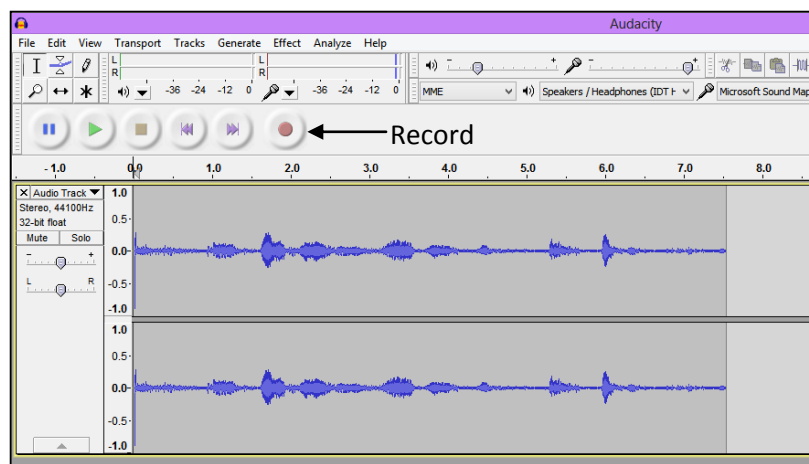


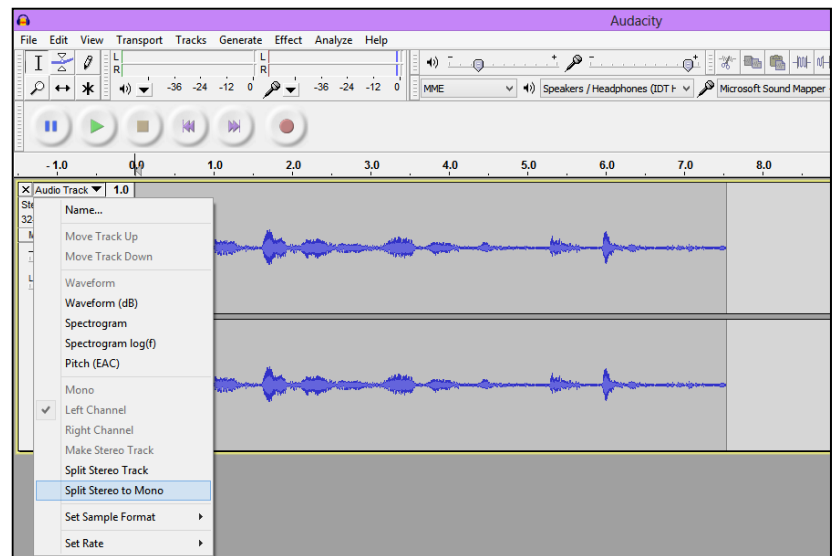
## Explain Phase Instructions

### The Cocktail Party Effect

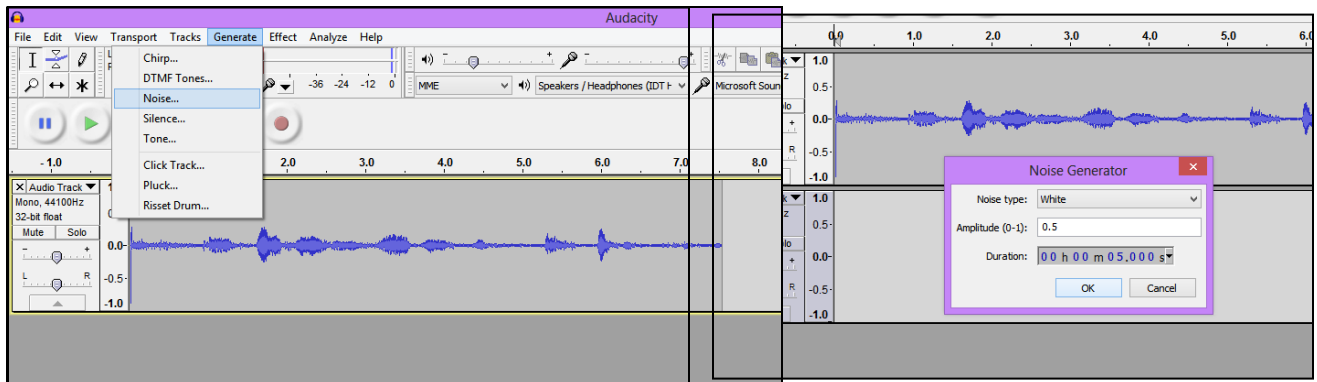
Recording your voice: Using a build-in or external microphone connected to your computer, simply click the record button (see image below) and record your voice. We recommend recording a simple sentence that the students will immediately recognize. For example, you might say, “It’s a great to learn about sound!” Speak slowly and clearly.



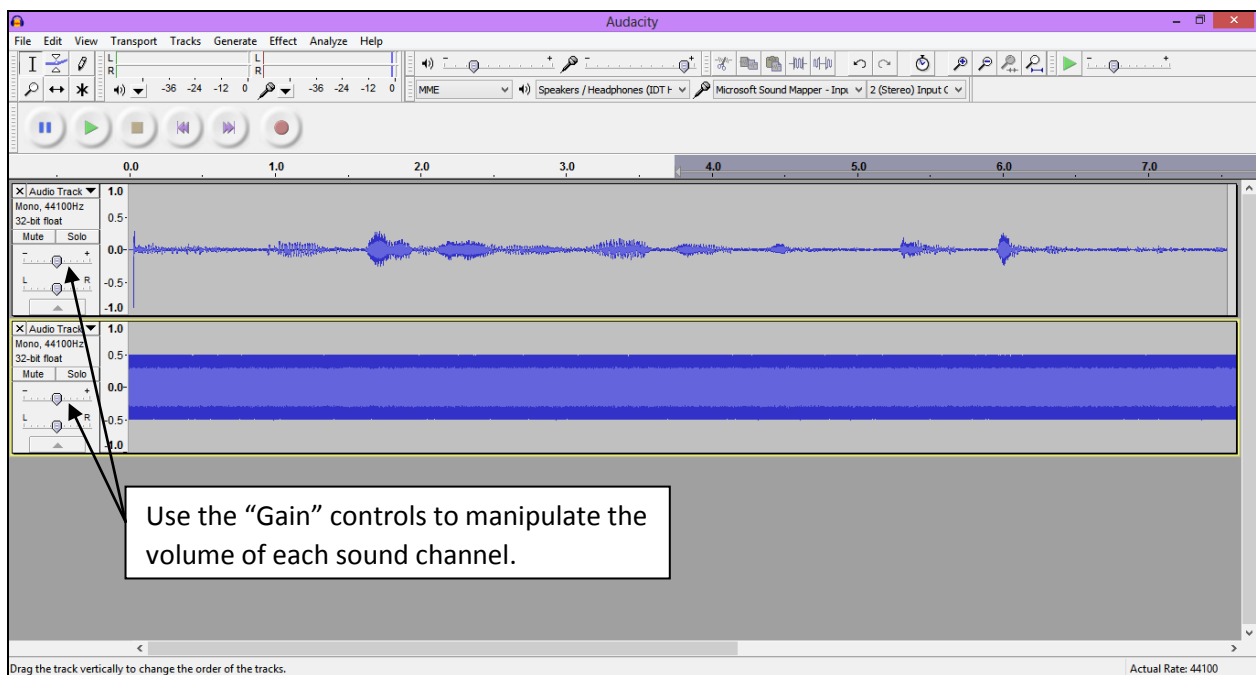
By default, Audacity records in stereo. You will need to delete one channel. To do this, Click on the menu button next to the Audio Track, and select “Split Stereo to Mono.” Once the tracks are split, you can simply delete one track by clicking the “X” next to “Audio Track.”



Importing White Noise: Now that you have a single voice track, it is time to add in the white noise. At the top of the window, find the “Generate” menu. Select the “Noise” option within this menu. Adjust the Amplitude to 0.05 and the Duration to the length of your voice recording. Press OK.



Your Audacity project should now look something like this:



Manipulating the volume for each channel: You can adjust the volume of each track by sliding the “Gain” switch in the positive or negative direction. (see above).

## **Elaborate Phase**

### **Treefrog Research Activity**

#### **Set-up**

1. Print out the game board template and arrange the pages as per the directions. Glue or tape the pages on a Styrofoam project board.
2. Print out as many frog images and oscillograms as you will need (plan for 30 per group). Cut out and tape the oscillograms on the back of the frog images. Be sure to use all three oscillograms.
3. Glue the frogs/oscillograms on toothpicks and place them in the habitat. We arranged the frogs by calls, placing one call type in the northern section, another call type along the river, and the third call type in the southern portion.
4. Print out a class set of the Elaborate student worksheet.
5. Print out a copy of the data table below with the call information for the treefrog species (or display it on the SmartBoard during the activity).
6. Optional: load the frogs calls from the webstie and review the background information below to share with your students before beginning the investigation.

## **Background on Gray Tree Frogs**

The Elaborate activity of this lesson is based on the characteristics of two species of North American treefrogs, they Cope's gray treefrog (*Hyla chrysoscelis*) and the Gray treefrog (*Hyla versicolor*). Physically, the two species look identical and can only be distinguished by their acoustic signal or by genetic measures (one species has 24 chromosomes, the other has 48). The two species can hybridize with each other, producing offspring with 36 chromosomes, which have a call falling in between the two parents' calls. The two species co-exist in some areas of their overlapping ranges, while in other areas, only one species is found.

### **Call Analysis**

Several researchers have studied the behavior of these and other treefrogs for many decades in an effort to understand the mechanism behind the evolution of their calls and other behaviors. In most frogs in the USA, only the males produce an acoustic signal (different signals for mating, aggression, etc.) and females are attracted to the signals of their own species. Mating usually occurs after a female has approached a calling male whose call she is attracted to. The calls can be easily obtained through recordings of the frogs in their natural environments or in a laboratory. Once recorded, the calls can be digitized using computer software and the researcher can study various aspects of the calls, such as its pitch (frequency) and timing. In our activity, students are asked to measure the length of the call in milliseconds, which serves as a proxy for the duration of the call (in seconds or milliseconds).

**Reference information for students**

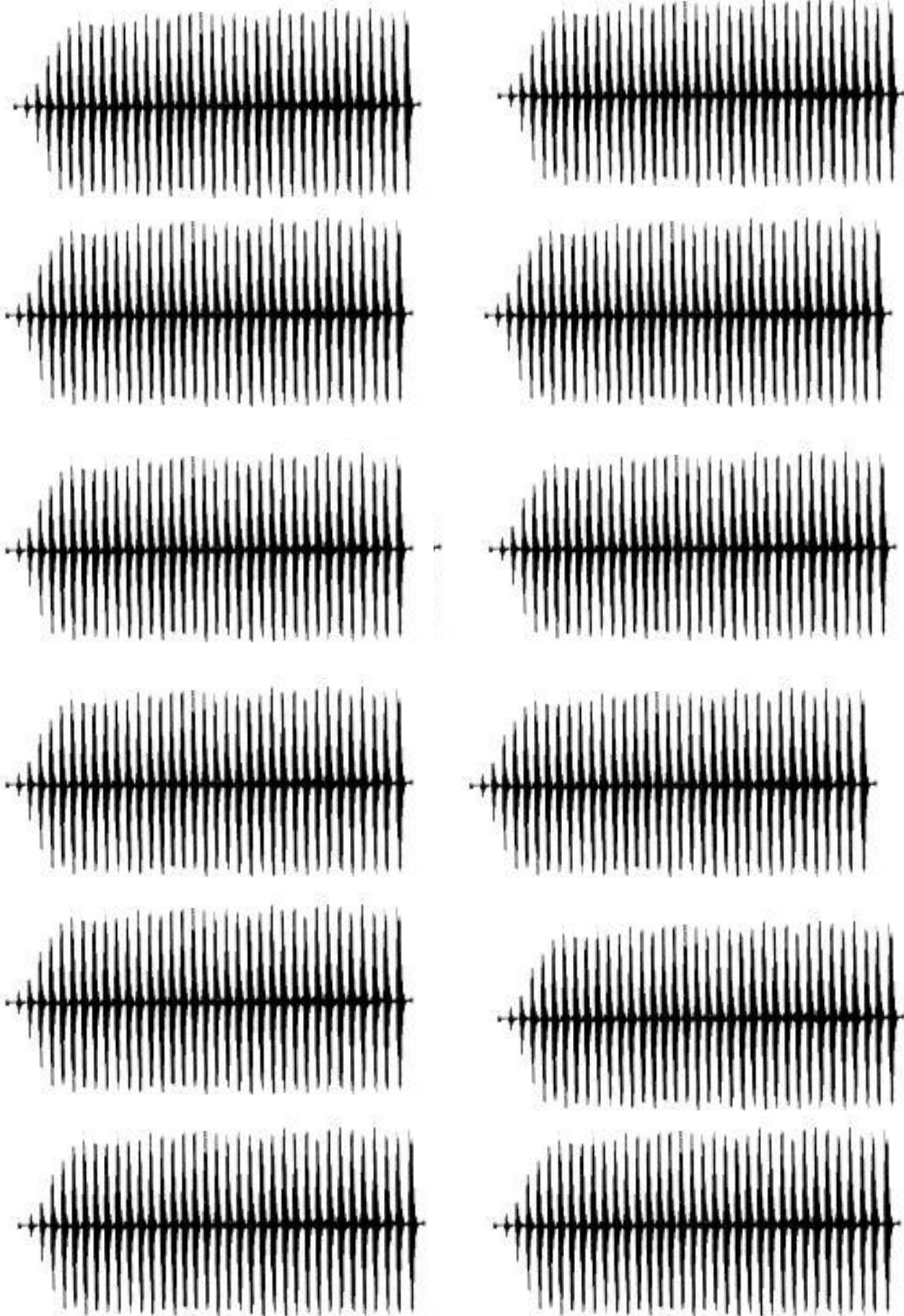
	<b>Gray Treefrog</b>	<b>Cope's Gray Treefrog</b>
<b>Number of pulses within each call</b>	12-16	32-36
<b>Call length</b>	50-55 mm	68-70 mm

**For video and audio recordings of the frogs for classroom viewing, see:**

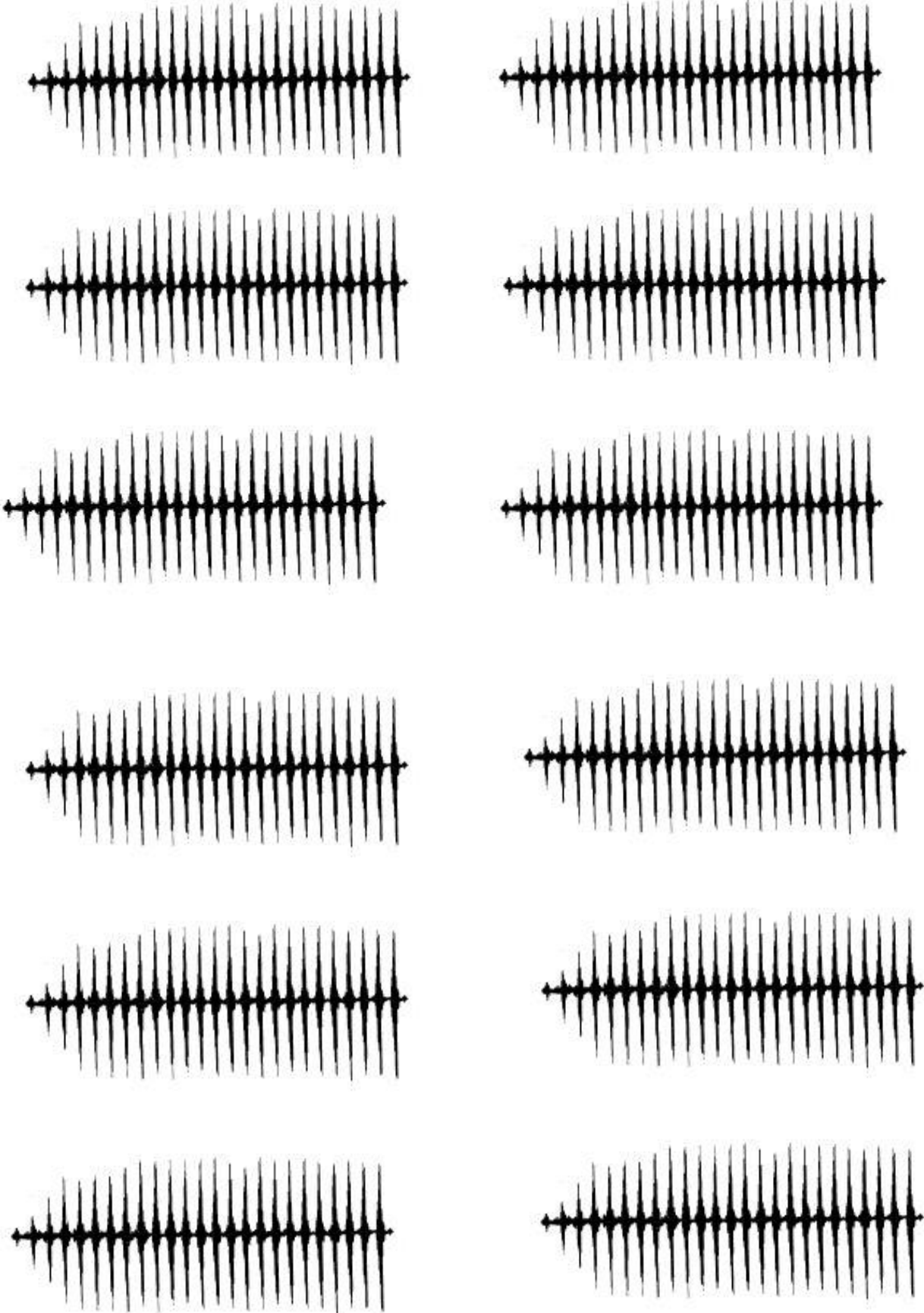
[www.biosci.missouri.edu/gerhardt/funstuff.htm](http://www.biosci.missouri.edu/gerhardt/funstuff.htm)



Cope's Grey Tree Frog (*Hyla chrysoscelis*)

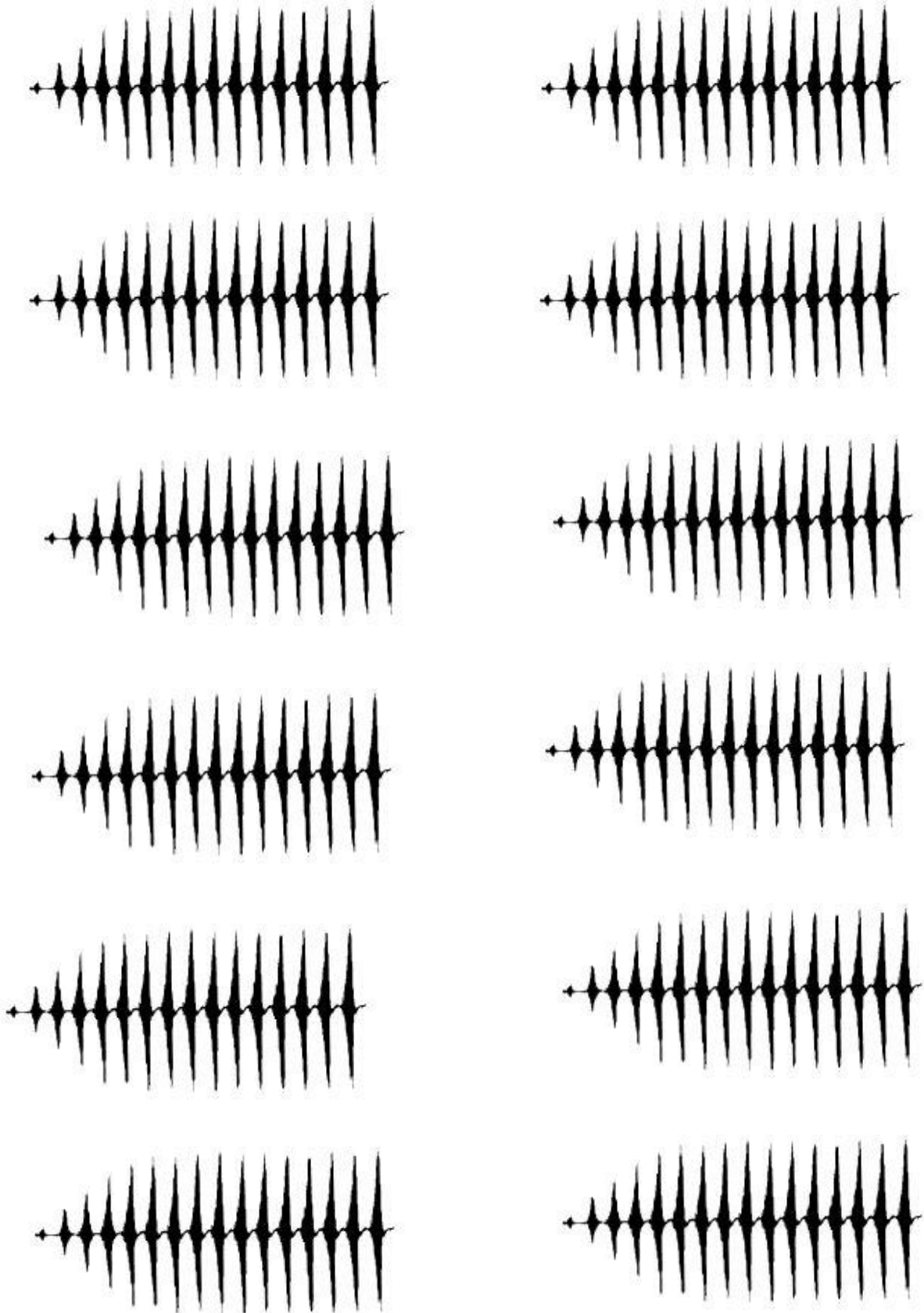


Grey Tree Frog (*Hyla versicolor*)

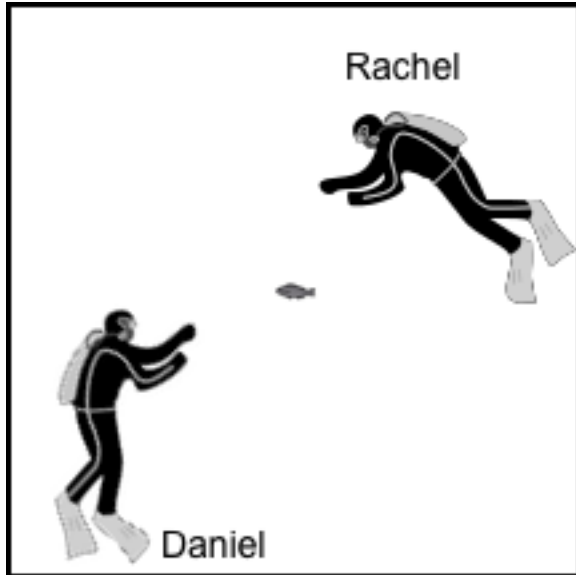




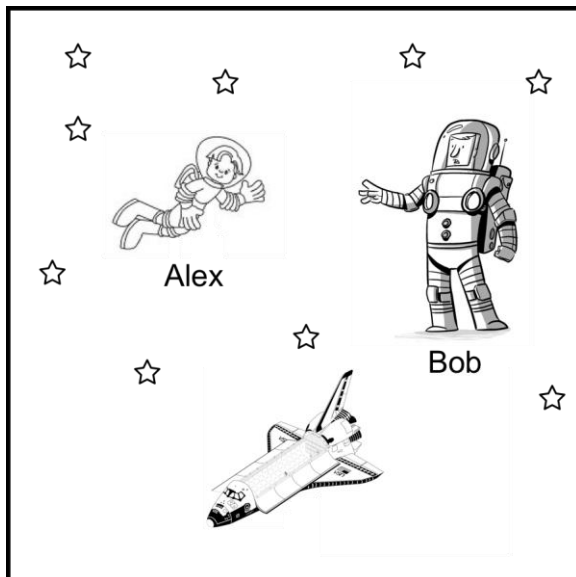
Hybrid between Cope's Grey Tree frog and Grey Tree frog



For each box, draw an arrow showing the direction of the vibrations caused by sound traveling from the sound source to the receiver.



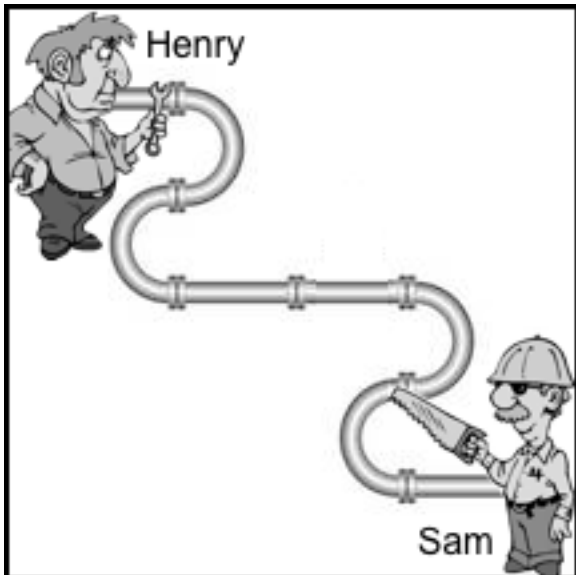
1. Rachel shouts to Daniel underwater to tell him about the fish she saw.



2. In outer space, Bob says, "Alex! Don't get too far from the space ship!"



3. Michael asks Susan to pass him the ball on the soccer field.



4. Henry wants to warn Sam not to cut the pipe so he yells and bangs on the pipe.

**Tree Frog Research Project**

Name: \_\_\_\_\_

1. Select 10 frogs from across the map and investigate their calls. Record your measurements in the table below. Can you group them based on their calls?

<b>Frog ID #</b>										
<b>Call length (cm)</b>										
<b>Number of pulses</b>										

2. Draw a circle around the three groups of frogs and label them "A", "B", and "C" on the map below. Fill in the data table below with your data.

	<b>Region A</b>	<b>Region B</b>	<b>Region C</b>
<b>Average call length (cm)</b>			
<b>Average number of pulses</b>			

Can your team identify which species belong to each region? Use the reference information on the board to help you.

Region A: \_\_\_\_\_  
 Region B: \_\_\_\_\_  
 Region C: \_\_\_\_\_



**Conclusions:**

Did your team discover anything surprising? Write a few sentences to explain the distribution of the three groups of tree frogs.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_