Homework #5

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Number of Questions: 20

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Question 1: (5 points)

The photosphere of the Sun is

- (1) 1. the visible "surface" of the Sun.
- ( ) 2. the middle layer of the Sun's atmosphere.
- ( ) 3. the region of convecting gases below the visible surface of the Sun
- ( ) 4. the core of the Sun, where the nuclear energy is generated.

Save answer

Question 2: (5 points)

How does the average density of the Sun compare to that of the planet Jupiter?

- ( ) 1. It is not possible to specify an average density for an object as large as the Sun.
- ( ) 2. The Sun is many times denser than Jupiter.
- ( ) 3. The Sun is considerably less dense than Jupiter.
- (1) 4. The Sun has approximately the same average density as Jupiter.

Save answer

Question 3: (5 points)

Granulation or the mottled appearance of the whole solar surface is an indication of what physical process at work in the Sun?

- ( ) 1. The outflow of neutrinos from the interior.
- ( ) 2. Rapid rotation of the Sun.
- ( ) 3. Thermonuclear fusion of hydrogen in the Sun's surface layers.
- (1) 4. Convective motion of gases in the upper portion of the Sun's interior.

Save answer

Question 4: (5 points)

The surface of the Sun near its edge appears dimmer and cooler than at the center of the disk when viewed in visible light because we see

- ( ) 1. deeper into the Sun near the edge than at disk center and temperature increases with depth.
- (1) 2. less deep into the Sun near the edge than at disk center and temperature increases with depth.
- ( ) 3. light from the edge that has had to pass through more of the absorbing chromosphere and corona and is thereby reduced in intensity.
- ( ) 4. less deep into the Sun near the edge than at disk center and temperature decreases with depth.

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Question 5: (5 points)

What is the name of the layer of the Sun's atmosphere that appears as a pinkish ring just outside the visible disk of the Sun during a total solar eclipse?

- (1) 1. The chromosphere.
- ( ) 2. The photosphere.
- ( ) 3. The convective zone.
- ( ) 4. The corona.

Save answer

Question 6: (5 points)

What is a spicule on the Sun?

- ( ) 1. A bright arc of gas suspended above the edge of the visible disk of the Sun.
- ( ) 2. A long, thin, curved line of bright gas in the corona.
- ( ) 3. A small, bright cell in the photosphere.
- (1) 4. A jet of rising gas in the chromosphere.

Save answer

Question 7: (5 points)

What is surprising about the atmosphere of the Sun?

1. Its pressure, after dropping just above the photosphere, rises again to a value equivalent to that at the photosphere at the top of the chromosphere.
2. Its density, after falling rapidly above the photosphere, rises again significantly in the chromosphere.
3. Its temperature, after falling above the photosphere, rises again to reach very high values high in the atmosphere.
4. Its temperature, after rising continuously from below the photosphere through the chromosphere, falls again suddenly in the corona.

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Question 8: (5 points)

Which of the following statements is NOT true for sunspots?

1. They occur in regions of lower-than-average magnetic fields.
2. They increase and decrease in number, relatively regularly.
3. They often occur in pairs of opposite magnetic polarity.
4. They are cooler than the surrounding photosphere of the Sun.

Save answer

Question 9: (5 points)

In what fundamental way does the overall solar magnetic field differ from that of the Earth?

1. The solar field has the same polarity at both poles and the other polarity at the equator.
2. The Sun's overall magnetic field never reverses itself, while that of the Earth has reversed itself many times in geological history.
3. The strength of the Sun's overall magnetic field is about 20,000 times more powerful than that of the Earth.
4. The solar field lies just beneath the surface, while the Earth's field passes through the whole Earth.

Save answer

Question 10: (5 points)

The bright X-ray image that one obtains of the solar corona when the Sun is photographed at this wavelength indicates that the gas temperature at these heights is

1. extremely high, above 10^6 K.
2. extremely low, much cooler than the photosphere.
3. about twice that of the photosphere.
4. about the same temperature as the photosphere.

Save answer

Question 11: (5 points)

What is the energy source for the Sun?

1. Radioactive decay of the nuclei of heavy elements.
2. Thermonuclear fusion in the core.
3. Primordial heat, left behind from when the Sun first formed.
4. Heat released by gravitational contraction as the Sun slowly shrinks.

Save answer

Question 12: (5 points)

To what do the words “hydrostatic equilibrium” in the Sun refer?

1. The balance of gas pressure outward and magnetic forces inward.
2. The balance of gravity inward and gas pressure outward.
3. The creation of one helium nucleus for the “destruction” of every four hydrogen nuclei.
4. The balance of gas pressure inward and heat outward.

Save answer

Question 13: (5 points)

Recent solar neutrino experiments have confirmed the suspicion that the explanation for the apparent shortfall in neutrino detection rates over the last 30 years was because

1. the Sun does indeed produce only 1/3 of that predicted by earlier theoretical models; these models require major modification.
2. 2/3 of the neutrinos from the Sun had been absorbed by material between Sun and Earth.

- 3. 2/3 of the solar neutrinos had transformed into a type of neutrino that was undetectable by old detection techniques.
- 4. the detectors had been faulty; 2/3 of the neutrinos had been missed by the detectors.

Save answer

Question 14: (5 points)

Which ONE of the following statements is TRUE?

- 1. Visible light takes up only a very small part of the total range of wavelengths in the electromagnetic spectrum.
- 2. Visible light takes up all of the electromagnetic spectrum.
- 3. Visible light takes up most (but not all) of the total range of wavelengths in the electromagnetic spectrum.
- 4. Visible light is NOT part of the electromagnetic spectrum.

Save answer

Question 15: (5 points)

X rays and light

- 1. are different because X rays are made up of waves, whereas light is made up of particles.
- 2. are different because X rays are made up of particles, whereas light is made up of waves.
- 3. are the same thing except that X rays have longer wavelengths than light.
- 4. are the same thing except that X rays have shorter wavelengths than light.

Save answer

Question 16: (5 points)

Radio waves travel through space at what speed?

- 1. Radio waves travel through space at what speed?
- 2. At the speed of light, $3x10^8 m/s$.
- 3. Much slower than the speed of light.
- 4. Slightly faster than the speed of light, because their wavelength is longer.

Save answer

Question 17: (5 points)

The diameter of the Earth is about 13,000 km. What distance does light travel in one second, in terms of the diameter of the Earth?

- 1. 23 times the diameter.
- 2. 23,077 times the diameter.
- 3. 46 times the diameter.
- 4. 0.043 times the diameter.

Save answer

Question 18: (5 points)

If two photons in a vacuum have different energies, what can we say about the wavelengths of these photons?

- 1. The higher-energy photon has the shorter wavelength.
- 2. The higher-energy photon has the longer wavelength.
- 3. They have the same wavelength; all photons have the same wavelength, regardless of energy.
- 4. We can't say anything; wavelength depends only on color and not on energy.

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Question 19: (5 points)

Which one of the following wavelength regions MUST be observed from space, because no energy in this region reaches the ground?

- 1. Radio.
- 2. Infrared.
- 3. X rays.
- 4. Visible light.

Save answer

Question 20: (5 points)

Which type of telescope uses a lens as the main optical element?

- 1. A radio telescope.
- 2. A Newtonian telescope.
- 3. A Cassegrain telescope.
- 4. A refracting telescope.

Save answer

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