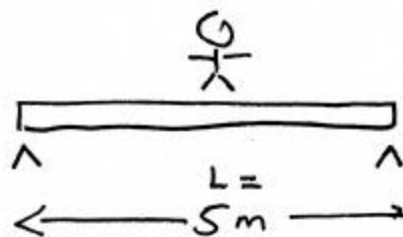


You jump on a 5m long board, supported at each end, with a frequency of 2 Hz. You observe that the board oscillates resonantly.



1) What is the speed of transverse waves in the board? Presumably the oscillates with the fundamental frequency

$$\Rightarrow \lambda = 2L = 10 \text{ m}$$

$$v = \lambda f = (10 \text{ m})(2 \text{ s}^{-1}) = 20 \text{ m/s}$$



2) Now jump at $1/4 L$ from the end resonantly. What frequency is required now?

Presumably you are producing the 1st overtone

$$\Rightarrow \lambda = L = 5 \text{ m}$$



$$f = \frac{v}{\lambda} = \frac{20 \text{ m/s}}{5 \text{ m}} = 4 \text{ s}^{-1} = 4 \text{ Hz}$$

c) Now hold the plank rigid at one end like a diving board. What frequency produces resonance?

Presumably you have a node at the wall and you are jumping at an antinode.

$$\Rightarrow L = \lambda/4$$

$$\lambda = 4 \cdot 5 = 20 \text{ m}$$

$$f = \frac{v}{\lambda} = \frac{20 \text{ m/s}}{20 \text{ m}} = 1 \text{ s}^{-1} = 1 \text{ Hz}$$

