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Audio frequency

An **audio frequency** or **audible frequency** (abbreviation: **AF**) is a periodic vibration whose frequency is in the band audible to the average human, the human hearing range. The SI unit of frequency is the hertz (Hz). It is the property of sound that most determines pitch.[1]

The generally accepted standard hearing range for humans is 20 to 20,000 Hz.[2][3][4] In air at atmospheric pressure, these represent sound waves with wavelengths of 17 meters (56 ft) to 1.7 centimetres (0.67 in). Frequencies below 20 Hz are generally felt rather than heard, assuming the amplitude of the vibration is great enough. High frequencies are the first to be affected by hearing loss due to age or prolonged exposure to very loud noises.[5]

Sound measurements	
Characteristic	Symbols
Sound pressure	p, SPL,L_{PA}
Particle velocity	v, SVL
Particle displacement	δ
Sound intensity	I, SIL
Sound power	P, SWL, L_{WA}
Sound energy	W
Sound energy density	w
Sound exposure	E, SEL
Acoustic impedance	Z
Audio frequency	AF
Transmission loss	TL

Frequencies and descriptions

Frequency (Hz)	Octave	Description
16 to 32	1st	The lower human threshold of hearing, and the lowest pedal notes of a pipe organ.
32 to 512	2nd to 5th	Rhythm frequencies, where the lower and upper bass notes lie.
512 to 2,048	6th to 7th	Defines human speech intelligibility, gives a horn-like or tinny quality to sound.
2,048 to 8,192	8th to 9th	Gives presence to speech, where labial and fricative sounds lie.
8,192 to 16,384	10th	Brilliance, the sounds of bells and the ringing of cymbals and sibilance in speech.
16,384 to 32,768	11th	Beyond brilliance, nebulous sounds approaching and just passing the upper human threshold of hearing

MIDI note	Frequency (Hz)	Description	Sound file
0	8.17578125	Lowest organ note	n/a (fundamental frequency inaudible)
12	16.3515625	Lowest note for tuba, large pipe organs, Bösendorfer Imperial grand piano	n/a (fundamental frequency inaudible under average conditions)
24	32.703125	Lowest C on a standard 88-key piano.	0:00 MENU
36	65.40625	Lowest note for cello	0:00 MENU
48	130.8125	Lowest note for viola, mandola	0:00 MENU
60	261.625	Middle C	0:00 MENU
72	523.25	C in middle of treble clef	0:00 MENU
84	1,046.5	Approximately the highest note reproducible by the average female human voice.	0:00 MENU
96	2,093	Highest note for a flute.	0:00 MENU
108	4,186	Highest note on a standard 88-key piano.	0:00 MENU
120	8,372		0:00 MENU
132	16,744	Approximately the tone that a typical CRT television emits while running.	0:00 MENU

See also

- Absolute threshold of hearing
- Hypersonic effect, controversial claim for human perception above 20,000 Hz
- Loudspeaker
- Musical acoustics
- Piano key frequencies
- Scientific pitch notation
- Whistle register

References

1. Pilhofer, Michael (2007). *Music Theory for Dummies* (https://books.google.com/books?id=CxcviUw4KX8C). For Dummies. p. 97. ISBN 9780470167946.
2. "Hyperphysics" (http://hyperphysics.phy-astr.gsu.edu/hbase/sound/earsens.html). Retrieved 19 September 2014.
3. Heffner, Henry; Heffner, Rickye (January 2007). "Hearing Ranges of Laboratory Animals" (http://www.ingentaconnect.com/content/aalas/jaalas/2007/00000046/00000001/art00003). *American Association for Laboratory Animal Science*. **46** (1): 20–2. PMID 17203911 (https://pubmed.ncbi.nlm.nih.gov/17203911). Retrieved 19 September 2014.
4. Rosen, Stuart (2011). *Signals and Systems for Speech and Hearing* (2nd ed.). BRILL. p. 163. "For auditory signals and human listeners, the accepted range is 20Hz to 20kHz, the limits of human hearing"
5. Bitner-Glindzicz, M (2002). "Hereditary deafness and phenotyping in humans". *British Medical Bulletin*. **63** (1): 73–94. doi:10.1093/bmb/63.1.73 (https://doi.org/10.1093%2Fbmb%2F63.1.73). PMID 12324385 (https://pubmed.ncbi.nlm.nih.gov/12324385). S2CID 3548932 (https://api.semanticscholar.org/CorpusID:3548932).