1 What is sound? Tell it, without mention the less applicable energy content of the sound field - we don't use this in audio.

We designate sound as waves propagating spatial and temporal change in pressure change (pressure fluctuation) of an elastic medium, which usually is air. The wave is superimposed on the static air pressure. There is a movement triggered when an air particle initiates the next. This domino effect is propagated through the air with the speed of sound of c = 343 m/s at 20°C.

2. A pure sound wave is "sin x" as particle air vibration. How is the formula for the vibration at three times the amplitude?

The threefold sound pressure amplitude is: "y = 3 sin x."

3. What is the equation for the fundamental wave "sin x" with double the pitch?

The wave at twice the frequency is: "y = sin 2 x."

4. The sound pressure amplitude is measured as the force F acting on the area A. How is this sound field size called?

This is the sound pressure amplitude or the sound pressure variation $p = F/A$.

5. What size is this unit?

Force divided by area is measured in newtons per square meter (N/m), which is called pascal (Pa).

6. The fluctuations generated by the sound wave are adequate stimuli for excitation of the auditory organ. Which fluctuations are effective on the ears?

Sound pressure fluctuations are effective here. The static pressure of the air (air pressure) with an average of 101325 pascals is superimposed.

7. What size determines the sound volume (loudness)?

The psycho-acoustically perceived loudness (volume) is determined by the acoustic pressure amplitude.

8. What size determines the pitch of the listening?

The pitch is the frequency of the oscillation.

9. What sound level in dBSPL must a low sine wave of 20 Hz have in our ears, to be perceived?

To be heard, the sound pressure level must be higher than the threshold of hearing of the equal loudness contour curves ISO 226:2003; that means for a tone of 20 Hz it must be a sound level of more than 73 dBSPL.

10. How much N/m² is corresponding to this level in dBSPL? See # **9.**

This is $10^{(73/20)}$ times 0.00002 = 0.089 Pa, or about 0.09 Pa as sound pressure. N/m² = Pa.

11. How is the oscillation of air particles around their rest position called?

This is the sound particle velocity or sound velocity v.

12. What is the unit of this velocity of air particles?

m/s, or meters per second for velocity. Particle velocity is the same unit as the speed of sound. Don't be confused.

13. What size of sound is directly converted by microphones into an electrical variable?

That is the sound field size Δp. The sound pressure variation (sound pressure) in Pa = N/m is proportional to the converted audio voltage.