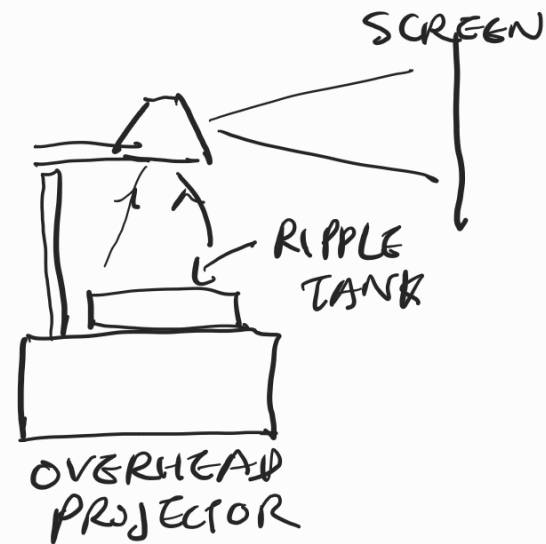
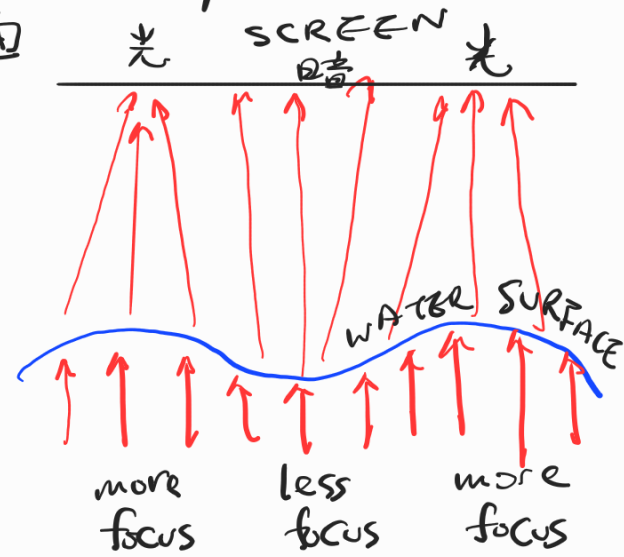
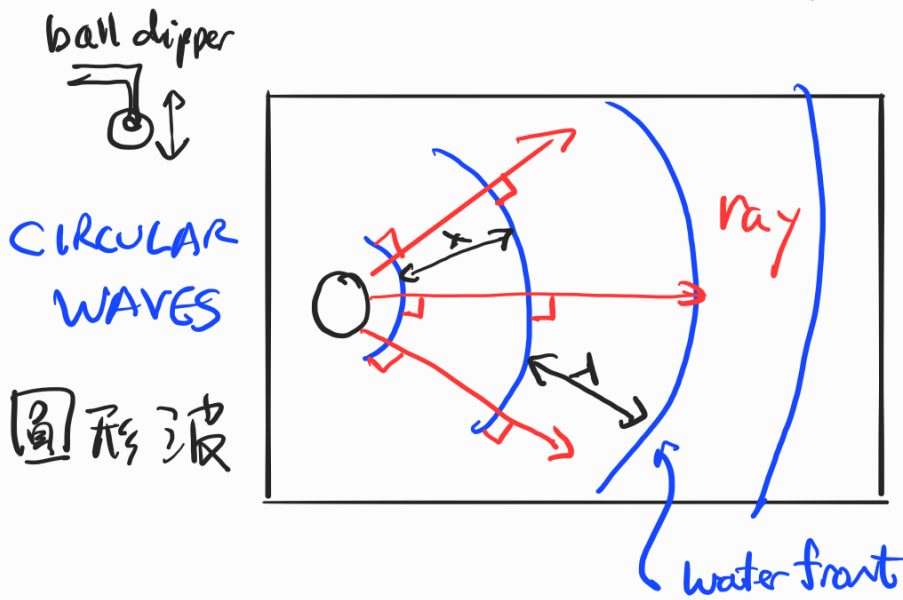
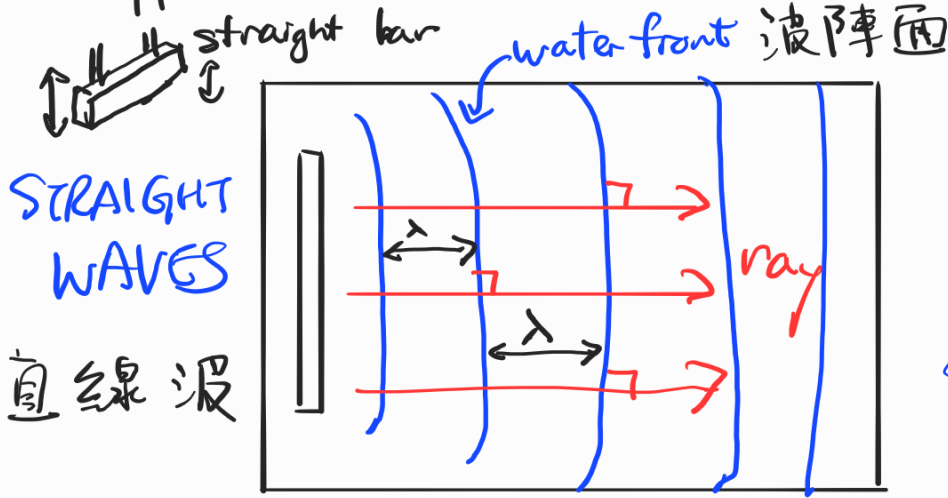


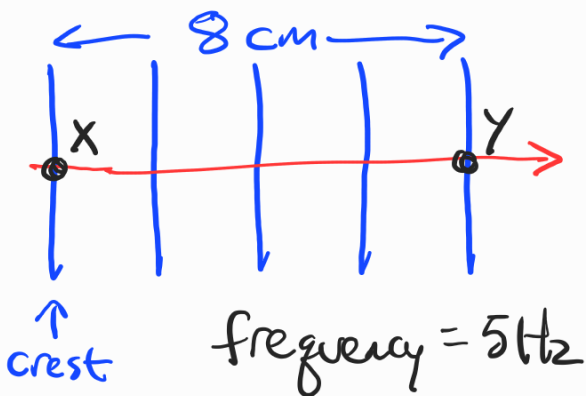
3.2 Reflection, Refraction, and Diffraction

水波槽

Ripple tank: We use it to study "water" waves.



Example



a) Find the wavelength and travelling speed.

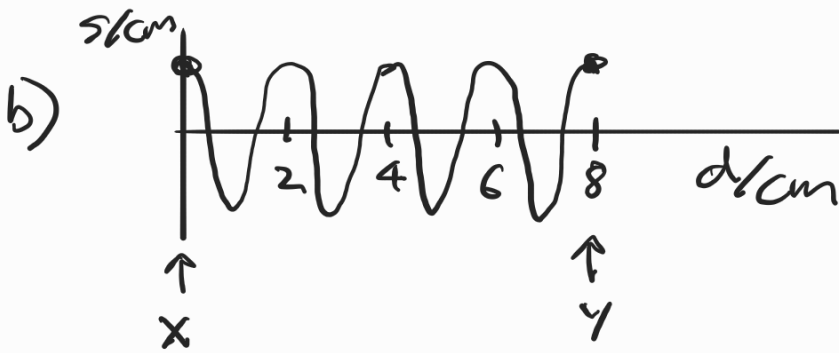
b) Sketch a graph to show the displacement of particle btw X + Y.

c) frequency is reduced to 2.5 Hz sketch the new wave pattern.

Solution

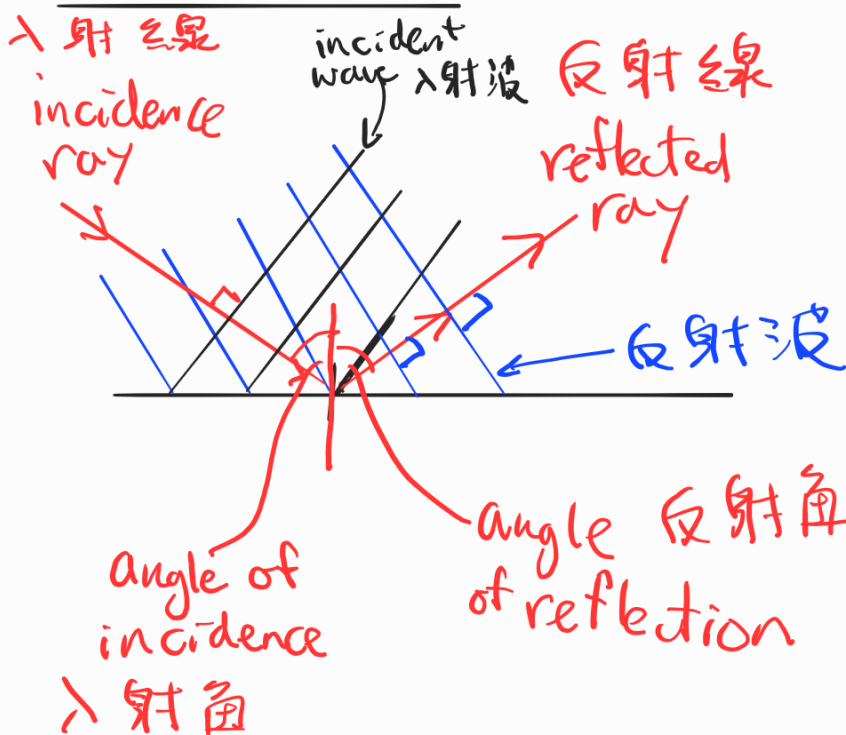
a) $8\text{cm} / 4 = 2\text{cm} \leftarrow \text{wavelength}$

$v = f\lambda = 5 \times 0.02 = 0.1\text{ms}^{-1}$



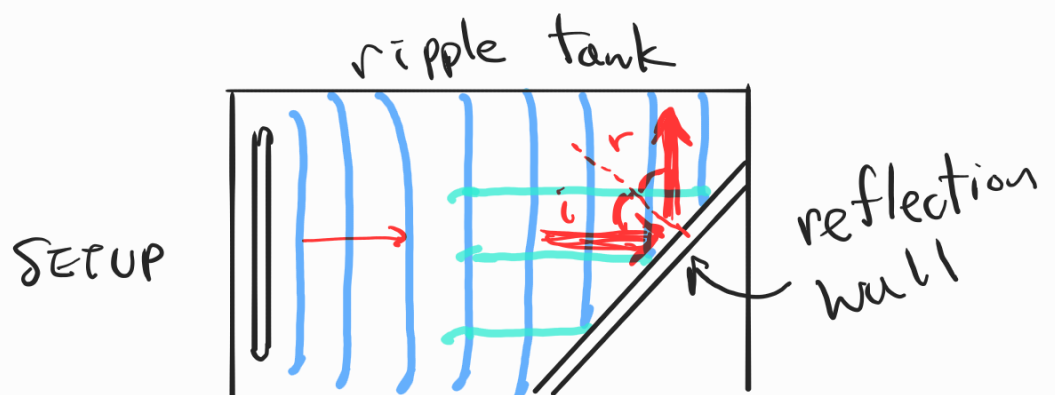
$v = f\lambda$ $\frac{v}{f} = \lambda$
 $0.1 / 2.5 = 0.04\text{m}$
 $= 4\text{cm}$

REFLECTION 反射率

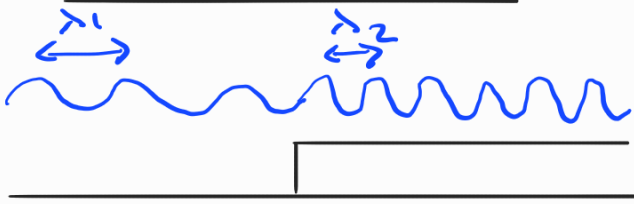


The angle of reflection is equal to the angle of incidence

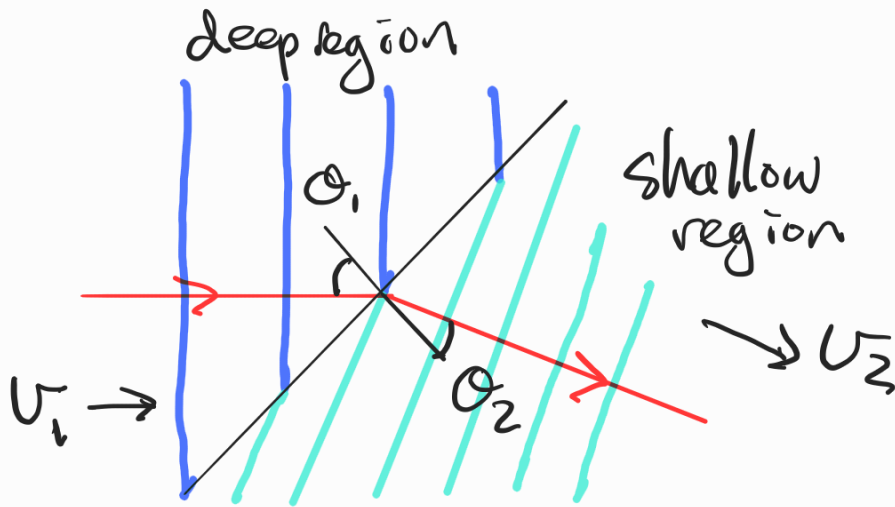
$\angle i = \angle r$



REFRACTION 折射率



$\lambda_1 > \lambda_2$ Therefore the water wave travels slower in shallow region.



$$n = \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2} = \frac{\sin \theta_1}{\sin \theta_2}$$

n : refractive index (from 1 to 2)

v_1 : speed of incident waves

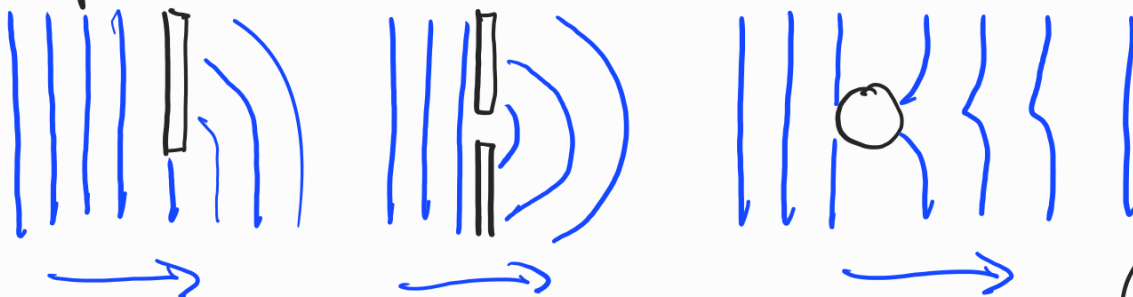
v_2 : speed of refracted waves

θ_1 : angle of incidence

θ_2 : angle of refraction

DIFFRACTION 绕射

Properties



Waves are diffracted more

* if wavelength is longer

* if gap is narrower

