



frequency = number of cycles per second. Unit = Hertz or Hz

wavelength= distance between 2 crests. Unit = meter

speed of a wave = wavelength x frequency. In a vacuum, the speed of light is 300,000 km/s or 300,000,000,000 m/s

period = 1/frequency = time for 1 cycle. Unit = second

speed of light = $c = 300,000 \text{ km/s} = 3 \times 10^8 \text{ m/s}$

TRY Not TO USE THE HINTS

1.
Is it correct to say that a radio wave is a low frequency light wave ?

2.
A sound wave moving through water has a frequency of 256Hz and a wavelength of 5.77m.
What is the speed of sound in water ?
Hint: speed of an EM wave = frequency x wavelength with speed= $c=3 \times 10^8 \text{ m/s}$

3.
What is the wavelength of a 100-MHz (FM 100) radio signal ?
Hint: 1MHz = 1,000,000 Hz so 100MHz = 10^8 Hz
Hint: speed of an EM wave = frequency x wavelength with speed= $c=3 \times 10^8 \text{ m/s}$

4.
What is the frequency of a light wave whose wavelength is $5.5 \times 10^{-7} \text{ m}$ (0.0000055 m)
Hint: speed of an EM wave = frequency x wavelength with speed= $c=3 \times 10^8 \text{ m/s}$
on the TI 5.5E-7

5.
compare the frequency of the longest radio waves with that of the shortest gamma rays. This factor applies to the energy too.
Hint: to find a factor divide the large number by the small number. So divide frequency of gamma rays by frequency of radio waves.
On TI 10^{20} is noted E20 NOT 10E20 !!!!!

7.

For each of these telescopes/observatories describe:

A) the EM range it covers (like is it in sensible light ? Infra-red ? UV? ..)

B) the full name (example HST stands for Hubble Space Telescope)

C) its mission.

D) 1 example of what it discovered

(search field from : <http://www.nasa.gov/missions/current/index.html> is a good resource + wikipedia.org and lecture notes)

	FULL NAME	EM RANGE	MISSION	DISCOVERY
S P I T Z E R				
C H A N D R A				
S W I F T				
G A L E X				
H S T	Hubble Space TElescope			
P L A N C K				
W M A P				

8) The wave model of light is better than the particle model explaining (see slides)

- a) shadows
- b) reflections
- c) constructive interference
- d) the inverse square intensity drop with distance

9) The uniqueness of the spectral line pattern of any element is caused by

- a) the density of the gas in the stellar atmosphere
- b) the energy structure of the atom
- c) the temperature of the atmosphere
- d) the Doppler shift

10) Atoms have particular associated spectral lines because:

- a) electrons have only certain allowed orbits
- b) light consists of waves
- c) light waves can show the Doppler effect
- d) photons have only allowed orbits
- e) speed of light in a vacuum is a constant.