



# ! "Test for Quick Audio Men" English Answers 03

Write down quickly a numerical value or a slogan.

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1. A sound pressure level  $L_p$  in dB is based on the sound pressure  $p$  and the reference sound pressure  $p_0$ . **a)** How great is the reference sound pressure  $p_0$ , which roughly corresponds to the threshold of hearing? **b)** How is the equation for the sound pressure level  $L_p$ ?

**a)** Reference sound pressure:  $p_0 = 2 \cdot 10^{-5} \text{ Pa}$  ( $1 \text{ Pa} = 1 \text{ N/m}^2$ ). Sound pressure is the sound pressure variation, which is specified as an RMS value. **b)** The sound pressure level is  $L_p = 20 \cdot \log p / p_0$ .

2. The ARD studio level is +6 dBu, which is 1.55 Vrms. (European studio level.) At what decibel value is the international studio level (USA) and to which voltage does it correspond?

The international studio level is  $L_p = +4 \text{ dBu}$ , which corresponds to a voltage of 1.228 Vrms.

3. How much is the rear attenuation of a microphone with hypercardioid pattern (directional characteristic)?

The attenuation of the correct hypercardioid for sounds coming from the  $180^\circ$  direction is **(-)6 dB**.

4. What do you understand by the abbreviation DVD?

Initially, that was the "Digital Video Disc" of 13.3 cm diameter for picture and multi channel sound. It is called today "**Digital Versatile Disk**" or simply DVD, in order to emphasize the versatility. Unilaterally recorded with one layer (4.7 GB) for 133 minutes of playing time up to two sides recorded with two layers (18.8 GB) for 532 minutes of playing time.

5. At the input terminals of a (let us say) "9 ohm" loudspeaker are 30 volts from a 1 kHz sine wave at 1% total harmonic distortion (THD). What is the electric power of the loudspeaker?

$P = V^2 / R = 30 \cdot 30 / 9 = 100 \text{ Watt}$ .

6. Which sound power  $P_{ac}$  will this loudspeaker (from question 5) emit at maximum?

The efficiency of the loudspeakers is not good. We get at maximum 10%, so  $P_{ac} = 10 \text{ watts}$  can be generated as sound power.

7. What is the output resistance  $R_{out}$  and what is the output voltage  $V_{p-p}$  of a digital AES / EBU = AES 3 interface?

The internal resistance of the RF interface is 110 ohms and the nominal voltage is 5 volts peak to peak.

8. Which type of microphone with which polar pattern is most sensitive to air movements and therefore not suitable for outdoor use?

The ribbon microphone with figure-of-eight as a pure pressure gradient receiver gives the most low-frequency disturbance when it is windy.

9. What microphone type is against pop and wind noise the least sensitive?

All types of microphones, which are pure pressure receivers (omnidirectional pattern), be it dynamic or condenser microphones, are far less sensitive to wind.

10. How great is in natural hearing, the maximum delay difference  $\Delta t$  between the left and right ears (interaural signal differences) when hearing clicking signals?

At  $90^\circ$  sound incidence, a maximum time difference of averaged  $\Delta t = 0.63 \text{ ms}$  was found.

11. What value must the time difference  $\Delta t$  between the loudspeaker signals (interchannel signal differences) have, so that at equal levels, the phantom source is just located from the direction of a loudspeaker?

Depending on the signal type there are  $\Delta t = 1$  to  $2 \text{ ms}$  time difference. That is a mean value of:  $\Delta t = 1,5 \text{ ms}$ .

12. A particular condenser microphone has a transfer factor of 10 mV/Pa. The sensitivity is related to 1 volt microphone voltage in dB at a sound pressure level of  $L_p = 94 \text{ dB}$ . What value has the sensitivity of the microphone in decibels?

Sensitivity  $B_f = 20 \cdot \log 0.01/1 = -40 \text{ dB}$ .

13. A mixer gets a 1 kHz test signal. The display of the correlation meter shows "-1". How much is the "phase shift  $\varphi$ " between the left and right channel?

A channel is reversed, that is out of phase. Therefore the correlation meter shows for sinusoidal signals the value  $\cos \varphi = -1$ . That is " $\varphi = 180^\circ$ " or  $540^\circ, 900^\circ \dots$