Classroom Noise Meter

Name: _____

Student worksheet

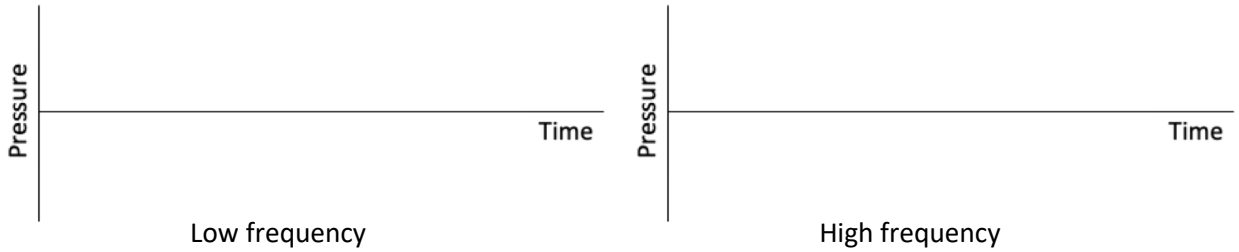
Date: _____

Word Bank *(when appropriate, use these words in your short answers)*		
• Amplitude • Frequency • Pitch	• Sound intensity • Sound volume • Sound wave	• Vibrations • Vocal cords

1. Before the experiment

a. Watch the video closely. Use this space to take notes on what you learn about sound waves.

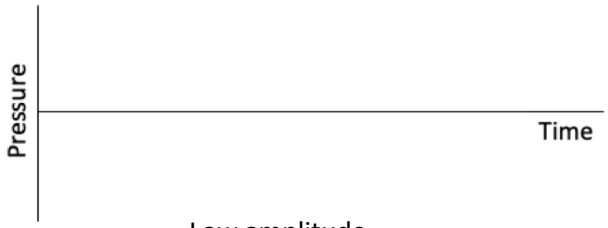
b. Draw a sound wave with a low frequency in the graph template on the left and a sound wave with a high frequency in the graph template on the right. In your graphs, label the part of the wave that represents its frequency.



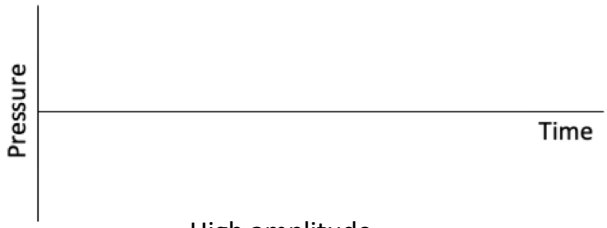
Classroom Noise Meter—Page 2

Name: _____

c. Draw a sound wave with a low amplitude in the graph template on the left and a sound wave with a high amplitude in the graph template on the right. In your graphs, label the part of the wave that represents its amplitude.

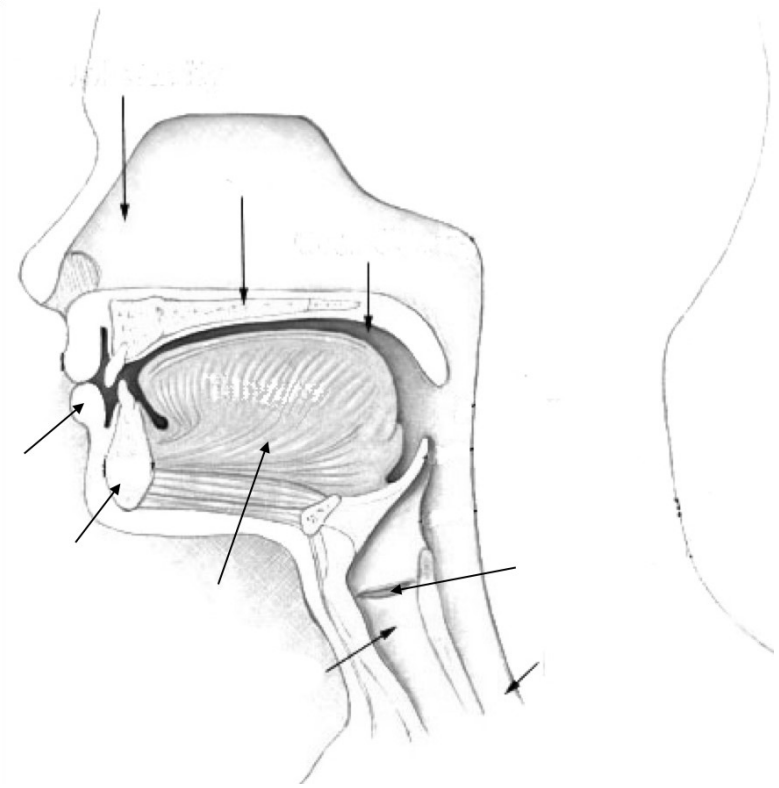


Low amplitude



High amplitude

d. We can make sounds with our voice. In the picture below, a cross section of a human head is shown. Many parts in our head contribute to our ability to talk. Label each of the parts indicated with an arrow to identify the following: oral cavity, nasal cavity, palate, lips, jaw, tongue, voice box (larynx), vocal folds, and esophagus. Indicate with different coloring where the voice box (larynx) and vocal folds are located.



2. Data collection

a. In the phyphox app, open the audio amplitude function.

b. Locate the sound sensor/microphone in your device and practice measuring different sounds and taking recordings with the app. You will have to calibrate your sensor before

Name: _____

taking any measurements. Follow your teacher's directions to do that. If you need help with the app, ask your teacher.

c. Measure the noise or sound levels for the five different classroom scenarios described in the table below.

Scenario 1: Background noise	Everybody is trying to be as quiet as possible.
Scenario 2: One speaker	Quietly listen to your teacher.
Scenario 3: Independent work	Quietly complete your reading assignment.
Scenario 4: Discussion in pairs	Two students discuss their findings from the assignment.
Scenario 5: Group discussion	All group members take part in a discussion.

d. Listen to and follow the instructions of your teacher, who will guide you through each of the five scenarios. Make sure to record the sound intensity of the sounds around you for each scenario.

e. Before each recording check if the sensor is still calibrated correctly and recalibrate it again if necessary.

f. Make sure to keep your sound sensor/microphone at the same location for each of the measurements. The best place to keep your phone is on your table where it is accessible to everyone in your group.

g. Take one continuous recording for the whole scenario time period. Make sure to save your data afterwards and give it a specific name so later you know which scenario it represents.

h. If something happens that affects your data during one of your recordings (such as a loud sound due to sneezing, coughing, or dropping something), make a note of the timepoint and the event, so you can assign the noisy event to your recording afterwards.

Classroom Noise Meter—Page 4

Name: _____

3. Data analysis

a. In the phyphox app, review your saved recordings for each scenario. You will need to export your data from the app to continue with the data analysis. You can either export your data as a .csv or Excel file. Open the exported file in a spreadsheet program, such as Excel or Google Sheets. Once you have the data in a spreadsheet, use the Minimum, Maximum, and Average functions to follow these steps:

   i. Determine the *minimum* sound intensity measured for each scenario.

   ii. Determine the *maximum* sound intensity measured for each scenario.

   iii. Determine the *average* sound intensity for each scenario.

   iv. Enter your results in the data table below.

	Average sound intensity [dB]	**Maximum** sound intensity [dB]	**Minimum** sound intensity [dB]	**Comments**
Scenario 1: Background noise				
Scenario 2: One speaker				
Scenario 3: Independent work				
Scenario 4: Discussion in pairs				
Scenario 5: Group discussion				

b. Discuss as a group:

? What is your classroom background noise level? Where do the background noises come from if nobody is talking?

? How do your average/maximum/minimum sound levels compare for each scenario?

? Do you see a pattern or a trend in your data when comparing sound levels for each scenario?

? Do you have any outliers in your data, measurements that do not fit with the rest of the data in a single recording? For example, a single high noise event (like a sneeze) that is represented by a large peak? How many of these events are in each scenario?

? What was your highest measurement throughout the whole investigation? What event caused that noise?

Classroom Noise Meter—Page 5

Name: _____

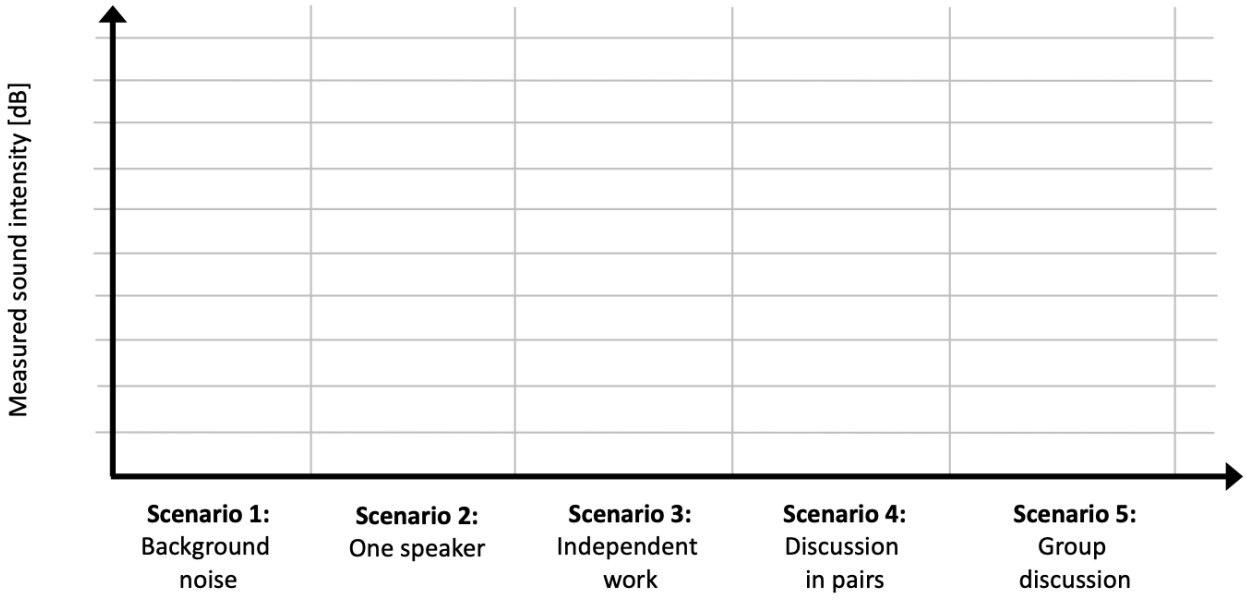
c. Briefly share your results with the rest of the class. Write down the average sound intensities for each scenario from the other groups in the data table below.

Average sound intensities [dB]	**Scenario 1:** Background noise	**Scenario 2:** One speaker	**Scenario 3:** Independent work	**Scenario 4:** Discussion in pairs	**Scenario 5:** Group discussion
Group 1					
Group 2					
Group 3					
Group 4					
Group 5					
Group 6					
Group 7					
Group 8					
Group 9					
Group 10					
Class average					

d. Calculate the class average sound intensity for each scenario from all group results in the data table above.

Name: _____

e. Draw a bar graph in the graph template below that shows your final results (the class average for sound intensity during each scenario). You will need to add decibel values on the y-axis.



f. Looking at your graph, do you see any trends or patterns?

4. After the experiment

a. Work together to create a "noise meter" poster that indicates the target sound levels, determined as a class, for each classroom scenario.