Frequency: the rate at which a vibration occurs that constitutes a wave, either in a material (as in sound waves), or in an electromagnetic field (as in radio waves and light), usually measured per second.(Symbol: $\mathbf{f}$ or ν). Frequency determines pitch of a string (the note you get).

Amplitude: the maximum extent of a vibration or oscillation, measured from the position of equilibrium. The greater the amplitude, the louder the sound. The Smaller the amplitude, the quieter the sound.

Fundamental: Frequency at which the wave (string) vibrates at.

Overtones/Harmonics/Partials: Higher frequencies present within the fundamental.

Harmonic Series: All the Harmonics within the fundamental.

Octave Higher: double the frequency of the original pitch
Octave Lower: half of the frequency of the original pitch.

Harmonic Series of the E string

E E B **E G# B** D

The harmonic series continues beyond D, but I think it is important to note that within the harmonic series is the major triad (highlighted with bold letters), which contributes to why we like the major triad so much. As the series continues past D, many of the notes in the series are also the same notes we find in the major scale, perhaps contributing to the appeal of the major scale. Every pitch has a harmonic series like this.

Equal Temperament Tuning:

Equal Temperament Tuning is where the difference between each frequency (or each number in interval notation, or each pitch in solfegge, or each fret of the guitar, or every half step on the staff), is exactly equal from one to the next in terms of vibrations per second (although the actual distance between frets is not in fact equal). In reality, we don't tune so that we get perfectly equal differences in frequencies, but the guitar and most other instruments are tuned very close to that system so we just call it that. This is important because it explains why you find a pattern on guitar like a scale or barre chord and you can simply shift that pattern up one fret and it will sound the same and look the same.

Essentially equal temperament tuning creates a base twelve system: 12 notes that sound identical and are roughly the same difference in vibrations per second from one to the next, and then those same 12 notes are repeated at different octaves. Whereas a metric ruler goes by tens, musical notes divide octaves by 12 frequencies/notes that are roughly equal in vibrations per second from one to the next. So between A440 and A880 (or any other octave, I chose A arbitrarily) are 11 other frequencies (notes) that are roughly equal in difference in frequency as you go up or down the chromatic scale created between A440 and A880.

The reason an orchestra can play the chromatic scale together and it all sounds the same is that our ears hear the same pitch at different octaves as essentially the same. So when you think about music theory, do not think of the octaves and all the sharps and flats as being all

these different things that are impossible to remember. Instead, think of it as twelve different pitches that we use to create a variety of patterns with.

In the long run, I think its important to remember that we just organize sound like this because it is a cultural tradition that has solidified. Earlier cultures in Europe did not organize sound the way we do today, and many contemporary cultures in Asia and Africa organize sound in ways very different to the way we do in the west. Is important not to get TOO bogged down in the “why” when it comes to music theory. At some point you just have to accept that this is how we do it.