

Physics 1051. Planetary Astronomy

Quiz 4 REVIEW.

Light and spectroscopy

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

7. Which of these is a type of electromagnetic radiation which is harmful to living tissues? (Circle one)
(a) gamma rays (b) infrared (c) radio (d) visible light (e) cosmic rays
8. 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
9. The pitch of a train horn will drop as the train passes because of the _____ effect.

10. 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
11. 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
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

1 Light and telescopes

(NOTE: Only those with ** are important.)

1. The diameter of the pupil is about 0.2 inches. How many times fainter than the naked-eye limit can be seen with a 1-inch diameter telescope? (Hint: LGP)
 - (a) 2 times (b) 4 times (c) 5 times (d) 25 times
2. The Light Gathering Power (LGP) of a telescope of mirror diameter D is proportional to
 - (a) D (b) D^2 (c) $1/D$ (d) the eye's pupil diameter
3. The following are designs of reflecting telescopes except the

- (a) refractor (b) Newtonian (c) Prime focus (d) Cassegrain (e) Coude
4. What is the faintest star that we can see using a telescope with a lens diameter 10 times greater than that of our pupil?
- (a) 1.0 (b) -6.0 (c) 4.0 (d) 6.0 (e) 11.0
5. The various types of reflecting telescopes can be distinguished by the position of their _____.
- (a) focal plane (b) primary mirror (c) secondary mirror (d) finder scopes (e) clock drive
6. The resolution of a telescope improves as you increase _____.
- (a) the magnification (b) the secondary mirror diameter (c) the distance to the double stars (d) the focal length (e) the objective's diameter
7. ** In the _____ design of reflecting telescope, there is a hole through the center of the primary.
- (a) Cassegrain (b) refractor (c) Prime (d) Coudé (e) Newtonian
8. ** Diffraction and refraction are examples of _____
- (a) telescopic imperfections (b) tricks of the eye (c) wave properties of light (d) particle properties of light (e) energy
9. Light comes in discrete 'pieces' of energy called _____
- (a) Joules (b) keppers (c) Planck's (d) photons (e) bullets
10. ** Besides visible light, the type of electromagnetic radiation which is least absorbed by the Earth's atmosphere is _____.
- (a) radio waves (b) X-rays (c) gamma-rays (d) cosmic-rays (e) infrared waves
11. ** Which wave property of light is often measured in nanometers and is related to color?
- (a) frequency (b) energy (c) wavelength (d) c , the speed of light (e) redshift

The Sun

NOTE: Much of this material has not yet been covered in class, but may be asked on a quiz if it is related to assigned reading or homework questions.

1. What is the temperature of the Sun's surface (the photosphere)?

- (a) 600 K (b) 2000 K (c) 3800 K (d) 5800 K (e) 10,000 K

2. This layer of the Sun's atmosphere includes gas with temperatures ranging from 15,000 K to about 1,000,000 K.
 - (a) photosphere
 - (b) radiative zone
 - (c) transition region
 - (d) chromosphere
 - (e) convective zone
3. Above the radiative zone of the Sun is a zone where heat is transferred upward by bulk motion of gas, a process called _____.
 - (a) conduction
 - (b) convection
 - (c) radiation
 - (d) projection
 - (e) reflection
4. The Sun generates all of its energy in a region called the _____.
 - (a) core
 - (b) fun zone
 - (c) radiative zone
 - (d) convective zone
 - (e) nucleus
5. The most powerful, short-lived explosions on the Sun's surface are called _____.
 - (a) coronal holes
 - (b) flares
 - (c) prominences
 - (d) filaments
 - (e) fusion
6. Which of these surface features on the Sun is the most short-lived?
 - (a) sunspots
 - (b) flares
 - (c) supergranules
 - (d) prominences
 - (e) coronal holes
7. When a gas is maintaining a stable, spherical shape, gravity is balanced by _____.
 - (a) temperature
 - (b) pressure
 - (c) density
 - (d) frictional forces
 - (e) electrical sources
8. Evidence for convection on the Sun is seen in bubble-like features about 1000 km across called _____.
 - (a) flares
 - (b) Texans
 - (c) granules
 - (d) prominences
 - (e) sunspots
9. The inhibition (prevention) of convection in regions of strong magnetic fields gives rise to _____.
 - (a) sunspots
 - (b) prominences
 - (c) flares
 - (d) granules
 - (e) the sunspot cycle
10. The Sun's chromosphere is more difficult to observe (fainter) than the photosphere because it is _____.
 - (a) more colorful
 - (b) cooler
 - (c) farther away
 - (d) more diffuse (less dense)
 - (e) eclipsed by the Sun
11. What is the deepest layer that we can see of the Sun in visible wavelengths?
 - (a) corona
 - (b) chromosphere
 - (c) photosphere
 - (d) convective zone
 - (e) radiative zone
12. Which layer of the Sun emits most of the photons that reach our eyes directly?
 - (a) corona
 - (b) chromosphere
 - (c) photosphere
 - (d) convective zone
 - (e) radiative zone

13. T or F. The density and temperature in the solar corona are much higher than in the photosphere.
14. Name a region of the Sun that produces an emission line spectrum, in accordance with Kirchoff's laws.

15. In what surface feature of the Sun would you expect to observe absorption lines that are split into 3 lines because of a strong magnetic field? _____
16. The nearest star to the Earth can be easily resolved by telescopes. It is called _____.
17. What provides the most direct evidence of nuclear reactions currently occurring in the Sun's core?
- (a) visible light emitted from the core
 - (b) gamma rays emitted from the core
 - (c) x-rays
 - (d) helioseismic vibrations on the surface
 - (e) neutrinos emitted from the core
18. The *number* of sunspots on the Sun increases and decreases with a period of about _____.
19. The latitude of sunspots on the Sun increases and decreases with a period of about _____.
20. After one, 11 year sunspot cycle, things are back to the starting state except that the _____ of the sunspot pairs is reversed.
21. The CME's from the Sun can lead to _____ on Earth.
- (a) coronas
 - (b) annihilation
 - (c) auroras
 - (d) migraines
 - (e) helioseismology
22. What is the name of the particular nuclear fusion process that provides most of the Sun's power?

23. T or F. Since neutrinos can pass through light years of lead without obstruction, we can't construct a neutrino detector on Earth.