- Music is important for other living creatures – birds, whales, frogs, etc. ***Why***? **How**?
  - Other living creatures don't ***need/use*** a formal musical scale, like we humans do!
  - Singing animals certainly don't know anything about formal musical scales.
  - Yet, the songs of many animals ***are*** quite musical-sounding! ***Why***???
  - Use of a formal musical scale enables humans to more easily learn/play each others music; also to impose structure/form & rules for music genres.

- Human Development of Musical Instruments
  - Emulate/mimic the human voice (some instruments more so than others, and *n.b.* not all musical instruments!!!), with $f_n = nf_1$ harmonic structure.
  - Sounds from musical instruments can evoke powerful emotional response(s) in humans – happiness, joy, sadness, *etc*. because auditory signals are wired into various emotional centers of our brains! ⇐ ***Why*** is this? ***How*** did this happen?
    - Music is innate - runs very deep in human psyche. ***Why***? ***How***?

Basic/Foundations of Physics: There exist three (3) fundamental physical quantities:

We use the Systeme International (SI)/metric system of units: kilograms – meters – seconds:

Length: — *meter* (*m*): 1*m* = 39.37 *inches* = 3.28 *ft*
1 *ft* = 0.3048 *m*

1 *cm* = 1/100 *m* (*centi-meter*)
1 *mm* = 1/1000 *m* (*milli-meter*)
1 μm = 1/1,000,000 *m* (*micro-meter*)

Mass: — *kilogram* (*kg*)
1 *kg* = 1000 *grams*
1 *gm* = 1/1000 *kg*

Time: — second (s) (or *sec*)
1 *day* = 24 *hours* = 24 ∗ 60 *minutes* = 1440 *minutes*
= 24 ∗ 60 ∗ 60 *seconds* = 86,400 *seconds*

Additional physical quantities we will need in this course:

Position: = instantaneous location of a point in space. 3-D vector quantity (*SI* units: *m*):

$$\boxed{\vec{r}(t) = x(t)\hat{x} + y(t)\hat{y} + z(t)\hat{z}} \qquad \text{(Cartesian Coordinates)}$$

Velocity: = instantaneous time rate of change of position $\vec{r}(t)$, and specifies the instantaneous direction in which the time rate of change of position is occurring. 3-D vector quantity:

$$\boxed{\vec{v}(\vec{r},t) = v_x(\vec{r},t)\hat{x} + v_y(\vec{r},t)\hat{y} + v_z(\vec{r},t)\hat{z} = \partial\vec{r}(t)/\partial t} \qquad \text{(SI units: } m/s\text{)}$$