

Theme	Video	Baccalauréat	Session
3-1 Son, phénomène vibratoire	Non	<b>Général</b>	<b>2025</b>

SECTION EUROPEENNE  
Épreuve orale de Physique-Chimie en anglais

## HOW DOES AN ACOUSTIC GUITAR WORK?

### Documents:

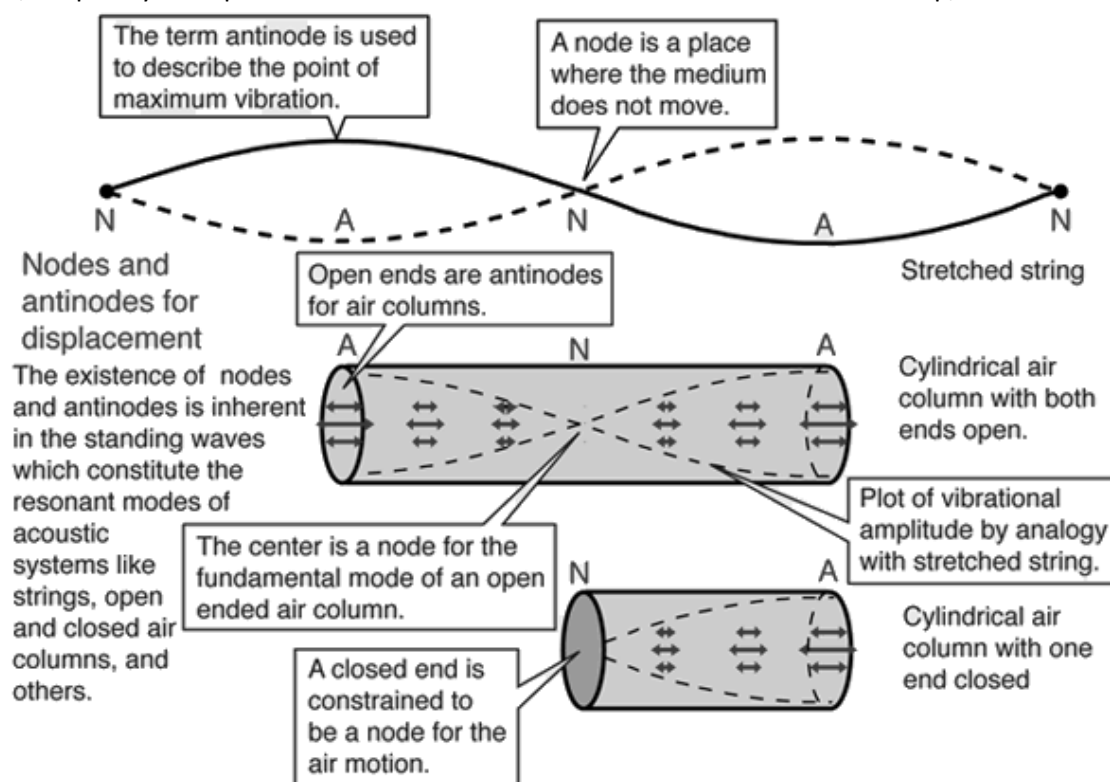
#### **Doc.1: Fundamental and Harmonics**

The lowest resonant frequency of a vibrating object is called its fundamental frequency. Most vibrating objects have more than one resonant frequency and those used in musical instruments typically vibrate at harmonics of the fundamental. A harmonic is defined as an integer (whole number) multiple of the fundamental frequency. Vibrating strings and open cylindrical air columns will vibrate at all harmonics of the fundamental. Cylinders with one end closed will vibrate with only odd harmonics of the fundamental. Vibrating membranes typically produce vibrations at harmonics, but also have some resonant frequencies which are not harmonics.

<http://hyperphysics.phy-astr.gsu.edu/hbase/Waves/funhar.html>

#### **Doc.2: Nodes and Antinodes**

The standing waves produced by wave motion in strings or air columns can be used to establish the values for wavelength, frequency and speed for the waves in accordance with the wave relationship,  $v = f\lambda$ .



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### Doc.3 : an acoustic guitar

It is one of the most prominent musical instruments in history. Created in the 1500s, the guitar has strummed its way to popular culture by playing to a variety of musical styles, from flamenco to rock. Without the acoustic guitar, music, as we know it today, will less likely strike a chord.

#### Main types of acoustic guitars



#### Generating sound

The guitar's body design is very crucial. The most important piece is the soundboard mounted on the front of the body. Its job is to make the guitar's sound loud enough for us to hear. The two widenings called 'bouts' also affect the tone.

**Upper bout**  
Accentuates higher tones

**Lower bout**  
Accentuates lower tones

**Soundboard**  
**Saddle**  
**Bridge**  
**Bindings**  
**Side**  
**Braces**  
**Tail block**  
**Linings**

When picked or strummed, strings vibrate

Vibrations are transmitted to the saddle and bridge

Vibrations then flow to the soundboard and body

Sound comes out

**Head**  
**Nut**  
**Fret**  
**Fretboard**  
**Tuning peg**  
**Neck**  
**Sound hole**  
**Graft**

#### Holding an acoustic guitar

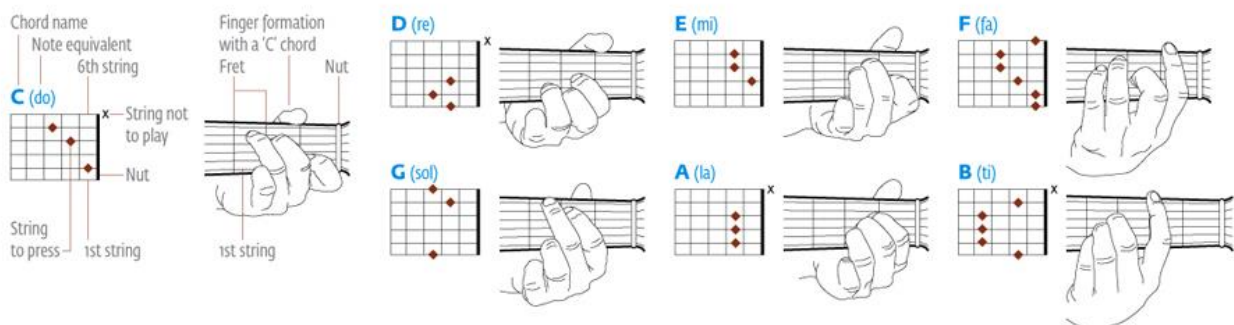
Proper form in holding the guitar positively affects your playing.

**Classical guitar**  
Guitar rests on your right thigh; left wrist under the fretboard; use foot rest for support

**Steel-string acoustic**  
Guitar roughly at a 90 degree angle to your body; knees relaxed; shoulders over the guitar's body

#### Basic guitar chords

There are plenty of guitar chord patterns. Start playing by learning these MAJOR chords.



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**TASK:** you are a guitar teacher and you want to explain to your student the physics of a guitar and how a sound is generated.

*You can use the previous documents and the following clues to organize your presentation but feel free to use them in any order you like.*

**Clues:**

- Sound waves
- Parts of a guitar
- How to play different notes ?
- Vibration of a string