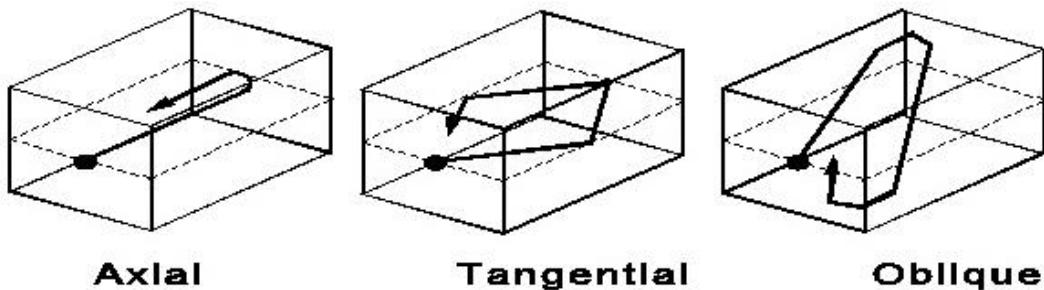


Answer on Question#40649 – Math – Geometry

what is the sum of room modes if the room 15 meters length 7 meters width and 4 meters hight?

Solution:

Room modes are caused by reflections between room surfaces. There are three types of modes in a rectangular room: axial (sound waves reflecting between two parallel surfaces), tangential (sound waves reflecting between four surfaces), and oblique (sound waves reflecting between all six surfaces). Axial modes have the most influence on the acoustical characteristics of the room. Oblique modes have less effect than the other two.



To calculate the frequencies of the axial, oblique und tangential modes, use the following equation:

$$f = \frac{c}{2} \sqrt{\left(\frac{n_x}{L}\right)^2 + \left(\frac{n_y}{B}\right)^2 + \left(\frac{n_z}{H}\right)^2}$$

f = Frequency of the mode in Hz

c = Speed of sound 343 m/s at 20 °C (68 °F)

n_x = Order of the mode of the room length

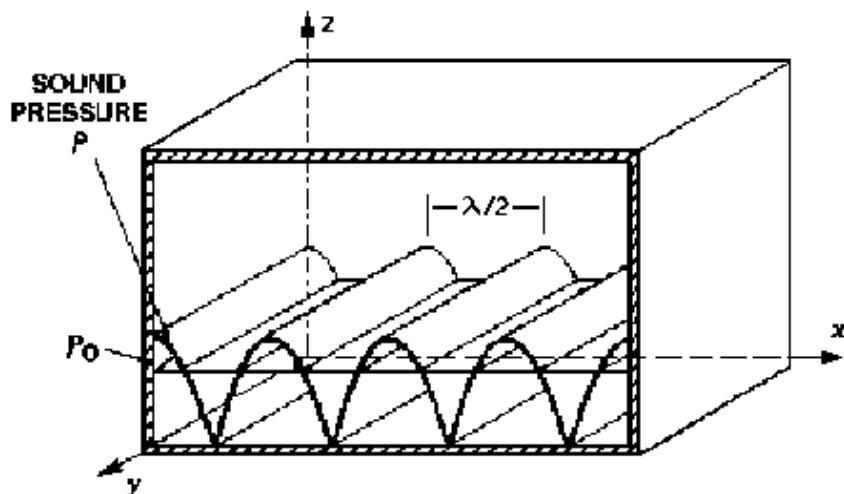
n_y = Order of the mode of the room width

n_z = Order of the mode of the room height

L, B, H = Length, width, and height of the room in meters

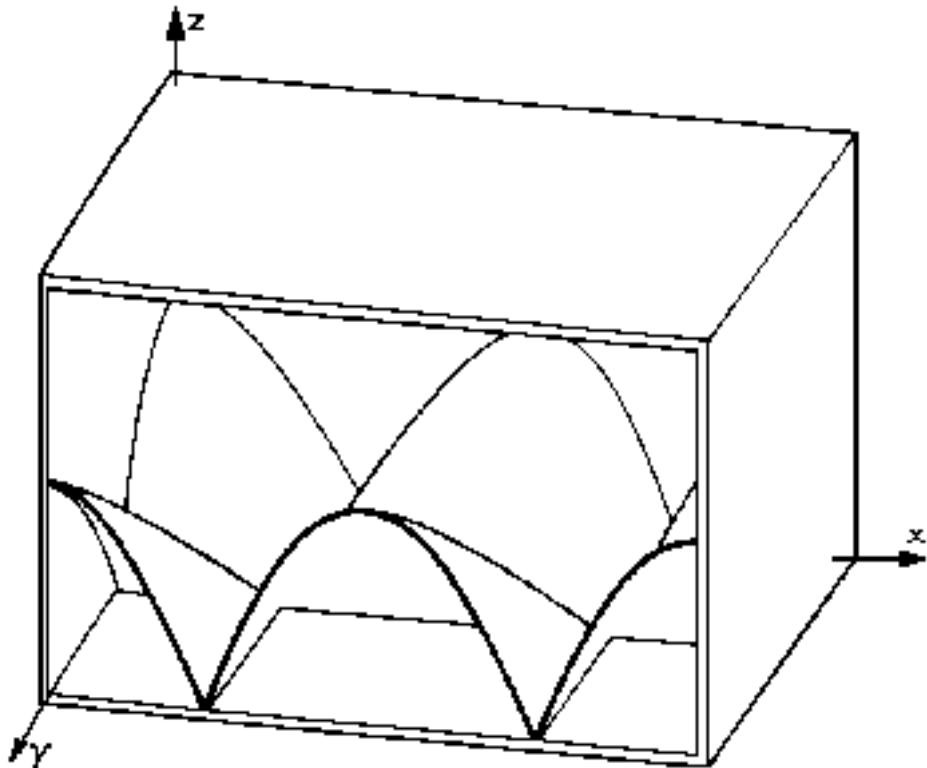
$$L = 15\text{m}, B = 7\text{m}, H = 4\text{m}$$

Axial room modes



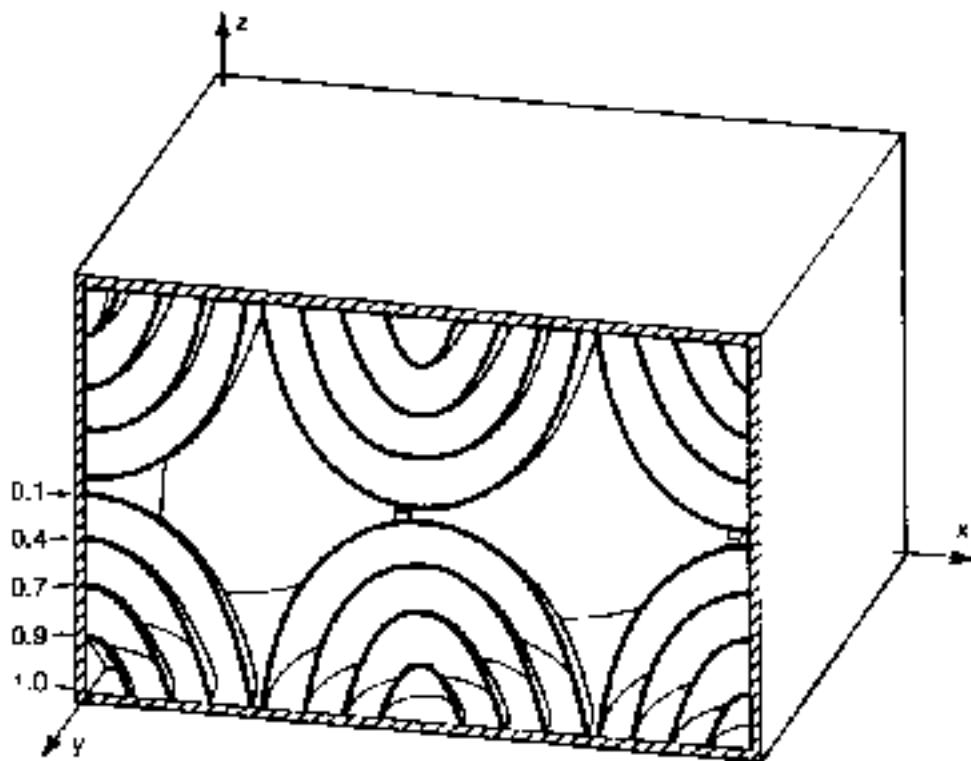
11.43 Hz	24.5 Hz	42.87 Hz	22.86 Hz	49 Hz	85.75 Hz
34.30 Hz	73.5 Hz	128.62 Hz	45.73 Hz	98 Hz	171.5 Hz
57.16 Hz	122.5 Hz	214.37 Hz	68.60 Hz	147 Hz	257.25 Hz
80.03 Hz	171.5 Hz	300.12 Hz	91.46 Hz	196 Hz	343 Hz
102.89 Hz	220.5 Hz	385.87 Hz			

Tangential room modes



27.03 Hz	44.37 Hz	49.38 Hz	54.07 Hz	88.74 Hz	98.76 Hz
81.10 Hz	133.11 Hz	148.14 Hz	108.14 Hz	177.49 Hz	197.52 Hz
135.18 Hz	221.86 Hz	246.90 Hz	162.21 Hz	266.23 Hz	296.28 Hz
189.25 Hz	310.61 Hz	345.66 Hz	216.29 Hz	354.98 Hz	395.05 Hz
243.32 Hz	399.35 Hz	444.43 Hz			

Oblique room modes



50.68 Hz	101.37 Hz	152.06 Hz	202.75 Hz	253.43 Hz	304.12 Hz
354.81 Hz	405.50 Hz	456.18 Hz			