Jerusalem Science Contest 5786
Astronomy
Test 4
Form A- Answer Key

1) What do we learn from the phrase used by the Mishnah to refer to sunrise?

a) "Hanetz ha'Chamah" implies two possible points of sunrise: (1) when the rays of the sun appear before the disc of the sun; (2) when the actual disc of the sun appears.

b) "Hanetz ha'Chamah" implies that Halachic sunrise is when the first rays of the sun appear.

c) "Hanetz ha'Chamah" implies that Halachic sunrise is when the top of the sun appears.

d) "Hanetz ha'Chamah" implies that Halachic sunrise is when the entire disc of the sun appears.

2) Which of the following Halachos does not depend on when sunrise or sunset occurs?

a) The most ideal time to recite the morning Shema and Shemoneh Esreh.

b) The latest time to do labor on Friday afternoon.

c) The latest time to eat before a 24-hour fast begins.

d) The latest time to recite the Ma'ariv (nighttime) Shemoneh Esreh.

3) What is the Halachic consensus with regard to how much of the sun must have risen to be considered sunrise for the purpose of the morning prayers?

a) When the rays of the sun begin to light up the sky.

b) When the upper edge of the sun appears.

c) When the entire sun is fully above the horizon.

d) When the sun has risen so much that the eastern sky is no longer reddish in color.

4) Which of the following factors does *not* affect the time for sunrise in a given location, according to all opinions?

a) A distant mountain range that delays the observer's visibility of the sun.

b) A nearby hill that delays the observer's visibility of the sun.

c) The observer's location being on a heightened elevation.

d) A large tree or building obstructing the visibility of the sun.

5) What is the Halachic consensus with regard to when sunrise occurs with regard to determining the length of the day (for the purpose of calculating the halachic hours of the day, such as the latest time for Shema, the latest time for Shacharit, the earliest time for Minchah, etc.)?

a) The time of sunrise for the purpose of the Vatikin prayer time is the time that is calculated for determining the length of the day.

b) The time at which one can see the sun from where he is standing is the time of sunrise that is calculated for determining the length of the day.

c) The time at which the top of the sun passes the geometric horizon is the time of sunrise that is calculated for determining the length of the day.

d) The time at which the first rays of the sun appear is the time used for calculating the length of the day.
A or D is correct

6) The number of exoplanets so far confirmed to exist, as of the year 2025, is about

a) 600

b) 6,000

c) 60,000

d) 6 million

7) An exoplanet is

a) a planet that used to orbit the Sun but doesn't anymore.

b) an object that used to be called a planet but is not anymore (e.g., Pluto).

c) a planet-sized object that orbits another star

d) an object that orbits the Sun that is more distant than the four giant planets (Jupiter, Saturn, Uranus, Neptune).

8) The first exoplanet found around a normal star was identified in

a) 1985

b) 1995

c) 2005

d) 2015

9) When using the radial velocity method to detect exoplanets, astronomers measure the velocity of

a) the exoplanet as it moves in its orbit around the host star.

b) the Earth as it moves toward and away from the host star.

c) both the exoplanet and the host star as they orbit each other.

d) the host star of the exoplanet as the host star moves in its orbit.

10) When using the transit method for discovering exoplanets, astronomers

a) measure how the brightness of the host star changes over time.

b) measure how the brightness of the exoplanet changes over time.

c) watch for the host star to block the light from the exoplanet.

d) watch for Venus to pass in front of the Sun.

11) The two NASA missions that have discovered most of the exoplanets discovered as of the year 2025 are

a) Gaia and Kepler

b) Kepler and TESS

c) TESS and Gaia

d) Kepler and JWST

12) The light we observe from an astrophysical object that is moving away from the Earth/Sun system will be _____ as a result of this motion.

a) unaffected

b) dimmed

c) blueshifted

d) redshifted

13) The time between consecutive exoplanet transits measures

a) the mass of the exoplanet

b) shape of the orbit of the exoplanet.

c) the orbital period of the exoplanet.

d) the diameter of the exoplanet.

14) An important motivation for astronomers in searching for exoplanets is to

a) learn whether life exists anywhere in the universe other than Earth.

b) discover at least one million exoplanets.

c) prove that the radial velocity method can be used to discover Earth-sized planets.

d) see if Carl Sagan's predictions from 1975 are right.

15) The methods of eclipse spectroscopy and transit spectroscopy will be used by astronomers to

a) discover thousands of exoplanets.

b) distinguish whether a particular exoplanet has a mass that makes it more like Earth or more like Jupiter.

c) measure the size of an exoplanet's orbit.

d) search for biosignature molecules like ozone and oxygen in the atmospheres of exoplanets.

16) If the light from an astrophysical object is "redshifted," this means that

a) all of the light from that object is seen shifted to longer wavelengths.

b) blue light appears as red light.

c) red light appears as blue light.

d) the object is a distant quasar.

17) The Gaia mission

a) is now viewed as a failure since it has only discovered two exoplanets.

b) will be launched by ESA in 2026.

c) has detected at least 6,000 exoplanet candidates.

d) uses the direct imaging technique to search for exoplanets.

18) The Earth

a) orbits the Sun, which does not move in space.

b) and Sun both orbit the center of mass of the Earth-Sun system.

c) transits the Sun once during every orbit.

d) is Doppler shifted as it orbits the Sun.

19) If you were in a car speeding (at many thousands of miles per second) toward a traffic light that appeared yellow as seen by a pedestrian standing still, what color would you think the traffic light would show?

a) Red/orange

b) yellow

c) blue/green

d) infrared

20) The Doppler shift can be used to

a) measure the speeds of cars on roads and highways.

b) measure the length of time between exoplanet transits.

c) measure the contents of the atmosphere of an exoplanet.

d) measure the range of colors in a painting.