Jerusalem Science Contest 5786
Astronomy
Test 1
Form A- answer key

1) 1) What is the difference between astronomy and astrology?
   a) Astrology is a physical science; astronomy is a pseudoscience.
   b) Astronomy is a physical science; astrology is a social science.
   c) Astronomy is a physical science; astrology is a field of spiritual study.
   d) Both are physical sciences, but astronomy focuses on the mathematics of the celestial bodies while astrology focuses on the physical composition of the celestial bodies.

2) According to the Rambam, what is the proper way to fulfill the Mitzvah to love Hashem?
   a) Spend many hours deep in meditation and prayer
   b) Study Torah.
   c) Study physical science and natural science.
   d) Study Torah and contemplate Hashem's wondrous creations and infinite wisdom.

3) What is the impact of ancient and modern discoveries in astronomy on the notion of an omniscient Creator? (c correct, a also acceptable)
   a) Scientific discoveries continue to support, at ever-increasing levels of sophistication, the presence of a Divine wisdom.
   b) Scientific discoveries have eliminated the idea that there is Divine wisdom behind the phenomena of the cosmos.
   c) There will also remain the possibility for a person to choose either (a) or (b) so that human free will not be obstructed.
   d) Any of the above answers is correct.

4) What is the most accurate statement describing what the Gemara says about studying the science of astronomy?
   a) The Gemara does not talk about it.
   b) The Gemara discourages it.
   c) The Gemara strongly encourages it.
   d) The Gemara places an absolute obligation on every Jew to become familiar with the basic principles of solar and lunar astronomy.

5) Many sources encourage the study of astronomy from a Torah perspective. But is the study of astronomy itself considered a mitzvah?

a) No

b) Yes

c) Dispute

d) Only for people who have already learned the entire Torah.

6) In a binary star system,

a) two stars lie at about the same distance from the sun and orbit each other.

b) two stars lie at different distances from the sun but in the same direction, so they appear close together in the sky.

c) both stars have the same intrinsic brightness.

d) planets cannot exist.

7) Photons are

a) positively charged particles in the nuclei of atoms.

b) particles that move faster than the speed of light.

c) ions that are ejected in supernova explosions.

d) particles of light that carry energy through space.

8) The Vera Rubin Observatory uses a CCD camera with

a) thousands of pixels.

b) millions of pixels.

c) tens of millions of pixels.

d) billions of pixels.

9) The parts of the human body that can detect infrared light are

a) the eyes.

b) water molecules in skin cells.

c) melanin molecules in skin cells.

d) bone cells

10) The currently-operating space telescope designed to detect infrared light is the

a) Chandra Space Telescope.

b) XMM-Newton Telescope.

c) James Webb Space Telescope.

d) GALEX.

11) Using the fastest rocket ever launched, as of 2025, you could get to the closest star, Proxima Centauri, in

a) hundreds of years.

b) thousands of years.

c) tens of thousands of years.

d) millions of years.

12) According to Aristotle,

a) the Earth is the center of the universe.

b) the Sun is the center of the universe.

c) the Milky Way is the center of the universe.

d) the universe has no center.

13) Which list puts the kinds of light in order, from longest wavelength (lowest energy) to shortest wavelength (highest energy)?

a) microwaves, radio waves, visible light, infrared light, ultraviolet light, x-rays, gamma rays

b) radio waves, microwaves, infrared light, visible light, ultraviolet light, x-rays, gamma rays

c) visible light, infrared light, gamma rays, ultraviolet light, x-rays, radio waves, microwaves

d) radio waves, microwaves, ultraviolet light, visible light, infrared light, x-rays, gamma rays

14) If an established scientific theory or idea is proven wrong, that is usually because

a) scientists in the past were not constrained to try to draw sensible, rational conclusions from their measurements.

b) new technologies allow scientists to make better observations than were previously possible.

c) modern scientists are smarter and better educated than scientists from previous centuries.

d) advances in mathematics allow scientists to re-interpret and better understand previously existing measurements.

15) William Herschel spent _____ studying double stars before discovering that the intrinsic brightnesses of stars are not all alike.

a) 6 months

b) 2 years

c) 4 years

d) 20 years

16) William Herschel discovered infrared light in an experiment in which he

a) found that a thermometer set beyond the red edge of a spectrum of sunlight heated up, despite having no visible light shine on it.

b) realized that one of the two stars in a binary star system that was invisible to humans could be seen by cats.

c) studied two stars, the red giant star Betelgeuse and the blue giant star Rigel, in the constellation of Orion.

d) searched for an explanation for mysterious waves of energy more powerful than ultraviolet light.

17) The dark band than runs down the midplane of the Milky Way, when viewed in visible light,

a) is full of black holes that absorb all the light.

b) marks a portal to other galaxies in deep space.

c) is filled with interstellar dust.

d) marks a region of the galaxy that is devoid of stars.

18) Big telescopes collect more light than smaller telescopes. This advantage enables astronomers to

a) study nearby objects that are intrinsically faint and bright objects that are very far away.

b) study black holes, since they are very small and emit very little light.

c) use the best, most modern and sensitive detectors and cameras.

d) eliminate the blurring effects that come from looking through Earth's atmosphere.

19) All of the following are important to the process of scientific discovery except

a) recognizing when new data indicates that an existing idea in science ('accepted wisdom') is wrong.

b) designing an experiment that has the potential to answer an important scientific question.

c) memorizing all the known laws of physics.

d) asking a good question.

20) Light

a) travels at a speed of 300,000 miles per second.

b) is made of particles called protons.

c) carries energy through space.

d) is the part of the electromagnetic spectrum that our eyes can see.