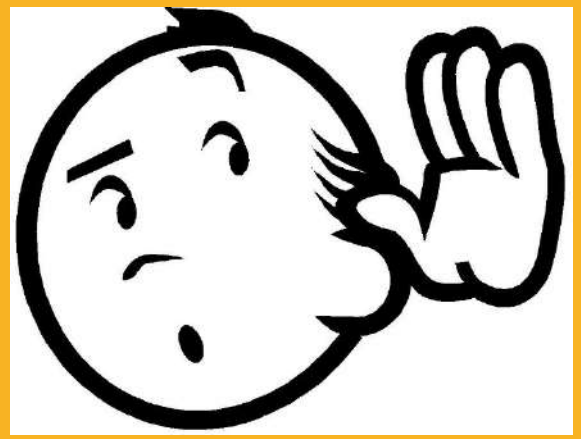
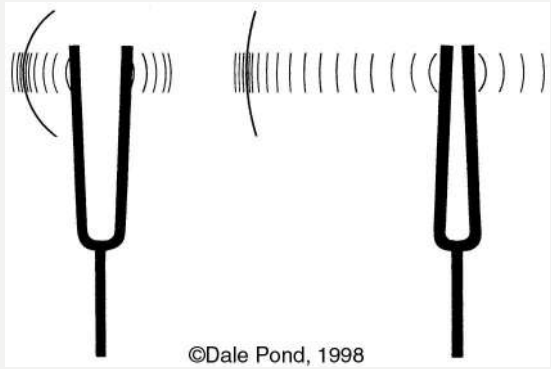
SCIENCE SOL 5.2
SOUND



WHAT IS SOUND?

- Sound is a form of **energy** produced and transmitted by vibrating matter (a solid, liquid, or gas).
- The source of all sound is **movement.**
- The movement causes **vibrations,** which in turn can cause molecules surrounding the source of the movement to vibrate.
- Vibrating objects **transfer** energy to whatever they touch.
- The **energy**, not the matter, is transferred.
- The **medium** (solid, liquid, or gas) is not carried along with the sound wave.

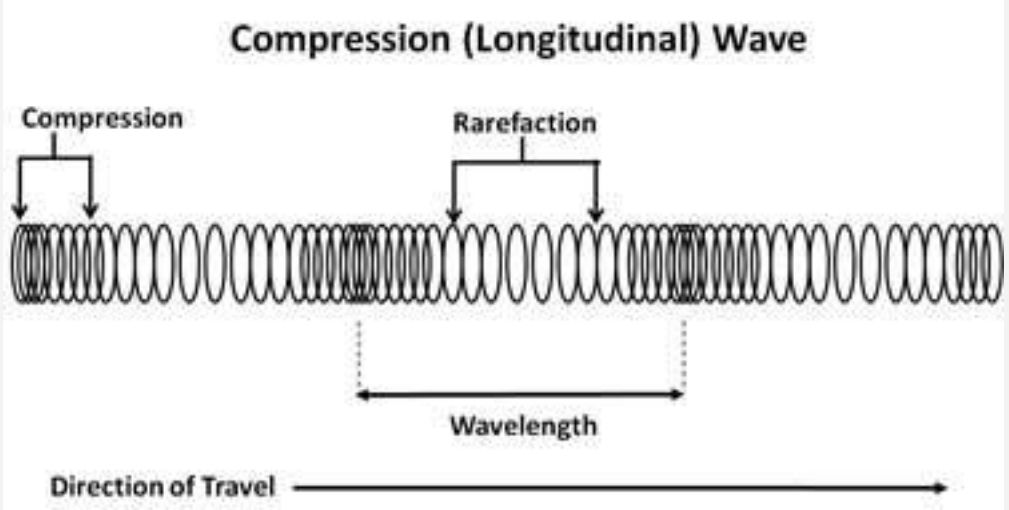
VIBRATION



- **Vibration** is a back and forth motion.
- **Larger** vibrations produce **louder** sounds, and **smaller** vibrations produce **softer** sounds.
- Vocal cords in our bodies **vibrate** to produce **sounds.**

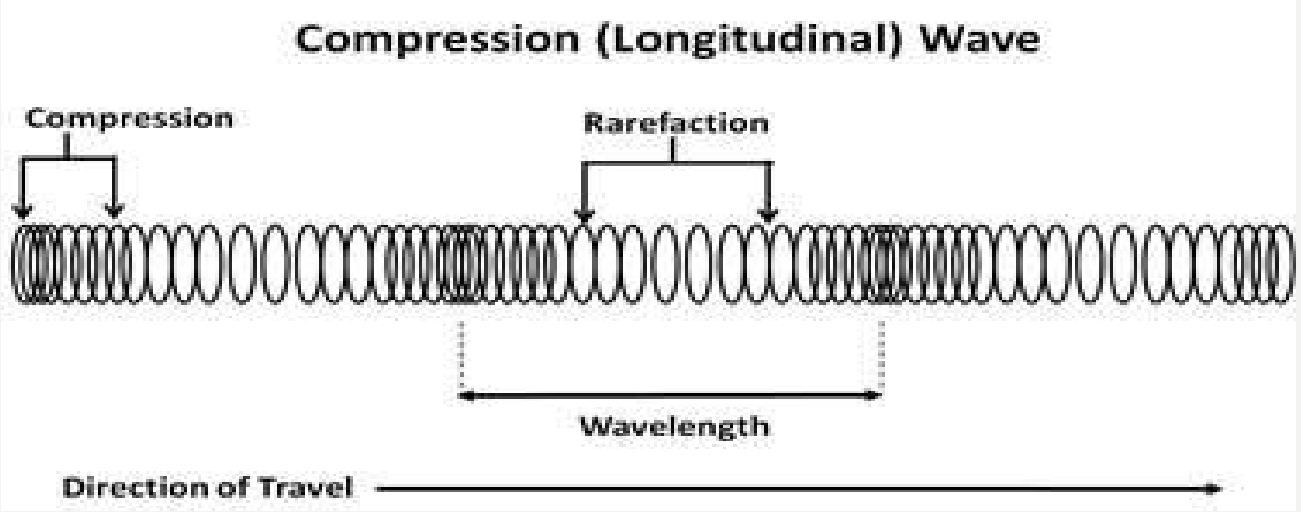
SOUND

- Sound is a **compression wave** moving outward from its source through a material **medium** (solid, liquid, or gas)
- Sound needs a form of **matter or medium** (solid, liquid, or gas) to travel through. Without matter, there would be **no sound**.
- In a vacuum, sound **cannot** travel because there is no matter for it to move through.
- Sound waves are **compression** (longitudinal) waves.

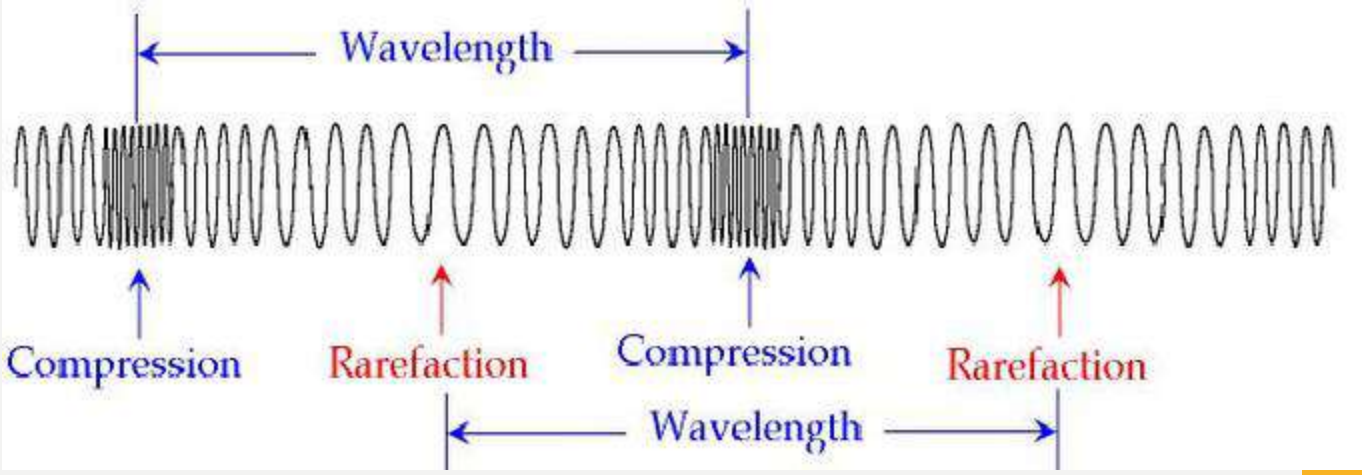


COMPRESSION WAVES

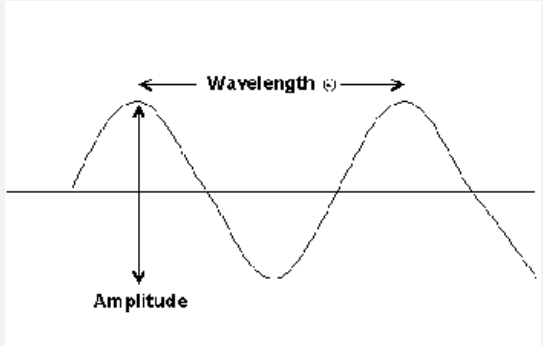
- When compression (longitudinal) waves move through matter (solid, liquid, or gas), the molecules of the matter move **backward and forward** in the direction in which the wave is traveling.
- As sound waves travel, molecules are pressed together in some parts (**compression**) and in some parts are spread out (**rarefaction**).

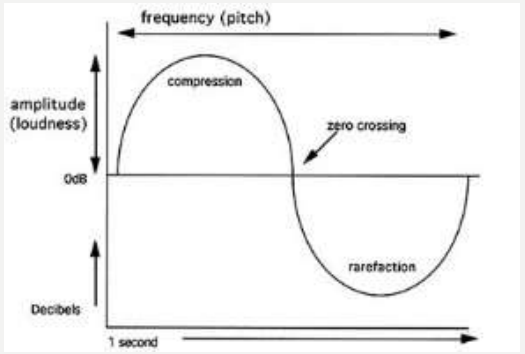


SOUND WAVES

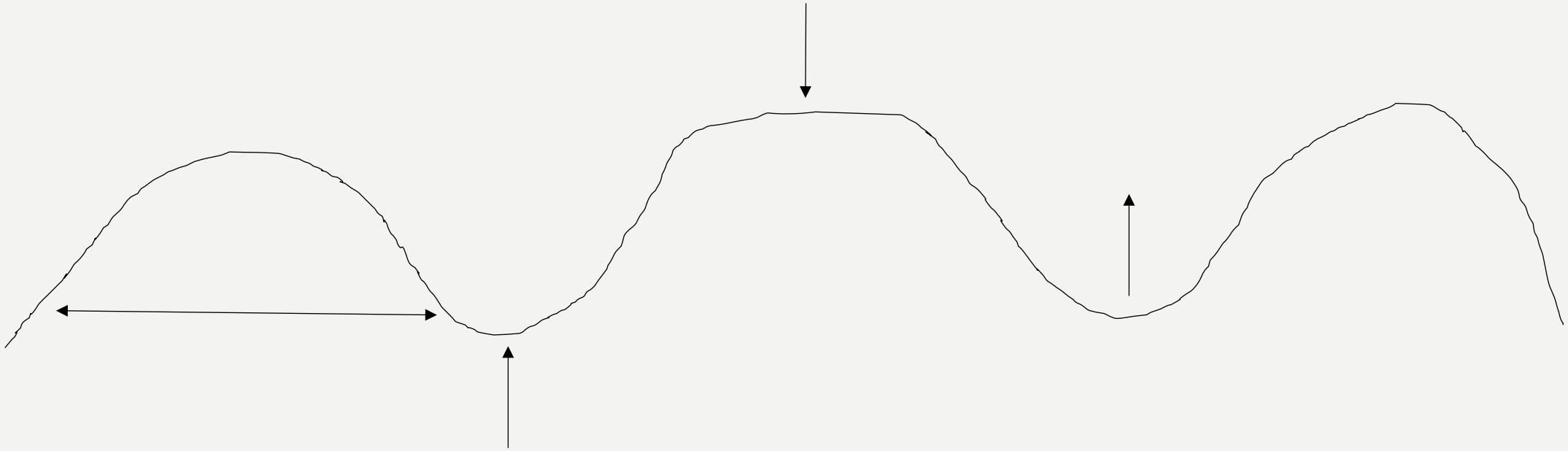


- Sound travels in **waves** and can be described by the wavelength and frequency of the waves.
- A **wave** is the regular disturbances caused by molecules bumping into each other (they moved through a solid, liquid, or gas.)
- A **wavelength** is the distance between a point on one wave to the same point on the next wave (the distance between 2 compressions or between 2 rarefactions.)
- The **frequency** is the number of wavelengths in a given unit of time (the number of sound waves in a given amount of time.)



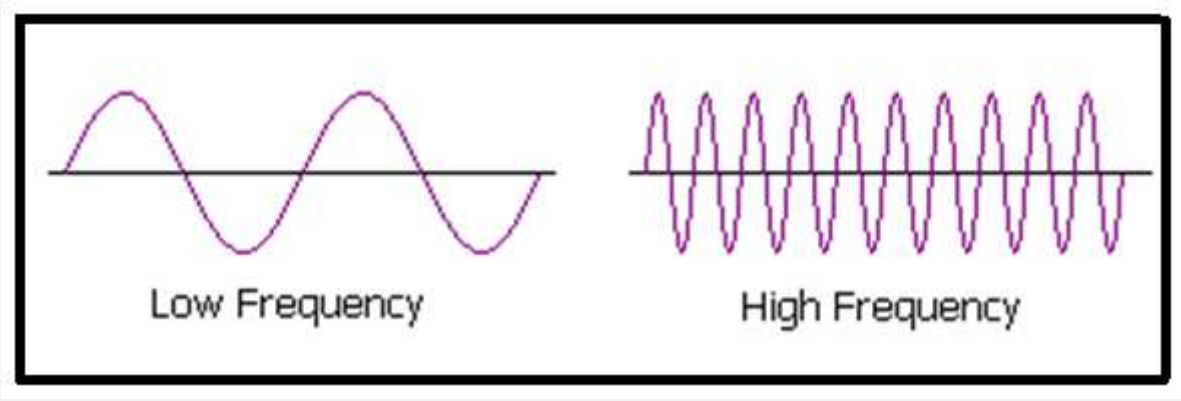


DRAW A SOUND WAVE



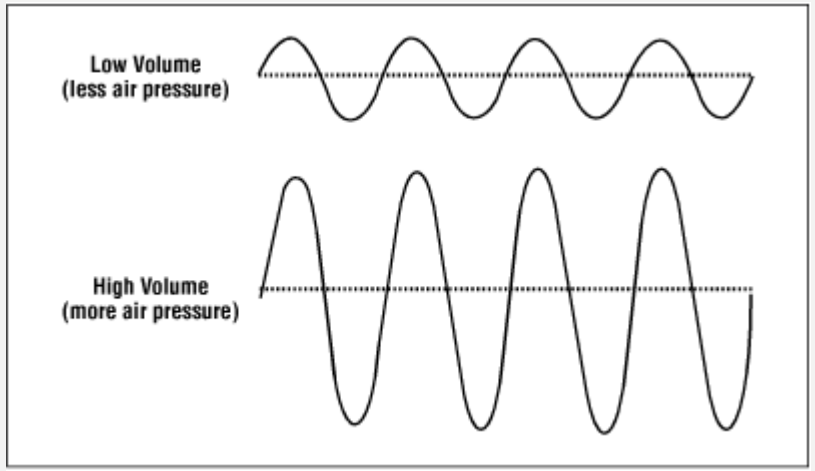
PITCH

- **Pitch** is determined by the **frequency** of a vibrating object.
- Objects vibrating **faster** have a **higher** pitch than objects vibrating slower.
- The **higher** the frequency, the **higher** the pitch.
- The **lower** the frequency, the **lower** the pitch.
- **Long** strings produce **lower** sounds.
- **Short** strings produce **higher** sounds.



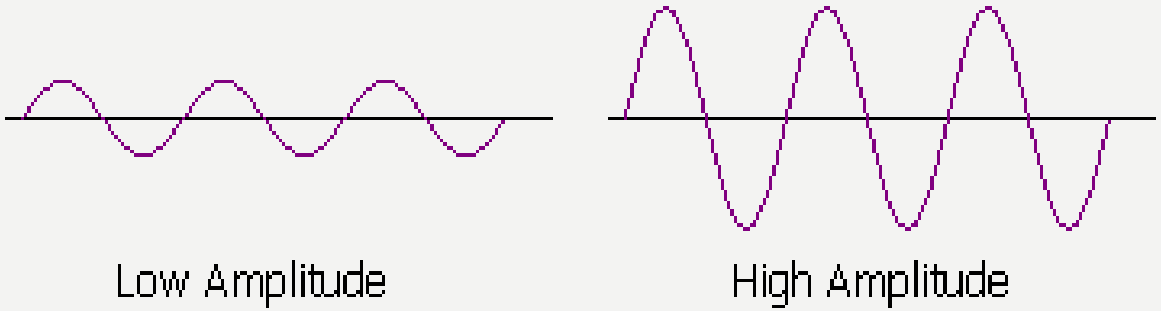
VOLUME

- **Volume** is how loud or soft a sound is.
- Volume is measured in **decibels.**
- The **higher** the decibel, the **louder** the sound.
- The **lower** the decibel, the **softer** the sound.



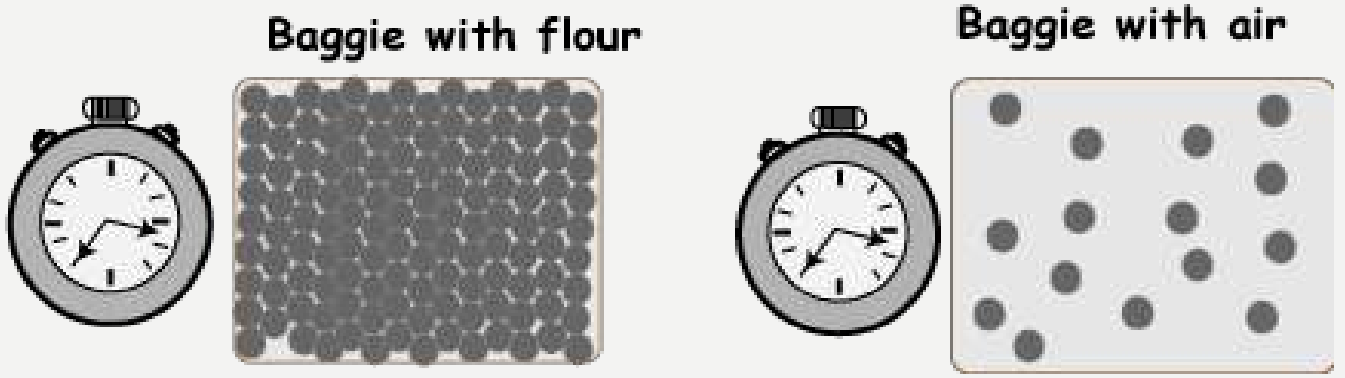
AMPLITUDE

- **Amplitude** is the amount of energy in a compression (longitudinal) wave and is related to the intensity and volume.
- For example, when a **loud** sound is heard, it is because many molecules have been vibrated with much force.
- A **soft** sound is made with fewer molecules being vibrated with less force.
- The **greater** the amplitude, the **louder** the sound.



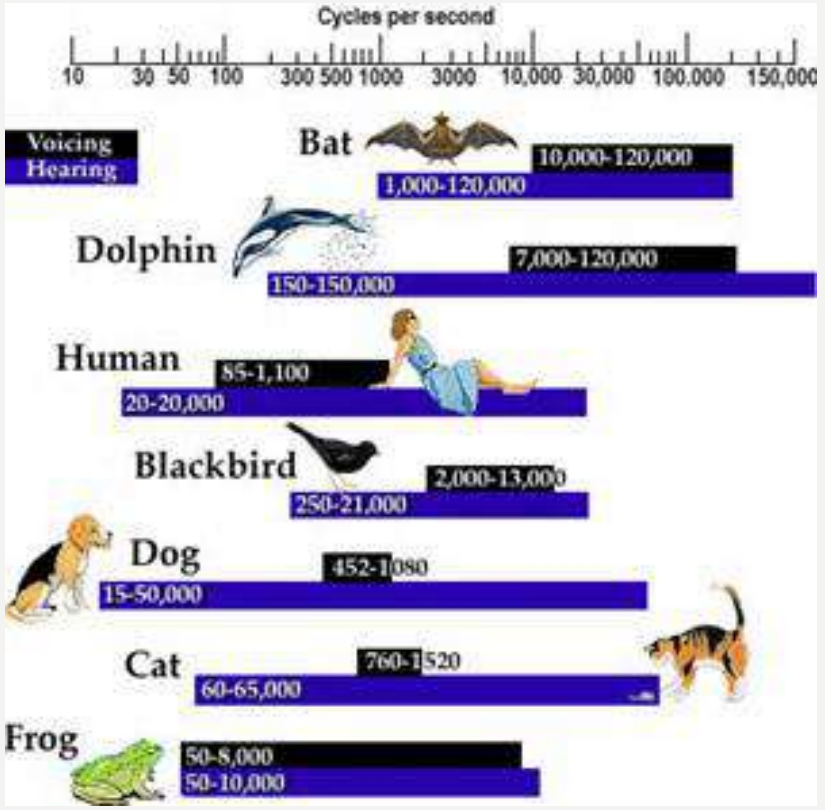
SOUND TRAVELING

- Sound travels more quickly through **solids** than through liquids and gases because molecules in a solid are closer together.
- Sound travels the **slowest** through **gases** because the molecules of gases are the farthest apart.
- Sound also travels **faster** in **warmer** temperatures.
- Smooth, hard, flat surfaces **bounce or reflect** sound.
- Soft, irregular surfaces **absorb** sound.



SOUNDS OF ANIMALS

- Some animals make and hear **ranges** (frequencies) of sound **vibrations** (pitches) that humans cannot make nor hear.
- Whales, dolphins, and bats use **sonar.**
- The sound waves used in sonar are **ultrasonic.**

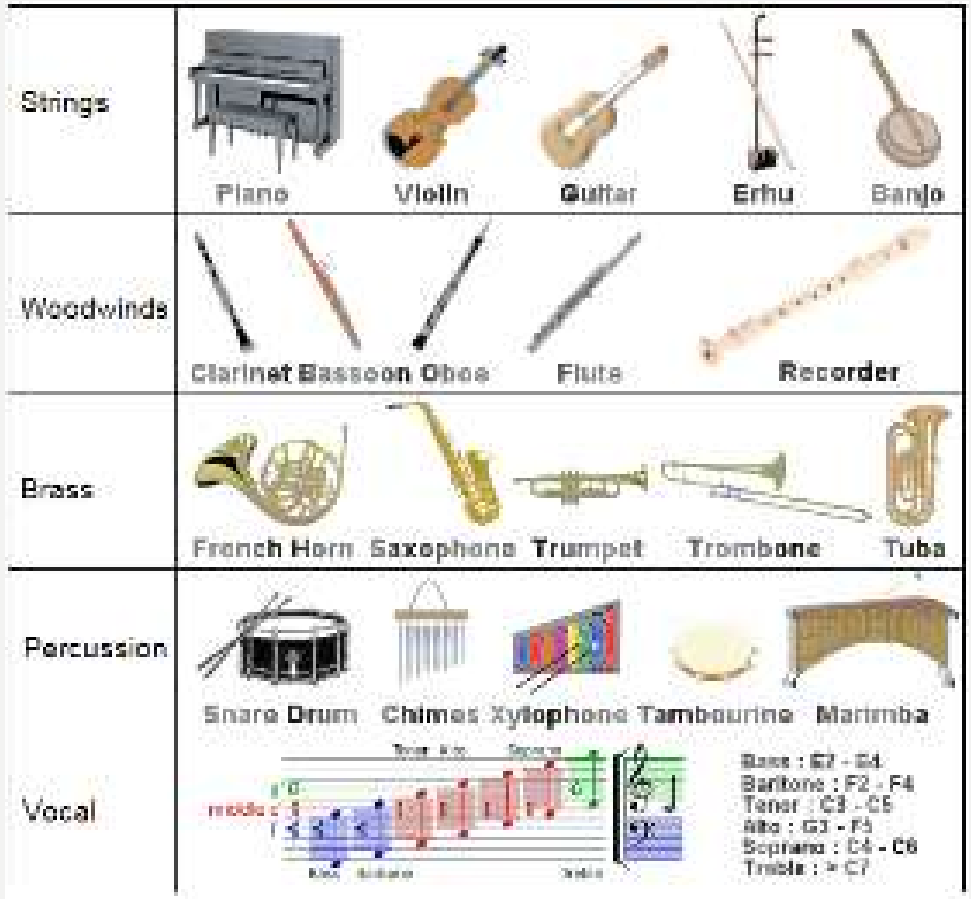


MUSICAL INSTRUMENTS

- Musical instruments **vibrate** to produce sound.
- There are many different types of musical instruments and each instrument causes the **vibrations** in different ways.
- The most widely accepted way to classify musical instruments is to classify them by the way in which the sound is **produced by the instrument.**

BASIC CLASSIFICATIONS OF INSTRUMENTS:

- **Percussion**: drums, cymbals
- **String**: violin, piano, guitar
- **Wind**: flute, clarinet, trumpet, trombone
- **Electronic**: electronic organ, electric guitar



SPEED OF SOUND

- The speed of sound is **343** meters per second or **1,115** feet per second.
- **Light** travels faster than **sound.**
- You will see **lightening** first, then hear the **thunder.**
- This plane is traveling near the speed of sound.