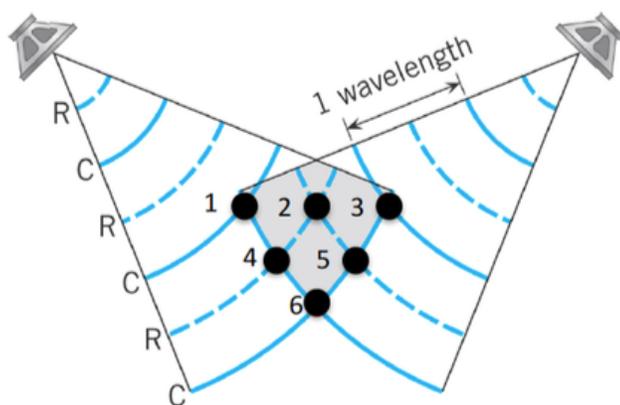


## Physics 111 Session 22

- 1) Find the formula you would use to find the frequency of the following things:
  - a) A guitar string
  - b) An open pipe
  - c) A pipe with a closed end
  - d) A rope with fixed ends
  - e) A rope with a movable end
- 2) A man standing in the middle of the street gets hit by a truck going 24 m/s. If the truck is honking its horn at 6037 Hz, what frequency does the man hear?
- 3) A train blasts its horn as it leaves the station at 50 m/s. If the people at the station hear 384 Hz, what frequency is the train's horn emitting?
- 4) As Sally is running a marathon, somebody is yelling in a megaphone with a frequency of 350 Hz. If Sally is running 4 m/s, what frequency does she hear as she approaches the megaphone?
- 5) [Challenge] Two trains with 124-Hz horns approach one another. The slower of the two trains has a speed of 26 m/s. What is the speed of the fast train if an observer standing near the tracks between the train hears a beat frequency of 4.4 Hz?
- 6) A motorcyclist is running from the cops. If the police car is moving with a speed of 32.2 m/s and the motorcycle is moving with a speed of 14.8 m/s, and the police car is emitting a sound with frequency 523 Hz, what frequency is the motorcyclist hearing?
- 7) What would change if the motorcyclist and the cop were approaching head on instead of one chasing the other?
- 8) Determine whether the interference at each point on the diagram is constructive or destructive.



- 9) What is the fundamental frequency of a standing sound wave in an open tube of length 1.5m?
- 10) Two guitar strings vibrate at 819 Hz. The tension is then increased slightly in one string. As a result, 6 beats per second are heard when both strings vibrate. What is the new frequency of the string that was tightened?
- 11) I have a closed pipe with length 4m. What is the frequency of the first, second, and third harmonic of this pipe?
- 12) A 6m clothesline of mass .3 kg is held between 2 poles with a tension of 50N. Calculate the fundamental frequency of the clothesline.