

# AST1002 MIDTERM

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## Abstract

This exam consists of **30 multiple choice questions**. **You must record your answers on a Scantron sheet.** Don't record your answers on this print-out; I will not accept it as a submission. Fill the Scantron sheet in with a pencil, not a pen. **Don't forget to include your name on the Scantron sheet, as well as the course: AST1002.**

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 experimental tests of conjectures
  - (d) Any field of study that uses mathematics
2. The procession of the Earth's North pole is caused by:
  - (a) The fact that the Earth isn't perfectly spherical, but is an oblate sphere
  - (b) The gravitational attraction from the Sun
  - (c) The tilt in the Earth's North pole
  - (d) The tilt in the Earth's orbital plane
3. A light year is:
  - (a) 6 million miles
  - (b) 6 billion miles
  - (c) How long it takes light to travel 6 million miles
  - (d) How far light travels in one year
4. A constellation is a cluster of stars, all about the same distance from Earth.
  - (a) True
  - (b) False

5. 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
6. Which of the choices below is a list of things in correct order from smallest to largest?
- (a) Star, Solar System, Galaxy, Universe
  - (b) Star, Galaxy, Solar System, Universe
  - (c) Solar System, Star, Galaxy, Universe
  - (d) Universe, Galaxy, Solar System, Star

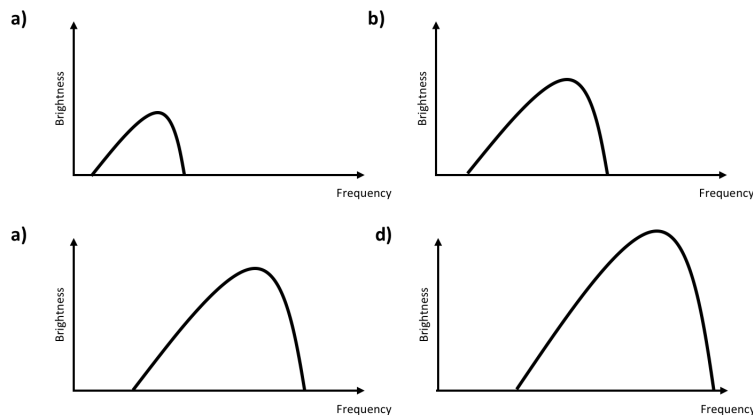


7. Shown above is an image of the Moon in some phase. Which position from the diagram below is the correct position of the Moon around the Earth for this phase?



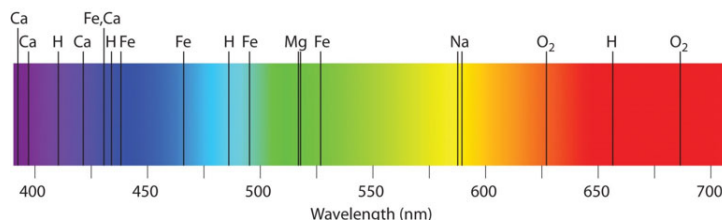
- (a) 1
  - (b) 3
  - (c) 5
  - (d) 7
8. An annular lunar eclipse is caused when:
- (a) The Moon's umbra touches the Earth
  - (b) The Moon's umbra doesn't touch the Earth
  - (c) The Earth's umbra touches the Moon
  - (d) The Earth's umbra doesn't touch the Moon

9. The nucleus of an atom is composed of:
- (a) Electrons and neutrons
  - (b) Protons and neutrons
  - (c) Electrons and protons
  - (d) Electrons, protons, and neutrons
10. A proton is:
- (a) A meson, composed of two leptons
  - (b) A meson, composed of two quarks
  - (c) A baryon, composed of three leptons
  - (d) A baryon, composed of three quarks
11. Consider two beams of light: beam 1 has a frequency  $f_1 = 5 \times 10^{14}\text{Hz}$  and beam 2 has a frequency  $f_2 = 6.5 \times 10^{14}\text{Hz}$ . Which of the following statements is true?
- (a) Beam 2 has a larger wavelength than beam 1
  - (b) Beam 1 has a larger wavelength than beam 2
  - (c) Beam 1 has more energy than beam 2
  - (d) Beam 2 is redder than beam 1
12. For a blackbody, which of the following statements is true?
- (a) As the temperature increases, the light gets brighter and redder
  - (b) As the temperature increases, the light gets dimmer and redder
  - (c) As the temperature increases, the light gets brighter and bluer
  - (d) As the temperature increases, the light gets dimmer and bluer
13. Below is a selection of brightness vs. frequency graphs of blackbodies. Choose the graph that corresponds to the blackbody at the highest temperature. (**Note: the lower-left graph should be marked (c), not (a).**)



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

- (a) Wavelength
- (b) Frequency
- (c) Speed
- (d) Photon energy



15. The above image is of:

- (a) A gas composed of a single element emitting light
- (b) A gas composed of multiple elements emitting light
- (c) A gas composed of a single element absorbing light
- (d) A gas composed of multiple elements absorbing light



16. 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

17. Which of the following is the Doppler Effect?

- (a) Objects moving towards us appear redder
- (b) Objects moving towards us appear brighter
- (c) Objects moving away from us appear redder
- (d) Objects moving away from us appear brighter

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

- (a) Radial velocity
- (b) Transverse velocity
- (c) Distance from Earth
- (d) Parallax

19. Planetary orbits are:
- (a) Parabolic
  - (b) Hyperbolic
  - (c) Elliptical
  - (d) Circular
20. Which of the following is a consequence of Kepler's second law:
- (a) Planetary orbits are circular
  - (b) Planetary orbits are elliptical
  - (c) The closer a planet gets to the Sun, the faster it moves
  - (d) The further a planet gets from the Sun, the faster it moves
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 edge of the Solar System is determined by:
- (a) Uranus
  - (b) Neptune
  - (c) Pluto
  - (d) The Oort Cloud
23. Which of the following features of planets **cannot** be explained by the geocentric model?
- (a) Rising and setting of stars at night
  - (b) Retrograde motion of planets
  - (c) Only seeing constellations during certain times of the year
  - (d) Galileo's discovery that Jupiter has moons
24. 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

25. The greenhouse effect is caused by which of the following?
- (a) Too much gas in the atmosphere
  - (b) Too little gas in the atmosphere
  - (c) Gases that scatter visible light in the atmosphere
  - (d) Gases that scatter infrared light in the atmosphere
26. Solar radiation (the Solar wind) doesn't affect us near the surface of the Earth because:
- (a) The Earth's magnetosphere deflects it
  - (b) The Earth's magnetosphere absorbs it
  - (c) The Earth's atmosphere deflects it
  - (d) The Earth's atmosphere absorbs it
27. If you were on a planet with an atmosphere, the daytime sky would be dark.
- (a) True
  - (b) False
28. Terrestrial planets are composed mainly of:
- (a) Hydrogen
  - (b) Helium
  - (c) Iron
  - (d) Uranium
29. Gas giants are composed mainly of:
- (a) Hydrogen
  - (b) Helium
  - (c) Iron
  - (d) Uranium
30. Which of the following statements is true?
- (a) The sky on Mars appears red because it scatters blue light
  - (b) The sky on Mars appears red because it scatters red light
  - (c) The sky on Mars appears red because it absorbs yellow light
  - (d) The sky on Mars appears red because it absorbs red light