# DOWNLOAD PDF INTENSITY OF SOUND

## Chapter 1 : Intensity (physics) - Wikipedia

*Sound intensity level also known as acoustic intensity is defined as the power carried by sound waves per unit area in a direction perpendicular to that area. The SI unit of intensity, which includes sound intensity, is the watt per square meter (W/m 2).*

For typical sound waves, the maximum displacement of the molecules in the air is only a hundred or a thousand times larger than the molecules themselves â€" and what technologies are there for tracking individual molecules anyway? Density fluctuations are equally minuscule and short lived. The period of sound waves is typically measured in milliseconds. There are some optical techniques that make it possible to see the intense compressions are rarefactions associated with shock waves in air, but this will be dealt with in another section of this book. Pressure fluctuations caused by sound waves are much easier to measure. Animals including humans have been doing it for several hundred million years with devices called ears. Humans have also been doing it electromechanically for about a hundred years with devices called microphones. In any case, the results of such measurements are rarely ever reported. Instead, amplitude measurements are almost always used as the raw data in some computation. When done by an electronic circuit like the circuits in a level meter the resulting value is called intensity. When done by a neuronal circuit like the circuits in your brain the resulting sensation is called loudness. The intensity of a sound wave is a combination of its rate and density of energy transfer. It is an objective quantity associated with a wave. Loudness is a perceptual response to the physical property of intensity. It is a subjective quality associated with a wave and is a bit more complex. As a general rule the larger the amplitude, the greater the intensity, the louder the sound. Sound waves with large amplitudes are said to be "loud". Sound waves with small amplitudes are said to be "quiet" or "soft". The word "low" is sometimes also used to mean quiet, but this should be avoided. Use "low" to describe sounds that are low in frequency. Loudness will be discussed at the end of this section. These look similar to the greater and less than symbols but they are taller and less pointy.

## Chapter 2 : Sound Intensity & Loudness - Teachers (U.S. National Park Service)

*30 Amplitude & Intensity of Sound Waves 2 0 2 0 I s I p Âµ Âµ v p I 2r 2 = 0 For sound waves: p 0 is the pressure amplitude and s 0 ith edplac mn u. The intensity of sound waves also follow an inverse.*

The Human Ear Sound waves are introduced into a medium by the vibration of an object. For example, a vibrating guitar string forces surrounding air molecules to be compressed and expanded, creating a pressure disturbance consisting of an alternating pattern of compressions and rarefactions. The disturbance then travels from particle to particle through the medium, transporting energy as it moves. The energy that is carried by the disturbance was originally imparted to the medium by the vibrating string. The amount of energy that is transferred to the medium is dependent upon the amplitude of vibrations of the guitar string. If more energy is put into the plucking of the string that is, more work is done to displace the string a greater amount from its rest position , then the string vibrates with a greater amplitude. The greater amplitude of vibration of the guitar string thus imparts more energy to the medium, causing air particles to be displaced a greater distance from their rest position. Subsequently, the amplitude of vibration of the particles of the medium is increased, corresponding to an increased amount of energy being carried by the particles. This relationship between energy and amplitude was discussed in more detail in a previous unit. Sound Intensity and Distance The amount of energy that is transported past a given area of the medium per unit of time is known as the intensity of the sound wave. The greater the amplitude of vibrations of the particles of the medium, the greater the rate at which energy is transported through it, and the more intense that the sound wave is. As a sound wave carries its energy through a two-dimensional or three-dimensional medium, the intensity of the sound wave decreases with increasing distance from the source. The decrease in intensity with increasing distance is explained by the fact that the wave is spreading out over a circular 2 dimensions or spherical 3 dimensions surface and thus the energy of the sound wave is being distributed over a greater surface area. The diagram at the right shows that the sound wave in a 2-dimensional medium is spreading out in space over a circular pattern. Since energy is conserved and the area through which this energy is transported is increasing, the intensity being a quantity that is measured on a per area basis must decrease. The mathematical relationship between intensity and distance is sometimes referred to as an inverse square relationship. The intensity varies inversely with the square of the distance from the source. So if the distance from the source is doubled increased by a factor of 2 , then the intensity is quartered decreased by a factor of 4. Similarly, if the distance from the source is quadrupled, then the intensity is decreased by a factor of  Applied to the diagram at the right, the intensity at point B is one-fourth the intensity as point A and the intensity at point C is one-sixteenth the intensity at point A. Since the intensity-distance relationship is an inverse relationship, an increase in one quantity corresponds to a decrease in the other quantity. And since the intensity-distance relationship is an inverse square relationship, whatever factor by which the distance is increased, the intensity is decreased by a factor equal to the square of the distance change factor. The sample data in the table below illustrate the inverse square relationship between power and distance.

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## Chapter 3 : Intensity and Loudness of Sound ( Read ) | Physics | CK Foundation

*Sound intensity is defined as the sound power per unit area. The usual context is the measurement of sound intensity in the air at a listener's location. The basic units are watts/m 2 or watts/cm 2.*

Use of the internet for research. Review sound waves, particularly: Sound travels through a material as a mechanical wave. The wave is a longitudinal, or compressional, wave. Sound occurs when energy causes air particles to move closer together and further apart. The bigger the amplitude is, the louder and more intense the sound. Sound intensity is measured in Watts per meters squared. Other sound wave properties include the frequency in Hertz how many waves per second , and wavelength literally the length of one wave, from compression to compression. Humans can only hear sounds between 20 and 20, Hertz. Animals have different ranges and may hear sounds we cannot. Loudness is the human perception of sound intensity. It is frequently measured in dB which is a scale based on the human threshold of hearing which is given a measurement of 0 dB on up. Noise is unpleasant or unwanted sounds, and noise pollution is considered to be any sounds that disrupt activities. Students analyze sound level data. Use the data provided with this unit plan or other sound data including where, when and the conditions recorded under, and typical sounds like birdsong. The students can take a sound meter to different areas around the school to collect data. Students should record the time and conditions at which they sampled the data. Using reliable books, articles, and websites, students research how sounds affect people and the natural environment. They can examine both positive and negative effects of sounds of differing loudness, intensity, and duration. Students also investigate methods by which sound intensity can be reduced. Students go to the place where they will be examining the effects of sound, such as a nearby park. Students bring sound level meters preferably capable of measuring dBA to record sound intensities. Students will listen and record all sounds heard over a 15 minute period. Students listen and record extrinsic sounds not typical of the place such as nearby traffic, for 10 minutes. Record observations about weather conditions and characteristics of the place while recording the data. Students may also want to determine which animals are native to the park and determine how the various sounds may affect them. Compare the data to those already collected by others. Consider how the sound levels may affect the natural residents of the park or human visitors. Research more about impacts on the native species. Discuss the impacts orally and write an outline or paper on the probable effects of different sounds on the residents and visitors, human or animal. Could the park experience be enhanced by eliminating or reducing certain sounds? If so, which sounds and how? Park Connections Sounds that are natural to a park are considered natural resources. Birdsong, the bubbling of Hoover Creek, and the sounds of a blacksmith at work are sounds typical of Herbert Hoover National Historic Site. These sounds, both natural and cultural, were sounds Herbert Hoover heard as a boy in West Branch, Iowa. Protecting and preserving them is part of the mission of the National Park Service. Visitors to the park may hear these sounds as well as the encroaching noise from the 21st century like traffic on Interstate  Students studying sound wave properties such as intensity and loudness must also see the effects sounds have on our environment and even how we can reduce any unwanted effects. Students can measure sound properties and then see how they affect the environment and people. Students may even take an active role in preserving and protecting the National Parks by recommending ways to reduce extrinsic noise. Their recommendations should show an understanding of sound properties as well as of the character of the park. In CSV format, which can be opened by a spreadsheet program.

## Chapter 4 : Sound Intensity | Definition of Sound Intensity by Merriam-Webster

*Sound intensity, amount of energy flowing per unit time through a unit area that is perpendicular to the direction in which the sound waves are travelling. Sound intensity may be measured in units of energy or workâ€”e.g., microjoules ( joule) per second per square centimetreâ€”or in units of power, as microwatts ( watt) per square centimetre.*

## Chapter 5 : Intensity Synonyms, Intensity Antonyms | calendrierdelascience.com

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*Sound Intensity. A sound not only has the property of frequency, it has volume, also known as amplitude or calendrierdelascience.com pressure terms, intensity is a measure of the amount of compression and rarefaction of the sound pressure wave.*

## Chapter 6 : Intensity â€“ The Physics Hypertextbook

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## Chapter 7 : Intensity and the Decibel Scale

*The decibel level of a sound having the threshold intensity of 10 âˆ'12 W/m 2 is Î² = 0 dB, because log 10 1 = 0. That is, the threshold of hearing is 0 decibels. Table 1 gives levels in decibels and intensities in watts per meter squared for some familiar sounds.*

## Chapter 8 : Sound intensity | physics | calendrierdelascience.com

*Sound Intensity and Distance. The amount of energy that is transported past a given area of the medium per unit of time is known as the intensity of the sound wave. The greater the amplitude of vibrations of the particles of the medium, the greater the rate at which energy is transported through it, and the more intense that the sound wave is.*

## Chapter 9 : Intensity | Define Intensity at calendrierdelascience.com

*A more convenient way to express sound intensity is the relative logarithmic decibel scale with reference to the lowest human hearable sound - W/m 2 (0 dB). Note! In US the reference 10 watts/m 2 is commonly used.*