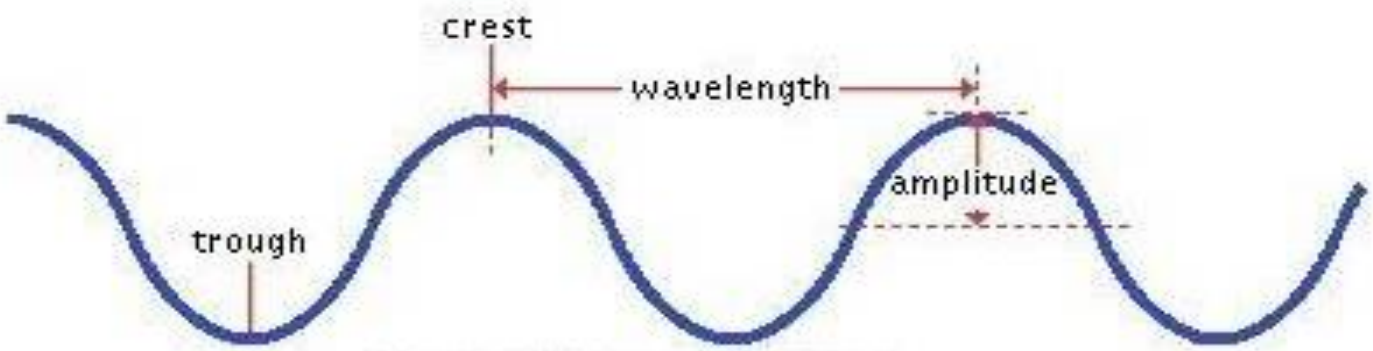


Figure 2: Transverse Wave

Transverse wave

- Intermediate particles moving the perpendicular to the direction of wave motion.

Mechanical Wave

1. Energy transfer of mechanical waves.

- wave type

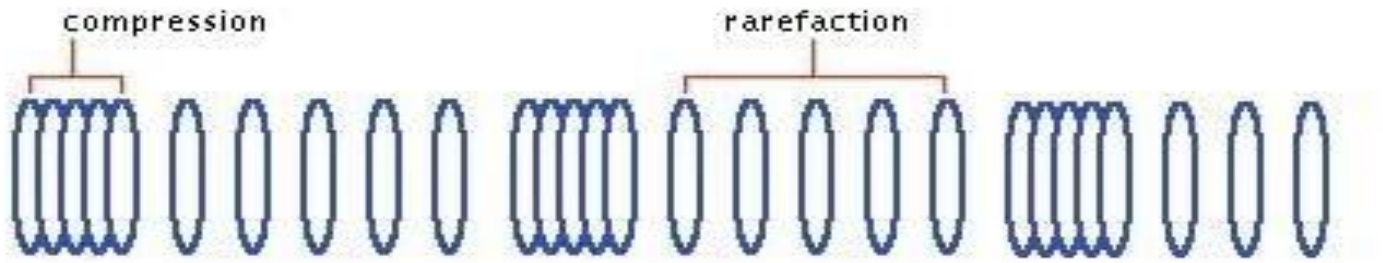


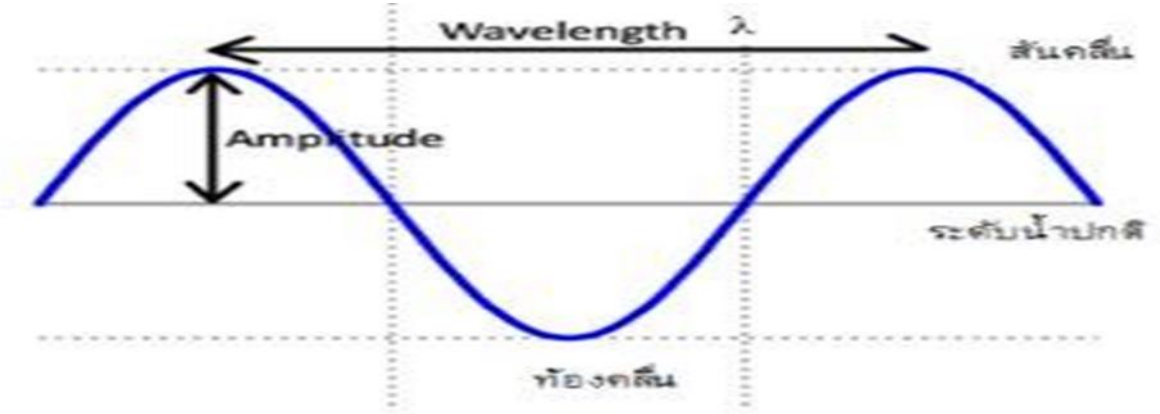
Figure 1: Longitudinal Wave

Longitudinal wave

- the particle of the medium is reversed in the direction parallel to the direction of the wave motion.

Mechanical Wave

2. Water surface wave



- The disturbance is the transfer of energy from disturbance, which is called wave propagation.
- It is a mechanical wave with a medium of water.
- Water surface particles are shorter and shorter.

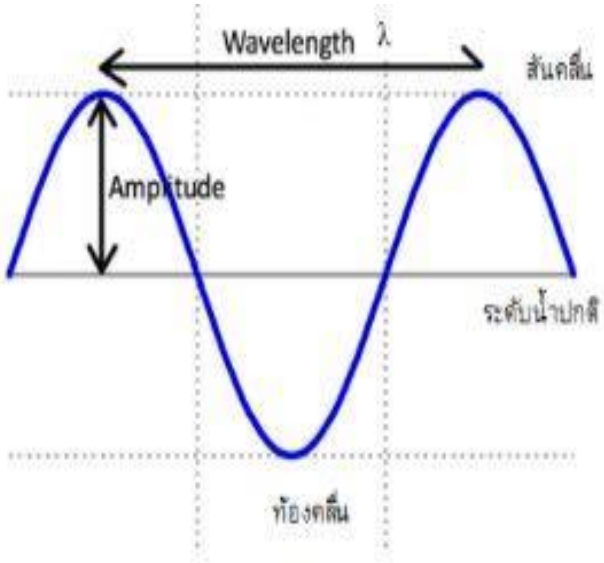
2. Water surface wave

Mechanical Wave

2. Water surface wave

- The period and the frequency are correlated.

$$T = \frac{1}{f}, \; f \; \frac{1}{T}$$



$$v = \frac{s}{t}$$

$$v = \frac{\lambda}{T}$$

$$v = f\lambda$$

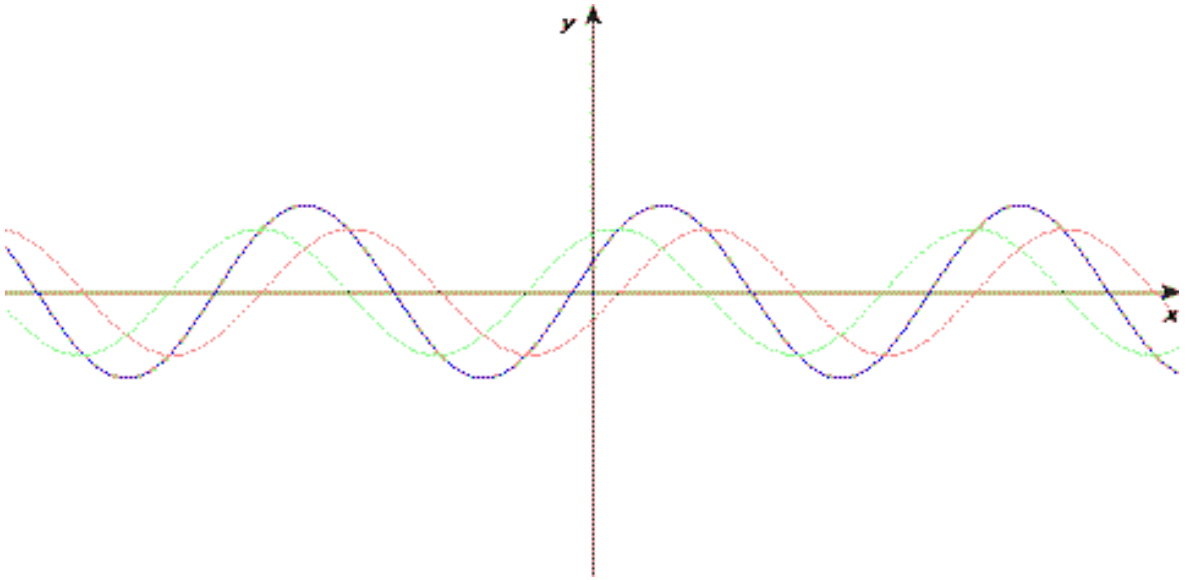
- Wave speed is related wavelength and frequency.

2. Water surface wave

$$v = f\lambda, v = \frac{s}{t}$$

One child uses his feet to splash water in the pool at regular intervals notice the leaves at the ripple surface 10 in 5 seconds, the first wave move to the opposite edge of the pool which is 10 meters away in 10 seconds find the wavelength of the surface waves.

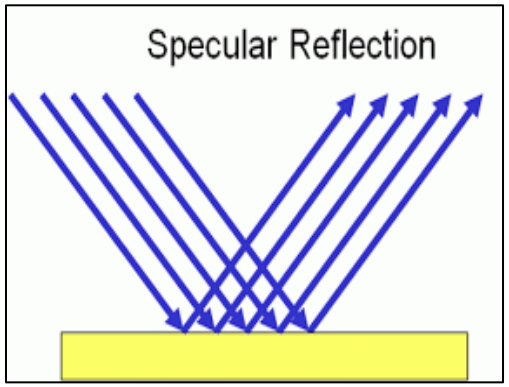
3. Superposition wave



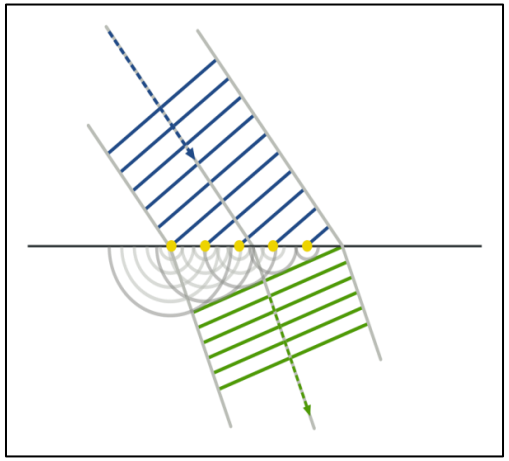
Two waves of the same wave meet together. The total wave displacement is equal to the sum of the displacement displacements.

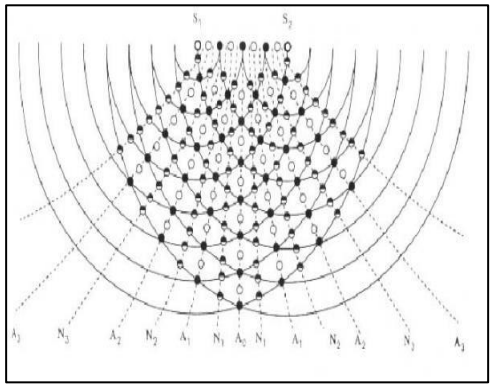
4. Wave properties

4.1 reflection



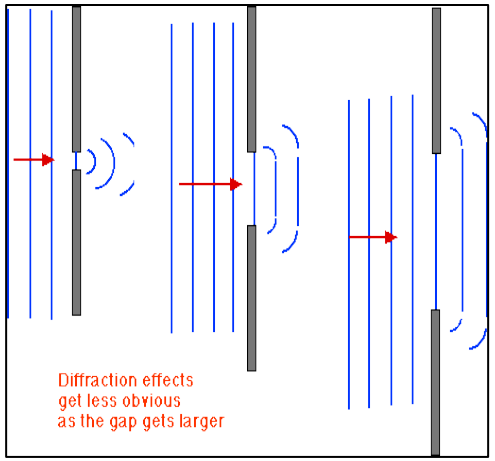
4.2 refraction



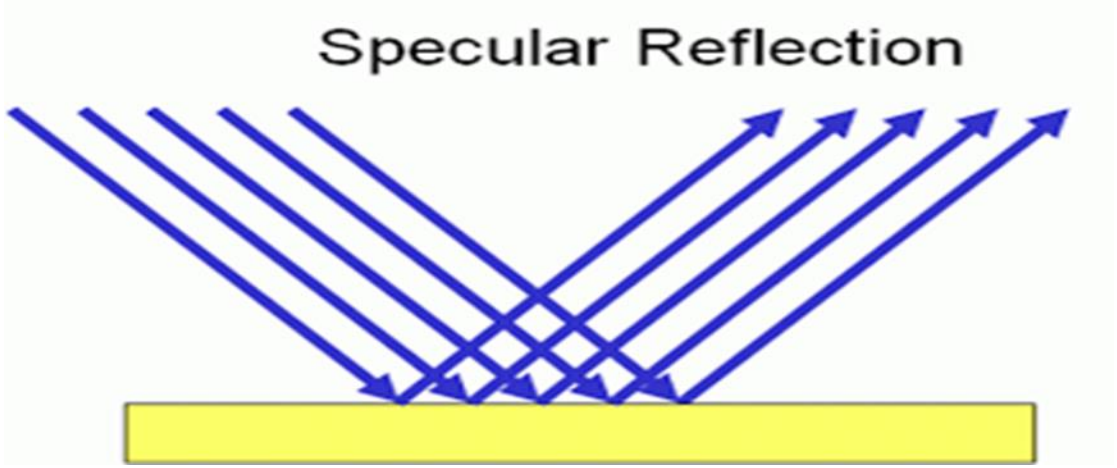


4.3 interference

4.4 diffraction



4.1 reflection



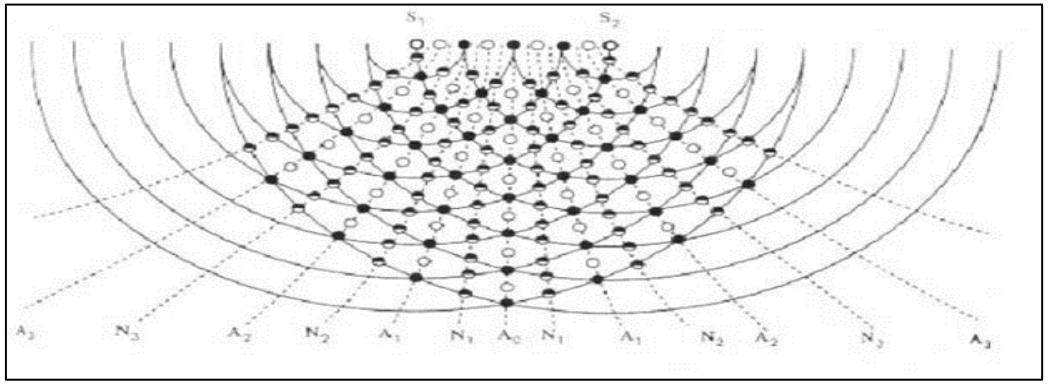
The moving waves strike the obstructions and then turn back in the middle. The moving waves affect the block the wave hits the moving wave, called the reflection the reflection is reflected by the reflection rule.

4.2 refraction

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{v_1}{v_2}$$

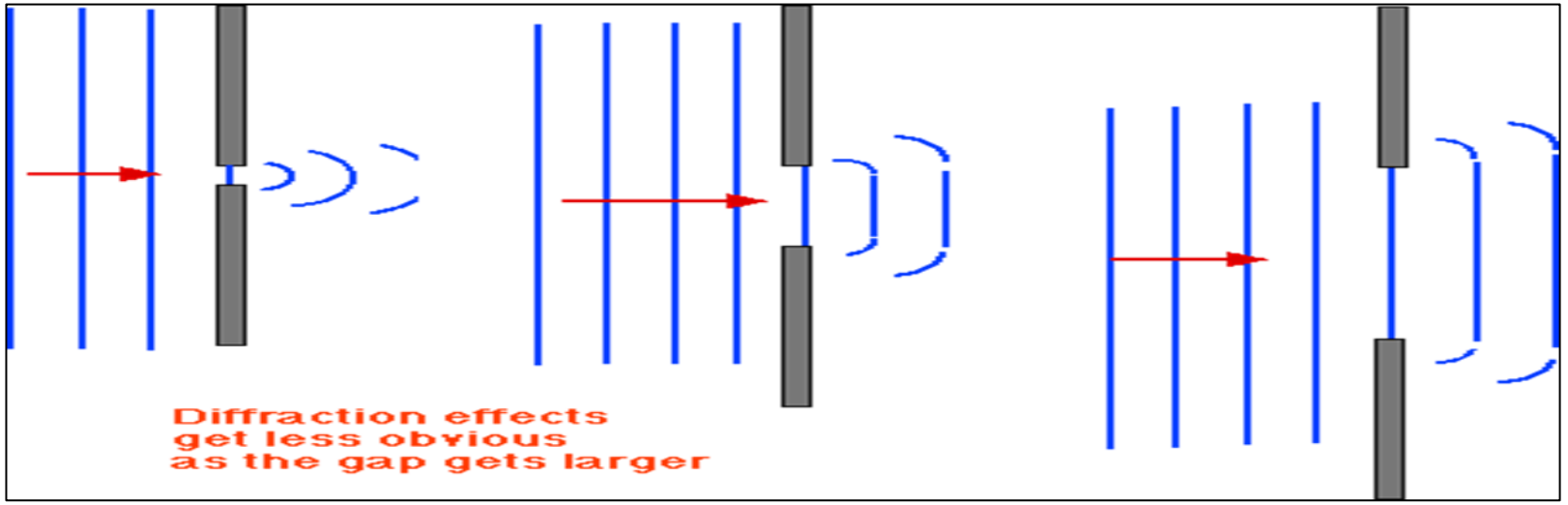
The wave moves through one medium into another. The direction of the wave motion of the scene with the joint between the two centers. The wave are passing through the middle of the wavelength changes with the direction of motion. Wave speed in the deflected medium.

4.3 interference



Wave 2 is overlapped with interference. If the wave crest is found in the wave or the wave is found, it will interrupt it in the event that two waves with equal or staggered waves are overlapped.

4.3 diffraction



The waves are moving, but there are some obstacles to wave motion from the edge of the baffle to the back of the baffle is called diffraction.

The End !!