AST1002 Spring 2018 Midterm Review Questions

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Abstract

This is a set of review questions for the upcoming midterm exam on **March 13, 2018**. These questions are on the material covered from chapters 1 – 5, 8, and parts of chapter 9. The questions that are in this review are very similar in style and difficulty to those that will be on the actual midterm. It will not be important to memorize facts for the exam (e.g. the mass of the Earth), but to know important definitions and to understand *why* things happen.

1. A science is:

   (a) Any field of study aimed at finding the truth

   (b) Any field of study aimed at describing the physical world

   (c) Any field of study centered around repeatable experimentation

   (d) Any field of study that uses mathematics

2. Astronomy is:

   (a) The study of the universe and its contents

   (b) The study of the Solar System and its contents

   (c) The study of how the positions of the celestial bodies relate to personality

   (d) The study of the physical world

3. Geocentrism is:

   (a) The view that celestial bodies orbit the Earth

   (b) The view that celestial bodies orbit the Sun

   (c) The view that the Earth orbits the Sun

   (d) The view that the Moon orbits the Earth, but the Earth orbits the Sun

4. The procession of the Earth's North pole is caused by:

   (a) The gravitational attraction from the Sun

   (b) The tilt in the Earth's rotational axis

   (c) The fact that the Earth isn't perfectly spherical, but is an oblate sphere

   (d) The tidal bulge the sun produces on the Earth

5. Celestial coordinates – the position of objects in the night sky – are given by:

   (a) Horizontal position and vertical position
   (b) Distance and angle
   (c) Right ascension and declination
   (d) Longitude and latitude

6. Sidereal time is defined as:

   (a) The time it takes for an object to pass overhead
   (b) The right ascension of your zenith
   (c) The right ascension of the Earth
   (d) The declination of your zenith

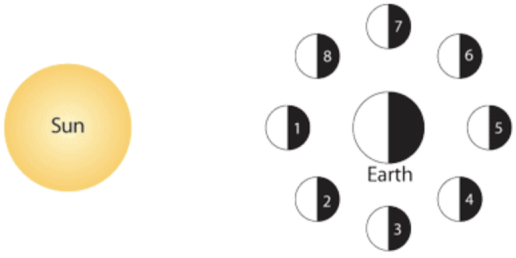
7. Which of the choices below is a list of things in correct order from largest to smallest?

   (a) Sun, Earth, Solar System, Milky Way, Universe
   (b) Universe, Milky Way, Sun, Earth, Solar System
   (c) Solar System, Earth, Sun, Universe, Milky Way
   (d) Universe, Milky Way, Solar System, Sun, Earth

8. While watching a star, you see it moves 15 degrees across the sky. How long have you been watching it?

   (a) 1 hour
   (b) 3 hours
   (c) 15 minutes
   (d) 15 seconds

9. Shown above is an image of the Moon in the waxing crescent phase. In the diagram below, circle the position of the Moon in the sky corresponding to this phase.



10. An annular eclipse is caused when:

    (a) The Moon's umbra touches the Earth

    (b) The Moon's umbra doesn't touch the Earth

    (c) The Earth's umbra touches the Moon

    (d) The Earth's umbra doesn't touch the Moon

11. Consider two beams of light: beam 1 has a wavelength $\lambda_1 = 500$nm and beam 2 has a wavelength $\lambda_2 = 600$nm. Which of the following statements is true?

    (a) Beam 1 has more energy than beam 2

    (b) Beam 2 has a larger frequency than beam 1

    (c) Beam 1 is redder than beam 2

    (d) Beam 2 is bluer than beam 1

12. In isotropic emission of light, brightness:

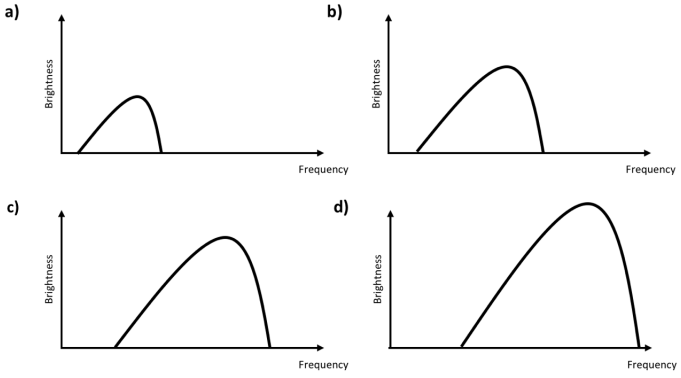
    (a) Increases with distance

    (b) Decreases with distance

    (c) Remains the same regardless of distance

    (d) None of the above

13. Below is a selection of brightness vs. frequency graphs of blackbodies. Choose the graph that corresponds to the blackbody at the highest temperature.



14. Which of the following properties is the same for all types of electromagnetic radiation?

    (a) Wavelength

    (b) Frequency

    (c) Speed

    (d) Photon energy


Hydrogen

15. The above image is of:

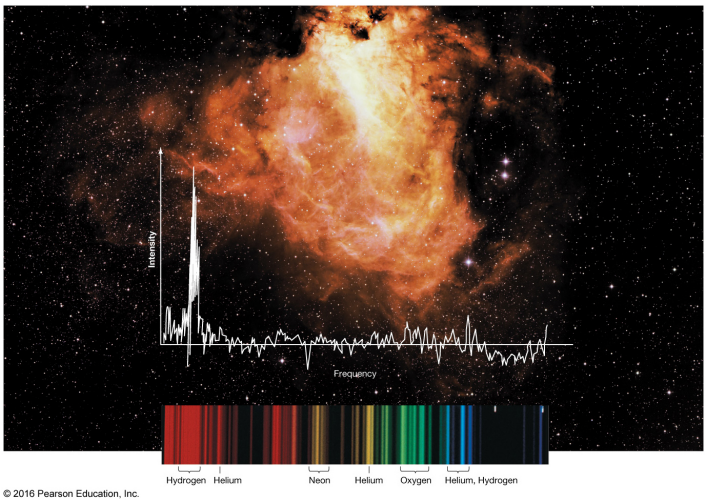
    (a) A cold gas emitting light
    (b) A hot gas emitting light
    (c) A cold gas absorbing light
    (d) A hot gas absorbing light

16. Which of the following statements about blackbodies is true?

    (a) They appear black to us, regardless of temperature
    (b) They emit light in discrete colors, not as a continuum
    (c) The brightness peaks at a color determined by its temperature
    (d) They have a thermal energy of zero

17. The Doppler Effect is a phenomenon that allows one to measure a star's:

    (a) Temperature
    (b) Radius
    (c) Line-of-sight speed
    (d) Chemical composition



18. In the above image, the gas is composed mainly of which element:

    (a) Hydrogen
    (b) Helium
    (c) Neon
    (d) Oxygen

19. A planet is distinguished from stars in the night's sky by its:

    (a) Motion along the ecliptic
    (b) Retrograde motion
    (c) Anterograde motion
    (d) Fixed position in the sky

20. Which of the following features of planets **cannot** be explained by the geocentric model?

    (a) Retrograde motion
    (b) Moons
    (c) Rising and setting of planets during a day
    (d) Only seeing planets during certain times of the year

21. Kepler's third law states:

    (a) All planetary orbits around the Sun are elliptical
    (b) All planetary orbits around the Sun are circular
    (c) The period of a planetary orbit is related to the mass of the planet
    (d) The period of a planetary orbit is related to the semi-major axis of the orbit

22. The farthest object in the Solar System is:

    (a) Uranus
    (b) Neptune
    (c) Pluto
    (d) The Kuiper Belt

23. Which of the following is a consequence of tidal locking of the Moon?

    (a) We always see the same face of the Moon
    (b) The rotational period of the Moon is longer than its orbital period
    (c) The rotational period of the Moon is shorter than its orbital period
    (d) The Moon is a perfect sphere

24. Greenhouse gases absorb light in what part of the spectrum?

    (a) Radio
    (b) Infrared
    (c) Visible
    (d) Ultraviolet

25. Which of the following is true about the Earth's magnetosphere?

    (a) It vanished about 3 billion years ago when the Earth cooled
    (b) It's powered by the Earth's rotating core
    (c) Its lines run parallel to the equator
    (d) It's perfectly spherical

26. What makes the Earth unique in our Solar system?

    (a) Volcanoes
    (b) Liquid water
    (c) Water of any kind
    (d) Weather

27. If you were on a planet without an atmosphere, the daytime sky would be black

    (a) True
    (b) False

28. The planets within the asteroid belt are composed mainly of:

    (a) Metals like iron
    (b) Hydrogen
    (c) Helium
    (d) Rock

29. The planets outside of the asteroid belt are composed mainly of:

    (a) Metals like iron
    (b) Hydrogen
    (c) Helium
    (d) Rock

30. Starting from the center and moving out, the Sun's layers are:

    (a) The core, radiation zone, atmosphere, and convection zone
    (b) The radiation zone, core, convection zone, and atmosphere
    (c) The core, radiation zone, convection zone, and atmosphere
    (d) The core, convection zone, radiation zone, and atmosphere

31. Which of the following statements is true?

    (a) The convection zone and radiation zone are both transparent
    (b) The radiation zone is transparent, but not the convection zone
    (c) The convection zone is transparent, but not the radiation zone
    (d) Neither the radiation zone nor the convection zone are transparent

32. Which layer of the solar atmosphere is the hottest?

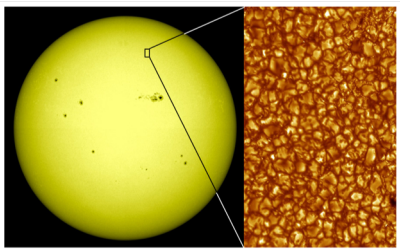
    (a) The photosphere
    (b) The chromosphere
    (c) The transition zone
    (d) The corona

33. The Sun is powered by:

    (a) Fusion of hydrogen
    (b) Fusion of helium
    (c) Fission of hydrogen
    (d) Fission of helium

34. The process of burning hydrogen is sumarized by which reaction?

    (a) $3p^+ \rightarrow {}^3\text{He}$ + energy
    (b) $2p^+ + 2n \rightarrow {}^4\text{He}$ + energy
    (c) $4p^+ \rightarrow {}^3\text{He}$ + energy
    (d) $4p^+ \rightarrow {}^4\text{He}$ + energy

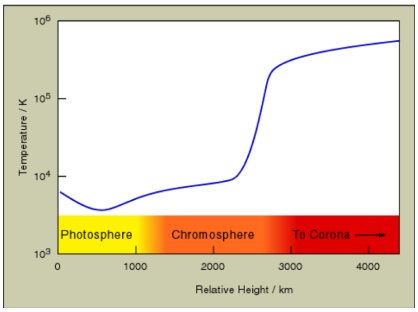


35. In the above image of the Sun, the bright spots within the granules should be:

    (a) Bluer than the dark spots
    (b) Redder than the dark spots
    (c) Colder than the dark spots
    (d) None of the above

36. Which of the following statements is true?

    (a) The Sun is yellow but appears white due to absorption in the atmosphere
    (b) The Sun is white but appears yellow due to absorption in the atmosphere
    (c) The Sun is yellow but appears white due to scattering in the atmosphere
    (d) The Sun is white but appears yellow due to scattering in the atmosphere



37. Referring to the figure above, the temperature of the corona is easily explained by the second law of thermodynamics.

    (a) True

    (b) False

38. Which of the following methods is used to determine the distance to nearby stars?

    (a) Radar

    (b) Stellar parallax

    (c) Spectroscopy

    (d) The Tully-Fisher relation

39. The larger the parallax angle of a star, the farther it is from Earth

    (a) True

    (b) False

40. Above is the spectrum of an unknown star superimposed over the spectrum of the Sun. Which of the following statements about the unknown star is true?

    (a) It is blueshifted and moving towards us

    (b) It is redshifted and moving towards us

    (c) It is blueshifted and moving away from us

    (d) It is redshifted and moving away from us