

Ch. 3 and 4 Review Questions

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1 Light and spectroscopy

- Which of these properties for waves on a string are measured in length units only (e.g., meters, mm, etc)? (Circle more than one.)
(a) speed (b) frequency (c) amplitude (d) wavelength (e) period
- Which of these properties for waves on a string are measured in time units only (e.g., sec, sec^{-1} , hrs, etc)? (Circle more than one.)
(a) speed (b) frequency (c) amplitude (d) wavelength (e) period
- Which type of electromagnetic radiation has the longest wavelength?
(a) Radio (b) visible (c) ultraviolet (d) infrared
(e) gamma rays
- What are the colors contained in white light, ordered from low to high frequency? (First letter only. Give at least six colors.)
- Which type of electromagnetic radiation has the lowest frequency?
(a) Radio (b) visible (c) ultraviolet (d) infrared (e) gamma rays
- Which type of electromagnetic radiation has the highest frequency?
(a) Radio (b) visible (c) ultraviolet (d) infrared
(e) gamma rays
- Name a phenomenon of light which is characteristic of waves but not particles.

- Which of these types of electromagnetic radiation is harmful to living tissues? (Circle two)
(a) gamma rays (b) infrared (c) radio (d) visible light (e) x-rays
- Which of these types of electromagnetic radiation can penetrate the Earth's atmosphere, at least down to the mountain tops? (Circle more than one.)
(a) gamma rays (b) infrared (c) radio (d) visible light (e) x-rays
- Which of these "rays" are not electromagnetic radiation at all? (Circle more than one.)
(a) x-rays (b) cosmic rays (c) beta rays (d) alpha rays (e) gamma rays

11. The temperature of an ideal blackbody can be measured from the _____ its spectrum.
- (a) emission lines in
 - (b) absorption lines in
 - (c) peak intensity of
 - (d) wavelength of peak intensity for
 - (e) width of absorption lines in
12. The amount of radiation leaving a blackbody depends on temperature raised to the _____ power.
- (a) 1st
 - (b) 2nd
 - (c) 3rd
 - (d) 4th
 - (e) 5th
13. Varying the current flowing through a lightbulb will change the filaments temperature and allow one to demonstrate _____.
- (a) Wien's law
 - (b) Stefan's Law
 - (c) Kirchoff's laws
 - (d) Wien's law and Stefan's law
 - (e) Newton's law
14. The pitch of a train horn will drop as the train passes because of the _____ effect.
15. The spectrum of a star moving away from us will be _____ compared to a similar star at rest.
- (a) redshifted
 - (b) blueshifted
 - (c) neither redshifted or blueshifted
 - (d) brighter
 - (e) dimmer
16. The spectrum of a star moving toward us will be _____ compared to a similar star at rest.
- (a) redshifted
 - (b) blueshifted
 - (c) neither redshifted or blueshifted
 - (d) brighter
 - (e) dimmer
17. T or F. The Doppler effect can occur in sound waves and electromagnetic waves.
18. If light with a continuous spectrum is shined through a cool gas, the light that comes out is
- (a) brighter
 - (b) still a continuous spectrum

- (c) an emission line spectrum
 - (d) an absorption line spectrum
19. If a gas is “excited” with electricity, it is most likely to produce
- (a) a spectrum completely in the infrared
 - (b) a continuous spectrum
 - (c) an emission line spectrum
 - (d) an absorption line spectrum
20. Kirchoff’s laws describe how three types of _____ are formed.
21. The physics experiment that shined photons of light on a metal slab to release electrons was called the _____.
22. The simplest atom is that of the element _____, which has one proton and one _____.
23. T or F The emission lines of hydrogen have a series of wavelengths that can be fit by a fairly simple mathematical equation.
24. Typical stellar spectra appear as:
- (a) a series of bright, colored lines.
 - (b) an unbroken rainbow of colors.
 - (c) a rainbow, but with some dark lines mixed in.
 - (d) a rainbow with some bright lines on top of the continuum.
 - (e) a very red shifted rainbow due to the expansion of the universe.
25. In the atom, which particles give the element its identity (atomic number)?
- (a) positrons
 - (b) electrons
 - (c) protons
 - (d) neutrons
 - (e) neutrinos
26. The classical model of the hydrogen atom that explains its spectral line structure is due to:
- (a) Kirchoff.
 - (b) Bohr.
 - (c) Fraunhofer.
 - (d) Newton.
 - (e) Mendeleev.
27. The splitting of spectral lines in the presence of strong magnetic fields is the:
- (a) Doppler Effect.
 - (b) Second Law of Kirchoff.

- (c) Zeeman Effect.
- (d) Photoelectric Effect.
- (e) polarization of sunlight.

28. The broadening of spectral lines can be caused by:

- (a) density of the hot medium.
- (b) thermal motion of the hot atoms.
- (c) rotation of the star.
- (d) magnetic fields of the star.
- (e) all of the above.