

# Chapter 7. Sound: Range of Hearing

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**Solution 1:**

The frequency of sound is defined as the number of vibrations produced by the sound producing object per second.

**Solution 2:**

S.I unit of frequency is hertz.

**Solution 3:**

One hertz is defined as one vibration produced in one second by sound producing object.

**Solution 4:**

The audible range of frequency is 20Hz to 20KHz.

**Solution 5:**

- Less than 20Hz – we cannot hear sound.
- More than 20KHz – we cannot hear sound.

**Solution 6:**

No, the audible range of frequency does not vary from person to person and also with age of person.

**Solution 7:**

Sound having frequency less than 20Hz is called infrasonic sound. Sound having frequency greater than 20KHz is called ultrasonic sound.

**Solution 8:**

The energy carried by ultrasonic sound is very high.

**Solution 9:**

Applications of Ultrasonic sound

- Ultrasonic sound is used to detect the flaws in metal castings of automobile tyres.
- It is used in hospitals to detect defects in certain parts of body.

**Solution 10:**

Echocardiography is used to obtain the image of the heart by the used of ultrasonic waves.

**Solution 11:**

SONAR stands for Sound Navigation and Ranging. Sonar helps the oceanographers and ship captains to determine the depth of the ocean.

**Solution 12:**

Bats emit the high frequencies that range between 20 KHz to 75 KHz. The echoes from these sounds help in locating the obstacles in their path and to avoid them.

**Solution 13:**

The elephants and whales produce the sound of frequency less than 20Hz. (means infrasonic sounds)

**Solution 14:**

No, all animals does not have same range of audible frequencies.

**Solution 15:**

When the sound strike any object and reflect back, the hearing of reflected sound is called echo.

**Solution 16:**

Echolocation is defined as sending out sounds to judge the location, size and motion of objects from the returning echoes. The animals use this phenomenon to locate the obstacles in their path and avoid them so it helps them in navigation and to locate their prey.

**Solution 17:**

Three Important uses of echolocation:

- It helps animals to communicate with each other. e.g dolphins use the echolocation to communicate with other dolphins.
- It helps in navigation and to locate their prey.
- It is used by them to hunt for the meal.

**Solution 18:**

A hearing aid is the device which increases the loudness and intensity of the incoming sound.

**Solution 19:**

The main components of hearing aid are microphone , amplifier and earphone.

**Solution 20:**

A ship sends ultrasonic waves downward in the ocean. When the sound waves reaches the ocean floor, they are reflected back to the ship . The time it takes for the signal to return is used to calculate the depth of submerged ship in the ocean.

**Solution 21:**

High Power, High Energy and good directionality are the properties of ultrasonic sounds which makes them useful.

**Solution 22:**

- 10 Hz – Infrasonic sound.
- 200 Hz – audible sound.
- 2000 Hz – Audible sound.
- 45 KHz – Ultrasonic sound