The scale below is not your usual linear scale. For a linear scale, every time you multiply a number by 10, its step is the same amount. Here we are multiplying by 10. Every large step ("mamma step") translates to multiplying by 10. Every small step ("baby step") translates to multiplying by 2. Roughly how many "baby steps" are there in a "mamma step"? The logarithm of any number along the line below is a "mamma step". Let’s take in base 10, is simply how many steps "baby" you need to take in order to arrive at the number. You always start from the shoe size "baby", need to take in order to arrive at the number.

Now, let’s draw three shoes to visualize these steps from 1 to 64. This interval is smaller than a 4th and smaller than a 3rd. The "devil’s tritone": this interval has been used in organ music with harmonies.

Chapter R: The Ear
Camille Saint-Saëns (1835-1921). Danse Macabre (1874). Romantic:

Clock Strikes 12: 12 plucking bass notes.

PHYS 102: The Physics of Sound and Music (Prof. Ruiz)

4, 4, 4 also means 4, 4, 4 = 64. 3 factors of 4
Cross Section of Unwound Cochlea

Auditory Nerve

Scala Vestibuli (Sound In)
Basilar Membrane
Scala Tympani (Sound Out)

Round Window
3.5 cm
Scala Tympani

Sound Path

Sounds travels down the top chamber resonating a section of the basilar membrane based on frequency.

Enlarged View of Basilar-Membrane Region

<table>
<thead>
<tr>
<th>Reissner Membrane</th>
<th>Tectorial Membrane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair Cells on Organ of Corti</td>
<td>Basilar Membrane</td>
</tr>
</tbody>
</table>

Scala Vestibuli

Stiffer responds to higher f

Sound Path

Remember the scale introduced at the beginning of this class? Start at the right and double for each step.

Nonlinear Spacing of Frequency Detection Along Basilar Membrane.

At the left mark the note that is a tritone higher than the 1. Recall *Danse Macabre*.

What is a half step? Tritone = 6 half steps

Musical Tension - wants to resolve... Cadence: Red Tritone to... 4 to 7 also a tritone

Duke Ellington and *Blues in...* composed in year 1958

Billie Holiday (Lady Day) and Oscar Peterson

Band Leader, Composer and Pianist

Jazz Pianist with super technical prowess

Often a tritone is embedded in the 5-chord