# Beethoven, Vibes, and Voltage: Exploring Sound Frequencies in Classical Music

Subject Areas: Music, Science (Physics), Language Arts (Research & Presentation)

Topic: Sound, Music History, Musical Elements, Creative Expression

**Description:** This lesson invites you, Aria, to explore the fascinating intersection of sound frequencies (Hertz), the emotional power of classical music, and the genius of Ludwig van Beethoven. You'll learn what Hertz means, how different frequencies might relate to musical expression, and creatively apply this understanding by composing a small musical idea inspired by Beethoven.

# **Learning Objectives:**

- Define Hertz (Hz) and explain its relevance to sound and music.
- Discuss how Beethoven's hearing loss might have influenced his perception and creation of music, particularly his sensitivity to vibrations/frequencies.
- Analyze segments of Beethoven's music, identifying and describing the emotional impact, and hypothesizing how frequency ranges might contribute to these emotions.
- Creatively apply your understanding by composing a short musical motif or phrase reflecting an emotional quality, considering the role of pitch (and thus frequency).
- Research and present findings on a chosen Beethoven piece, connecting its characteristics to the concepts explored in the lesson.

## **Materials Needed:**

- Computer with internet access
- Good quality headphones or speakers
- Paper and pencil/pen (or a digital document for notes and composition ideas)
- Optional: Access to a simple music composition software/app (e.g., GarageBand, MuseScore (free), online sequencer, or a piano/keyboard if available)
- Access to an online tone generator (search "online tone generator" many free options available)
- Selected recordings of Beethoven's music (easily found on YouTube or streaming services):
  - Symphony No. 5, 1st movement
  - Für Elise
  - Piano Sonata No. 14 "Moonlight," 1st and 3rd movements
  - Symphony No. 9, "Ode to Joy" theme

# **Lesson Activities:**

### Part 1: What's the Frequency, Aria? (Approx. 30 minutes)

#### 1. Introduction to Sound and Hertz (Hz):

- Start with a question: "Aria, what do you think makes a sound high or low? What makes it loud or soft?"
- Explain that sound travels in waves. The number of waves that pass a point in one second is called frequency, measured in Hertz (Hz). High frequency = high pitch; low frequency = low pitch.
- Use an online tone generator. Experiment together:

- Generate a low frequency (e.g., 100 Hz). Describe how it sounds and feels. Can you
  feel the vibration if the speaker is good?
- Generate a high frequency (e.g., 2000 Hz, then 8000 Hz). Describe how it sounds. (Be careful with volume at very high frequencies).
- Discuss the range of human hearing (typically 20 Hz to 20,000 Hz).
- **Activity: Frequency Guessing Game.** I'll play a few tones (low, mid, high) from the generator. You guess if it's a generally low, middle, or high frequency.

#### 2. Frequencies and Emotion in Music:

- Discuss: "Do you think different frequencies or pitches can make us feel different emotions? For example, what kind of feeling does a deep, rumbling sound give you? What about a high, tinkling sound?"
- Connect this to musical instruments and their typical ranges (e.g., tuba vs. piccolo).

### Part 2: Beethoven's Sonic World (Approx. 45-60 minutes)

#### 1. Beethoven's Story:

- Briefly discuss Beethoven's life, focusing on his progressive hearing loss.
  - How do you think losing his hearing affected him as a musician and composer?
  - It's said he sawed the legs off his piano to feel the vibrations on the floor. How does this relate to our discussion of frequency and sound waves?
- Emphasize that he composed some of his most profound works \*after\* he became deaf, relying on his "inner ear" and his understanding of music's structure and, likely, its physical vibrations.

#### 2. Listening Adventure - "Feeling" Beethoven:

- Listen to excerpts from Beethoven's works. For each piece:
  - Symphony No. 5, 1st movement (opening): What emotions do you feel? Are there prominent low, middle, or high frequencies you notice? How do they contribute to the drama? (Think of the famous "da-da-da-DUM" – it has power, partly from its pitch and instrumentation).
  - Für Elise (opening): How does this piece make you feel? Is it predominantly high, low, or a mix? How does this create its delicate or melancholic character?
  - "Moonlight" Sonata, 1st movement: What's the mood? How do the frequencies (often gentle, arpeggiated chords) contribute to this?
  - "Moonlight" Sonata, 3rd movement: Big contrast! How does the use of fast notes and wider frequency ranges change the emotion compared to the 1st movement?
- During listening, encourage Aria to jot down words describing the emotions and any thoughts about the frequencies she perceives.
- Discussion: "Did Beethoven use a wide range of frequencies in these pieces? How did that affect the music's impact?"

# Part 3: Creative Composition - Your "Beethoven Beat" (Approx. 45-60 minutes)

1. **The Challenge:** "Aria, your mission is to compose a short musical idea (a motif or phrase, maybe 4-8 bars long) inspired by what we've learned. Think about conveying a specific emotion through your choice of notes (pitches/frequencies) and rhythm."

#### 2. Steps:

- 1. **Choose an Emotion:** Pick an emotion you want to express (e.g., joy, sadness, mystery, excitement, peace).
- 2. Brainstorm Frequencies/Pitches:
  - If you want to convey sadness, would you use mostly high, bright notes or lower, more somber ones?
  - For excitement, would you use slow, drawn-out notes or quick, energetic ones?
     Wide leaps in pitch or smaller steps?

#### 3. Sketch Your Idea:

- You can write it down using simple notation (if you know some), draw shapes representing high/low notes over time, or use a simple online sequencer or music app. Even just humming it and trying to describe the contour is a start!
- Focus on the \*idea\* and how it uses high/low sounds, not on making it perfect or complex.
- Think about a simple rhythm too. Does it match your emotion?
- 4. **Optional:** If using software or an instrument, try playing your idea.
- 3. **Share and Discuss:** Share your musical idea. Explain the emotion you chose and how you tried to use frequencies/pitches to express it. (This isn't about performance quality, but about creative thought!).

## Part 4: Deeper Dive - Beethoven Research Project (Ongoing, then Presentation - Approx. 60-90 mins for research + prep, 15 mins presentation)

- 1. **Choose a Piece:** Aria, select one Beethoven piece (it can be one we listened to, or a new one you're curious about perhaps a different symphony movement, a piano sonata, or a string quartet).
- 2. Research Questions to Guide You:
  - When did Beethoven compose this piece? What was happening in his life (especially regarding his hearing)?
  - $\circ\,$  What is the general mood or story (if any) of the piece?
  - Listen closely: How does Beethoven use different ranges of pitch (low, medium, high frequencies) in this piece? Does he use contrasting sections of high vs. low?
  - How do these choices of frequency/pitch contribute to the emotional impact or the overall effect of the piece?
  - Are there any particularly interesting instrumental colors or combinations that stand out in terms of their sound frequency characteristics?
  - What are 1-2 things you find most fascinating about this piece in relation to our discussion on sound and frequency?
- 3. **Prepare a Short Presentation:** You can present your findings in a way you enjoy:
  - A short written report.
  - A verbal presentation with musical examples.
  - A slideshow with notes and audio clips.
- 4. Presentation Day: Share your discoveries!

## Part 5: Wrap-up and Reflection (Approx. 15 minutes)

- Discussion:
  - $\circ\,$  "What was the most surprising thing you learned today about sound frequencies and music?"
  - $\circ\,$  "How has this lesson changed how you might listen to music in the future, especially classical music?"
  - "What questions do you still have about Beethoven, Hertz frequencies, or sound?"
- Journal Prompt (Optional): In your homeschool journal, write a paragraph reflecting on how understanding sound frequencies enhances your appreciation of music, especially complex compositions like Beethoven's.

This lesson aims to be interactive and discovery-based. Feel free to pause, explore tangents, and revisit concepts as needed. The goal is for Aria to develop a deeper, more nuanced appreciation for music through the lens of sound science and creative expression!