

MUSIC TO YOUR EARS (sound and hearing)- Ss

I. Look at the idiomatic phrases below and decide which one suits each sentence best.

to face the music it rings a bell safe and sound to jazz up play it by ear

1. You didn't spend much time studying, now you have to _____ and re-take your exams.
2. This theory _____, but I don't know how to explain it.
3. He never prepared his presentations. He always _____.
4. Try to _____ your essay with some analytical insights rather than simply sum up everything you've read.

II. Read the description of how our ears work and label the picture.

The three parts of the ear anatomy are the outer ear, the middle ear and the inner ear. The inner ear is also called the cochlea. ('Cochlea' means 'snail' in Latin; the cochlea gets its name from its distinctive coiled up shape.)

The outer ear consists of the pinna, ear canal and eardrum.

The middle ear consists of the malleus (hammer), incus (anvil) and stapes (stirrup).

The inner ear consists of the cochlea, the auditory (hearing) nerve and the brain.

Sound waves enter the ear canal and make the ear drum vibrate. This action moves the tiny chain of bones (ossicles – malleus, incus, stapes) in the middle ear. The last bone in this chain 'knocks' on the membrane window of the cochlea and makes the fluid in the cochlea move. The fluid movement then triggers a response in the hearing nerve.



http://www.scislowska.pl/08_ryciny_anatomiczne.html visited: 4.2.2017

III. Match the beginnings of the sentences with their endings.

Sound waves are longitudinal waves that can	vibrations per second and has units called hertz (Hz).
The loudness and softness of a sound	is measured in units called decibels (dB).
The loudness of a sound	depends on its amplitude.
The frequency of a sound is the number of	the impulse to the brain via the auditory nerve.
Sounds with irregular frequencies	which could lead to permanent deafness.
Sound waves are heard when they are transferred	are classified as noise.
The cochlea contains the sensory cells that transfer	through the structures in the ear to the cochlea.
Very loud sounds may rupture the eardrum	cause air molecules to compress and rarefy as they pass.

IV. Read the text about sound ranges and fill in the gaps with appropriate words (1 or 2 words). Then listen to the recording and check your answers.

Humans are usually able to hear sounds ranging between 20 and **1.** _____ Hz. Animals, such as cats, bats and dogs are sensitive to sounds of **2.** _____. Sounds with frequencies exceeding the range normally heard by humans are often referred to as ultrasound. Although we cannot hear it, we have scientific instruments that use ultrasound for a wide range of important **3.** _____. Ultrasound is safer to use than **4.** _____ when trying to “see” inside the body as it does not damage **5.** _____, so we use it for: monitoring the growth **6.** _____ of a foetus; detecting **7.** _____ growth (cancer) in the body; detecting brain damage.

Sounds with frequencies below the normal range heard by humans are very **8.** _____ waves and are called infrasound. It is believed that some birds, such as pigeons, use infrasound for **9.** _____. Infrasound has also important uses. For example, it is used to move air around in air conditioners and other **10.** _____. At very high intensities, these low frequency sounds may cause **11.** _____ to vibrate, which can result in **12.** _____ such as nausea and internal injury.

V. Put the phrases in the correct order to make sentences.

1. a ruler that _____ and produces sound. _____ at the edge of a table _____ is flicked _____ vibrates
2. by the ruler _____ the distance _____ moved up and down _____ of the vibration. _____ the _____ amplitude
We call _____
3. loud _____ of a sound wave _____ or soft. _____ The amplitude _____ the sound is _____ whether will
determine _____
4. a small amount of energy _____ If _____ is flicked only a little, _____ is supplied _____ the ruler _____ then _____ to the
ruler.
5. a small amplitude _____ a soft sound _____ and _____ causes _____ in vibration _____ is heard. _____ This
6. _____ and _____ and a large energy _____ However, _____ if the ruler _____ is larger _____ is flicked more
strongly, _____ is supplied, _____ louder. _____ the amplitude _____ the sound will be _____
7. _____ on the ruler, _____ that occurs. _____ The harder _____ the louder _____ the sound _____ you pluck
8. _____ a guitar. _____ applies _____ of _____ on the strings _____ The same _____ to plucking
9. _____ can be _____ cycle _____ graphically. _____ of _____ represented _____ The complete _____ the vibrations
10. A _____ a _____ amplitude. _____ greater _____ has _____ louder _____ sound

VI. In the description above find words or phrases that you can use to explain any phenomenon.

VII. Read the text about an ancient Greek amphitheatre and complete it with the phrases from A to H

- A. may have acted as primitive loudspeakers
- B. hushes low frequency background noises like the murmur of a crowd
- C. was acting as a filter for sound waves at certain frequencies
- D. the low frequencies of speech were also filtered out to some extent
- E. makes the ancient amphitheatre an acoustic marvel
- F. similar to the ridged acoustics padding on walls or insulation in a parking garage



- G. which may have played a large role in the gradual abandonment of Epidaurus' design
- H. well before any theatre had the luxury of a sound system

As the ancient Greeks were placing the last few stones on the magnificent theater at Epidaurus in the fourth century B.C., they couldn't have known that they had unwittingly created a sophisticated acoustic filter. But when audiences in the back row were able to hear music and voices with amazing clarity (1. _____), the Greeks must have known that they had done something very right because they made many attempts to duplicate Epidaurus' design, but never with the same success.

Researchers at the Georgia Institute of Technology have pinpointed the elusive factor that 2. _____. It's not the slope, or the wind — it's the seats. The rows of limestone seats at Epidaurus form an efficient acoustics filter that 3. _____ and reflects the high-frequency noises of the performers on stage off the seats and back toward the seated audience member, carrying an actor's voice all the way to the back rows of the theater.

While many experts speculated on the possible causes for Epidaurus' acoustics, few guessed that the seats themselves were the secret of its acoustics success. There were theories that the site's wind — which blows primarily from the stage to the audience — was the cause, while others credited masks that 4. _____ or the rhythm of Greek speech. Other more technical theories took into account the slope of the seat rows.

When Declercq set out to solve the acoustic mystery, he too had the wrong idea about how Epidaurus carries performance sounds so well. He suspected that the corrugated, or ridged, material of the theater's limestone structure 5. _____, but he didn't anticipate how well it was controlling background noise.

“When I first tackled this problem, I thought that the effect of the splendid acoustics was due to surface waves climbing the theater with almost no damping,” Declercq said. “While the voices of the performers were being carried, I didn't anticipate that 6. _____.”

But as Declercq's team experimented with ultrasonic waves and numerical simulations of the theater's acoustics, they discovered that frequencies up to 500 Hz were held back while frequencies above 500 Hz were allowed to ring out. The corrugated surface of the seats was creating an effect 7. _____.

So, how did the audience hear the lower frequencies of an actor's voice if they were being suppressed with other background low frequencies? There's a simple answer, said Declercq. The human brain is capable of reconstructing the missing frequencies through a phenomenon called virtual pitch. Virtual pitch helps us appreciate the incomplete sound coming from small loudspeakers (in a laptop or a telephone), even though the low (bass) frequencies aren't generated by a small speaker.

The Greeks' misunderstanding about the role the limestone seats played in Epidaurus' acoustics likely kept them from being able to duplicate the effect. Later theaters included different bench and seat materials, including wood, 8. _____ over the years by the Greeks and Romans, Declercq said.

VIII. Find in the text words that mean:

Par I: nevědomky, mimoděk;

Par II: určit, identifikovat; prchavý, těžko pochopitelný; zázrak, div; svah, sklon; vápenec;

Par IV: vlnitý

Par V: tlumení

Par VI: hřebenovitý, drážkovaný; tlumený

Par VII: potlačovaný; výška, poloha (tonu)

Par VIII: zanechání

IX. Ask about the underlined part of the sentence

1. The Greeks must have known that they had done something very right.
2. The Greeks must have known that they had done something very right.
3. Limestone seats at Epidaurus form an efficient acoustics filter.
4. Limestone seats at Epidaurus form an efficient acoustics filter.
5. Limestone seats at Epidaurus form an efficient acoustics filter.
6. Limestone seats at Epidaurus form an efficient acoustics filter.
7. Declercq's team experimented with ultrasonic waves of the theatre's acoustics.
8. Declercq's team experimented with ultrasonic waves of the theatre's acoustics.
9. They had unwittingly created a sophisticated acoustic filter.
10. The magnificent theatre at Epidaurus was built in the fourth century B.C.

X. With information from the reading and phrases from ex.V write an explanation of the virtual pitch phenomenon.

Sources:

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