

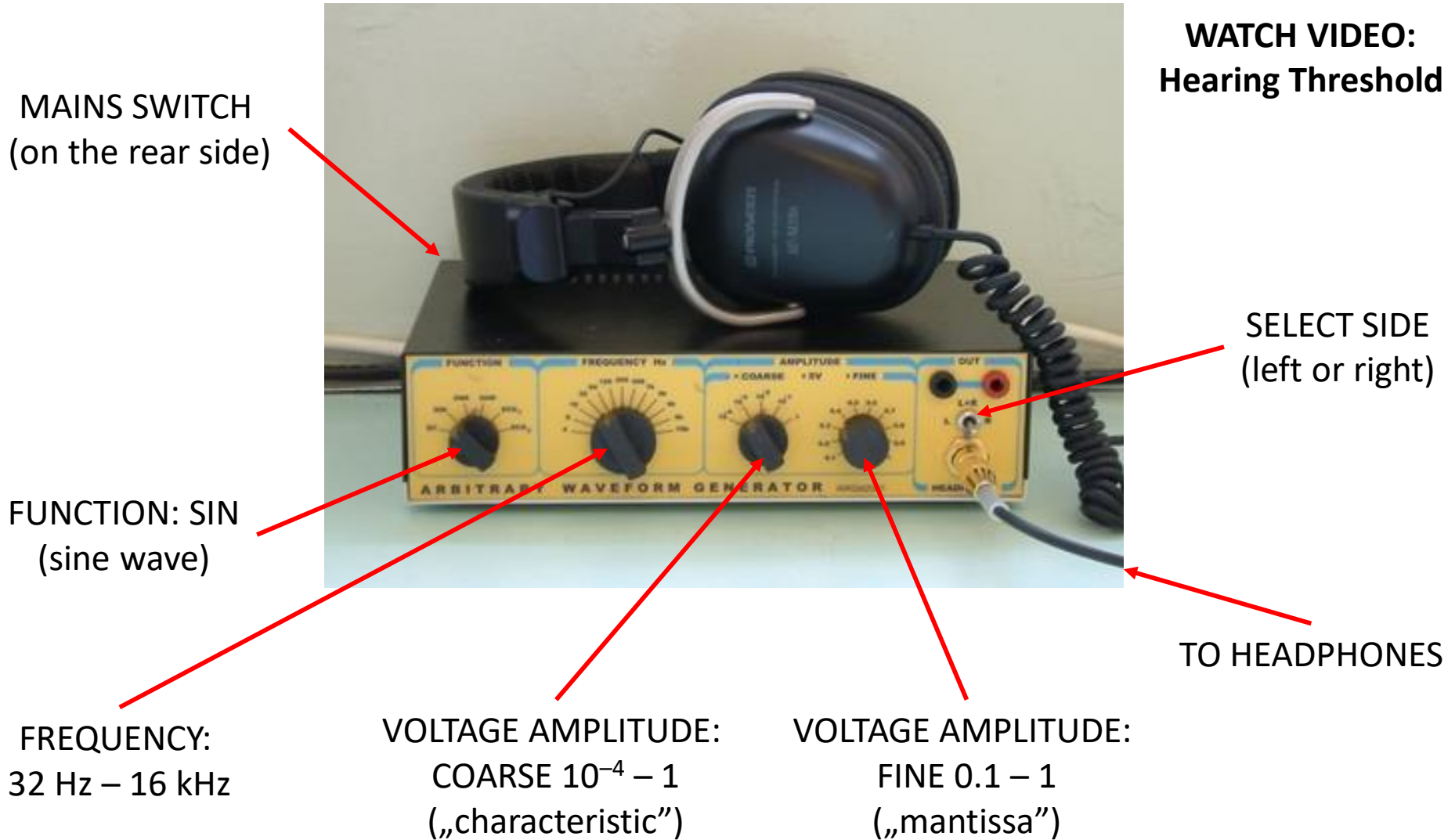
– 25 –

## Audiometry

edited by: Gergely AGÓCS

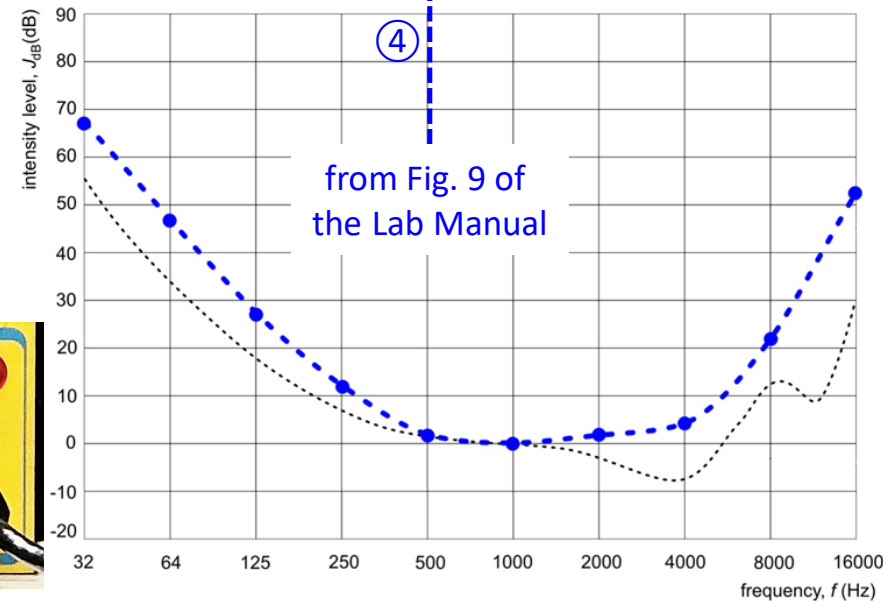
April 2020

# Measurement Setup

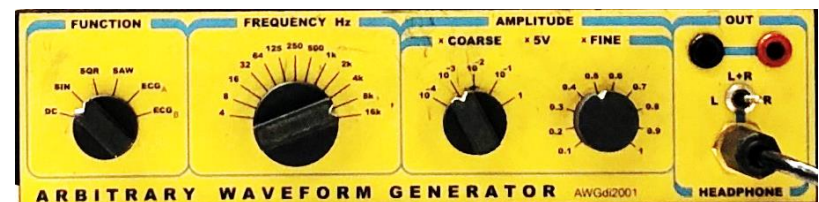
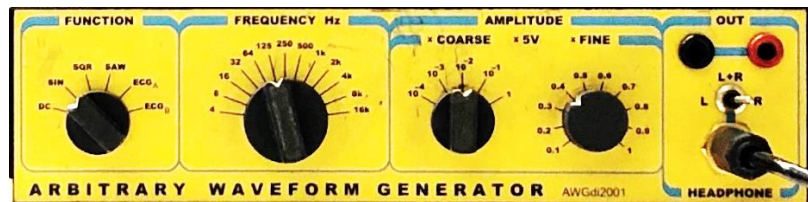


# Evaluation: Entering Data

frequency, $f$ (Hz)	$U_{\text{coarse}}$	$U_{\text{fine}}$	signal voltage, $U$ (V)	subject's hearing threshold, $J_{\text{own}}$ (W/m <sup>2</sup> )	subject's hearing threshold, $J_{\text{dB,own}}$ (dB)	normal hearing threshold, $J_{\text{dB,norm}}$ (dB)	hearing loss, $J_{\text{dB,own}} - J_{\text{dB,norm}}$ (dB)
32	1	0,6				67	
64							
125							
250							
500							

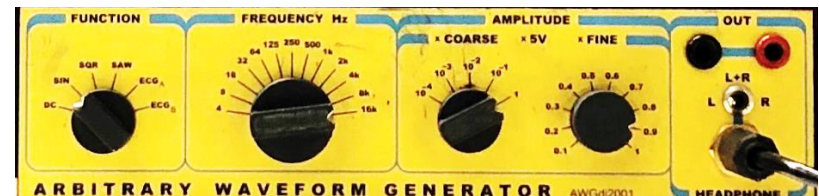


# Measurement Results – Right Ear





# Biophysics Practicals



# Evaluation: Completing the Table

frequency, $f$ (Hz)	$U_{\text{coarse}}$	$U_{\text{fine}}$	signal voltage, $U$ (V)	subject's hearing threshold, $J_{\text{own}}$ (W/m <sup>2</sup> )	subject's hearing threshold, $J_{\text{dB,own}}$ (dB)	normal hearing threshold, $J_{\text{dB,norm}}$ (dB)	hearing loss, $J_{\text{dB,own}} - J_{\text{dB,norm}}$ (dB)
32	1	0,6	3	0,00009	80	67	13
64							
125							
250							
500							

$$5 \cdot U_{\text{coarse}} \cdot U_{\text{fine}} = U$$

$$10^{-5} \cdot U^2 = J_{\text{own}}$$

$$10 \cdot \log(J_{\text{own}}/J_0) = J_{\text{dB,own}}$$

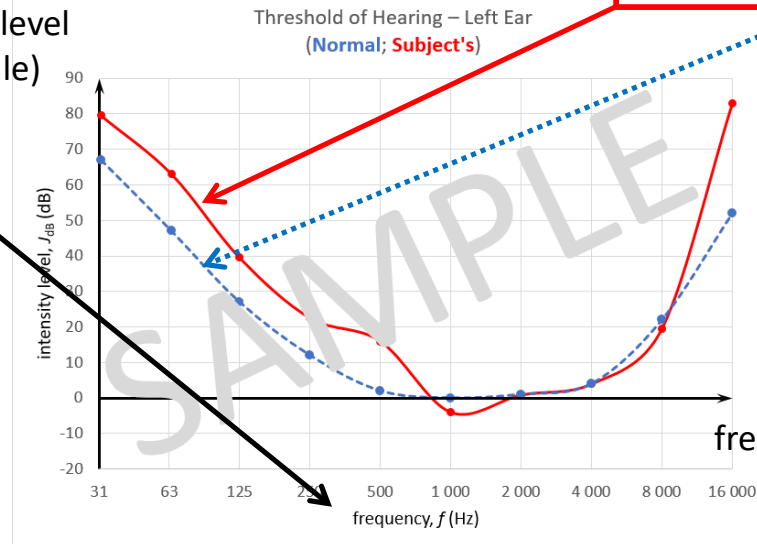
$$J_0 = 10^{-12} \text{ W/m}^2$$

$$J_{\text{dB,own}} - J_{\text{dB,norm}}$$

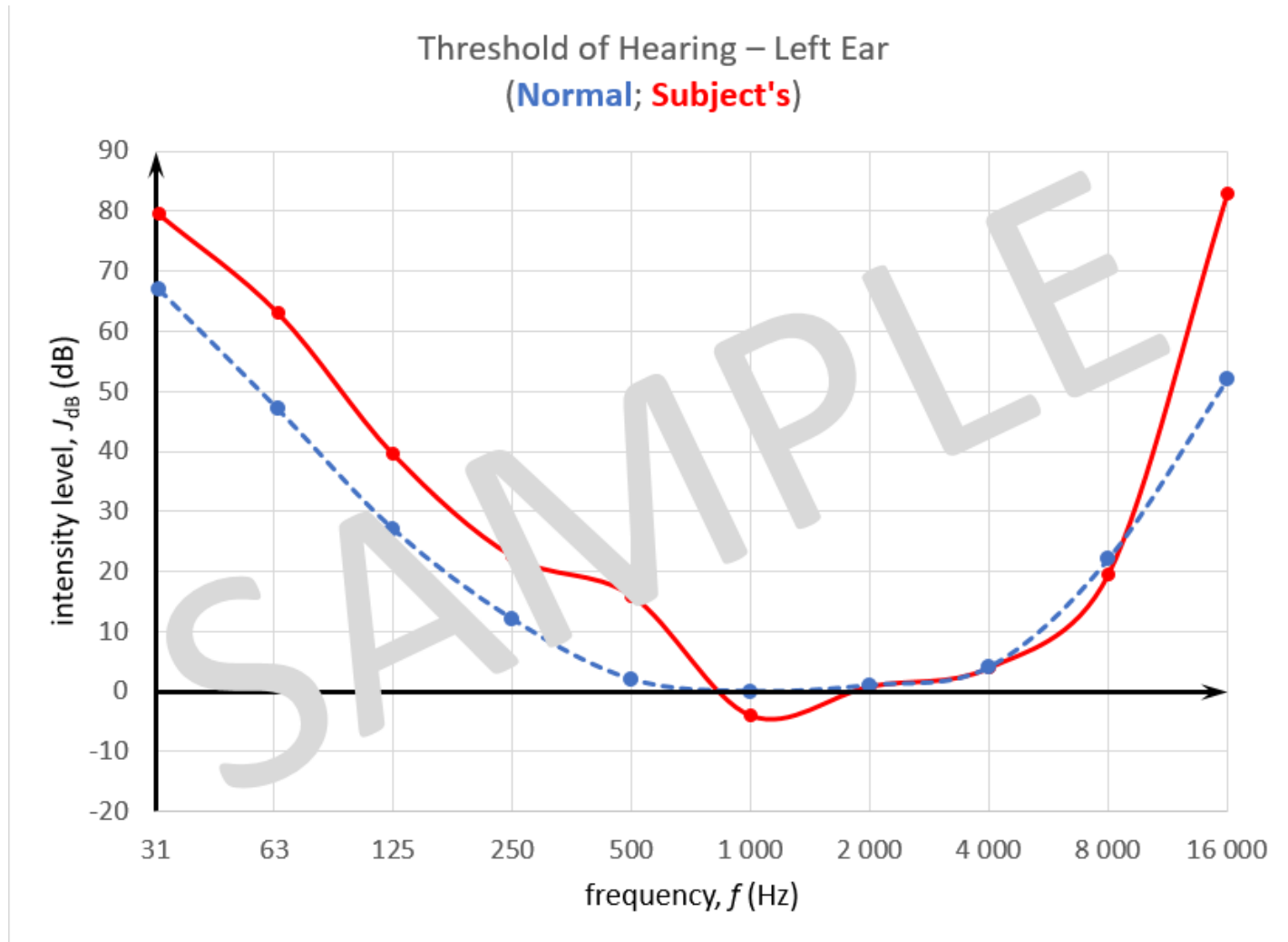
# Evaluation: Threshold of Hearing Curve

frequency, $f$ (Hz)	$U_{\text{coarse}}$	$U_{\text{fine}}$	signal voltage, $U$ (V)	subject's hearing threshold, $J_{\text{own}}$ (W/m <sup>2</sup> )	subject's hearing threshold, $J_{\text{dB,own}}$ (dB)	normal hearing threshold, $J_{\text{dB,norm}}$ (dB)	hearing loss, $J_{\text{dB,own}} - J_{\text{dB,norm}}$ (dB)
32	1	0,6	3	0,00009	80	67	13
64							
125							
250							
500							

intensity level  
(lin. scale)



# Evaluation: Threshold of Hearing Curve

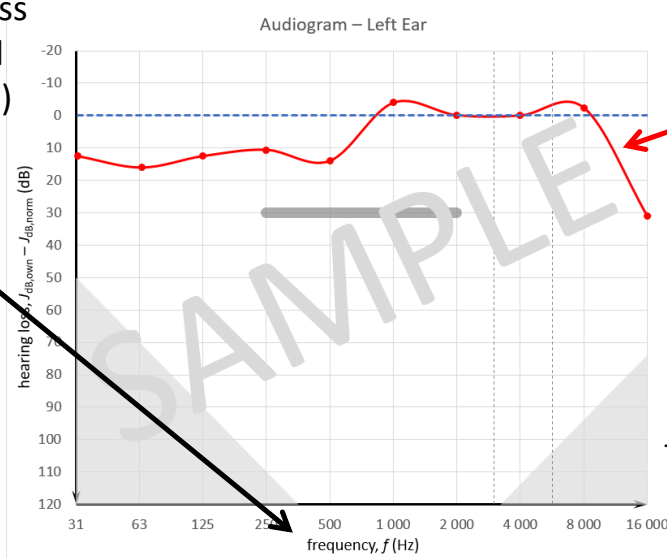




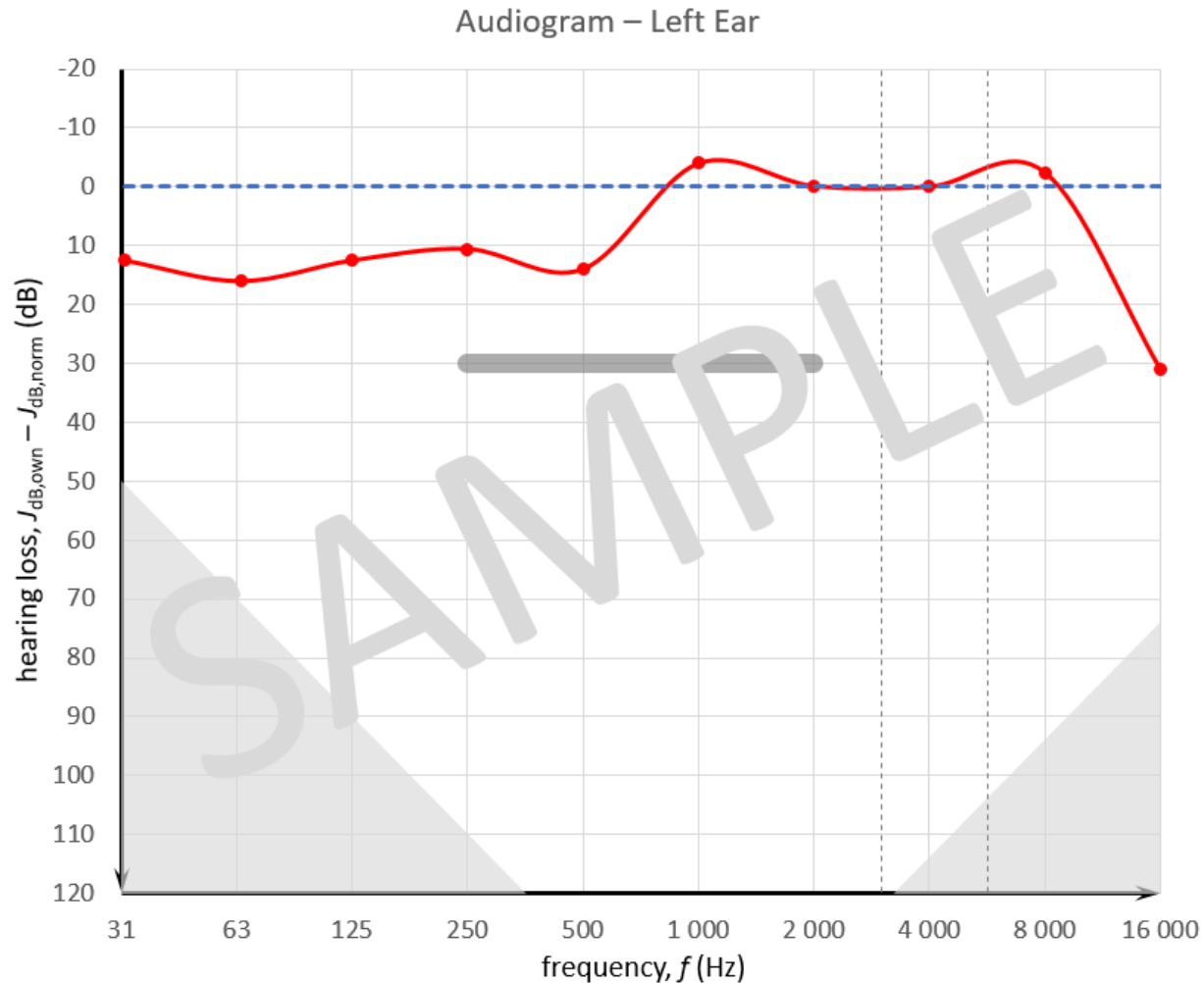
# Evaluation: Audiogram

frequency, $f$ (Hz)	$U_{\text{coarse}}$	$U_{\text{fine}}$	signal voltage, $U$ (V)	subject's hearing threshold, $J_{\text{own}}$ (W/m <sup>2</sup> )	subject's hearing threshold, $J_{\text{dB,own}}$ (dB)	normal hearing threshold, $J_{\text{dB,norm}}$ (dB)	hearing loss, $J_{\text{dB,own}} - J_{\text{dB,norm}}$ (dB)
32	1	0,6	3	0,00009	80	67	13
64							
125							
250							
500							

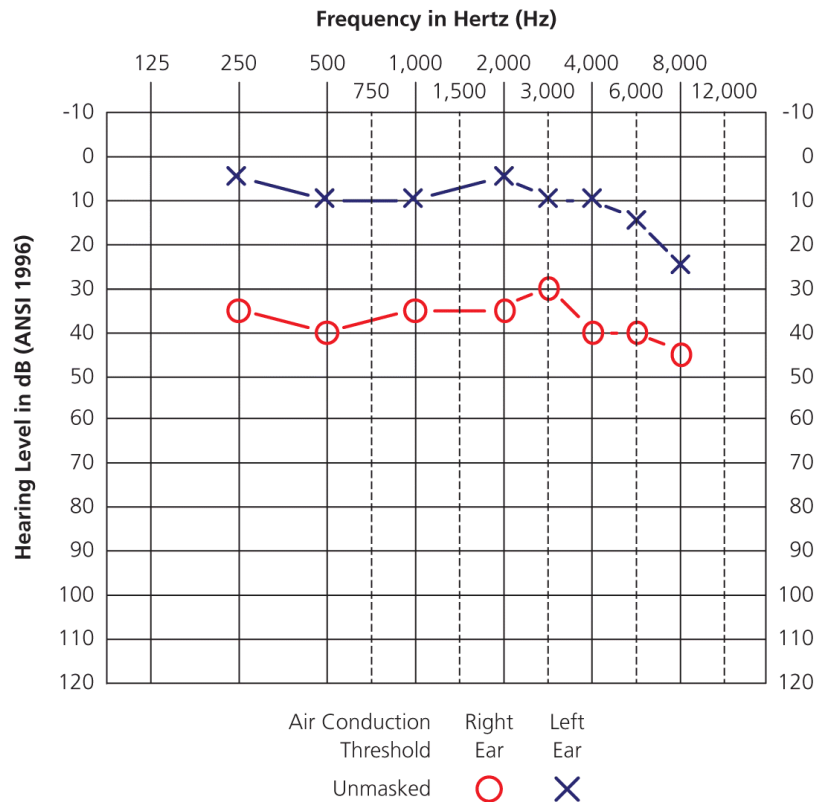
hearing loss  
(inverted  
lin. scale)



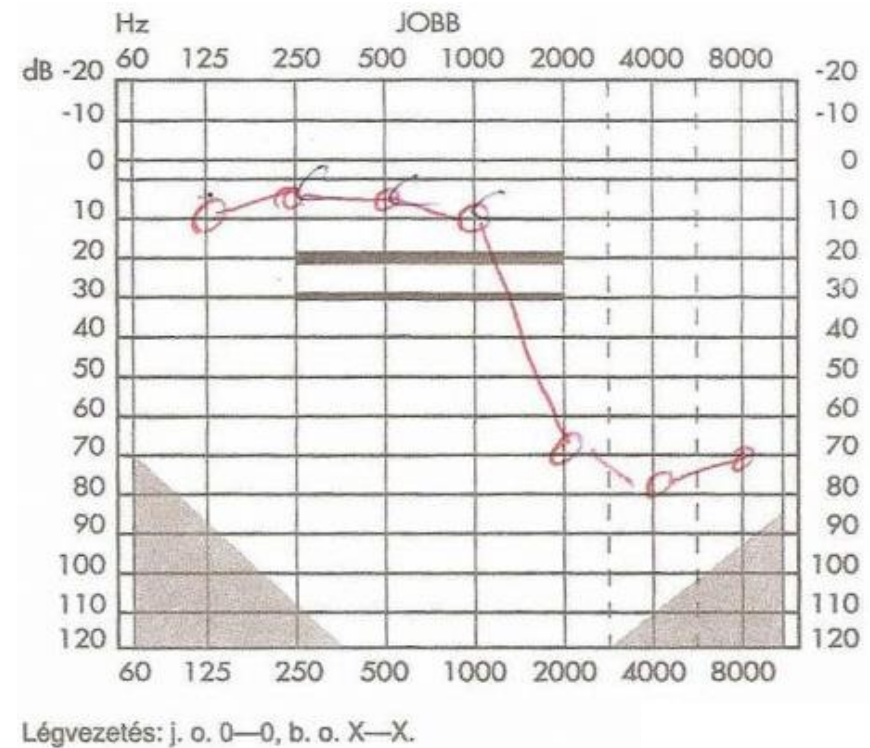
# Evaluation: Audiogram



# Examples for Clinical Audiograms



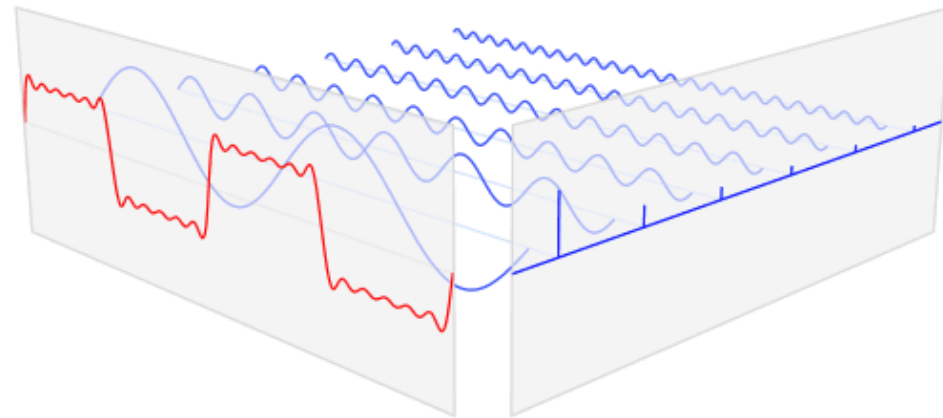
U.S.A.



Hungary

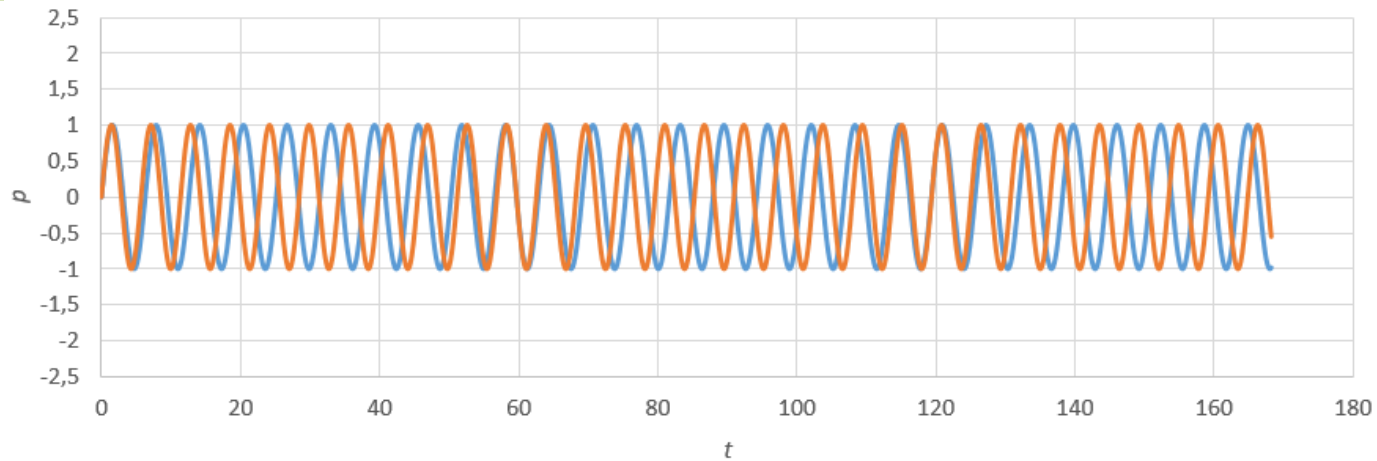
# Spectrum of a (Sound) Wave

**WATCH VIDEO:  
Beats, Spectra**

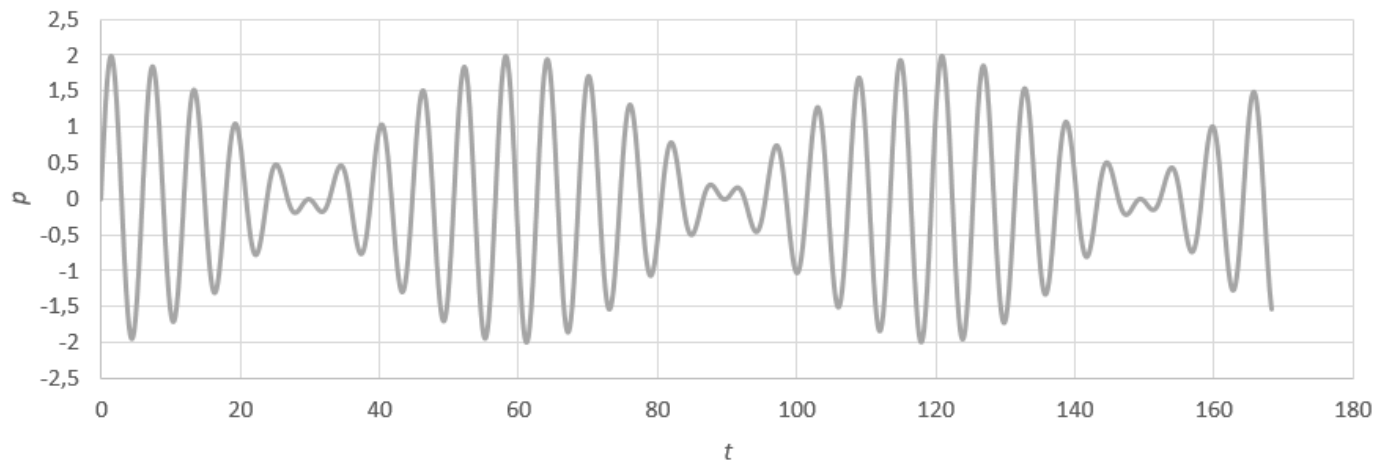




# Beats



—  $p = p_0 + \Delta p_{\text{max}} \cdot \sin(\omega \cdot t)$  —  $p' = p_0 + \Delta p_{\text{max}} \cdot \sin(\omega' \cdot t)$



—  $p + p'$