

Worksheet 24

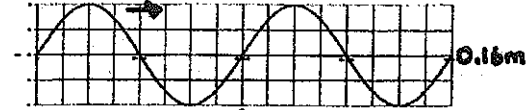
standing sound waves

Name:

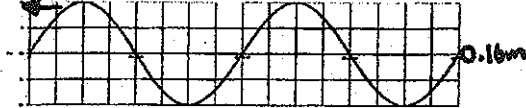
Relevant textbook sections covered: 21.3, 21.4

1. Qualitative – adding sine curves moving in opposite directions.

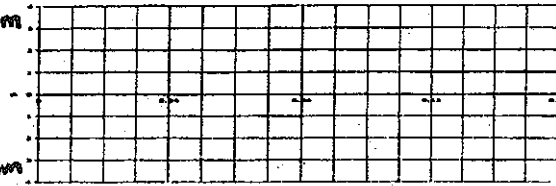
A $t=0$ Snapshot



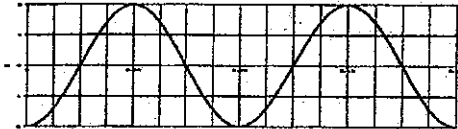
B $t=0$



A+B $t=0s$



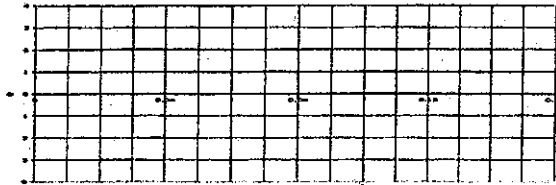
A $t=0.020 s$



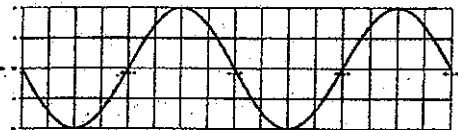
B $t=0.020 s$



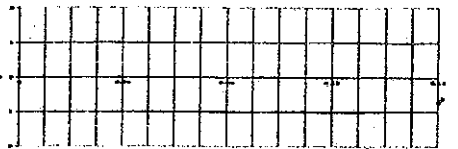
A+B $t = 0.020s$



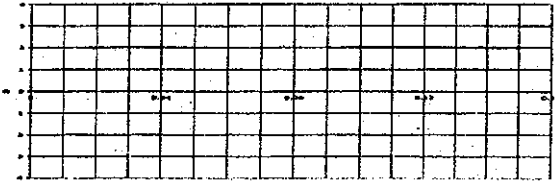
A $t=0.040 s$



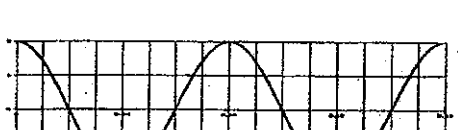
B $t=0.040 s$



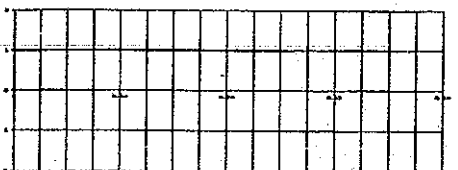
A+B $t = 0.040 s$



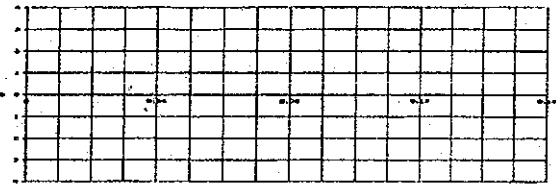
A $t=0.060 s$



A $t=0.060 s$



A+B $t = 0.060 s$



2. **Quantitative** – adding sine curves moving in opposite directions.

Two waves traveling in opposite directions produce a standing wave. The individual wave functions are (distances in cm):

$$D_1 = (4\text{cm})\sin(3x - 2t) \quad D_2 = (4\text{cm})\sin(3x + 2t)$$

- (a) What is the amplitude of a particle located at an antinode?
- (b) Find the (x-)positions of first two nodes and antinodes.
- (c) What is the distance between two nodes?
- (d) What is the distance between two antinodes?
- (e) What is the distance between a node and an antinode?
- (f) What is the amplitude of a point located at $x = 0.12$ cm?