# 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 (!)  $\sim \text{HW7}$
- 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

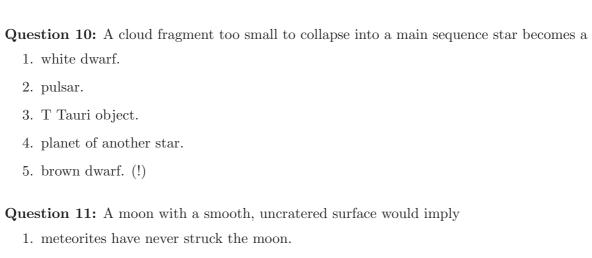
- 1. small.
- 2. large. (!) → HW8
- 3. hot.
- 4. close to our solar system.
- 5. in binary systems with another star.

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. (!)  $\rightarrow \sim HW7$
- 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.



- 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.  $(!) \rightarrow HW8$
- 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. (!)  $\sim$  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?

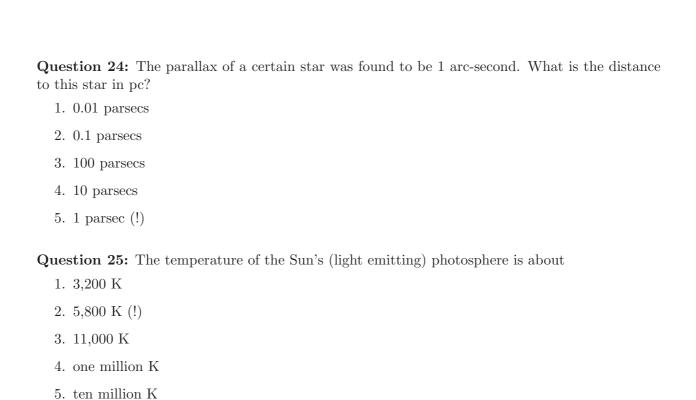
- 1. It is more inclined to the ecliptic than any of the eight planets. (!) → HW7
- 2. It has an unexpectedly short orbital period.
- 3. It's orbital period is exactly twice that of Neptune's.
- 4. It lies exactly on the ecliptic.
- 5. It has the lowest eccentricity of any planet's orbit.

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

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

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.

4. every 11 years. (!) → Review; Miniquiz 7, Q5

1. temperature. (!)

2. proper motion.

4. radial velocity.

1. a cold terrestrial planet.

3. a large Kuiper Belt object. (!)

5. approximately every 100 years.

2. a small Jovian planet.

4. a wandering moon.

5. a captured comet.

2. once a year.

3. every 51/2 years.

3. distance.

5. age.

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

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

- 1. Io (!) → HW7
- 2. Europa

5. Triton

- 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