Astronomy 104, Spring 2025

Test 1

Print your name:

_____

Make sure your scantron has your name and code on it.

Show a picture ID,
and
turn in the test paper with the scantron.

It is advisable but not required
to fill in the answers on the test paper.

Answer these questions on the scantron as indicted:

1 **Answer E**
2 **Answer A**
3 **Answer C**

4 What is a planetary nebula?

A: The result of a supernova explosion.

B: The result of the explosion of a star.

C: A star with a very strong stellar wind.

D: A star with a planet that is forming now.

E: A gas cloud around a planet.

5 Sirius, the Dog Star, has its parallax measured as 0.33 arc seconds. How far is it?

A: 0.33 light years.

B: 3 parsecs.

C: 5 AU's.

D: 100 light years.

E: 1 million light years.

6 If the Sun were covered all in sunspots, how would it appear?

A: Dark and almost unnoticeable in the sky.

B: Much hotter, brighter and redder than it is now.

C: As dim as the full Moon, red.

D: Still very bright and hot, but dimmer than now and red in color.

E: Much hotter, brighter and whiter than it is now.

7 How large is the Universe?

A: 200,000 km.

B: 1.0 arc minutes.

C: 14 billion light years.

D: 150 million km.

E: 4.5 billion light years.

8 How large is the Galaxy?

A: About one light year.

B: Ten million light years.

C: A hundred astronomical units.

D: 14 billion light years.

E: A good 100,000 light years.

9 What is aurora?

A: Fluorescing air due to charged particles from the Sun.

B: Sunlight is reflected in interplanetary dust particles.

C: The upper atmosphere glows due to extreme solar heating.

D: Sunlight reflected in very high elevation clouds.

E: The light of the rising/setting sun scattered in the atmosphere.

10 Where in the Sun is there heat production?

A: Only in the convection zone.

B: Only in the core.

C: Only in the photosphere.

D: Nowhere: the Sun is only hot because is cooling off.

E: Everywhere inside.

11 How long before/after the Sun did the planets form?

A: The planets were formed 1 billion years ago, while the Sun is 4-5 billion years old.

B: The planets were formed right after the Sun did.

C: The planets were formed long before the Sun and were captured by the Sun's gravity.

D: The planets were formed only a few thousand years ago, while the Sun is billions of years old.

E: The Sun is 14 billion years old, the planets are 4-5 billion years old.

12 How far is the closest star, and what is its name? (Exclude the Sun.)

A: Venus, 0.3 AU.

B: Alpha Centauri, 150 million km.

C: The Andromeda galaxy, 270 arc minutes.

D: Proxima Centauri, 4 light years.

E: Polaris, 100 light years.

13 What is a parsec?

A: A unit of distance. The parallax of a star at 1 parsec is 1 arc second.

B: The time light takes to cross the solar system.

C: A very long time. The solar system is almost 5 parsecs old.

D: The angle the closest star moves in the sky in one year.

E: The time light takes to arrive from the Sun to Earth.

14 What is absolute brightness?

A: The brightness of the star as observed outside the atmosphere.

B: The brightness of the star as we see it in the sky.

C: The brightness the star would have if it was located at 1AU, where the Sun is now.

D: The calculated brightness of the star with invisible light forms added.

E: The calculated brightness of a star, as observed from a distance of 10 pc.

15 Where in the Galaxy is the Sun?

A: 20,000 light years from the center, inside a spiral arm.

B: 20,000 light years from the center, between two spiral arms.

C: At the outer edge of the galaxy.

D: The Sun is not in the Galaxy at all.

E: At the center of the Galaxy.

16 What instrument do you need to see a 7-magnitude star?

A: A 12-inch amateur telescope.

B: A pair of binoculars.

C: Only your naked eyes.

D: Such an object would be too faint to see at all.

E: A large professional telescope, at least 80 inches.

17 How is the motion of charged particles restricted by the magnetic field of Earth?

A: Charged particles are slowed and stopped by magnetic field lines.

B: Charged particles are reflected by field lines back into space.

C: Charged particles closely follow magnetic field lines.

D: Charged particles cancel out the magnetic field lines of Earth.

E: Charged particles do not interact with magnetic field lines but move on straight.

18 What is the absolute magnitude of the Sun?

A: +11.4 mg.

B: 5 mg.

C: 0 mg.

D: -26.4 mg.

E: -12.5 mg.

19 The Pleiades is … ?

A: A planet.

B: An open cluster.

C: A star.

D: A constellation.

E: A galaxy.

20 What is granulation?

A: The 'surface' of the Sun is very uneven. Higher elevations look brighter.

B: Giant waves travelling along the surface of the Sun.

C: Rotating storms on the Sun, the equivalent of tornadoes.

D: The heads of hot upcoming gas bubbles in the Sun look like bright spots.

E: Matter falling onto the Sun from outer space makes the Sun look grainy.

21 Define the photosphere.

A: The illuminated, bright half of the Sun where it is day.

B: The part of the Sun where heat is produced in a nuclear reaction.

C: The part of the Sun that is hot, from the center out.

D: The visible outside 'shell' of the Sun.

E: The non-convective inner part of the Sun.

22 All stars that one can see as individual stars in the sky are part of …

A: the Solar Neighborhood.

B: the Galaxy.

C: the Andromeda Galaxy.

D: either our Galaxy or the space between galaxies.

E: the Solar System.

23 What is in Picture 6?

A: A diffuse nebula.

B: A galaxy.

C: A supernova remnant.

D: A planetary nebula.

E: An open cluster.

24 What is the name of the first and most famous deep-sky object catalogue?

A: Messier

B: Messerschmidt

C: Herzsprung-Russell

D: Terminator

E: Stefan-Boltzman

25 Can we see a 21 mg star with the naked eye?

A: No, because it is too small.

B: No, because it is too far.

C: No, because it is too faint.

D: Yes, it looks very bright.

E: Barely.

26 In the Sun, what can you say about the motion of magnetic field lines relative to matter?

A: There is no magnetic field in the Sun.

B: Magnetic field lines attempt to sink, while hot matter tries to move up.

C: Matter crossing magnetic field lines gets heated up.

D: Matter crossing magnetic field lines also gets magnetized.

E: Magnetic field lines are frozen into the matter of the Sun, they can only move together.

27 What is a globular cluster?

A: a star with a large collection of planets orbiting around it.

B: a large galaxy that has no spiral arms.

C: a collection of ~ 100,000 old stars.

D: a loose, desintegrating collection of young stars.

E: a globe-shaped nebula of gas and dust.

28 How hot is the photosphere of the Sun?

A: 15 million degrees.

B: 1 million degrees.

C: 20 F.

D: -200 F below.

E: 6000 degrees.

29 How many stars are brighter than 5 magnitudes?

A: Two hundred.

B: Three.

C: Millions.

D: Five thousand.

E: None.

30 What heats the Sun?

A: Helium is used up to produce oxygen and carbon.

B: The Sun is slowly contracting and using its gravitational energy to produce heat.

C: Hydrogen to helium fusion.

D: Hydrogen burns into water in its core.

E: It has no energy source now, but it is still hot and cooling off slowly.

31 What is in the Picture 7?

A: An open cluster.

B: A supernova remnant.

C: A diffuse nebula.

D: A galaxy.

E: A planetary nebula.

32

Which is the brightest star in the sky and how bright is it? (Exclude the Sun.)

A: Betelgeuse (Alpha Orionis), 0.5 mg.

B: Polaris, 2 mg.

C: Proxima Centauri, 11.7 mg.

D: Sirius, -1.6 mg.

E: Polaris, 0 mg.

33 How far is the farthest constellation?

A: 14 billion light years.

B: 4 light years.

C: 750 light years.

D: 150 million kilometers.

E: This question is nonsense.

34 How large is a globular cluster?

A: 10,000 kilometers.

B: 100,000 light years.

C: 10 billion light years.

D: 10 astronomical units.

E: 10 - 100 light years.

35 How old is the Universe?

A: infinitely old.

B: 4.5 billion years.

C: 14 billion years.

D: 65 million years.

E: 6,000 years.

36

What minimum temperature is needed for hydrogen to helium fusion?

A: 200 million K.

B: 1 million K.

C: 6000 K.

D: 400 K.

E: 3 K.

37 How long is the sunspot cycle?

A: 11 years.

B: 350 years.

C: 1 day.

D: 1 month.

E: 9 months.

38 The number of sunspots changes with what time period?

A: 1 month.

B: 4.5 billion years.

C: 22 years.

D: 11 years.

E: 1 year.

39 What is distance modulus?

A: The difference between apparent and absolute magnitude.

B: The ratio of the distance to a star to the distance to the Sun.

C: The distance to the star expressed in parsecs.

D: The amount of change in the color of the star due to distance.

E: The amount of starlight lost due to interstellar dust between us and the star.

40 Which constellation is closest to us, and how do we know?

A: This question is nonsense because the distance to constellations changes as Earth revolves around the Sun.

B: This question is nonsense because constellations are not real objects.

C: Orion is closest because it contains the brightest stars in the sky.

D: The Andromeda Galaxy is the closest constellation, except for a few small irregulars.

E: All constellations are in the sky, consequently at the same distance.

41 What is in Picture 2?

A: A hot cloud of gas hovering over a sunspot area (called 'facula').

B: A hot solar granule.

C: A solar prominence.

D: A sunspot.

E: A solar flare.

42 What is an astronomical unit, and how many km's is it?

A: 1 AU is the circumference of the equator, equals 150,000,000 km.

B: 1 AU is the distance to the center of the Galaxy, equals 150,000,000 km.

C: 1 AU is the size of the observable Universe, 14,000,000,000 light years.

D: 1 AU is the distance from the Sun to Earth, equals 150,000,000 km.

E: 1 AU is the distance from Earth to Moon, equals 400,000 km.

43 How is a planetary nebula different from a supernova remnant?

A: A planetary nebula is in our galaxy, a supernova remnant must be in other galaxies.

B: A planetary nebula is not an explosion but a continuous blow-off of gas from a star.

C: A planetary nebula is millions of times larger than a supernova remnant.

D: A planetary nebula is in the empty space outside galaxies, supernova remnants are in the centers of galaxies.

E: A planetary nebula is the birthplace of stars, a supernova remnant is a blown-up star.

44 What object must M 42 be, judged only by its name?

A: A planet.

B: A bright star.

C: A deep-sky object.

D: A meteorite.

E: A moon (satellite).

45 The majority of the individual stars, but not all, of those that are visible in the sky without a telescope, are in …

A: the Galaxy.

B: the Galaxy and a few close-by galaxies.

C: the Solar System.

D: the Solar Neighborhood.

E: a little area around the center of the Galaxy.

46 The whole universe is build up of …'s. (Provide the name of the type of objects.)

A: Gas clouds.

B: Stars.

C: Planets.

D: Galaxies.

E: Star clusters.

47 How long does a planetary nebula live?

A: A few million years.

B: A few years.

C: 10 billion years.

D: A few hundred million years.

E: 10-20 thousand years.

48 Why can we not see spectacular views of nebulae and galaxies in a telescope?

A: Because they are all exceedingly faint.

B: Because their light is obscured by interstellar dust.

C: Because they all radiate in invisible (IR) light only.

D: Because they are all too far to see.

E: Because they are all too small.

49 What is in Picture 5?

A: A solar eruption.

B: A solar flare.

C: A sunspot.

D: A solar prominence.

E: Aurora.