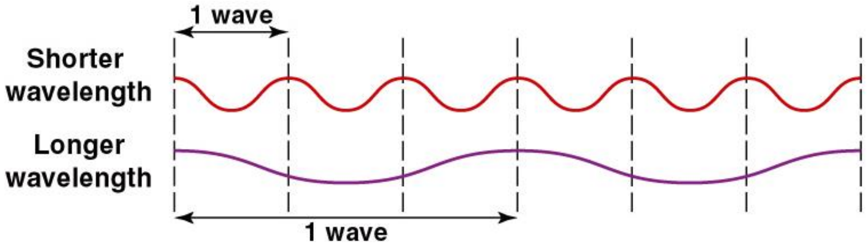
# Sequence n° 3: periodic waves

## ACTIVITY 1 : Waves of all shapes and sizes

First, let's look at what we really mean by a wave. A wave appears on the surface of the ocean when a burst of energy passes through the water. Lots of bursts of energy in a short time make short, choppy waves. Fewer bursts of energy in the same time make longer, drawn out, more graceful waves.

**Document 1: wavelength**

Light waves and radio waves are both electromagnetic energy. The only difference between them is the size of the waves. Light waves are kind of like tiny ripples on the surface of the ocean. Radio waves are more like the long, slow ocean waves that move a whole boat up and down. Electromagnetic energy comes in every wavelength in between these two, as well as waves much shorter than light waves and much longer than the radio waves we use for communication. As a matter of fact, we don't know how long or how short electromagnetic waves can be. We know only the ones we have eyes or instruments to detect.

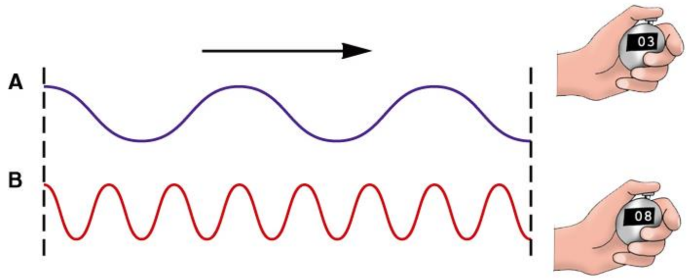



We could pick any wavelength to carry information as long as we could build an instrument that could transmit energy through the air or through space at that wavelength. But it turns out that light waves and shorter wavelengths, besides taking more energy to transmit, get scattered and absorbed easily by Earth's atmosphere. Some short wavelengths (like X-rays and gamma rays) can't penetrate air at all. That's lucky for us, since these highly energetic waves would bombard Earth's surface from space and eventually kill off every living thing!

**Source: Speaking in phases** originally published in The Technology Teacher, April 2001, by the International Technology Education Association

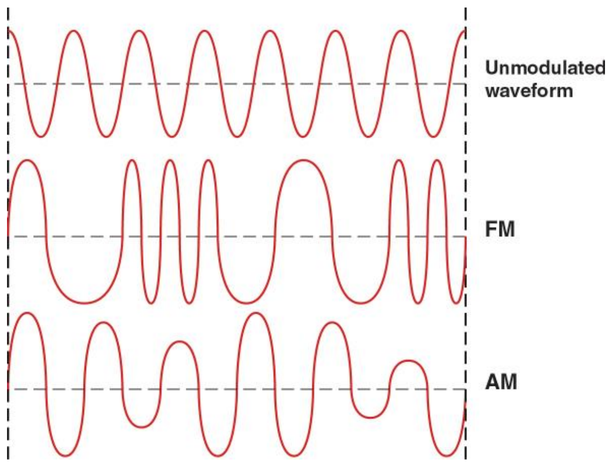
**Document 2: frequency**

Frequency is another way to describe wavelength. Frequency refers to the time it takes for two crests (highest part of the wave) or troughs (lowest part of the wave) in a row to pass the same point in space. The longer the wave, the lower (or slower) the frequency (because it takes longer for the wave to pass a point). The shorter the wave, the higher (or faster) the frequency.




In the above drawing, more B waves than A waves will pass by a certain point in a certain time. So the shorter the wavelength, the higher the frequency.

TV stations and some radio stations put their program information on the wave by adjusting the frequency. FM (as in FM radio stations) means **frequency** modulation. Modulation means changing a radio signal so that it carries information. Some radio stations use amplitude modulation (AM). **Amplitude** is the height of the wave from crest to trough.




**Source: Speaking in phases** originally published in The Technology Teacher, April 2001, by the International Technology Education Association

## Acquiring vocabulary about waves

Explain in your own terms the notion of frequency.

______________________________________________________________________________

Define amplitude.

______________________________________________________________________________

Explain the difference between AM and FM radios.

______________________________________________________________________________

# Activity summary

What you must remember:

**- wavelength**

**- frequency**

**- amplitude**

Skills linked to the curriculum**:**

| Compétences | Capacités à maitriser |
|---|---|
| – ANA | - Caractériser une onde progressive sinusoïdale unidimensionnelle par les grandeurs : fréquence, période, longueur d'onde, célérité, amplitude.<br>- Exprimer la relation entre fréquence, longueur d'onde et célérité. |
| – COM | Formuler et argumenter des réponses structurées<br>Formuler et présenter une conclusion |