Sound waves are a variation of pressure in a medium such as air. They are created by the vibration of an object, which causes the air surrounding it to vibrate. The vibrating air then causes the human eardrum to vibrate, which the brain interprets as sound. They include longitudinal waves and transverse waves. **Longitudinal waves** are waves that have the same direction of oscillation or vibration along their direction of travel. **Transverse waves** are moving waves that consist of oscillations occurring perpendicular to the direction of energy transfer; in other words, it is a classic wave.

Consonance is a musical term to describe a harmony, interval, or chord that is stable. The ratios between the wave frequencies are smaller than those in harmonies, intervals, or chords that are unstable, which have larger ratios and produce **dissonance**.

A **harmonic** is a frequency that is a whole number multiple of the "fundamental note", the lowest frequency in the harmonic series. These frequencies are mostly limited to integer multiples, or harmonics, of the lowest frequency, and such multiples form the **harmonic series**. An **overtone** is any partial except the lowest, any resonant frequency higher than the fundamental frequency. The fundamental and the overtones together are called **partials**.

The arched shape, the thickness of the wood, and its physical qualities govern the sound of a **violin**. Bowing or plucking an open string, a string played without any finger stopping it, gives a different sound from a stopped string, since the string vibrates more freely than under a finger.

The **guitar** is a stringed instrument played by plucking, either with fingers or a pick. The tone of an acoustic guitar is produced by the vibration of the strings. This is amplified by the body of the guitar, which acts as a resonating chamber. Electric guitars introduced in the 1930s, rely on an amplifier that can electronically manipulate tone.

The **flute** produces its sound from the flow of air across the opening of the mouthpiece, creating a vibration of air at the hole. Inside the resonant cavity, sound waves bounce back and forth to amplify and produce sound. The player changes the pitch produced by opening and closing holes in the body of the instrument, changing the length of the resonator and its corresponding resonant frequency. By varying the air pressure, a flute player can also change the pitch of a note by causing the air in the flute to resonate at a harmonic other than the fundamental frequency (the lowest frequency in a harmonic series) without opening or closing any extra holes.

Pressing a key on the **piano**'s keyboard causes a felt-covered hammer to strike steel strings. The hammers rebound, allowing the strings to continue vibrating at their resonant frequency. These vibrations are transmitted through a bridge to a sounding board that couples the acoustic energy to the air so that it can be heard as sound. When the key is released, a damper stops the string's vibration. In grand pianos, the frame and strings are horizontal, with the strings extending away from the keyboard. The longer strings on a concert grand can vibrate more accurately than the shorter, thicker strings on a baby grand, which means that a concert grand's strings will have truer overtones. Upright pianos, also called vertical pianos, are more compact because the frame and strings are vertical. The hammers move horizontally, and are returned to their resting position by springs.

The lungs, the vocal folds within the larynx, and the articulators (the tongue, palate, cheek, lips, etc.) produce the sound of your **voice**. The lung must produce adequate airflow and air pressure to vibrate vocal folds (this air pressure is the fuel of the

voice). The vocal folds (cords) vibrate and chop up the airflow from the lungs into audible pulses that form the sound. The muscles of the larynx adjust the length and tension of the vocal folds to fine tune pitch and tone. The articulators articulate and filter the sound emanating from the larynx and to some degree can interact with the airflow to strengthen it or weaken it as a sound source.