

AST1002 - Section 2: Test 2

Date: 11/05/2009

Name:

Equations: $E = m \cdot c^2$

Question 1: The Sun is a stable star because

1. gravity balances forces from pressure. (!) → Miniquiz 7, Q3
2. the rate of fusion equals the rate of fission.
3. radiation and convection balance.
4. mass is converted into energy.
5. fusion doesn't depend on temperature.

Question 2: What is thought to cause Io's volcanism?

1. Jupiter's magnetosphere
2. Tidal stresses from both Jupiter and Europa (!) ~ HW7
3. Jupiter's rapid rotation
4. Radioactive decay from its core
5. Io's large mass and tectonic activity

Question 3: The magnetic fields of which two planets are most unusual?

1. Jupiter and Neptune
2. Jupiter and Saturn
3. Jupiter and Earth
4. Saturn and Earth
5. Uranus and Neptune (!) → Review; Miniquiz 6, Q5

Question 4: Rigel has an apparent magnitude of +0.18 and Betelgeuse an apparent magnitude of +0.45. What can you conclude from this?

1. Rigel must be closer to Earth.
2. Betelgeuse must be closer to Earth.
3. Rigel is brighter than Betelgeuse. (!) → Review; ~ Miniquiz 8, Q3
4. Betelgeuse is brighter than Rigel.
5. Both stars are brighter than the full Moon.

Question 5: Some regions along the plane of the Milky Way appear dark because

1. there are no stars in these areas.
2. stars in that region are hidden by interstellar gas.
3. stars in that region are hidden by dark dust particles. (!)
4. many brown dwarfs in those areas absorb light which they turn into heat.
5. many black holes absorb all light from those directions.

Question 6: Stars like our Sun will end their lives as

1. red giants.
2. comets.
3. black holes.
4. white dwarfs. (!) → Review; Miniquiz 9, Q1
5. red dwarfs.

Question 7: Cool stars can be very luminous if they are

1. small.
2. large. (!) → HW8
3. hot.
4. close to our solar system.
5. in binary systems with another star.

Question 8: Which are the four Galilean moons of Jupiter?

1. Europa, Titan, Ganymede, and Callisto
2. Io, Ganymede, Callisto, and Titan
3. Europa, Ganymede, Io, and Triton
4. Io, Europa, Ganymede, and Callisto (!) → Review?
5. Io, Titan, Triton, and Charon

Question 9: Inside the Roche Limit

1. large moons are torn apart. (!) → ~ HW7
2. is where large moons form.
3. ring systems cannot exist.
4. there is a gap in a planet's magnetic field.
5. hydrogen can only exist in its liquid metallic form.

Question 10: A cloud fragment too small to collapse into a main sequence star becomes a

1. white dwarf.
2. pulsar.
3. T Tauri object.
4. planet of another star.
5. brown dwarf. (!)

Question 11: A moon with a smooth, uncratered surface would imply

1. meteorites have never struck the moon.
2. a strong magnetic field surrounds the moon.
3. the surface is very young. (!)
4. the moon lies within the planet's Roche limit.
5. the surface is completely liquid.

Question 12: A Type II supernova occurs when

1. hydrogen fusion shuts off.
2. uranium decays into lead.
3. a white dwarf gains mass.
4. helium is exhausted in the outer layers.
5. iron in the core starts to fuse. (!) → Miniquiz 9, Q5

Question 13: On the H-R diagram, red supergiants like Betelgeuse lie

1. at the top right. (!) → HW8
2. at the top left.
3. about the middle.
4. to the lower left edge.
5. on the bottom, coolest portion of the main sequence.

Question 14: Jovian planets share all of the following traits EXCEPT

1. large magnetic fields.
2. lots of hydrogen & helium gas.
3. many moons.
4. differential rotations.
5. a low-density gaseous core. (!) → Miniquiz 6, Q2

Question 15: The Sun will evolve away from the main sequence when

1. its core begins fusing iron.
2. its supply of hydrogen is used up.
3. the carbon core detonates, and it explodes as a Type I supernova.
4. the core loses all of its neutrinos, so all fusion ceases.
5. helium builds up in the core, while the hydrogen-burning shell expands. (!) → Quiz 9, Q2

Question 16: Today, the primary source of the Sun's energy is

1. oxidation of carbon in the core.
2. gravitational collapse of the helium coreward.
3. dark energy.
4. the strong force fusing hydrogen into helium. (!) ~ HW7
5. the weak force creating energy from uranium decay.

Question 17: Of the elements in your body, the only one not formed in stars is

1. Carbon
2. Calcium
3. Iron
4. Aluminum
5. Hydrogen (!)

Question 18: A star will spend most of its life

1. as a protostar.
2. on the main sequence. (!) → Miniquiz 9, Q4
3. inside its planetary nebula.
4. in repeated swellings to the red giant.
5. in a sustained helium flash lasting billions of years.

Question 19: Why are reflection nebulae blue and emission nebulae red?

1. Reflection nebulae emit blue light, and emission nebulae emit red light.
2. Reflection nebulae are hot, and emission nebulae are cool.
3. Reflection nebulae scatter blue light, and emission nebulae emit red light. (!)
4. Reflection nebulae emit blue light, and emission nebulae scatter red light.
5. Reflection nebulae scatter blue light, and emission nebulae scatter red light.

Question 20: Stellar parallax is used to measure the

1. sizes of stars.
2. distances of stars. (!) → Miniquiz 8, Q1
3. temperatures of stars.
4. radial velocity of stars.
5. brightness of stars.

Question 21: What is so unusual about Pluto's orbit?

1. It is more inclined to the ecliptic than any of the eight planets. (!) → HW7
2. It has an unexpectedly short orbital period.
3. It's orbital period is exactly twice that of Neptune's.
4. It lies exactly on the ecliptic.
5. It has the lowest eccentricity of any planet's orbit.

Question 22: A star's apparent magnitude is a number used to describe how our eyes measure its

1. distance.
2. temperature.
3. brightness. (!) → Miniquiz 8, Q4
4. absolute luminosity.
5. radial velocity.

Question 23: What would Jupiter have needed to be a star?

1. More mass to make the planet hotter (!)
2. A larger satellite system
3. More uranium to ignite nuclear fission chain reactions in its core
4. A slower spin, similar to the Sun's 25 days, instead of its present 10 hours
5. A different chemical composition

Question 24: The parallax of a certain star was found to be 1 arc-second. What is the distance to this star in pc?

1. 0.01 parsecs
2. 0.1 parsecs
3. 100 parsecs
4. 10 parsecs
5. 1 parsec (!)

Question 25: The temperature of the Sun's (light emitting) photosphere is about

1. 3,200 K
2. 5,800 K (!)
3. 11,000 K
4. one million K
5. ten million K

Question 26: A star's color index directly tells us its

1. temperature. (!)
2. proper motion.
3. distance.
4. radial velocity.
5. age.

Question 27: Many astronomers believe Pluto is perhaps best classified as

1. a cold terrestrial planet.
2. a small Jovian planet.
3. a large Kuiper Belt object. (!)
4. a wandering moon.
5. a captured comet.

Question 28: The number of sunspots and solar activity in general peaks

1. every 27 days, the apparent rotation period of the Sun's surface.
2. once a year.
3. every 5 1/2 years.
4. every 11 years. (!) → Review; Miniquiz 7, Q5
5. approximately every 100 years.

Question 29: Which moon in the solar system shows a dense atmosphere and a landscape similar to Earth's?

1. Our Moon
2. Titan (!)
3. Phobos
4. Europa
5. Triton

Question 30: Which of the Galilean moons is the most geologically active?

1. Io (!) → HW7
2. Europa
3. Ganymede
4. Callisto
5. Titan

Question 31: Stars are often born within groups known as

1. clans.
2. spiral waves.
3. aggregates.
4. clusters. (!)
5. swarms.

Question 32: What can be said with certainty about a red star and a blue star?

1. The red star is more massive than the blue star.
2. The blue star is hotter than the red star. (!)
3. The red star has a greater radial velocity than the blue star.
4. The blue star has a greater proper motion than the red star.
5. The red star is closer to Earth than the blue star.

Question 33: A star near the lower right of the H-R diagram is likely to be

1. red, with high luminosity.
2. blue, with high luminosity.
3. hot, bright, and very large.
4. yellow, with luminosity similar to our Sun's.
5. red, with low luminosity. (!)

Question 34: Why is the sky blue?

1. It's not blue, just an optical illusion.
2. Air particles are moving towards us due to gravity. We observe a Doppler shift.
3. Tiny particles in the air are more efficient at scattering short-wavelength light than they are at scattering long-wavelength light. (!) → Attendance question
4. Most polluting gases and dust particles in the air are bluish in color and lend their color to that of the sky.
5. Air molecules absorb red light more efficiently than they do blue light because of their electron orbitals.

Question 35: Suppose two stars with the same luminosity are at different distances from Earth. Which has the greater apparent brightness?

1. There is not enough information to answer the question.
2. Both have the same brightness.
3. The farther star
4. The closer star (!)
5. The blue star