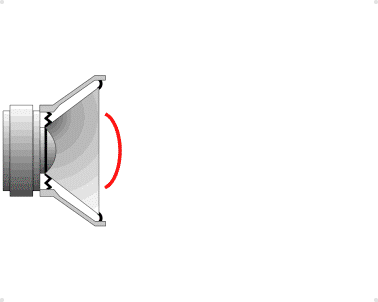
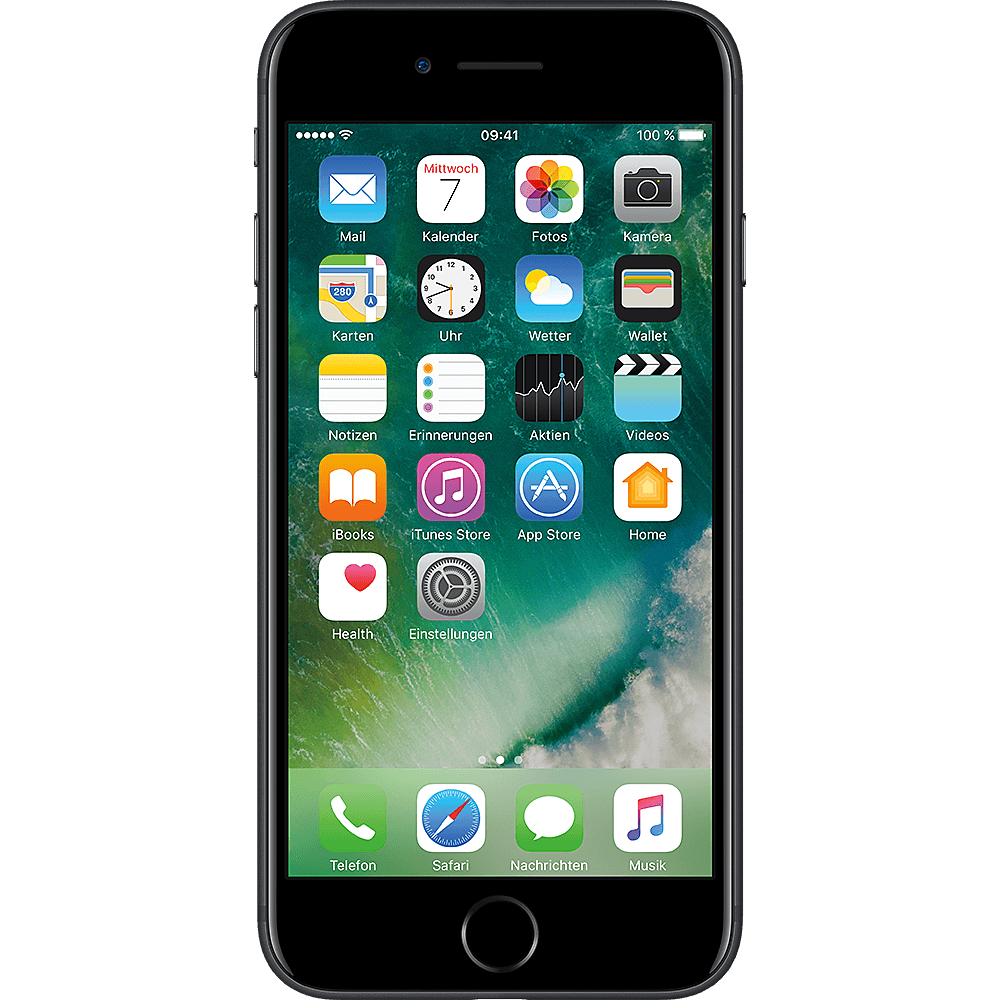
**Real-Life Smartphone Physics:**Examine your own hearing threshold  
with a smartphone

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name

**Audiometric Test**

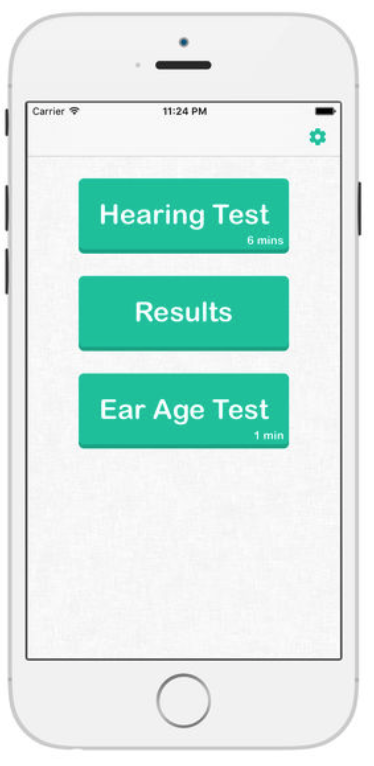


**Audiometric test with a smartphone**

1. Which of the following factors could distort a hearing test? Check.

|  |  |  |
| --- | --- | --- |
| **Root cause** | **can distort** | **can not distort** |
| Body size | 🞎 | 🞎 |
| Traffic noise | 🞎 | 🞎 |
| Conversations in the room | 🞎 | 🞎 |
| Gender | 🞎 | 🞎 |
| Respiratory rate | 🞎 | 🞎 |
| Loose headphone contact | 🞎 | 🞎 |

In the following hearing test, be sure to do it in a quiet environment and avoid interference. If possible, use the headphones that came with your smartphone.

1. ******Conduct audiometric test with the iOS app** (alternative for Android smartphones: see last page)
   * 1. Open the app *Hearing Test & Ear Age Test* or download the app.
     2. Start *Hearing Test* and follow the instructions on the screen.
     3. At the end you get a graph. Press *Share* and then *Save Image*.
2. Open *Fotos* and look at the results of your hearing test. The graph shows how well you hear different tones. The tones are getting higher and higher from left to right.
3. What may have disturbed / influenced the measurement?
   * + - * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Read the dB-HL for the seven frequencies and both ears from the audiogram, enter the values in the following table and calculate the mean of both ears!

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
| Left ear |  |  |  |  |  |  |  |
| Right ear |  |  |  |  |  |  |  |
| Mean |  |  |  |  |  |  |  |



Enter the means in the following online table: <http://did.physik.lmu.de/qr/q.php?c=zsb>

1. Compare
   * + 1. Compare your result with the results of your classmates.
       2. Who can hear best …?

… conversations (2.0 kHz): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

… at a frequency of 8.0 kHz: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

… at a frequency of 0.125 kHz: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + - 1. Who can hear best overall?

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

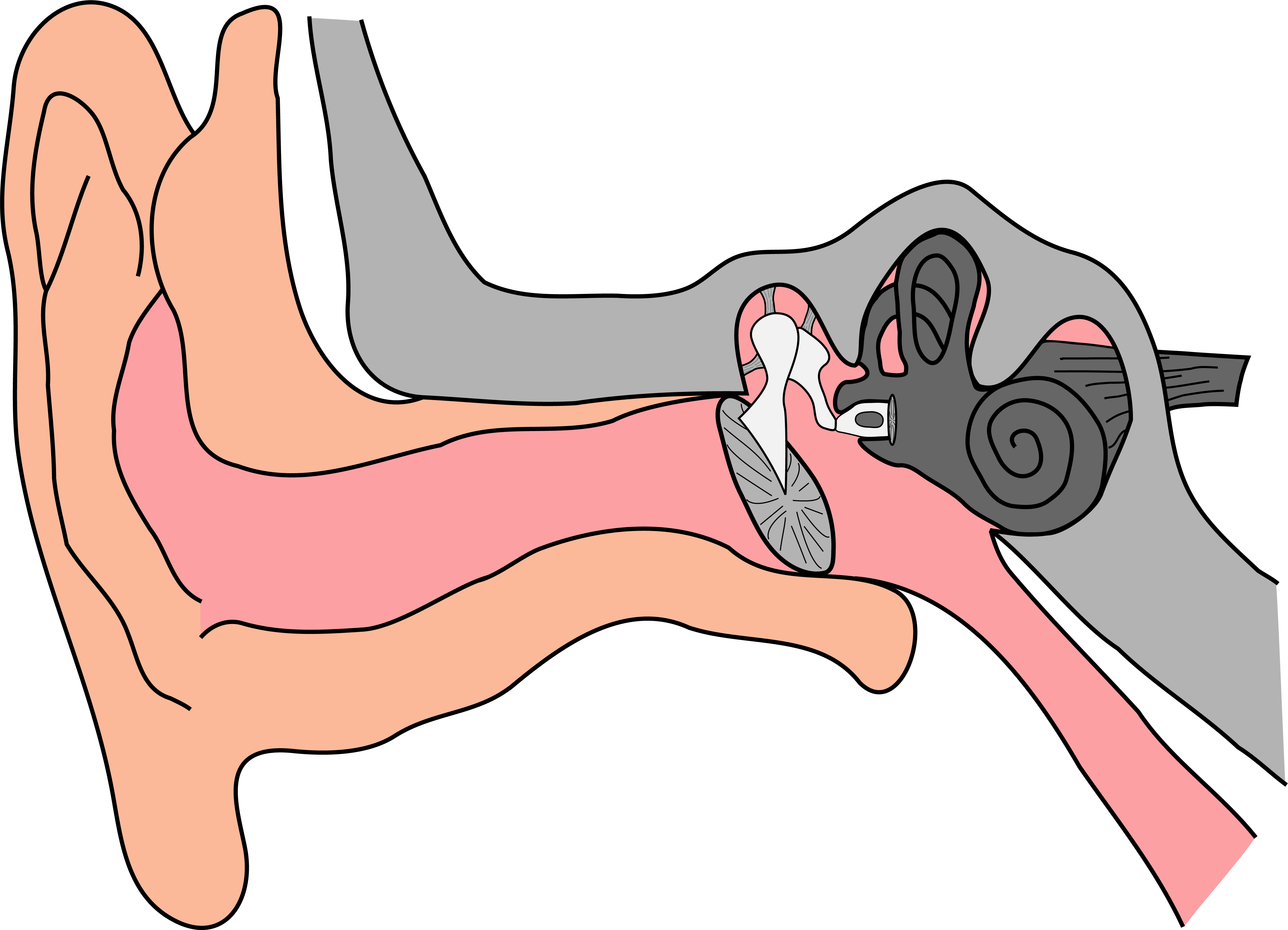
* + - 1. How did you know who heard best?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The process of hearing – put the appropriate words in the blank spaces!



The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hit the pinna. There they are passed through the ear canal to the middle ear. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sits in the middle ear and begins to vibrate. There are fine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the cochlea. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eardrum stimulates them to vibrate via several intermediate stations.

There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ under the fine sensory hairs, which register the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and pass them on to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Different sensory hairs are stimulated depending on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. We hear tones around a frequency of 3.5 kHz the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. We perceive tones with lower or higher frequency the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sensory hairs | brain | loudest | quietest | vibrating |
| nerves | sound waves | ear drum | movements | tone |

**For Android smartphones**

An alternative app for Android smartphones is e.g. *Hörtest* by e-audiologia.pl.

You can download it for free: <https://play.google.com/store/apps/details?id=mobile.eaudiologia>