Musician

What do musician's do?

- Musicians are artists which utilize sound. There are many different types of musicians which include studio musicians, touring musicians, composers, teachers, and solo or group artists. Some musicians participate in multiple roles.

- There are also many instruments which one can specialize in. These include drums, vocals, bass, keyboards, horns, woodwinds, guitar, etc.

Usage of Math

- Musicians divide time into specific calculated segments in order to make synchronized music. These segments vary in speed. Without this division of rhythm, music would not exist

- Music is initially separated into **bars**, or segments of **beats**. Most music you hear is 4 beats per bar. These beats can then be divided to allow for more notes within them.

- Music also has many numerical properties which aren't used by musicians themselves, but can be explored in music theory.
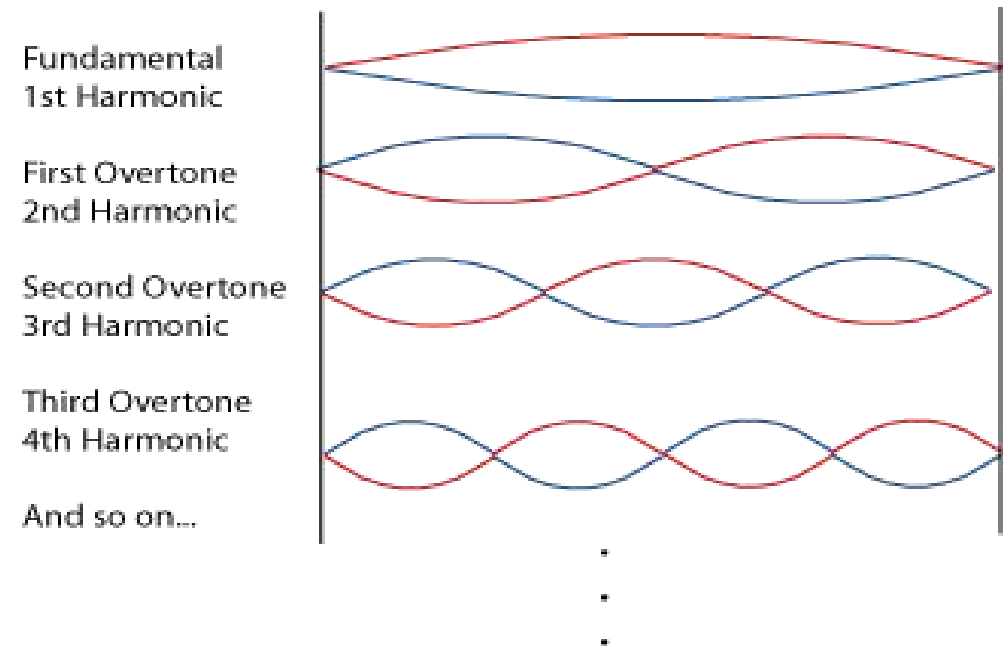
Usage of Math

- Some other applications of math in music have to do with harmonics, series, and ratios.

- For example, harmonics are specific wavelengths of sound (This tends to get pretty complicated).

- **Math requirements**:

    Usually only Basic Math but it can

    involve Geometry, Calculus and

    Physics if studied in depth.

Fundamental
1st Harmonic

First Overtone
2nd Harmonic

Second Overtone
3rd Harmonic

Third Overtone
4th Harmonic

And so on...

Math Problem

A composer has written a song but did not figure out how many bars would be necessary. He would like us to determine how many **5/4** bars (explained below) we would need for a song with 129 quarter note beats and if any notes are left over.

How bars are counted:

- A time signature of 4/4 means 4 beats of quarter(1/4) notes. The 1st number is the number of beats and the 2nd number describes the type of note.

$\quad$ ♩ = quarter note beat

$\quad$ 4/4 bar = ♩ ♩ ♩ ♩

- For example, a time signature of 5/4 means 5 beats of quarter(1/4) notes.

$\quad$ 5/4 bar = ♩ ♩ ♩ ♩ ♩

Math Problem

5/4

4/4

Math Problem

$$129 \text{ } beats \times \frac{1 \text{ } bar}{5 \text{ } beats} = \frac{129}{5} \text{ } bars = \frac{125}{5} \text{ } bars + \frac{4}{5} \text{ } bars$$

$$= 25 \text{ } bars + \frac{4}{5} \text{ } bars$$

Each bar is 5 *beats* so $\frac{4}{5}$ *bars* is 4 *beats*. The song would require **25 *bars*** and would have **4** **extra *beats***

Education

- **No degree**: Experience and exposure are vital for a career in music. You can take lessons and play with others or become self-taught to gain the experience needed. If this route is taken, networking (getting to know and meet people) and dedication are the keys to success. You can do most anything without a degree if your lucky enough and experienced enough, but overall it is very difficult to become successful.

- **Bachelors, Masters, or Doctorate**: These degrees usually take 4 years, 6 years, and 8 years respectively. With a degree you are allowed to teach and take on administrative positions. The higher the degree, the better job you'll be able to obtain and the more money you'll likely make.

References

http://www.ams.org/samplings/math-and-music

https://www.princeton.edu/main/news/archive/S20/83/65A48/index.xml