Homework #7

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Number of Questions: 20

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Question 1: (5 points)

What is parallax?

- 1. The distance to an object, measured in parsecs.
- 2. The angle taken up by the size (e.g., diameter) of an object, as seen by an observer.
- 3. The shift in angular position of an object as it moves in space.
- 4. The apparent shift in position of an object as the observer moves.

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Question 2: (5 points)

Parallax of a nearby star is used to estimate its

- 1. surface temperature.
- 2. distance from Earth.
- 3. apparent magnitude.
- 4. physical size or diameter.

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Question 3: (5 points)

Spectral types of stars (e.g., O, B, A, F, G, K, M) define uniquely their

- 1. sizes or radii.
- 2. absolute magnitudes.
- 3. luminosities.
- 4. surface temperatures.

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Question 4: (5 points)

What are the two physical parameters of stars that are plotted in the Hertzsprung-Russell diagram?

- 1. Mass and surface temperature.
- 2. Luminosity and mass.
- 3. Radius and mass.
- 4. Luminosity and surface temperature.

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Question 5: (5 points)

Compared to a star in the middle of the Hertzsprung-Russell diagram, a star in the upper right part of the diagram is

- 1. fainter.
- 2. hotter.
- 3. larger.
- 4. non-existent, because there are no stars that appear in the upper right part of the diagram.

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Question 6: (5 points)

Measurements indicate that a certain star has a very high intrinsic brightness (100,000 times as bright as our Sun) and yet is relatively cool (3500 K). How can this be?

- 1. The star must be quite small.
- 2. The star must be very large.
- 3. There must be an error in observation, because no star can have these properties.
- 4. The star must be in the upper part of the main sequence.

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Question 7: (5 points)

Which important property of stars can be best determined by observations of binary stars systems?

1. Stellar mass.
2. Surface temperature.
3. Distance from Earth.
4. Pulsation period.

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Question 8: (5 points)

In order for a pair of stars to be classified as a visual binary, which one of the following conditions must be true?

1. The stars must be orbiting around each other, and both stars must be visible through telescopes from the Earth.
2. The stars must be orbiting around each other, and absorption or emission lines from both stars must be visible in the spectrum.
3. The stars must be orbiting around each other, and one must periodically cross in front of the other (i.e., it must eclipse the other) as seen from the Earth.
4. The stars must lie in almost the same direction from the Earth, but must not be orbiting around each other.

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Question 9: (5 points)

An eclipsing binary system consists of

1. a star that is periodically eclipsed by the Moon.
2. two stars that periodically eclipse each other, as seen from Earth.
3. two stars in which spectral lines move back and forth periodically because of Doppler shift, indicating mutually orbiting stars.
4. two mutually orbiting and gravitationally bound stars that are close enough to be resolved when viewed from Earth.

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Question 10: (5 points)

The relationship between mass and luminosity of stars on the main sequence is that

1. the luminosity of stars reaches a peak at around 1 solar mass and decreases as mass increases,

and decreases beyond this limit.

2. luminosity is independent of the stellar mass.
3. the larger the stellar mass, the larger the luminosity.
4. the greater the stellar mass, the less the luminosity.

Save answer

Question 11: (5 points)

Where are the most massive stars to be found in the main sequence of a Hertzsprung-Russell diagram?

1. The upper left end.
2. Main-sequence stars all have approximately the same mass, by definition.
3. In the center.
4. The lower right end.

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Question 12: (5 points)

What do our atmosphere and a reflection nebula surrounding a star have in common?

1. They both appear blue because of preferred scattering of this color of light.
2. They both have about the same temperature.
3. They have almost the same average density of gas.
4. They both contain the same types of molecules.

Save answer

Question 13: (5 points)

How is gas distributed in interstellar space?

1. In clumps, concentrated in interstellar clouds.
2. Concentrated in narrow riverlike streams of gas that extend across the Galaxy.
3. Uniformly distributed through space.
4. Concentrated around existing stars, because of the stars' gravitational pull.

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Question 14: (5 points)

What determines whether a particular region of an interstellar cloud can collapse and form a star?

- 1. Only the temperature, since higher temperatures act to prevent collapse.
- 2. The amount of gravity pulling inward compared to gas pressure pushing outward.
- 3. The gas density, the ratio of the mass of the cloud over its volume, since this determines how gravity will act upon the cloud material.
- 4. Only the amount of mass in the cloud, since this determines the strength of gravity.

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Question 15: (5 points)

What is a protostar?

- 1. A sphere of gas after collapse from an interstellar cloud but before nuclear reactions have begun.
- 2. A small interstellar cloud, before it collapses to become a star.
- 3. A star near the end of its life, before it explodes as a supernova.
- 4. A shell of gas left behind from the explosion of a star as a supernova.

Save answer

Question 16: (5 points)

At what point in its evolution will a protostar stop shrinking and stabilize into a star?

- 1. When nuclear reactions end in its core.
- 2. When gravitational contraction has heated up the gas to the point where radiation pressure opposes gravity for the first time.
- 3. When it has spun off enough of its matter and is spinning fast enough that centrifugal force opposes the gravitational contraction.
- 4. When nuclear processes generate enough energy and internal pressure to resist gravitational contraction.

Save answer

Question 17: (5 points)

A brown dwarf is

- 1. an object intermediate between a planet and a star, with not enough mass to begin nuclear reactions in its core.
- 2. a general name for objects similar to the planet Jupiter.
- 3. any star whose blackbody spectrum peaks in the brown region of the visible spectrum.
- 4. a star of less than about 11/2 solar masses at the very end of its life, after it has cooled to near invisibility.

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Question 18: (5 points)

All stars on the main sequence

- 1. generate energy by hydrogen fusion in their centers.
- 2. have approximately the same age, to within a few million years.
- 3. are changing slowly in size, by gravitational contraction.
- 4. are at a late stage of evolution, after the red giant stage.

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Question 19: (5 points)

How is the length of a star's lifetime related to the mass of the star?

- 1. Lower-mass stars run through their lives faster and have shorter lifetimes.
- 2. The lifetimes of stars are too long to measure, so it is not known how (or if) their lifetimes depend on mass.
- 3. A star's lifetime does not depend on its mass.
- 4. Higher-mass stars run through their lives faster and have shorter lifetimes.

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Question 20: (5 points)

The next stage in the star's life after the main-sequence phase is

- 1. the horizontal branch phase.
- 2. the red giant phase.
- 3. a protostar.
- 4. death (i.e., either a supernova or a white dwarf).

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