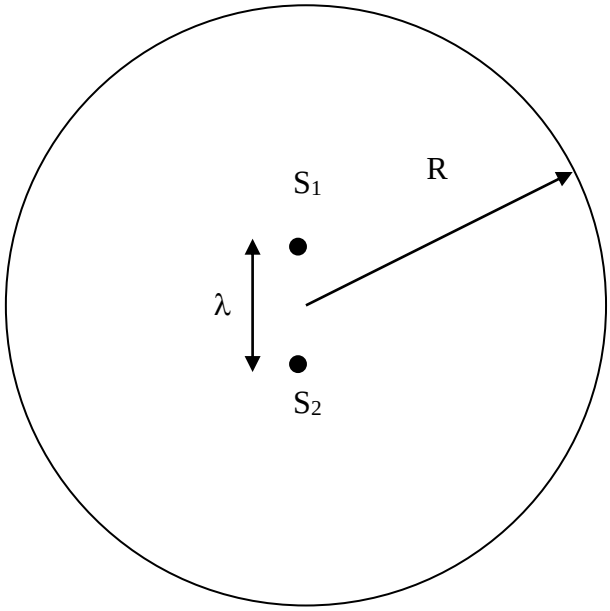
1- Two transmitters, S1 and S2 in figure (1), emit sound waves of wavelength lambda. The transmitters are separated by a distance lambda. Consider a big circle of radius R with center halfway between these transmitters. How many interference minima (i.e . completely silent positions) are there on this big circle?

A1 4.
A2 6.
A3 2.
A4 5.
A5 1.



2- A man strikes a long steel rod at one end. Another man, at the other end with his ear close to the rod, hears the sound of the of the blow twice (one through air and once through the rod), with a 0.1 seconds interval between. How long is the rod?
[For the steel, the bulk modulus = 2.1*10**11 Pa, and the density = 7.0*10**3 kg/m**3. Speed of sound in air = 340 m/s].

A1 36 m.
A2 34 m.
A3 42 m.
A4 40 m.
A5 44 m.

3- If two successive frequencies of a pipe, closed at one end and filled by air, are 500 Hz and 700 Hz, the length of the pipe is:
[speed of sound in air = 340 m/s]

A1 0.85 m.
A2 1.70 m.
A3 0.43 m.
A4 3.40 m.
A5 0.18 m .

4- If the distance from a source of sound increases by 1 meter, the sound level is decreased by 2 dB. Assume the loudspeaker that is emitting this sound emits sound in all directions. The original distance from the sound source is:

A1 3.86 m.
A2 1.93 m.
A3 7.72 m.
A4 9.93 m.
A5 12.0 m.

5- An ambulance siren emits a sound of frequency 1.60 kHz. A person running with a speed of 2.50 m/s hears a frequency of 1.70 kHz as the ambulance approaches him from the back. How fast is the ambulance moving? (speed of sound is 340 m/s).

A1 22.4 m/s.
A2 17.7 m/s.
A3 12.2 m/s.
A4 25.6 m/s.
A5 2.50 m/s.

6- The volume of a certain solid shrinks by 2 parts in 10**6 when it is subject to an external hydrostatic pressure of 1 atm. The density of the solid is 8.0 grams/cm**3. What is the speed of a longitudinal wave through this material?

A1 2.5*10**3 m/s.
A2 3.4*10**3 m/s.
A3 1.5*10**3 m/s.
A4 3.4*10**2 m/s.
A5 2.5*10**2 m/s.

7- A point source uniformly radiates 440 W of sound in all directions. How far, from the source, will the intensity
level be 106 dB?

A1 29.7 m.
A2 21.8 m.
A3 32.5 m.
A4 38.1 m.
A5 52.5 m.

8- During a time equal to the period of a certain vibrating fork, the emitted sound wave travels a distance:

A1 of one wavelength.
A2 equal to the length of the fork.
A3 directly proportional to the frequency of the fork.
A4 proportional to the frequency of the wave.
A5 of about 331 meters.

9- A train approaches a mountain at a speed of 75 km/hr. The train's engineer sounds a whistle that emits a frequency of 420 Hz. What will be the frequency of the echo that the engineer hears reflected off the mountain?
(The speed of sound in air = 343 m/s).

A1 474 Hz
A2 430 Hz
A3 446 Hz
A4 420 Hz
A5 400 Hz

10- A standing wave is established in a 3.0-m-long string fixed at both ends. The string vibrates in three segments with an amplitude of 1.0 cm. If the wave speed is 100 m/s, what is the frequency?

A1 50 Hz
A2 100 Hz
A3 33 Hz
A4 25 Hz
A5 10 Hz

11- Organ pipe A, with both ends open, has a fundamental frequency of 30 Hz. The third harmonic (n=3) of organ pipe B, with one end open, has the same frequency as the second harmonic (n=2) of pipe A. How long is pipe B?
(The speed of sound in air = 343 m/s).

A1 4.3 m.
A2 7.4 m.
A3 2.1 m.
A4 8.6 m.
A5 0.4 m.