Reflective Sounds

If you shout down a long hallway, and hear the echo 0.25 second later, how long is the hallway? The speed of sound in air at 20°C is about 343 m/s.

1. Read and Understand

What information are you given?

time for sound to travel down the hallway and back = 0.25 s

time for sound to travel the length of the hallway = 0.25 s/2 = 0.125 s

v = 343 m/s

2. Plan and Solve

What unknown are you trying to calculate?

length of hallway = ?

What mathematical expression can you use to calculate the unknown?

$d = v \times t$

d = (343 m/s)(0.125 s) = 43 m

3. Look Back and Check

Is your answer reasonable?

Yes, the length is reasonable and the units indicate distance.

Math Practice

On a separate sheet of paper, solve the following problems.

1. If you shout across a canyon, and you hear the echo 3.00 seconds later, how wide is the canyon? The speed of sound in the air is 343 m/s.

2. A boat captain sounds the ship's horn and you hear it 2.25 seconds later. How far away from the boat are you? The speed of sound in the air is 343 m/s.

3. A boat emits a sonar signal and it strikes an underwater object 4.67 seconds later. How far is the underwater object from the boat? The speed of sound in the seawater is 1533 m/s.