A “sound” usually is made up of various vibrations that we hear as a single sound.

Pythagoras discovered the mathematical nature of harmonic ratios.

(How to make a monochord: http://www.youtube.com/watch?v=j4qCc5a3m8w)
The harmonic series
http://www.youtube.com/watch?v=no7ZPPqtZEc

Vibrations of a guitar string with iphone 4
http://www.youtube.com/watch?v=TKF6nFzpHBU

• Getting the piano to “reveal” the harmonic components in a vibrating string
• Math and the difference between frequency and pitch
• Music and the fibonacci series and phi
  • http://www.goldennumber.net/music/
• The numbers of a sound wave
  • 2321321
  • 345432123454321234543212
• Ratios and rhythm
• Thinking of rhythms are series of fractions, or as ratios
  (clave example)
• Music an a vast swath of interconnected series of proportions

• Visualizing sound waves
• Ruben’s flaming tube
  (mythbusters: www.youtube.com/watch?v=ynqz4IYA7lw )

Pyro Board
https://www.youtube.com/watch?v=2awbKQ2DLRE

• Dubstep (from 2 min)
  • www.youtube.com/watch?v=hip-4KF6z4o
  • Liquid on a speaker: www.youtube.com/watch?v=jwMq8mmqgQ4
• Cymatics – sound waves make shapes
  www.youtube.com/watch?v=ouAUo9jVtAU

• Vi Hart – the mathemusician
  • Blog: vihart.com/
  • Moebius music box:
    • www.youtube.com/watch?v=3iMI_uOM_fY
  • What’s up with Noises?: www.youtube.com/watch?v=i_0DXxNeaQ0 (12 min)
  • Doodling: www.youtube.com/watch?v=dsvLLKQCxeA&feature=youtu.be
  • How music works: mentalfloss.com/article/28605/mathemusician-explains-how-sound-works

Sound and Instruments and Mosh and Icebergs

• Mosh pit math: www.npr.org/2013/03/22/174962714/mosh-pit-math-physicists-analyze-rowdy-crowd
  • Turning a glacier into a tuba
  • www.npr.org/2013/02/24/172818754/turning-a-glacier-into-a-tuba-ice-music-from-norway

The Icebergs Are Talking
  http://www.npr.org/2015/02/01/382980142/the-icebergs-are-talking-we-just-have-to-listen

  https://www.youtube.com/watch?v=krnBUDVMk9c (1:41)

The Vegetable Orchestra
  www.vegetableorchestra.org/

Live
  www.youtube.com/watch?v=0M_8TR9Nc0