

Tutorial for PHYS210 lectures 2 and 3. EM spectrum & light sources

1. Look with the hand-held spectrometer to the following light sources and classify the spectrum you see as a line spectrum or continuous spectrum:  
A) Incandescent light bulb B) sodium lamp C) fluorescent tube

2. Consider blue light with a wavelength of 450nm.  
What is the speed in vacuum?  
What is the frequency in vacuum?  
What is the energy per photon in vacuum?

This light enters water ( $n=1.33$ ).  
What is the speed of this light in water?  
What is the wavelength of this light in water?  
What is the frequency of this light in water?  
What is the energy per photon of this light in water?

What kind of light source can produce such light?

3. How many times can light go around the earth in 1 second if it travels through the air? (the circumference of the earth is 40,000 km). What if the light travels through an optical fibre with  $n=1.5$ ?

4. Which has the longest wavelength?  
(A) Infrared radiation (B) X rays (C) Blue light

5. Which has the highest frequency?  
(A) Red light (B) Green light (C) Blue light

6. Which has the highest energy per photon?  
(A) Infrared A radiation (B) Infrared B radiation (C) Infrared C radiation

7. Why is infrared A radiation invisible?  
Why is ultraviolet A radiation invisible?

8. Red and green light are combined. What is the resultant colour?  
Blue and yellow light are combined. What is the resultant colour?

9. Cyan light passes through a magenta filter. What colour is the light after the filter?  
Yellow light passes through a green filter. Which colour is absorbed?

10. A solid is heated to a temperature of 3000K. At what wavelength is its peak emission?  
What type of radiation is that?