Speed of Sound

Adapted from an experiment idea sent in by Sam Barnum at West Point Grey Academy, Vancouver, BC.

Part 1

In Part 1 of this experiment, you will stand outside, some distance from the wall of a building. You will need to measure the distance from where you are standing to the wall of the building.

1) Turn on your LabQuest.
2) Choose Sensor Setup from the Sensors menu.
3) Check the box next to Internal Microphone. Tap OK.
4) Setup the recording parameters
    a. On the Meter screen, tap Rate.
    b. Set the data-collection rate to 1000 samples/s.
    c. Change the Duration to 0.6 s.
    d. Enable Triggering.
        i. Check the box next to Enable Triggering.
        ii. Set triggering so that collection starts when the Microphone is increasing across: 3.4.
    e. Tap OK.
5) Start data collection. LabQuest wait for a loud sound to trigger recording.
6) Hit together two claves or two other large blocks of wood. **It is important that everyone is quiet so that recording is not triggered by yelling instead of by your intended sound.** Note: talking will not trigger the device, but yelling, or bumping the LabQuest will.
7) Measure the distance from you to the wall.
8) Review your data. If you see one large spike, followed by a smaller one, then you have successfully captured the echo. Store the run by tapping the File Cabinet icon. **Note:** If you see no second spike, don't worry, as we will perform many trials. Store the run when you do get usable data.
9) Once back in the classroom, calculate the time difference between the start of the first spike and the start of the second spike for each trial. Average your trials.
10) Calculate the speed of sound.
    a. Speed = distance/time, BUT be careful about the distance you use. **Think!** How far did the sound actually travel?
    b. Calculate speed of sound
        i. Using your longest time _____ m/s
        ii. Using your shortest time _____ m/s
        iii. Using your average time _____ m/s

PART 2

In Part 2 of the experiment, you will stand outside, some distance from a different wall of a building. You will measure the distance to the wall using sound waves.

11) Using your calculated speed of sound of your choice, figure out how far away from the second wall we were standing. Again, be mindful of how far sound traveled, compared to how far from the wall we were standing. _____m

Data and Calculations

Part 1

Distance to wall: _____ m

Distance sound travelled: _____ m

Trial #	Travel time (s)

Average time: _____ s

Part 2

Trial #	Travel time (s)

Average time: _____ s

Calculations