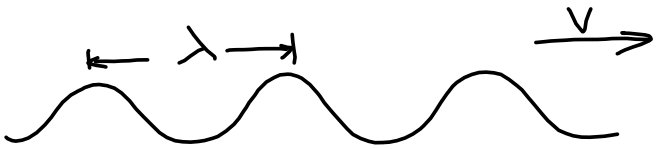
Wave Equation



frequency = f

$d = vt$

$\lambda = vT$

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

$= \left(\frac{1}{T}\right)\lambda$

$v = f\lambda$

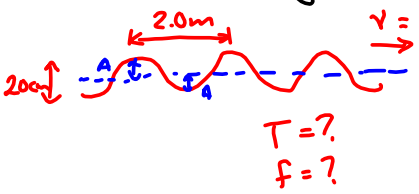
Wave equation.

If we consider the time it takes for the wave to move a distance, λ. This is the definition of the period, T.

But $\frac{1}{T} = f$ $\left(\frac{1}{T}\right)\lambda = \left(\frac{1}{T}\right)\left(\frac{\lambda}{1}\right) = \frac{\lambda}{T}$

The speed of the wave is determined by the medium.

Example: You are standing on the beach. You see waves hit the shore every 0.80s and the waves are about 2.0m apart. The waves are about 20cm from crest to trough vertically.



a) What is the amplitude?

b) What is the period?

c) What is the frequency?

d) What is the speed?

(a) $2A = 20cm$
$A = 10cm$

(b) $T = 0.80s$

(c) $f = \frac{1}{T} = \frac{1}{0.80s} = 1.25\ Hz$

(d) $v = f\lambda$
$= (1.25Hz)(2.0m)$
$= 2.5\ \frac{m}{s}$

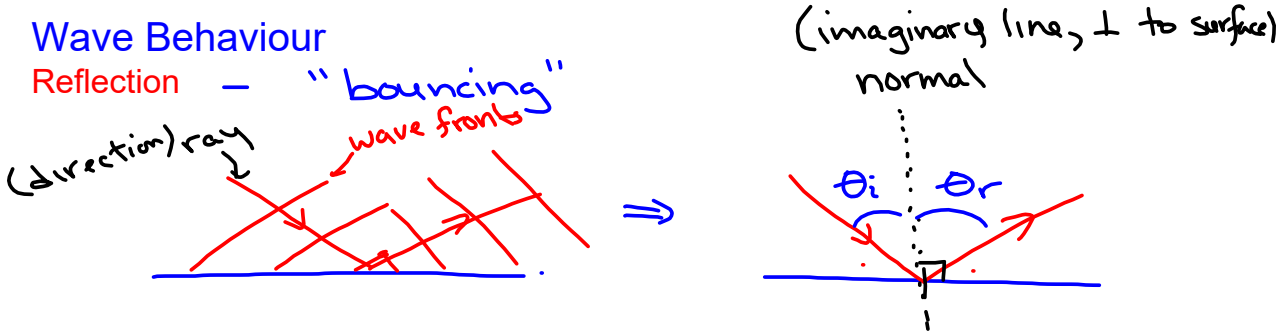
(d) $v = \frac{d}{t} = \frac{2.0m}{0.80s} = 2.5\ \frac{m}{s}$

(c) $v = f\lambda$
$2.5 = f(2.0m)$
$f = 1.25Hz$

$T = \frac{1}{f} = \frac{1}{1.25Hz} = 0.80s$

Wave Behaviour

Reflection – "bouncing"



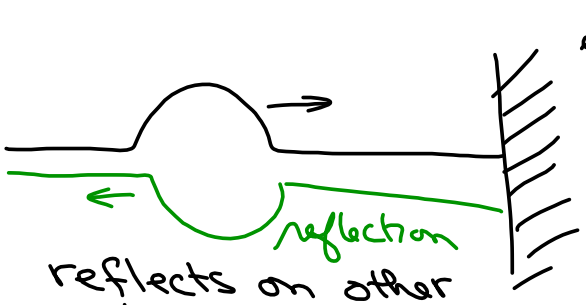
θ_i = angle of incidence

θ_r = angle of reflection

$\theta_i = \theta_r$

Law of reflection

Reflection at Boundaries

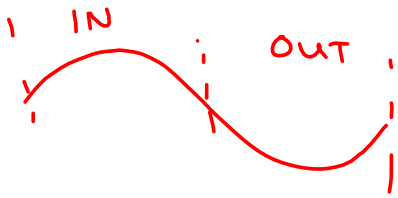


hits something more difficult to move (more "dense")

reflects on other side

$\frac{\lambda}{2}$ phase change

or 180° phase change.

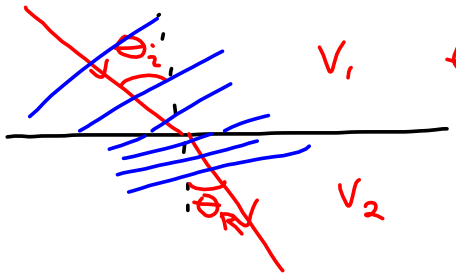


string (less "dense")

transmitted pulse

no phase change

Refraction - bending due to a change in speed



θ_i = angle of incidence

θ_R = angle of refraction

$V_1 > V_2$

Homework: #1,2 Sheet.