Basic Physics

Lecture 6: Sound

รวบรวมและเรียบเรียงโดย
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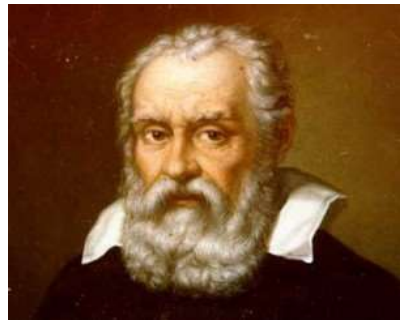
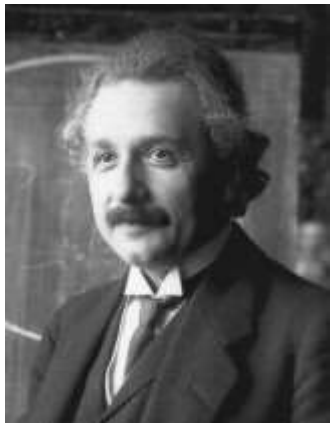
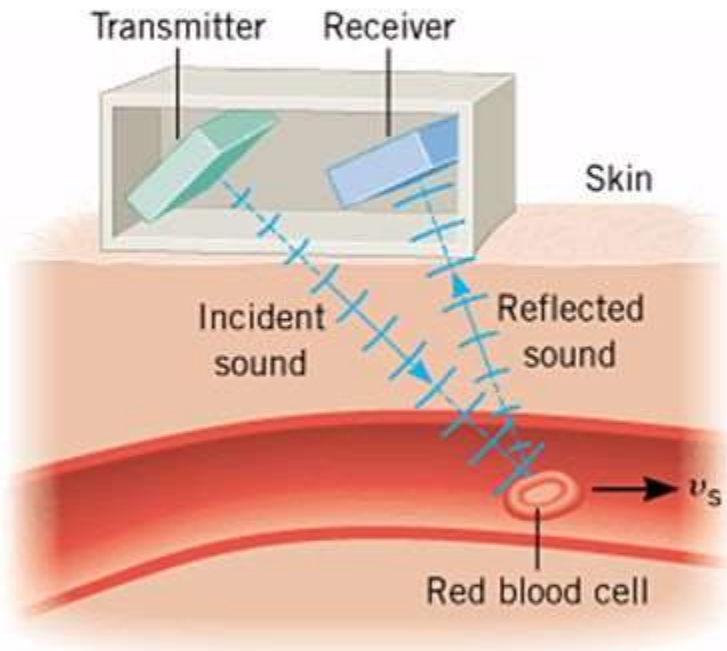
Topics

0. Nature of Science and physics
1. Mechanics
2. Temperature and Heat
3. Fluid
4. Waves
5. Sound and hearing
6. Optics and visualization
7. basic electromagnetism
8. basic quantum mechanics
9. atomic physics
10. basic nuclear physics and radioactivity

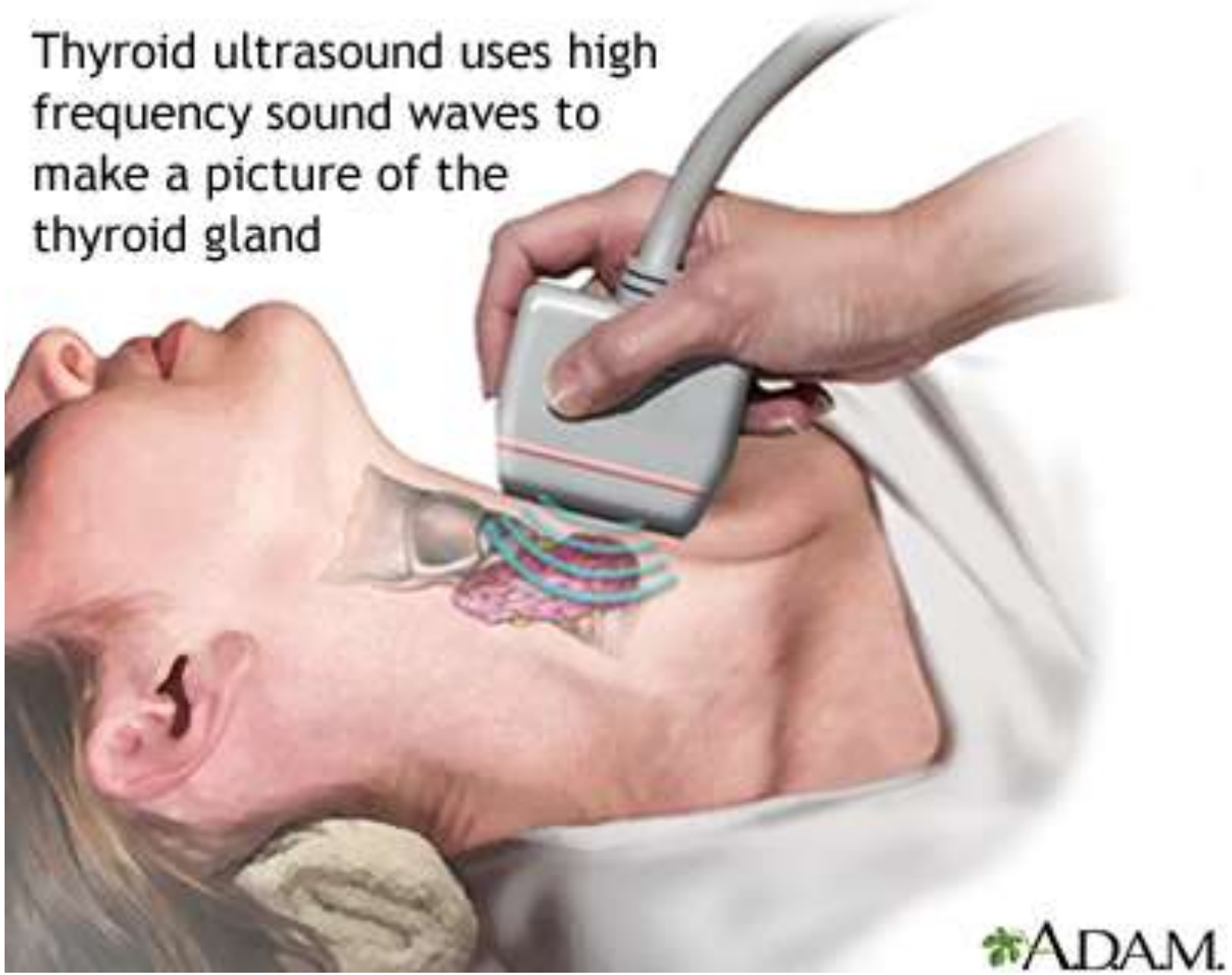




Doppler Flow Meter



A Doppler flow meter measures the speed of red blood cells.


Thyroid ultrasound uses high frequency sound waves to make a picture of the thyroid gland
A.D.A.M.


MUSIC
THERAPY

Speed of Sound

Medium	velocity m/sec
air (20 C)	343
air (0 C)	331
water (25 C)	1493
sea water	1533
diamond	12000
iron	5130
copper	3560
glass	5640

Pitch

- description of how high or low the sound seems to a person

. Loudness-

how loud or soft a sound is perceived to be.

Loudness of Sound in Decibels

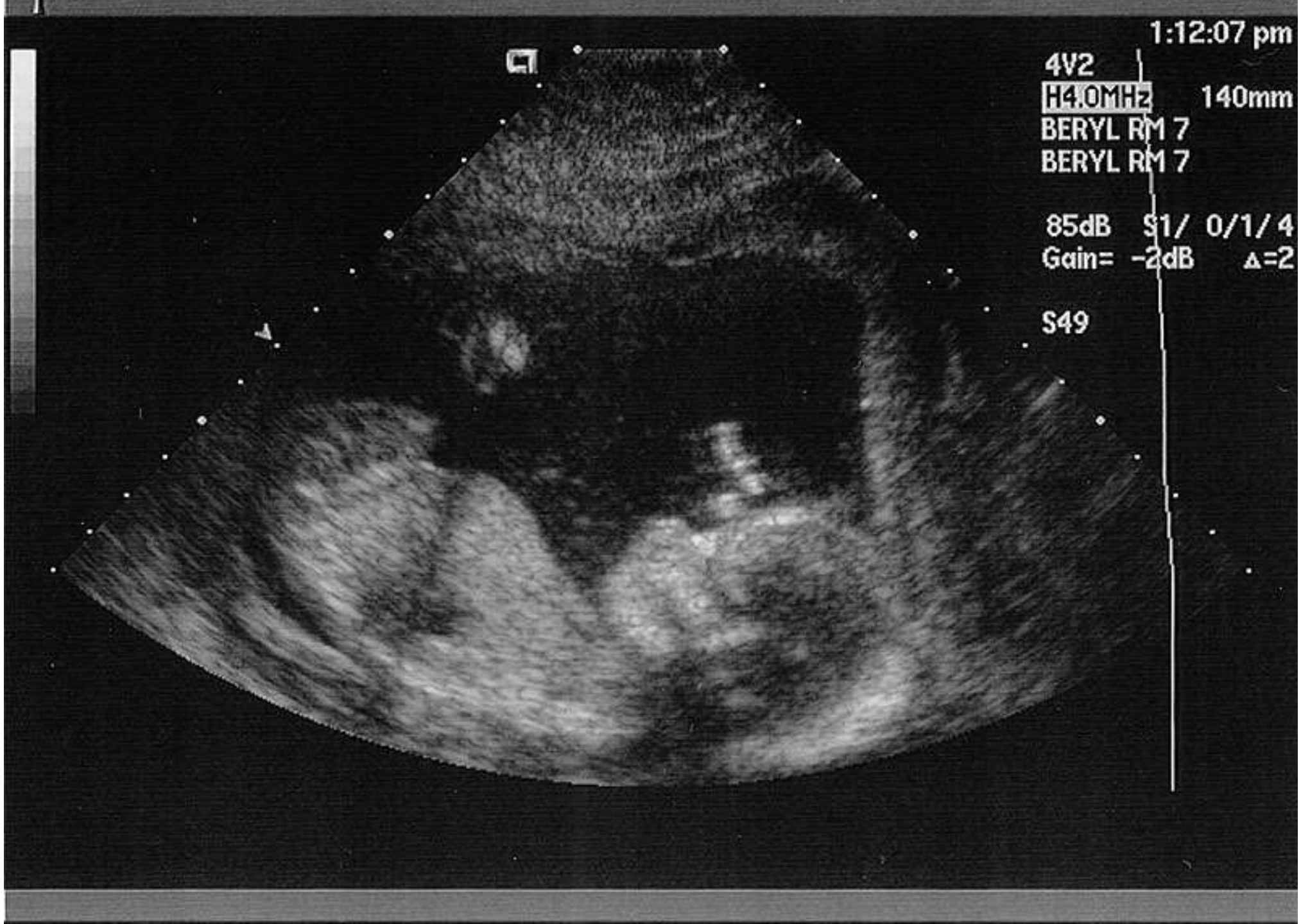
Sound	Loudness (dbs)	Hearing Damage
Average Home	40-50	
Loud Music	90-100	After long exposure
Rock Concert	115-120	Progressive
Jet Engine	120-170	Pain

Ultrasound

- sound waves with frequencies above the normal human range of hearing. Sounds in the range from 20-100kHz

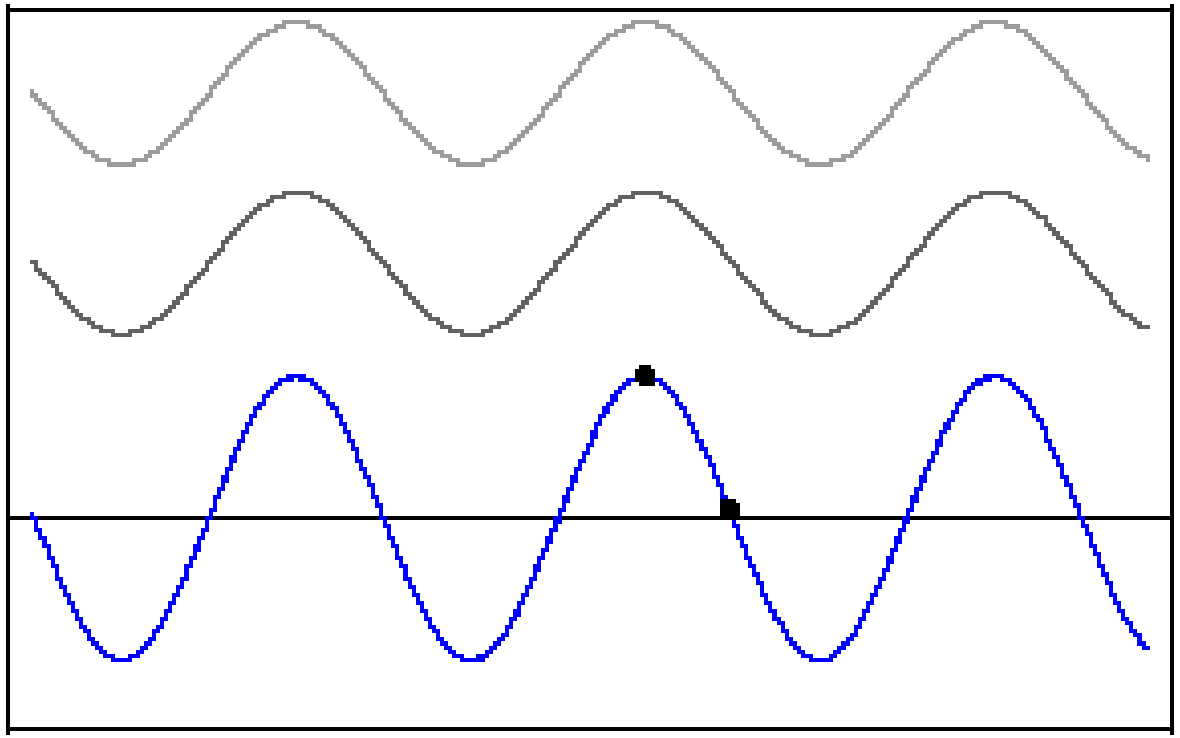
Infrasound

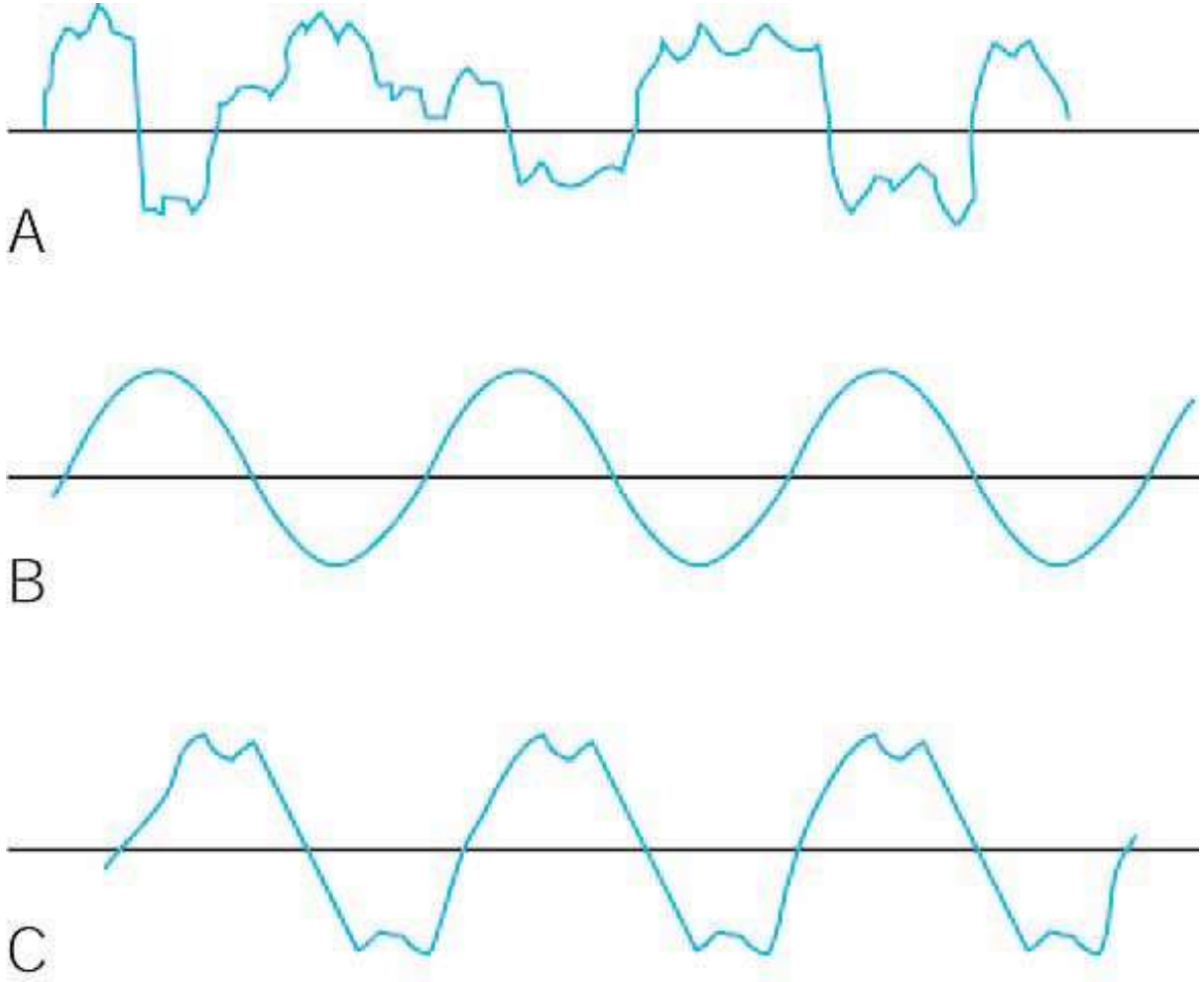
- sounds with frequencies below the normal human range of hearing. Sounds in the 20-200 Hz range


1:12:07 pm
4V2
H4.0MHz
140mm
BERYL RM 7
BERYL RM 7
85dB S1/ 0/1/ 4
Gain= -2dB Δ=2
S49

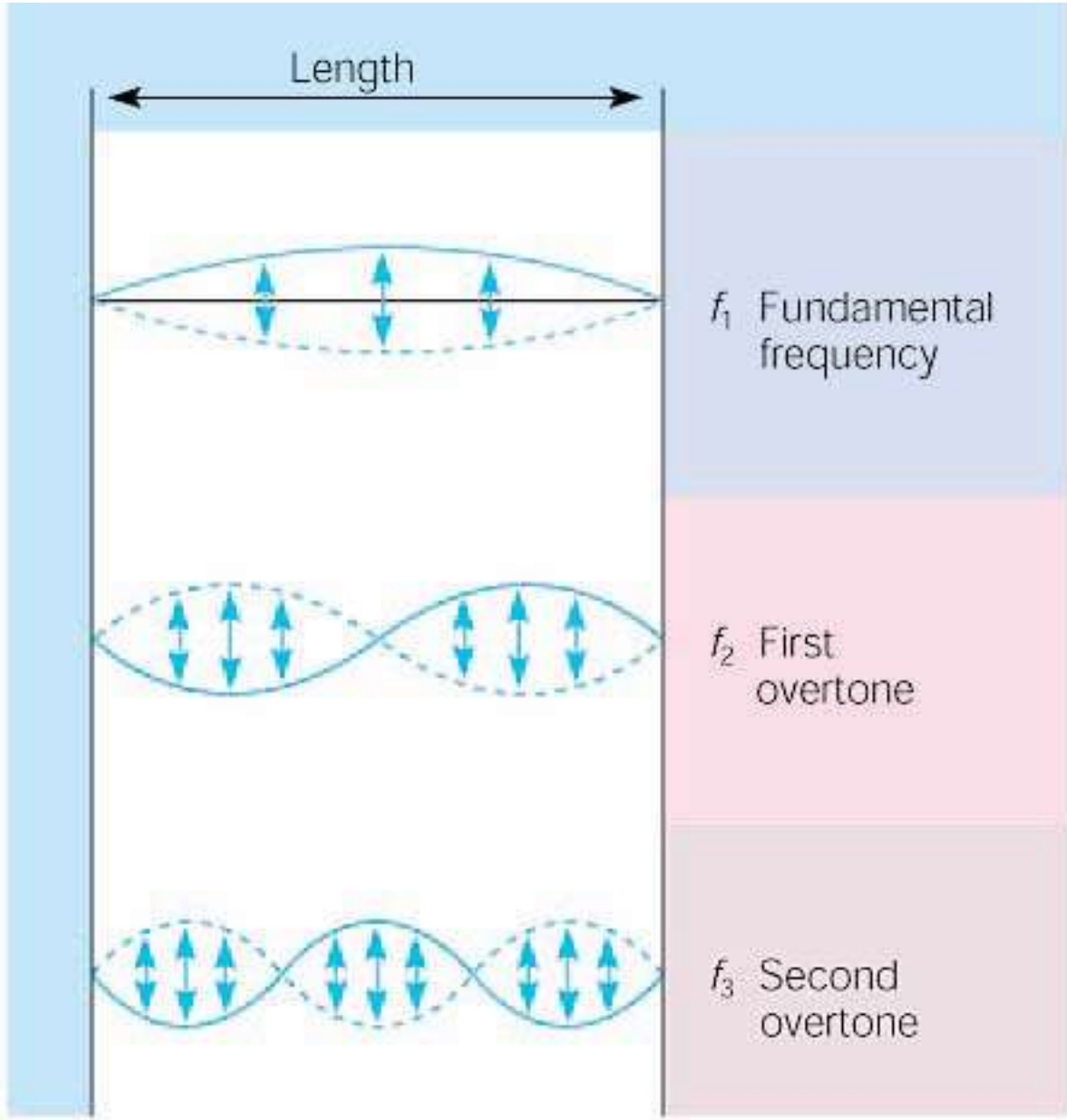
Interference

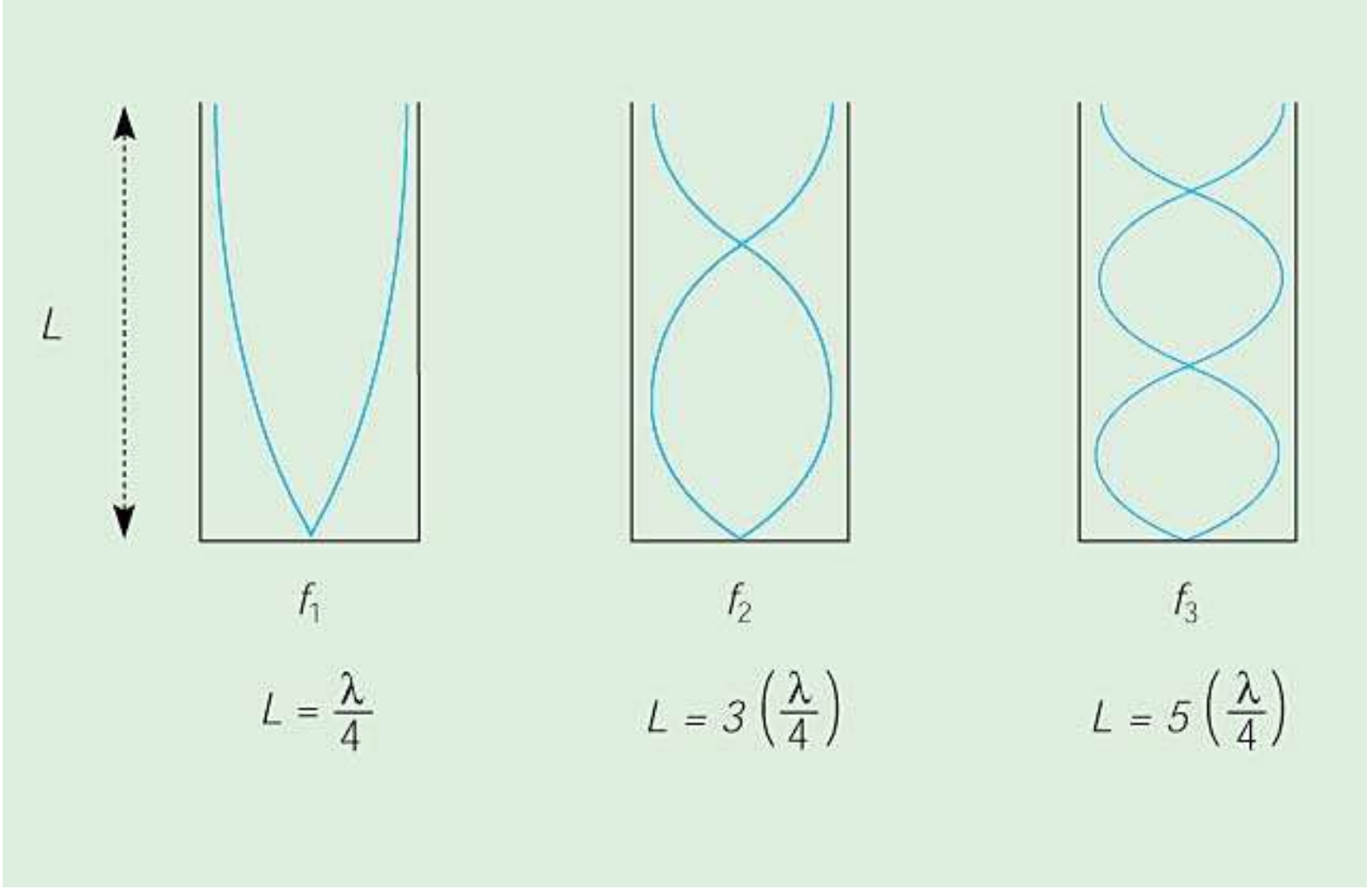
- the result of two or more sound
- waves overlapping





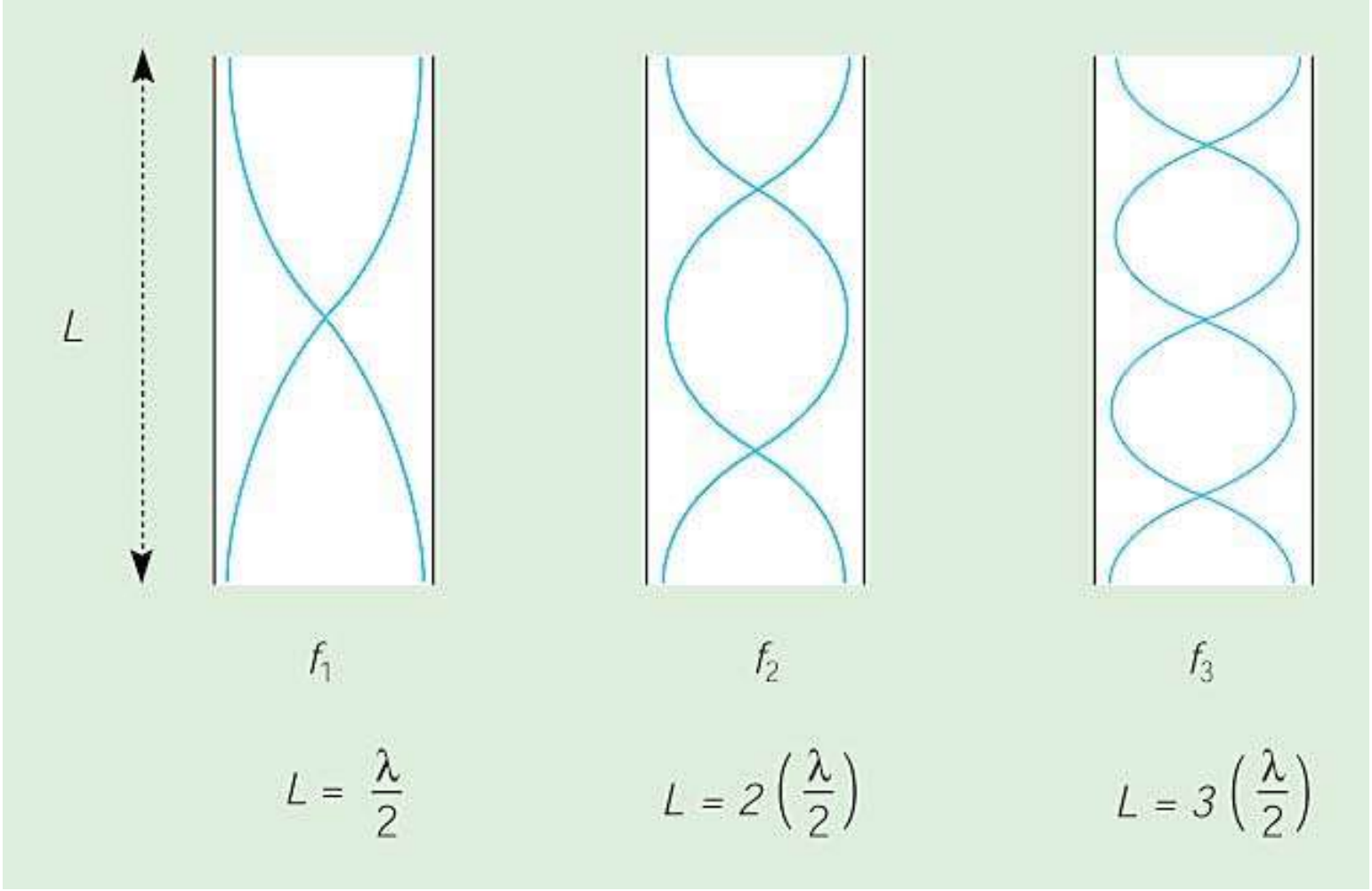
Different sounds that you hear include (A) noise, (B) pure tones, and (C) musical notes.


Length
f_1 Fundamental frequency
f_2 First overtone
f_3 Second overtone



Standing sine wave patterns of air vibrating in a closed tube. Note the node at the closed end and the antinode at the open end. Only odd multiples of the fundamental are therefore possible.

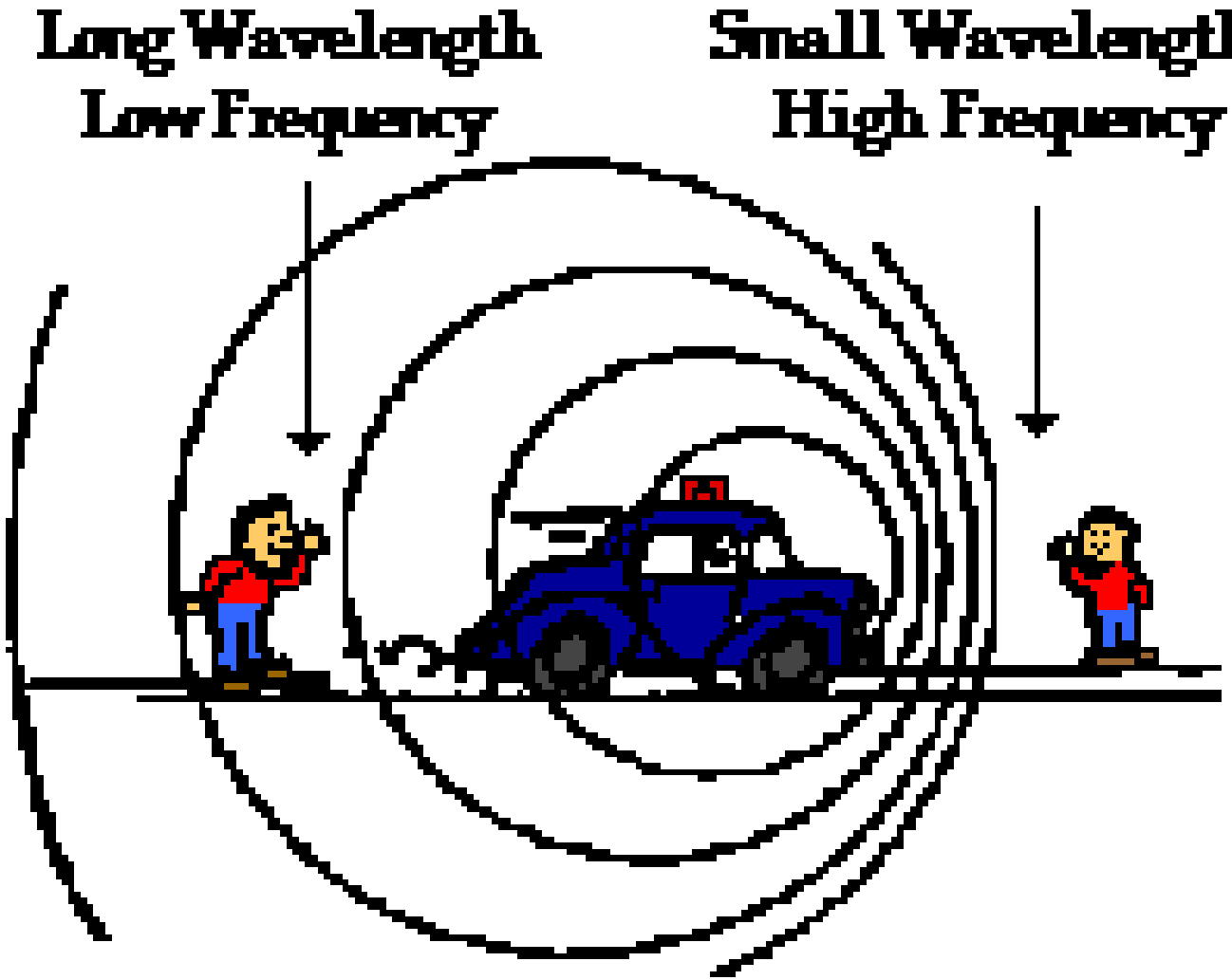
Standing waves in these open tubes have an antinode at the open end, where air is free to vibrate.



Standing sine wave patterns of air vibrating in an open tube. Note that both ends have anitnodes. Any whole number of multiples of the fundamental are therefore possible.

Doppler Effect

is the apparen d by
the motion of nd.



The Doppler Effect for a moving sound source

- Sounds from Moving Sources.
  - A moving source of sound or a moving observer experiences an apparent shift of frequency called the **Doppler Effect.**
  - If the source is moving as fast or faster than the speed of sound, the sound waves pile up into a shock wave called a sonic boom.
  - A sonic boom sounds very much like the pressure wave from an explosion

"INSANITY IS DOING THE SAME THING OVER AND OVER AND EXPECTING A DIFFERENT RESULT."

--ALBERT EINSTEIN