A1. Navigation: What Shape Changes Did We See Last Class?

Think back to the last class or two. How would you describe the shape changes we have seen in instruments? What did we see about how big those shape changes must have been?

Turn and talk: Turn to your neighbor. What shape changes did you see in instruments? What affected how big those shape changes were?

A2. Navigation: Make Predictions about Sticks and Sounds

There's a big stick set up at the front of the class.

1. Answer the following questions in your science notebook.
    a. *How do you think it will move?* Describe how the long wooden stick might be similar to a guitar string or tuning fork.
    b. *Why the long stick?* What is the advantage of using a long stick to model the motion of something smaller, like a tuning fork?
    c. *Will there be a difference between loud and. soft sounds?* Describe how the motion of the guitar string or tuning fork might change for louder sounds and softer sounds.

A3. Set Up Your Notebook for This Lesson

2. Write the question for this lesson—***How do the vibrations of the sound source compare for louder versus softer sounds?***—in your notebook and put a box around it.
3. Write your ideas about this question immediately below the question. It's OK if you don't have the answer right now. You will come back to this question at the end.

B1. The Motion Detector

Sketch graphs in your science notebook to answer the following questions.

4a. What does it look like when someone walks away from the detector at a steady pace?

4b. What does it look like when someone walks toward the detector, more slowly than before?

Share your ideas about the graphs. Why do they look the way they do?

B2. Prediction: Stick not moving

5. Your teacher will give you the Lesson 5 Handout: Graphs with two graphs on it. Tape the entire sheet in your notebook on the left hand side of a page (you will need a clean sheet on the facing right hand side).

6. Sketch your prediction about how the graph will look if the stick doesn't move. Record your prediction on both graphs (Condition 1 and Condition 2) in your notebook.

7. After your teacher collects data of the stick not moving, you can make corrections. Label the lines "this is what the graph looks like when the stick is not moving."

C1. Make Predictions and Gather Data

Prediction: Light push

8. Predict what you think the graph will look like if the stick is pushed lightly. Draw your prediction on your Condition 2: Light push graph with a different-colored dashed line. Label this line "prediction."

Prediction: Harder push

9, Predict what you think the graph will look like if the stick is pushed a little bit harder. Draw your prediction on the Condition 2: Harder push graph with a different-colored dashed line. Label this line "prediction."

C2. Condition 1: Push the stick lightly and Condition 2: Push the stick hader

10. After you see what happened in each demonstration, sketch the actual shape of the graphs in Condition 1 and Condition 2 with a solid line. Label these lines “actual graph.” Describe any differences between your predicted graphs and actual graphs.

Turn and talk: Turn to your neighbor. How did the actual graph compare with your predicted graph?

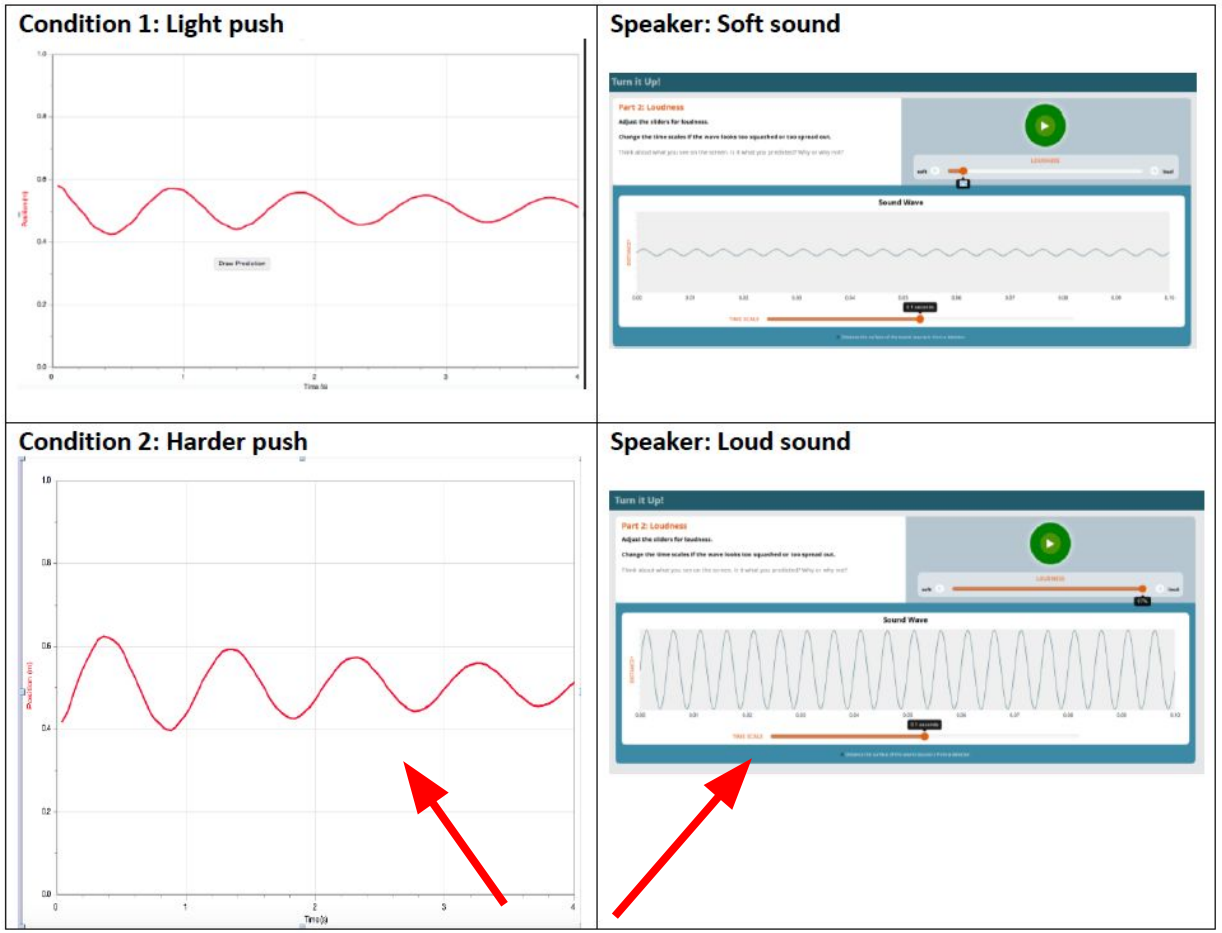
C3. Look at the Graph of the Speaker's Motion (Soft and Loud)

Graph of a speaker's motion

11. Sketch the two graphs of the speaker (soft sound and louder sound) on the right-hand page in your notebook (so you can see the stick graphs and the speaker graphs all together). Be sure to label which is which.

C3. “What I See” Comments

12. On each of the four graphs, use “What I see” comments in complete sentences to describe what you see. You should point out how the graphs are different from each other and similar to each other.



What I see: I see that the harder push and the loud sound are alike because…

D1. Describe Patterns and Interpret Data Discussion

Discuss Patterns

13. Discuss and summarize all the class observations.

Share your ideas about the graphs. What patterns do you see?

D2. Unpacking “Amplitude” and “Frequency”

Write these science words in your science notebook.

Amplitude

Frequency

Listen to your teacher and your classmates share their ideas about these words, then use your own words to write their definitions in your science notebook.

D3. Completing the Model Tracker

Your teacher will update the Model Tracker for the class.

14. Complete the Model tracker for Lesson 5, which should be at the back of your notebook.

Lesson Question	Evidence	What did we figure out?	How can we represent what we figured out?
How do the vibrations of the sound source compare for louder versus softer sounds?			