Sound Wave interference

Solutions

1. Let ΔL = 1 λ (biggest possible) so 295 – 161 = 134 m = λ1

Check 161/134 = 1.2 λ and 295/134 = 2.2 λ so ΔL is one extra λ

1. L1b = 1.5 m L2b = 3.35 m (Pythagorean) ΔL = 1.85 m Assume 343 for v

343/1.85 = 185 Hz for f1 (biggest λ means lowest f.

1. If now out of phase, still out of phase at that spot because ΔL = 1λ
2. L1 = 1.875 m L2 = 2.625 m ΔL = 0.75 m = λ1

v = fλ = 343/0.75 = f1 = 457 Hz

ΔL = 2λ λ2 = 0.375 m f2 = 343/0.375 = 914 Hz

1. L1 = 3.0 L2 = 3.5 Δl = 0.5 m for destructive interference ΔL = odd/2 λ so 0.5 = ½ λ λ = 1.0 m 343m/s/1.-0 m = 343Hz

ΔL can also be 3/2 λ and 5/2 λ; λ2 = 0.33 m f2 = 1039 Hz

ΔL = 5/2 λ λ3 = 0.2 m f3 = 1715 Hz

1. L1 = 1.0 m L2 = 1.16 m (Pythagorean) ΔL = 0.16 m = λ v = fλ

343 m/s/0.16 = f = 2144 Hz

1. If we are in center, ΔL = 0 so just use v = fλ to find λ

343m/s/256 Hz = λ = 1.34 m

To hear destructive interference, we must move to a point where the DL = ½ wavelength. If we move ½ a wavelength, then ΔL will be one whole wavelength we must move ¼ of the wavelength either way from center to hear a minimum.

1. L1 = 3.05 m (Pythagorean (32 + 0.62) ½ ) and L2 = 3.31 (3.02 + 1.42)1/2

ΔL = 0.25 m 343 m/s = 0.25 and must = ½ λ for minimum. so λ = 0.5m

343/0.5 = f1 = 686 Hz

ΔL = 0.25 = 3/2 λ for λ2 λ2 = 0.167 and 343/0.167= f2 = 2054 Hz Hz

1. If the waves are out of phase and no one moves, Moe and Curley will hear max if Larry hears a Min.