

Answer on Question #41759, Physics, Acoustics

A sound pulse (like a loud clap) is directed toward the wall of a tall building that is 680 m from the source of the sound. The reflected wave is detected 4.0 seconds after the pulse is produced.

A) how long does it take the pulse to reach the building?

B) what is the speed of the sound pulse?

Solution:

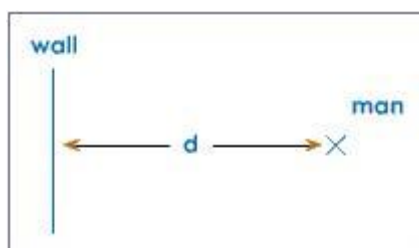
Given:

$$d = 680 \text{ m,}$$

$$T = 4 \text{ s,}$$

$$t = ?,$$

$$v = ?$$



A) how long does it take the pulse to reach the building?

If it takes 4 seconds for the echo to be detected it must have taken 4 seconds for the sound to travel to the object and back.

Thus,

$$t = \frac{T}{2} = 2 \text{ s}$$

B) what is the speed of the sound pulse?

Distance travelled by sound is

$$D = 2d = 2 \cdot 680 = 1360 \text{ m}$$

$$\text{Velocity of sound} = \frac{\text{distance travelled}}{\text{time taken}}$$

$$v = \frac{2d}{T} = \frac{1360}{4} = 340 \text{ m/s}$$

Answer. A) $t = 2 \text{ s}$, B) $v = 340 \text{ m/s}$.