Waves Notes 2

Energy, Amplitude, distance

- Energy is proportional to the square of the Amplitude
  - to double the amplitude you need 4 times the energy ($\times 2^2$)
  - to triple the amplitude you need 9 times the energy ($\times 3^2$)

Ex. A wave has 15 J of energy and an amplitude of 5cm. If the amplitude is increased to 15cm how much energy will the wave carry?

Ans.: the amplitude is tripled $5\text{cm} \xrightarrow{\times 3} 15\text{cm}$

so the energy increases from $15\text{J} \xrightarrow{\times 3^2} 135\text{J}$

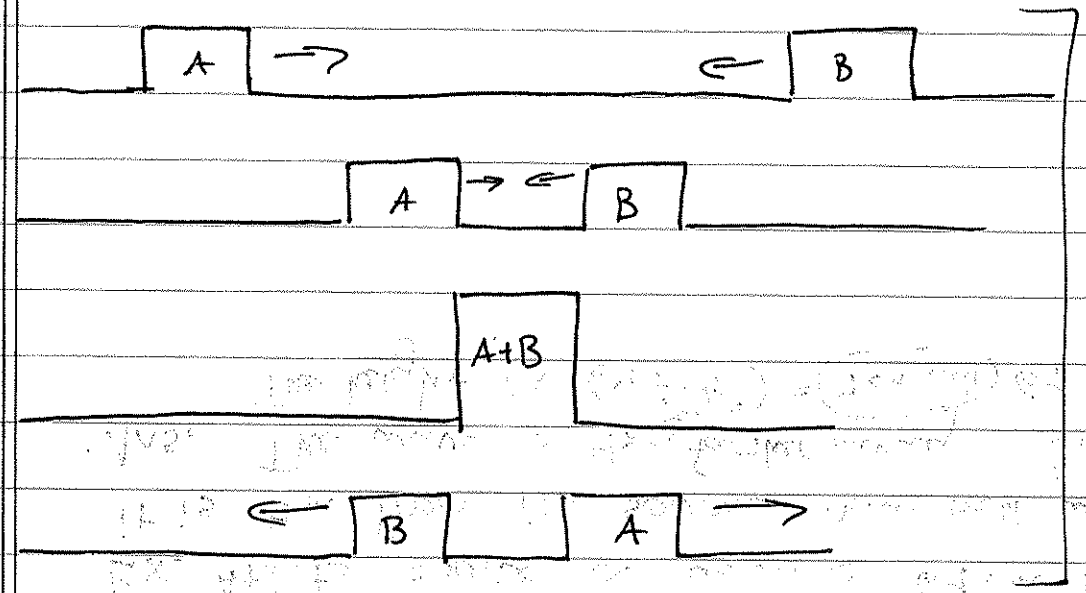
$15(9)$

- Waves spread out in ALL directions so they cover a 2D area (Think circle ripples on a pond)
  - so the energy decreases with the square of the distance.
  - Ex. At 1m from its source a wave is 64cm tall. When it is 4m from its source how tall will it be?
  - Ans. The wave is 4x farther away $1\text{m} \xrightarrow{\times 4} 4\text{m}$

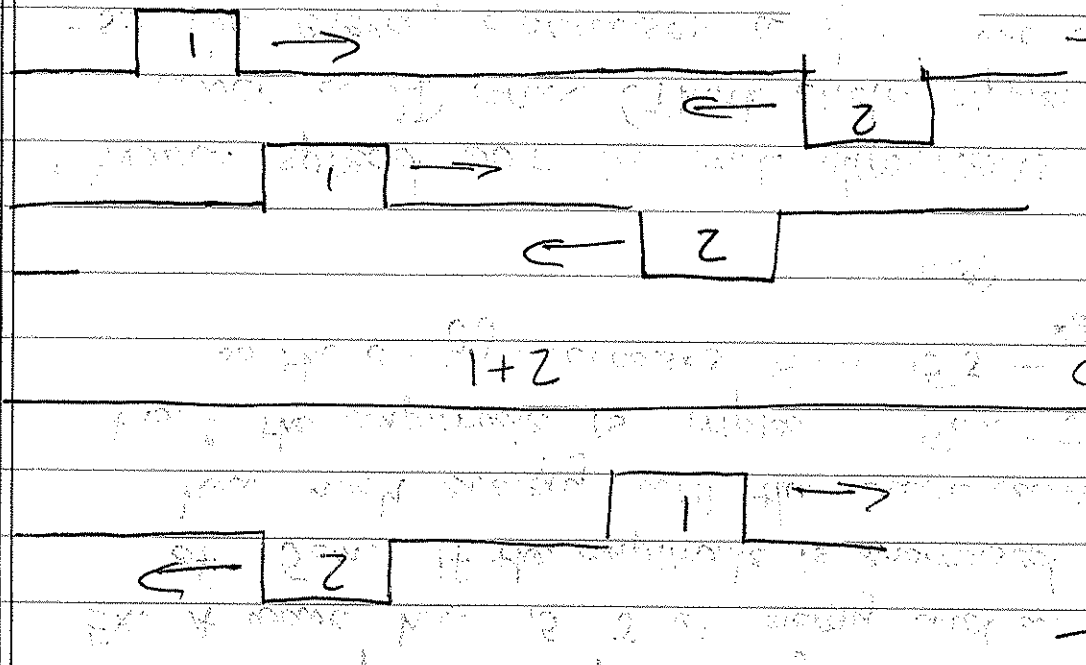
The height is $64 \div (4^2) =$ 4cm tall $\quad 64\text{cm} \xrightarrow{\div 4^2} 4\text{cm}$

Interference

When two waves hit, their amplitudes add up.



Constructive interference



Destructive Interference

cancels out

Beats (woo-woo-woo-woo) occur when sound exhibits interference.

Intereference is how we know sound is a wave.