

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 D**

4 How many stars are brighter than 5 magnitudes?

- A: Two hundred.
- B: Five thousand.
- C: Millions.
- D: None.
- E: Three.

5 How long does a planetary nebula live?

- A: 10-20 thousand years.
- B: A few years.
- C: 10 billion years.
- D: A few million years.
- E: A few hundred million years.

6 How large is a globular cluster?

- A: 10 billion light years.
- B: 10,000 kilometers.
- C: 10 - 100 light years.
- D: 10 astronomical units.
- E: 100,000 light years.

7 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: Rotating storms on the Sun, the equivalent of tornadoes.
- E: Giant waves travelling along the surface of the Sun.

8 What is distance modulus?

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

9 What is in Picture 6?

- A: A supernova remnant.
- B: A planetary nebula.
- C: A diffuse nebula.
- D: An open cluster.
- E: A galaxy.

10 What is absolute brightness?

- A: The brightness of the star as we see it in the sky.
- B: The calculated brightness of a star, as observed from a distance of 10 pc.
- 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 brightness of the star as observed outside the atmosphere.

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

- A: A deep-sky object.
- B: A meteorite.
- C: A planet.
- D: A moon (satellite).
- E: A bright star.

12 What is in Picture 5?

- A: A solar flare.
- B: A solar eruption.
- C: A solar prominence.
- D: A sunspot.
- E: Aurora.

13 How far is the farthest constellation?

- A: 4 light years.
- B: This question is nonsense.
- C: 150 million kilometers.
- D: 14 billion light years.
- E: 750 light years.

14 How old is the Universe?

- A: 4.5 billion years.
- B: 14 billion years.
- C: 65 million years.
- D: 6,000 years.
- E: infinitely old.

15 What is a planetary nebula?

- A: A star with a very strong stellar wind.
- B: The result of a supernova explosion.
- C: The result of the explosion of a star.
- D: A gas cloud around a planet.
- E: A star with a planet that is forming now.

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

- A: the Solar Neighborhood.
- B: the Solar System.
- C: the Galaxy.
- D: a little area around the center of the Galaxy.
- E: the Galaxy and a few close-by galaxies.

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

- A: Polaris, 100 light years.
- B: Proxima Centauri, 4 light years.
- C: Venus, 0.3 AU.
- D: Alpha Centauri, 150 million km.
- E: The Andromeda galaxy, 270 arc minutes.

18 What is in the Picture 7?

- A: A diffuse nebula.
- B: An open cluster.
- C: A planetary nebula.
- D: A supernova remnant.
- E: A galaxy.

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

- A: A 12-inch amateur telescope.
- B: Such an object would be too faint to see at all.
- C: A pair of binoculars.
- D: Only your naked eyes.
- E: A large professional telescope, at least 80 inches.

20 What is in Picture 2?

- A: A solar prominence.
- B: A solar flare.
- C: A hot solar granule.
- D: A sunspot.
- E: A hot cloud of gas hovering over a sunspot area (called 'facula').

21 The Pleiades is ... ?

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

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

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

23 The number of sunspots changes with what time period?

- A: 1 month.
- B: 1 year.
- C: 4.5 billion years.
- D: 22 years.
- E: 11 years.

24 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.

25 What heats the Sun?

- A: Hydrogen burns into water in its core.
- B: Helium is used up to produce oxygen and carbon.
- C: The Sun is slowly contracting and using its gravitational energy to produce heat.
- D: It has no energy source now, but it is still hot and cooling off slowly.
- E: Hydrogen to helium fusion.

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

- A: Much hotter, brighter and redder than it is now.
- B: Still very bright and hot, but dimmer than now and red in color.
- C: As dim as the full Moon, red.
- D: Much hotter, brighter and whiter than it is now.
- E: Dark and almost unnoticeable in the sky.

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

- A: All constellations are in the sky, consequently at the same distance.
- 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: This question is nonsense because the distance to constellations changes as Earth revolves around the Sun.
- E: The Andromeda Galaxy is the closest constellation, except for a few small irregulars.

28 How hot is the photosphere of the Sun?

- A: 6000 degrees.
- B: 15 million degrees.
- C: -200 F below.
- D: 20 F.
- E: 1 million degrees.

29 Define the photosphere.

- A: The part of the Sun that is hot, from the center out.
- B: The part of the Sun where heat is produced in a nuclear reaction.
- C: The non-convective inner part of the Sun.
- D: The visible outside 'shell' of the Sun.
- E: The illuminated, bright half of the Sun where it is day.

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

- A: 5 AU's.
- B: 0.33 light years.
- C: 100 light years.
- D: 1 million light years.
- E: 3 parsecs.

31 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 closely follow magnetic field lines.
- C: Charged particles are reflected by field lines back into space.
- D: Charged particles do not interact with magnetic field lines but move on straight.
- E: Charged particles are slowed and stopped by magnetic field lines.

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

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

33 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 arrive from the Sun to Earth.
- C: The angle the closest star moves in the sky in one year.
- D: The time light takes to cross the solar system.
- E: A very long time. The solar system is almost 5 parsecs old.

34 How large is the Universe?

- A: 200,000 km.
- B: 14 billion light years.
- C: 4.5 billion light years.
- D: 1.0 arc minutes.
- E: 150 million km.

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

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

36 What is aurora?

- A: The upper atmosphere glows due to extreme solar heating.
- B: Sunlight is reflected in interplanetary dust particles.
- C: Fluorescing air due to charged particles from the Sun.
- D: The light of the rising/setting sun scattered in the atmosphere.
- E: Sunlight reflected in very high elevation clouds.

37 What minimum temperature is needed for hydrogen to helium fusion?

- A: 6000 K.
- B: 1 million K.
- C: 400 K.
- D: 200 million K.
- E: 3 K.

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

- A: Star clusters.
- B: Planets.
- C: Gas clouds.
- D: Stars.
- E: Galaxies.

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

- A: A planetary nebula is the birthplace of stars, a supernova remnant is a blown-up star.
- B: A planetary nebula is in our galaxy, a supernova remnant must be in other galaxies.
- 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 the empty space outside galaxies, supernova remnants are in the centers of galaxies.

40 Where in the Galaxy is the Sun?

- A: The Sun is not in the Galaxy at all.
- B: 20,000 light years from the center, between two spiral arms.
- C: 20,000 light years from the center, inside a spiral arm.
- D: At the outer edge of the galaxy.
- E: At the center of the Galaxy.

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

- A: Magnetic field lines attempt to sink, while hot matter tries to move up.
- B: Matter crossing magnetic field lines gets heated up.
- C: Magnetic field lines are frozen into the matter of the Sun, they can only move together.
- D: There is no magnetic field in the Sun.
- E: Matter crossing magnetic field lines also gets magnetized.

42

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

- A: Polaris, 0 mg.
- B: Sirius, -1.6 mg.
- C: Betelgeuse (Alpha Orionis), 0.5 mg.
- D: Proxima Centauri, 11.7 mg.
- E: Polaris, 2 mg.

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

- A: Because they are all too small.
- B: Because they all radiate in invisible (IR) light only.
- C: Because they are all exceedingly faint.
- D: Because they are all too far to see.
- E: Because their light is obscured by interstellar dust.

44 Where in the Sun is there heat production?

- A: Only in the photosphere.
- B: Nowhere: the Sun is only hot because it is cooling off.
- C: Only in the core.
- D: Everywhere inside.
- E: Only in the convection zone.

45 All stars that one can see as individual stars in the sky are part of ...

- A: the Galaxy.
- B: the Andromeda Galaxy.
- C: the Solar System.
- D: either our Galaxy or the space between galaxies.
- E: the Solar Neighborhood.

46 What is the absolute magnitude of the Sun?

- A: +11.4 mg.
- B: 0 mg.
- C: -26.4 mg.
- D: -12.5 mg.
- E: 5 mg.

47 How long is the sunspot cycle?

- A: 1 month.
- B: 9 months.
- C: 11 years.
- D: 350 years.
- E: 1 day.

48 How large is the Galaxy?

- A: A good 100,000 light years.
- B: About one light year.
- C: Ten million light years.
- D: 14 billion light years.
- E: A hundred astronomical units.

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

A: Barely.

B: No, because it is too faint.

C: No, because it is too small.

D: Yes, it looks very bright.

E: No, because it is too far.