**Sound Waves Online Tutorial**

***Instructions****: Follow the links below, read the text on the page, follow the instructions given and answer the questions as directed below in your journal.* ***Formulate thoughtful responses*** *after careful study of the entire website lessons.*

**Part I – The Nature of Sound**

1. Click on 🡪 [Sound Waves and Music](http://www.physicsclassroom.com/class/sound) 🡪 Lesson 1: The Nature of a Sound Wave
2. [**Lesson 1c**](http://www.physicsclassroom.com/class/sound/Lesson-1/Sound-is-a-Pressure-Wave)**: Sound is a Pressure Wave**
	1. Take notes in your journal. Make sure to include the following:
		1. Which type of wave is a sound wave?
		2. How do air particles interact when a sound wave propagates?
		3. Can sound travel without a medium?
		4. Watch the animation of sound and an ear drum.
	2. Answer the **Check Your Understanding** question.
3. [**Lesson 2a**](http://www.physicsclassroom.com/class/sound/Lesson-2/Pitch-and-Frequency)**: Pitch and Frequency**
	1. Take notes in your journal. Make sure to include the following:
		1. How does frequency influence what we hear?
	2. Write down the definitions to all of the words in **bold red** text.
	3. Answer the **Check Your Understanding** question.
4. [**Lesson 2b**](http://www.physicsclassroom.com/class/sound/Lesson-2/Intensity-and-the-Decibel-Scale)**: Intensity and the Decibel Scale**
	1. Take notes in your journal. Make sure to include the following:
		1. What is intensity? Write down our new equation.
		2. Write down the definitions to all of the words in **bold red** text.
	2. Answer 2 of the 3 **Check Your Understanding** questions.
5. [**Lesson 2c**](http://www.physicsclassroom.com/class/sound/Lesson-2/The-Speed-of-Sound)**: Speed of Sound**
	1. Skim this section, it is mostly review from wave properties.
	2. What is the speed of sound in air? What does it depend on?
	3. Answer 4 of the 10 **Check Your Understanding** questions.
6. [**Lesson 3b**](http://www.physicsclassroom.com/class/sound/Lesson-3/The-Doppler-Effect-and-Shock-Waves)**: The Doppler Effect and Shock Waves**
	1. In your own words, explain the Doppler Effect.
	2. Draw any diagrams you find helpful in understanding the Doppler Effect.
	3. What causes sonic booms?

**Part II – Physics of Music**

1. Click on 🡪 [Sound Waves and Music](http://www.physicsclassroom.com/class/sound) 🡪 Lesson 4: Resonance and Standing Waves
2. [**Lesson 4a**](http://www.physicsclassroom.com/class/sound/Lesson-4/Natural-Frequency)**: Natural Frequency**
	1. Take notes in your journal. Make sure to include the following:
		1. What is natural frequency?
		2. What is timbre?
		3. How can you make a wine glass “sing”?
3. [**Lesson 4c**](http://www.physicsclassroom.com/class/sound/Lesson-4/Standing-Wave-Patterns)**: Standing Wave Patterns**
	1. *Take notes about the Chladni plates*
	2. Sketch the harmonic patterns
	3. Watch the animations for harmonic patterns and briefly describe what you see.
	4. View the **Watch It!** video at the bottom of the page.
4. [**Lesson 4d**](http://www.physicsclassroom.com/class/sound/Lesson-4/Fundamental-Frequency-and-Harmonics)**: Fundamental Frequencies and Harmonics**
	1. Explain IN YOUR OWN WORDS what a harmonic is.
	2. Sketch any diagrams you find helpful in understanding the harmonics.
	3. Look at the new equations in **bold red** text
		1. Explain what each of the symbols means.
		2. When can we use these equations?
	4. Answer #3 in the **Check Your Understanding** questions.

**IF YOU HAVE MORE TIME:**

1. Click on 🡪 [Sound](https://phet.colorado.edu/en/simulation/legacy/sound)
	1. Click the play button in the simulation preview.
	2. Play with the different tabs in the applet.
	3. What do you notice? What types of wave behavior are present?