

Name: _____

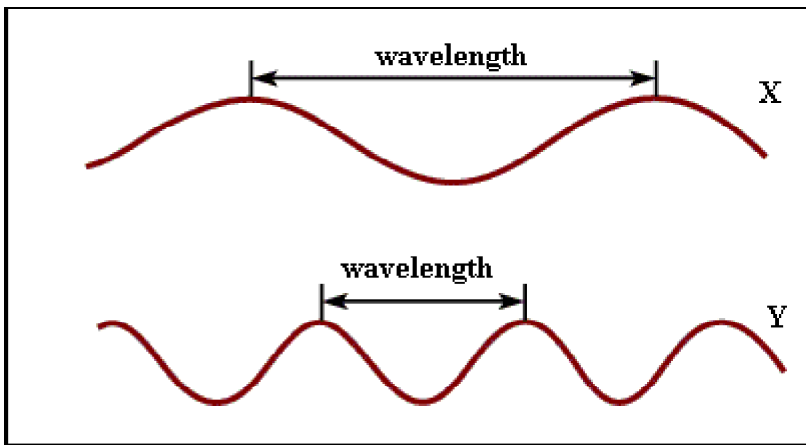
Astro 101 Test 3 F14

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. Astronauts orbiting Earth in the space shuttle feel weightless in space because:
- the added gravitational pull of the Moon balances the Earth's gravitational pull
 - there is no gravity in space
 - they are in constant free fall around the Earth
 - they are farther away from the Earth
- _____ 2. What provides the centripetal force to keep a satellite going around the earth instead of flying off into space?
- Earth's Gravity
 - the Engines on the satellite
 - Tension
 - the Moon's Gravity
- _____ 3. Kepler's 2nd Law says that a planet will travel slower when it is farther from the Sun. Which of the following statements best explains *why*?
- The planet loses energy the farther away it gets from the sun, slowing it down.
 - The planet must sweep out equal areas in equal times, so it slows down when it covers less distance.
 - Gravity pulls on the planet, slowing it down and turning it back to the Sun.
 - The planet is in a circular orbit so it's speed is always changing.
- _____ 4. When a comet only goes past the sun once in its entire existence, what kind of orbit is it in?
- Circular
 - Elliptical
 - Eccentric
 - Unbound
- _____ 5. Which of the following lists different types of electromagnetic radiation in order of increasing wavelength?
- X-rays, infrared, visible, ultraviolet, radio waves
 - Gamma rays, ultraviolet, visible, infrared, radio waves
 - Radio waves, infrared, visible, ultraviolet, X-rays
 - Gamma rays, X-rays, infrared, visible, ultraviolet
 - Radio waves, ultraviolet, visible, infrared, gamma rays
- _____ 6. Which of the following has the LEAST energy?
- Radio waves
 - Visible light
 - Infrared light
 - X-rays
 - They all have the same energy.
- _____ 7. How did James Clerk Maxwell figure out that light is an Electromagnetic Wave?
- The electromagnets in his experiment put off a light.
 - He measured the amplitude of EM waves.
 - He measured the speed of EM waves.
 - He measured the time it took for light to travel from Jupiter's moons to Earth.

- _____ 8. Which of the following **best** describes how light is made?
- Accelerating magnetic fields make light.
 - Any particle moving in a magnetic field emits light.
 - Light is created when electric and magnetic fields change.
 - Light is created by a moving electron.
- _____ 9. Which of the following correctly describes light?
- Light is a transverse wave.
 - Light is a compression wave.
 - Light is a particle.
 - Both B and C are true.
 - Both A and C are true.
- _____ 10. Consider the two waves (X and Y) depicted below. Suppose that the wavelength of X is exactly twice the wavelength of Y. Then how do the wave frequencies compare? (Assume equal wave speeds.)



- The frequency of X is less than the frequency of Y.
 - The frequencies are equal.
 - The frequency of X is greater than the frequency of Y.
 - There is not enough information to compare the frequencies.
- _____ 11. One reason to prefer a reflecting over a refracting telescope is:
- its cheaper cost to build.
 - its shorter length for the same aperture size.
 - its lighter weight for larger apertures.
 - All of the above are valid reasons.
- _____ 12. The primary lens in a refractor is located at the _____ and the primary mirror of a reflector is located at the _____.
- eyepiece of the telescope; middle of the telescope
 - middle of the telescope; base of the telescope
 - opening to the sky; base of the telescope
 - base of the telescope; opening to the sky
- _____ 13. Why would you want a telescope with a long focal length?
- It has a longer integration time.
 - Refractors are better than reflectors.
 - It will produce a larger image.
 - It will gather more light.

- _____ 14. One of the limits to the human eye is its *resolution*. What does this mean?
- It needs at least 10 photons to get a signal to the brain.
 - It can't see all the wavelenths of the spectrum.
 - It only gathers information in certain blocks of time.
 - It can't distinguish things that are too close together.
- _____ 15. The major advantage CCDs have over other imaging techniques is that:
- they have a shorter exposure time
 - they operate at visible and near-infrared wavelengths
 - they have a higher quantum efficiency
 - they yield output in digital format
 - All of the above are true
- _____ 16. Which of the following is NOT a limitation to the human eye for astronomical observations?
- Diffraction
 - Integration time
 - Resolution
 - Quantum efficiency
- _____ 17. Why can we see infrared images from the Spitzer Space Telescope?
- The colors we see in the image represent infrared wavelengths we can't see.
 - The infrared light is filtered into visible light.
 - When multiple infrared images are added together, they make a true color image.
 - CCDs make infrared light visible.
- _____ 18. Which of the following correctly describes how a spectrometer works?
- Information is gathered every 100 milliseconds.
 - Light coming into a CCD is limited by wavelength.
 - Light is bent more or less according to its wavelength.
 - Photons create charges in a pixel.
- _____ 19. Telescopes that use adaptive optics provide higher resolution images primarily because:
- composite lenses correct for chromatic aberration
 - they capture infrared light, which has a longer wavelength than visible light
 - they operate above the Earth's atmosphere
 - mirrors that change shape are used to correct blurring due to the atmosphere
- _____ 20. Which of the following is the BEST reason to build telescopes on mountains?
- To be closer to the objects you are observing
 - To get above the water vapor in the atmosphere
 - Because the sky is clearer at high altitudes
 - To observe wavelengths blocked by the atmosphere
- _____ 21. When some light is bent away from its path inside a telescope, the image is blurred. What is this type of blurring called?
- Absorption
 - Diffraction
 - Reflection
 - Seeing

- _____ 22. How are radio telescopes DIFFERENT from optical telescopes?
- They require very large collecting areas.
 - They can only detect wavelengths in a specific region of the EM spectrum.
 - The detector sends a signal to a computer.
 - The incoming light is focused and directed toward the detector.
- _____ 23. Which of the following best describes why interferometers are useful?
- Combining the signals of telescopes is a good way to reduce the effects of astronomical seeing.
 - You need more than one radio telescope to detect radio waves from distant objects.
 - Interferometers effectively make the telescope bigger and increase the resolution.
 - Radio dishes are inexpensive, so you can easily build more.
- _____ 24. Which of the following proposals for new telescopes would be the **best** to build considering the atmosphere and how telescopes work?
- A Gamma Ray telescope in Antarctica to look for black holes
 - An X-ray telescope at the North Pole to look at the Sun
 - An Infrared telescope in orbit around earth to look at supernovae
 - An optical telescope in the middle of a city to look for planets outside the solar system
- _____ 25. Why do astronomers sometimes use balloons to make observations?
- To get above water vapor in the air
 - To get above the clouds
 - To observe infrared wavelengths
 - All of the above are valid reasons
- _____ 26. Your test is Version A. Please fill in the circle for A for this question on your scantron.
- Mark this on Scantron
 - not this one
 - not this one
 - not this one

Astro 101 Test 3 F14 Answer Section

MULTIPLE CHOICE

- | | | | |
|-----------------|---------------|-------------|--------------|
| 1. ANS: C | PTS: 1 | DIF: Medium | REF: 3.4 |
| OBJ: Applied | TOP: VI.B | | |
| 2. ANS: A | PTS: 1 | | |
| 3. ANS: C | PTS: 1 | | |
| 4. ANS: D | PTS: 1 | | |
| 5. ANS: B | PTS: 1 | DIF: Easy | REF: 4.4 |
| OBJ: Factual | TOP: V | | |
| 6. ANS: A | | | |
| LT | | | |
| PTS: 1 | | | |
| 7. ANS: C | PTS: 1 | | |
| 8. ANS: C | PTS: 1 | | |
| 9. ANS: E | PTS: 1 | | |
| 10. ANS: A | PTS: 1 | | |
| 11. ANS: D | PTS: 1 | DIF: Easy | REF: 4.3 |
| OBJ: Factual | TOP: III.A.vi | | |
| 12. ANS: C | PTS: 1 | | |
| 13. ANS: C | PTS: 1 | | |
| 14. ANS: D | PTS: 1 | | |
| 15. ANS: E | | | |
| CLICKER | | | |
| PTS: 1 | DIF: Medium | REF: 4.4 | OBJ: Applied |
| TOP: IV.E | | | |
| 16. ANS: A | PTS: 1 | | |
| 17. ANS: A | PTS: 1 | | |
| 18. ANS: C | PTS: 1 | | |
| 19. ANS: D | PTS: 1 | DIF: Medium | REF: 4.5 |
| OBJ: Conceptual | TOP: VI.B.ii | | |
| 20. ANS: B | PTS: 1 | | |
| 21. ANS: B | PTS: 1 | | |
| 22. ANS: A | PTS: 1 | | |
| 23. ANS: C | PTS: 1 | | |
| 24. ANS: C | | | |
| LT | | | |
| PTS: 1 | | | |
| 25. ANS: D | PTS: 1 | | |
| 26. ANS: A | PTS: 1 | | |