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 A**

4 How large is the Universe?

A: 150 million km.

B: 200,000 km.

C: 1.0 arc minutes.

D: 14 billion light years.

E: 4.5 billion light years.

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

A: Because they are all too small.

B: Because they are all too far to see.

C: Because they are all exceedingly faint.

D: Because their light is obscured by interstellar dust.

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

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

A: Polaris, 2 mg.

B: Polaris, 0 mg.

C: Proxima Centauri, 11.7 mg.

D: Sirius, -1.6 mg.

E: Betelgeuse (Alpha Orionis), 0.5 mg.

7 Where in the Galaxy is the Sun?

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

B: At the center of the Galaxy.

C: At the outer edge of the galaxy.

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

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

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

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

B: Dark and almost unnoticeable in the sky.

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

D: As dim as the full Moon, red.

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

9 What is in the Picture 7?

A: A supernova remnant.

B: A planetary nebula.

C: A galaxy.

D: An open cluster.

E: A diffuse nebula.

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

D: Matter crossing magnetic field lines also gets magnetized.

E: Matter crossing magnetic field lines gets heated up.

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

A: Only your naked eyes.

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

C: A pair of binoculars.

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

E: A 12-inch amateur telescope.

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

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

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

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

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

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

13 What is distance modulus?

A: The amount of starlight lost due to interstellar dust between us and the star.
B: The distance to the star expressed in parsecs.
C: The ratio of the distance to a star to the distance to the Sun.
D: The difference between apparent and absolute magnitude.
E: The amount of change in the color of the star due to distance.

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

A: 1 AU is the distance to the center of the Galaxy, equals 150,000,000 km.
B: 1 AU is the size of the observable Universe, 14,000,000,000 light years.
C: 1 AU is the circumference of the equator, equals 150,000,000 km.
D: 1 AU is the distance from Earth to Moon, equals 400,000 km.
E: 1 AU is the distance from the Sun to Earth, equals 150,000,000 km.

15 The Pleiades is … ?

A: A constellation.
B: A galaxy.
C: An open cluster.
D: A planet.
E: A star.

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

A: Terminator
B: Stefan-Boltzman
C: Messier
D: Messerschmidt
E: Herzsprung-Russell

17 What is a parsec?

A: A unit of distance. The parallax of a star at 1 parsec is 1 arc second.
B: The angle the closest star moves in the sky in one year.
C: A very long time. The solar system is almost 5 parsecs old.
D: The time light takes to arrive from the Sun to Earth.
E: The time light takes to cross the solar system.

18 How large is the Galaxy?

A: Ten million light years.

B: A good 100,000 light years.

C: 14 billion light years.

D: About one light year.

E: A hundred astronomical units.

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

A: Alpha Centauri, 150 million km.

B: Polaris, 100 light years.

C: Venus, 0.3 AU.

D: The Andromeda galaxy, 270 arc minutes.

E: Proxima Centauri, 4 light years.

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

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

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

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

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

A: A deep-sky object.

B: A planet.

C: A bright star.

D: A moon (satellite).

E: A meteorite.

22 **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 and a few close-by galaxies.

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

C: the Galaxy.

D: the Solar System.

E: the Solar Neighborhood.

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

A: the Solar System.

B: either our Galaxy or the space between galaxies.

C: the Andromeda Galaxy.

D: the Galaxy.

E: the Solar Neighborhood.

24 **How long before/after the Sun did the planets form?**

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

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

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

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

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

25 **What minimum temperature is needed for hydrogen to helium fusion?**

A: 400 K.

B: 200 million K.

C: 3 K.

D: 6000 K.

E: 1 million K.

26 What heats the Sun?

A: Hydrogen burns into water in its core.

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

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

D: Hydrogen to helium fusion.

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

27 How large is a globular cluster?

A: 10 billion light years.

B: 10 astronomical units.

C: 10 - 100 light years.

D: 100,000 light years.

E: 10,000 kilometers.

28 How far is the farthest constellation?

A: 14 billion light years.

B: This question is nonsense.

C: 150 million kilometers.

D: 750 light years.

E: 4 light years.

29 What is in Picture 2?

A: A solar flare.

B: A sunspot.

C: A solar prominence.

D: A hot solar granule.

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

30 What is in Picture 5?

A: A solar eruption.

B: A solar prominence.

C: A solar flare.

D: A sunspot.

E: Aurora.

31 Define the photosphere.

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

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

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

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

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

32 What is a planetary nebula?

A: A gas cloud around a planet.

B: A star with a very strong stellar wind.

C: The result of the explosion of a star.

D: The result of a supernova explosion.

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

33 What is a globular cluster?

A: a large galaxy that has no spiral arms.

B: a loose, desintegrating collection of young stars.

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

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

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

34 How hot is the photosphere of the Sun?

A: 20 F.

B: 15 million degrees.

C: 6000 degrees.

D: -200 F below.

E: 1 million degrees.

35 Where in the Sun is there heat production?

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

B: Only in the photosphere.

C: Only in the convection zone.

D: Everywhere inside.

E: Only in the core.

36 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 calculated brightness of the star with invisible light forms added.

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

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

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

A: Planets.

B: Stars.

C: Galaxies.

D: Gas clouds.

E: Star clusters.

38 How old is the Universe?

A: 6,000 years.

B: 14 billion years.

C: infinitely old.

D: 4.5 billion years.

E: 65 million years.

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

A: 100 light years.

B: 1 million light years.

C: 0.33 light years.

D: 5 AU's.

E: 3 parsecs.

40 How many stars are brighter than 5 magnitudes?

A: Three.

B: Five thousand.

C: Millions.

D: None.

E: Two hundred.

41 What is the absolute magnitude of the Sun?

A: +11.4 mg.

B: 0 mg.

C: -26.4 mg.

D: 5 mg.

E: -12.5 mg.

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

A: Yes, it looks very bright.

B: No, because it is too far.

C: Barely.

D: No, because it is too faint.

E: No, because it is too small.

43 How long does a planetary nebula live?

A: A few hundred million years.

B: 10 billion years.

C: 10-20 thousand years.

D: A few million years.

E: A few years.

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

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

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

C: Charged particles closely follow magnetic field lines.

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

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

45 How long is the sunspot cycle?

A: 1 month.

B: 11 years.

C: 1 day.

D: 9 months.

E: 350 years.

46 The number of sunspots changes with what time period?

A: 1 month.

B: 4.5 billion years.

C: 1 year.

D: 22 years.

E: 11 years.

47 What is in Picture 6?

A: A planetary nebula.

B: An open cluster.

C: A diffuse nebula.

D: A supernova remnant.

E: A galaxy.

48 What is granulation?

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

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

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

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

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

49 What is aurora?

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

B: Sunlight is reflected in interplanetary dust particles.

C: Sunlight reflected in very high elevation clouds.

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

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