

Waterford 7th Gr.  
Science Assignment  
#1 Due May 18

## Did You Hear That?

There are many ways to measure sound. You are probably familiar with the musical scale—do, re, mi, fa, sol, la, ti, do. Each note is higher than the one before it. The musical scale is made up of sounds with a different pitch. **Pitch** is the highness or lowness of a sound. Pitch depends on how many times the air vibrates in a second. The number of vibrations, or back-and-forth motions, per second is called the **frequency**. Frequency is measured in hertz. A **hertz** is one vibration per second.

The faster an object vibrates, the higher the pitch. The slower an object vibrates, the lower the pitch. The human voice can make sounds that range in frequency from around 85 to 1,100 hertz. The range of frequencies a human ear can hear is around 20 to 20,000 hertz. Some animals can hear sounds that humans cannot hear. That is why, for example, there are special whistles used to call dogs. These whistles make sounds at frequencies well above the range of human hearing. Some animals also make sounds that humans cannot hear.

Sound waves move away from their source and travel in many different directions. The loudness, or **volume**, of sound decreases the farther you move away from the source. We can measure volume in units called **decibels**. Volume is determined by amplitude, or the height of the sound waves. As amplitude increases, loudness increases. A sound of zero decibels is the starting point of human hearing. A sound of over 140 decibels may damage human ears. Listening to very loud music for long periods of time can permanently reduce a person's ability to hear.

*Write letters in the blanks below to match each sound word with its definition.*

- |   |              |
|---|--------------|
| 1. _____ the number of vibrations per second    | A. volume    |
| 2. _____ determined by amplitude of sound waves | B. pitch     |
| 3. _____ measurement of the loudness of sound   | C. hertz     |
| 4. _____ highness or lowness of a sound         | D. decibels  |
| 5. _____ frequency is measured by this          | E. frequency |

*Draw lines to match each sound with its average number of decibels. Remember that the louder a sound is, the greater its number of decibels.*

- |                         |              |
|-------------------------|--------------|
| 6. a vacuum cleaner     | 60 decibels  |
| 7. a jet                | 15 decibels  |
| 8. the rustle of leaves | 120 decibels |
| 9. normal conversation  | 85 decibels  |

10. Describe the difference between pitch and volume.

---

---

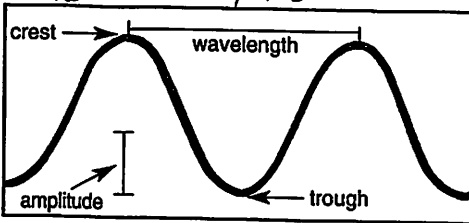
---

Waterford 7th Gr.

Science Assignment #2

Due May 18

# All About Waves



Waves carry energy from one location to another. The **crest** is the highest point of a wave, and the **trough** is the lowest point. The distance from one crest to the next, or from one trough to the next, is called **wavelength**. A wave's **amplitude** is the

distance from the middle level of a wave to the crest or to the trough. The amplitude shows the amount of energy the wave carries. The more energy a wave has, the greater the amplitude.

The number of waves that pass a point in a second is called **frequency**. The unit used to measure frequency is the **hertz**. One wave per second equals one hertz.

A wave's speed depends on the kind of wave and the material it travels through. Light waves and sound waves, for example, travel at different speeds through air. Light waves travel faster through air than sound waves do. That's why even though lightning and thunder are created at the same time, you see lightning before you hear thunder. The equation below shows how wavelength, frequency, and speed are related:

$$\text{wavelength} \times \text{frequency} = \text{speed}$$

To find out how fast a wave is moving if its wavelength is 15 meters and its frequency is 230 hertz, multiply 15 by 230. The speed of the wave is 3450 meters per second.

*Write letters in the blanks below to match each wave property with its definition.*

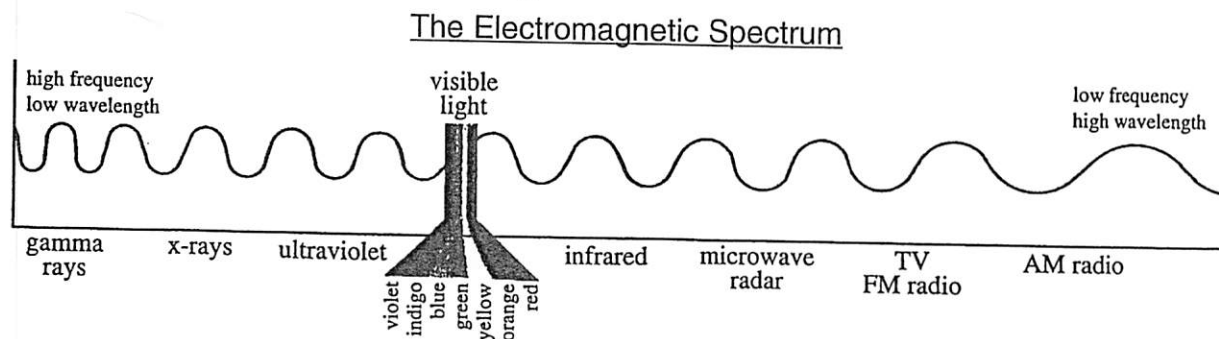
A. frequency      B. amplitude      C. wavelength      D. trough      E. speed

1. \_\_\_\_\_ the distance from one crest to the next crest
2. \_\_\_\_\_ the low point of a wave
3. \_\_\_\_\_ wavelength multiplied by frequency
4. \_\_\_\_\_ the distance from the middle level of a wave to a crest or trough
5. \_\_\_\_\_ the number of waves that pass a point in a second
6. What is the speed when wavelength equals 27 meters and frequency equals 97 hertz?
7. Use a ruler to draw a wave with an amplitude of 1 centimeter and a wavelength of 7 centimeters.

Waterford 7th Gr.  
 Science Assignment  
 #13 Due May 18

## An Energy Chart

The electromagnetic spectrum is a chart that shows many different types of energy arranged according to their wavelength.



There are many kinds of electromagnetic waves. Each kind vibrates at a different wavelength and frequency. (Remember that *wavelength* refers to the distance from one crest or trough to the next. *Frequency* refers to the number of waves that pass a point in one second.) As you go from left to right on the spectrum shown above, wavelength increases and frequency decreases. Some waves, such as the waves that carry radio and television signals, are long, while others, such as x-rays and ultraviolet rays from the sun, are very short. Other types of electromagnetic waves include gamma waves, infrared waves, light waves, and microwaves. The only electromagnetic waves we can see are light or visible waves.

Shorter, high-energy waves such as x-rays can be harmful to people if used improperly. However, when used correctly and in short exposure times, these rays can improve and even save lives. For example, gamma rays from radioactive cobalt are used to kill cancer cells. Doctors use x-rays to "photograph" parts of the body such as teeth and potentially broken bones. Ultraviolet rays have been used to sterilize objects and kill certain kinds of bacteria.

*Complete the following sentences by circling the correct phrase.*

- The waves shown on the electromagnetic spectrum vibrate ( at one speed / at different speeds ).
- The waves shown on the right of the electromagnetic spectrum above vibrate ( more quickly / more slowly ) than the waves on the left.
- In each pair below, circle the waves that vibrate faster.
 

a. gamma rays or radio waves	b. infrared rays or ultraviolet rays
c. ultraviolet rays or x-rays	d. visible light or radio waves
- List the colors of the visible spectrum according to wavelength from longest to shortest.
 

a. _____	b. _____	c. _____	d. _____
e. _____	f. _____	g. _____	