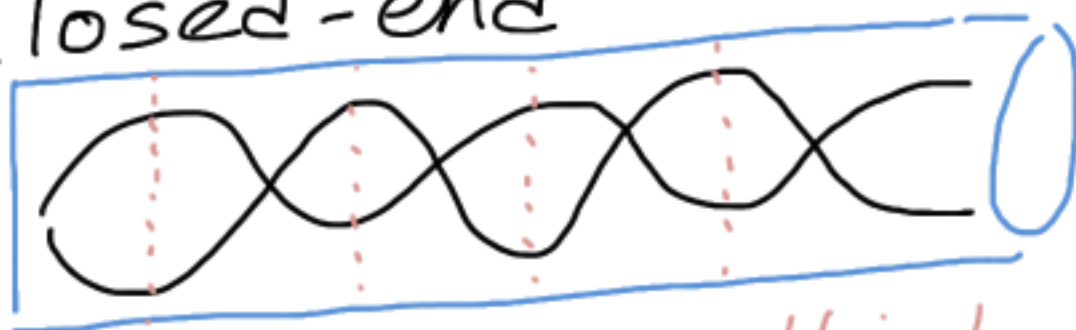


# Resonance in a tube

Closed-end



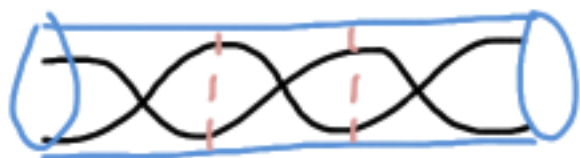
Closed end has a node, open end a wave.

↳ if tube was this long, wave.

$l = \frac{1}{4} \lambda$ , next there is resonance at tube length  $l = \frac{3}{4} \lambda, \frac{5}{4} \lambda$ , etc.

$$l_{\text{tube}} = \frac{n}{4} \lambda, n = 1, 3, 5, \dots$$

Open-ended



wave at both ends, resonance at  $l = \frac{2}{4} \lambda, \frac{4}{4} \lambda, \frac{6}{4} \lambda$ , etc.

**\*Resonance occurs when a standing wave reinforces itself in the tube.**