Please, Do NOT write on this…thank you ☺ # Waves and the Electromagnetic Spectrum

Directions: On a loose leaf sheet of paper, for each of the following questions, write the question and pair of choices and follow the directions for each question:

1. Circle the form of radiation with the *LONGER WAVELENGTH*:
   a. red light OR blue light
   b. microwaves OR radio waves
   c. infrared radiation OR red light
   d. gamma rays OR UV radiation
2. Circle the form of radiation with the *GREATER FREQUENCY*:
   a. yellow light OR green light
   b. x-rays OR gamma rays
   c. UV radiation OR violet light
   d. AM radio waves OR FM radio waves
3. Circle the form of radiation with the *LOWER ENERGY*:
   a. red light OR blue light
   b. microwaves OR radio waves
   c. infrared radiation OR red light
   d. gamma rays OR UV radiation
   e. yellow light OR green light
   f. x-rays OR gamma rays
   g. UV radiation OR violet light
   h. AM radio waves OR FM radio waves
4. Rewrite the following after ranking the series from *low frequency to high frequency:*
   a. infrared light, radio waves, x-rays
   b. black light, nuclear energy, cell phone
   c. visible light, television waves, gamma rays
5. Rewrite the following after ranking the series from *high energy to low energy:*
   a. x-rays, gamma rays, visible light
   b. heat lamp, wireless network, sterilizer
   c. visible light, UV light, radio waves
6. Rewrite the following after ranking the series from *short wavelength to long wavelength:*
   a. sterilization, cooking, TV remote
   b. television wave, x-ray, microwave
   c. UV light, gamma rays, visible light

Directions: Match each kind of wave with one item from column one and one item from column two.

COLUMN 1		WAVE		COLUMN 2
A. used in remote controls for TVs and VCRs	_____	RADIO	_____	**H.** used to detect illegal plane plane carry on
B. goes through most matter except bone and lead	_____	MICROWAVE	_____	**I.** used to kill bacteria on food
C. highest frequency and energy	_____	INFRARED	_____	**J.** R O Y G B I V
D. can cause skin cancer or promote vitamin D production	_____	VISIBLE	_____	**K.** lowest frequency
E. longest wavelength	_____	ULTRAVIOLET	_____	**L.** most dangerous waves
F. used to transmit cellular phone calls	_____	X-RAY	_____	**M.** warming food with a heat lamp
G. wavelengths and frequencies that can be seen by the eye	_____	GAMMA	_____	**N.** radiant rays used in cooking

7. As you go across the EM spectrum from radio to gamma, what happens to the frequency and energy of the waves?
8. As you go across the EM spectrum from radio to gamma, what happens to the wavelength of the waves?
9. What happens to the speed of light as it enters a different *medium*?
10. Which color of the visible light portion of the EM spectrum has the highest frequency and the most energy?
11. Which color of the visible light portion of the EM spectrum has the shortest wavelength?

Directions: rewrite the question and underline each word used from the word bank. ***EACH WORD WILL BE USED ONLY ONCE*****.**

crest	**frequency**	**mechanical**	**infrared**
trough	**transverse**	**radio**	**gamma**
wavelength	**longitudinal**	**ultraviolet**	**x-rays**
visible light	**amplitude**	**electromagnetic**	

12. _____ waves are used to penetrate solids and are used in doctor's offices and airports.
13. _____ is the distance between one point of a wave to the same point in the next wave.
14. _____ is the number of waves per unit of time.
15. _____ waves occur when the motion of the medium is parallel to the direction of the wave.
16. _____ waves have a color spectrum known as ROYGBIV.
17. _____ waves disturb matter.
18. _____ is the top of a wave.
19. _____ is the bottom of a wave.
20. _____ is the maximum distance that matter is displaced from the resting position.
21. _____ waves are produced by stars and galaxies.
22. _____ waves occur when the motion of the medium is at right angles (perpendicular) to the direction of the wave.
23. _____ waves are often used in heat lamps.
24. _____ waves are utilized by insects to locate nectar.
25. _____ waves are transverse waves that disturb electromagnetic fields.
26. _____ waves have the shortest wavelength and the highest frequency.

Calculations Directions: read each statement below carefully. Use the 5 Steps to Problem Solving to show all necessary work and steps on a separate sheet of paper.

27. Springfield's "Classic Rock" radio station broadcasts at a frequency of 102.1 MHz. What is the length of the radio wave **in meters**?

28. A beam of light has a wavelength of 506 nanometers. What is the frequency of the light? What color is the light?

29. Blue light has a frequency of 6.98×10^{14} Hertz. Calculate the wavelength of blue light **in nanometers**.

Directions: rewrite the question and underline each word used from the word bank. ***You will NOT need to use every term*****.**

Electromagnetic radiation	**Gamma rays**	**Radiant energy**	**Visible light**
Electromagnetic spectrum	**Infrared waves**	**Radio waves**	**Wavelength**
Frequency	**Microwaves**	**Ultraviolet rays**	**X-rays**

30. _____ The ____ represents the different forms of electromagnetic radiation.
31. _____ Light is classified as ____ because electrical and magnetic fields vibrate in a light wave.
32. _____ ____ is energy that travels by radiation. An example of this is light.
33. _____ Heat radiation, also known as ____, cannot be seen by your eyes but can be felt by your skin.
34. _____ Microwaves are one type of ____.
35. _____ ____ can be used to communicate with satellites.
36. _____ because ____ have the highest energy of all electromagnetic radiation, they are the most damaging to human skin.
37. _____ Compared to all other types of electromagnetic radiation, radio waves have the lowest ____.
38. _____ An overexposure to ____ can result in sunburns and skin cancer.

39. Why does an empty paper plate not heat up in the microwave?

40. Why should you use sunscreen and a hat when you are out in the Sun?