22 A loudspeaker is playing music in a room. The door to the room is open and has a width of 0.80 m.

Sound waves of many different frequencies pass through the doorway and diffract. The speed of sound in air is $340\,\mathrm{m\,s^{-1}}$.
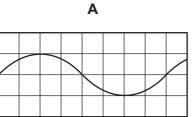
Which frequency of sound wave diffracts the most as it passes through the doorway?

A $2.4 \times 10^{-3}\,\mathrm{Hz}$

B $8.0 \times 10^{-1}\,\mathrm{Hz}$

C $2.7 \times 10^{2}\,\mathrm{Hz}$

D $4.3 \times 10^{2}\,\mathrm{Hz}$

23 A stationary sound wave is set up between a loudspeaker and a wall.
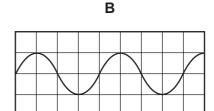
A microphone is connected to a cathode-ray oscilloscope (CRO) and is moved along a line directly between the loudspeaker and the wall. The amplitude of the trace on the CRO rises to a maximum at a position X, falls to a minimum and then rises once again to a maximum at a position Y.

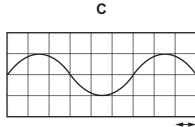The distance between X and Y is 33 cm. The speed of sound in air is $330\,\mathrm{m\,s^{-1}}$.

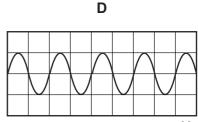Which diagram could represent the CRO trace of the sound received at X?

A

time base 0.50 ms/cm   1 cm

B

time base 0.50 ms/cm   1 cm

C

time base 0.50 ms/cm   1 cm

D

time base 0.50 ms/cm   1 cm