Chapter 14-16 Review

Why does the Sun shine?

a) It is on fire.
b) chemical energy
c) gravitational energy
d) nuclear fusion
e) nuclear fission

Chapter 14-16 Review

Why does the Sun shine?

a) It is on fire.
b) chemical energy
c) gravitational energy
d) nuclear fusion
e) nuclear fission

Chapter 14-16 Review

Why is the Sun very dense on the inside?

a) Denser materials sank to its center.
b) Pressure of the overlying gas keeps the density high.
c) It formed from dense material.
d) Nuclear fusion increases the density in the core by changing hydrogen into helium.

Chapter 14-16 Review

Why is the Sun very dense on the inside?

a) Denser materials sank to its center.
b) Pressure of the overlying gas keeps the density high.
c) It formed from dense material.
d) Nuclear fusion increases the density in the core by changing hydrogen into helium.

Chapter 14-16 Review

What conditions are required for nuclear fusion of hydrogen to occur?

a) a temperature of millions Kelvin
b) high density
c) the presence of uranium
d) all of the above
e) A and B

Chapter 14-16 Review

What conditions are required for nuclear fusion of hydrogen to occur?

a) a temperature of millions Kelvin
b) high density
c) the presence of uranium
d) all of the above
e) A and B

Chapter 14-16 Review

What is a hydrogen nucleus–the particle that fuses into helium in the Sun?

a) a neutron
b) a proton
c) an electron
d) a positron

Chapter 14-16 Review

What is a hydrogen nucleus–the particle that fuses into helium in the Sun?

a) a neutron
b) a proton
c) an electron
d) a positron

Chapter 14-16 Review

What kind of radiation do you think shines out of the core of the Sun?

a) visible light
b) infrared light
c) X-ray light
d) ultraviolet light
e) gamma rays

Chapter 14-16 Review

What kind of radiation do you think shines out of the core of the Sun?

a) visible light
b) infrared light
c) X-ray light
d) ultraviolet light
e) gamma rays

Chapter 14-16 Review

If the Sun's core went out of balance and shrank a little, what would happen?

a) The density would decrease, and fusion would slow down, releasing less energy.
b) The density would increase, and fusion would speed up, releasing more energy.
c) The whole Sun would shrink.
d) Not much would change.

Chapter 14-16 Review

If the Sun's core went out of balance and shrank a little, what would happen?

a) The density would decrease, and fusion would slow down, releasing less energy.
b) The density would increase, and fusion would speed up, releasing more energy.
c) The whole Sun would shrink.
d) Not much would change.

Chapter 14-16 Review

If the fusion in the Sun's core sped up slightly, releasing more energy, what would happen?

a) The entire Sun would become hotter.
b) The core would expand.
c) The color of the Sun would change.
d) all of the above

Chapter 14-16 Review

If the fusion in the Sun's core sped up slightly, releasing more energy, what would happen?

a) The entire Sun would become hotter.
b) The core would expand.
c) The color of the Sun would change.
d) all of the above

Chapter 14-16 Review

How do photons get from the core of the Sun to the surface?

a) They bounce from atom to atom, being absorbed and reemitted as they make their way to the surface.
b) They are brought to the surface by conduction.
c) They are brought to the surface by convection.
d) none of the above

Chapter 14-16 Review

How do photons get from the core of the Sun to the surface?

a) They bounce from atom to atom, being absorbed and reemitted as they make their way to the surface.
b) They are brought to the surface by conduction.
c) They are brought to the surface by convection.
d) none of the above

By the time photons reach the surface of the Sun, they are mostly

a) infrared light.
b) visible light.
c) ultraviolet light.
d) X rays.
e) gamma rays.

Chapter 14-16 Review

By the time photons reach the surface of the Sun, they are mostly

a) infrared light.
b) visible light.
c) ultraviolet light.
d) X rays.
e) gamma rays.

Chapter 14-16 Review

If we can't see the Sun's interior, how do we know what it is like?

a) observations of sunquakes
b) observations of neutrinos
c) our understanding of gravitational equilibrium
d) all of the above
e) B and C

Chapter 14-16 Review

If we can't see the Sun's interior, how do we know what it is like?

a) observations of sunquakes
b) observations of neutrinos
c) our understanding of gravitational equilibrium
d) all of the above
e) B and C

Chapter 14-16 Review

The Sun's visible surface, or *photosphere*, has regions of strong magnetic field called

a) granulation.
b) magnetic traps.
c) magnetic lines.
d) sunspots.
e) sundogs.

Chapter 14-16 Review

The Sun's visible surface, or *photosphere*, has regions of strong magnetic field called

a) granulation.
b) magnetic traps.
c) magnetic lines.
d) sunspots.
e) sundogs.

Chapter 14-16 Review

Since the Sun's outer atmosphere, or *corona*, is millions of degrees but not very dense,

a) we can't really see it in any wavelength.
b) we see it very clearly in visible light.
c) we see X rays coming from it.
d) we only see the lower layers of the Sun's atmosphere, which are much more dense.

Chapter 14-16 Review

Since the Sun's outer atmosphere, or *corona*, is millions of degrees but not very dense,

a) we can't really see it in any wavelength.
b) we see it very clearly in visible light.
c) we see X rays coming from it.
d) we only see the lower layers of the Sun's atmosphere, which are much more dense.

Chapter 14-16 Review

What is the *solar activity cycle*?

a) the balance of pressure and gravity in the Sun's core
b) the process of fusing hydrogen into helium
c) the 11-year cycle of changes in the occurrence of sunspots, flares, and solar wind
d) the process by which photons from the Sun's core make their way to the surface

Chapter 14-16 Review

What is the *solar activity cycle*?

a) the balance of pressure and gravity in the Sun's core
b) the process of fusing hydrogen into helium
c) the 11-year cycle of changes in the occurrence of sunspots, flares, and solar wind
d) the process by which photons from the Sun's core make their way to the surface

Chapter 14-16 Review

How does solar activity affect Earth?

a) It can make beautiful aurora.
b) It can cause geomagnetic storms.
c) It can damage satellites.
d) It can disrupt electrical power.
e) all of the above

Chapter 14-16 Review

How does solar activity affect Earth?

a) It can make beautiful aurora.
b) It can cause geomagnetic storms.
c) It can damage satellites.
d) It can disrupt electrical power.
e) all of the above

Chapter 14-16 Review

Which of the following can be used to directly measure the Sun's mass?

a) solar luminosity and Earth-Sun distance
b) solar temperature and Earth-Sun distance
c) solar rotation rate and Earth-Sun distance.
d) Earth's mass and orbital period
e) The Venus-Sun distance and the length of a Venusian year

Chapter 14-16 Review

Which of the following can be used to directly measure the Sun's mass?

a) solar luminosity and Earth-Sun distance
b) solar temperature and Earth-Sun distance
c) solar rotation rate and Earth-Sun distance.
d) Earth's mass and orbital period
e) The Venus-Sun distance and the length of a Venusian year

Chapter 14-16 Review

If fusion in the solar core ceased today, worldwide panic would break out tomorrow as the Sun began to grow dimmer.

a) Yes, because Earth would quickly freeze over.
b) Yes, because Earth would no longer be bound to the solar system and would drift into space.
c) Yes, because the Sun would collapse and the planets would soon follow.
d) No, it takes thousands of years for photons created in nuclear reactions at the solar core to reach the surface.
e) No, the Sun would continue to glow brightly for billions of years because of gravitational contraction.

Chapter 14-16 Review

If fusion in the solar core ceased today, worldwide panic would break out tomorrow as the Sun began to grow dimmer.

a) Yes, because Earth would quickly freeze over.
b) Yes, because Earth would no longer be bound to the solar system and would drift into space.
c) Yes, because the Sun would collapse and the planets would soon follow.
d) No, it takes thousands of years for photons created in nuclear reactions at the solar core to reach the surface.
e) No, the Sun would continue to glow brightly for billions of years because of gravitational contraction.

Chapter 14-16 Review

If you want to see a lot of sunspots, just wait for the time of solar maximum.

a) Yes, the number of sunspots peaks at solar maximum.
b) No, the number of sunspots peaks at solar minimum.
c) No, the number of sunspots is random and does not depend on whether it is the time of solar minimum or maximum.

Chapter 14-16 Review

If you want to see a lot of sunspots, just wait for the time of solar maximum.

a) Yes, the number of sunspots peaks at solar maximum.
b) No, the number of sunspots peaks at solar minimum.
c) No, the number of sunspots is random and does not depend on whether it is the time of solar minimum or maximum.

Chapter 14-16 Review

If a star was moved twice as far away, what would happen to it?

a) It would get twice as faint.
b) It would get four times as faint.
c) It would get eight times as faint.
d) It would get fainter and redder.
e) It would get fainter and bluer.

Chapter 14-16 Review

If a star was moved twice as far away, what would happen to it?

a) It would get twice as faint.
b) It would get four times as faint.
c) It would get eight times as faint.
d) It would get fainter and redder.
e) It would get fainter and bluer.

Chapter 14-16 Review

How do we determine the distances to nearby stars?

a) radar
b) parallax
c) measuring luminosity, radius, and temperature, and inferring the distance
d) comparing observed brightness to the Sun, and inferring the distance

Chapter 14-16 Review

How do we determine the distances to nearby stars?

a) radar
b) parallax
c) measuring luminosity, radius, and temperature, and inferring the distance
d) comparing observed brightness to the Sun, and inferring the distance

Chapter 14-16 Review

How can you tell the temperatures of stars?

a) color–the hottest stars are "red hot"
b) color–the hottest stars are "bluish white"
c) spectral type
d) A and C
e) B and C

Chapter 14-16 Review

How can you tell the temperatures of stars?

a) color–the hottest stars are "red hot"
b) color–the hottest stars are "bluish white"
c) spectral type
d) A and C
e) B and C

Chapter 14-16 Review

Why do the hottest spectra (types O and B) show few absorption lines?

a) Many elements have been used up in these stars.
b) These stars are old and were formed before there were heavy elements in the galaxy.
c) Many atoms in these stars are ionized–have lost electrons–and can't absorb photons.

Chapter 14-16 Review

Why do the hottest spectra (types O and B) show few absorption lines?

a) Many elements have been used up in these stars.
b) These stars are old and were formed before there were heavy elements in the galaxy.
c) Many atoms in these stars are ionized–have lost electrons–and can't absorb photons.

Chapter 14-16 Review

In binary stars, the orbital period depends on the masses of the stars and the sizes of their orbits. Why is this so valuable to know?

a) We can predict how long an orbit will take.
b) This is the main way we determine the masses of stars.
c) This lets us know if two stars that look close together in the sky really orbit one another.

Chapter 14-16 Review

In binary stars, the orbital period depends on the masses of the stars and the sizes of their orbits. Why is this so valuable to know?

a) We can predict how long an orbit will take.
b) This is the main way we determine the masses of stars.
c) This lets us know if two stars that look close together in the sky really orbit one another.

Chapter 14-16 Review

What is the X-axis in an H-R diagram?

a) color
b) temperature
c) spectral type
d) all of the above

Chapter 14-16 Review

What is the X-axis in an H-R diagram?

a) color
b) temperature
c) spectral type
d) all of the above

Chapter 14-16 Review

What is the Y-axis in an H-R diagram?

a) Color
b) Temperature
c) Spectral type
d) Luminosity

Chapter 14-16 Review

What is the Y-axis in an H-R diagram?

a) Color
b) Temperature
c) Spectral type
d) Luminosity

Stars spend about 90% of their life

a) as protostars.
b) as main-sequence stars.
c) as red giants.
d) as planetary nebulae.

Stars spend about 90% of their life

a) as protostars.
b) as main-sequence stars.
c) as red giants.
d) as planetary nebulae.

In a random sample of stars in the Sun's neighborhood, you would expect about 90% of them to be

a) red giants.
b) white dwarfs.
c) main sequence stars.
d) protostars.

In a random sample of stars in the Sun's neighborhood, you would expect about 90% of them to be

a) red giants.
b) white dwarfs.
c) main sequence stars.
d) protostars.

To measure a star's luminosity, you need to know

a) its temperature and distance.
b) its temperature and color.
c) its apparent brightness and distance.
d) its apparent brightness and color.
e) its distance, apparent brightness, and color.

To measure a star's luminosity, you need to know

a) its temperature and distance.
b) its temperature and color.
c) its apparent brightness and distance.
d) its apparent brightness and color.
e) its distance, apparent brightness, and color.

What is the fundamental way of measuring the distance to the stars?

a) radar
b) the H-R diagram
c) measuring apparent brightness
d) parallax
e) Doppler shifts

What is the fundamental way of measuring the distance to the stars?

a) radar
b) the H-R diagram
c) measuring apparent brightness
d) parallax
e) Doppler shifts

Which of the following in an example of parallax?

a) Hold your thumb out and blink one eye at a time. Your thumb moves more than the background.
b) Driving down a road, a nearby fence appears to shift more than distance scenery.
c) Planets shift their position in the sky partly because Earth moves, shifting *our* position.
d) Stars shift their position at different times of the year as Earth orbits the Sun.
e) all of the above

Which of the following in an example of parallax?

a) Hold your thumb out and blink one eye at a time. Your thumb moves more than the background.
b) Driving down a road, a nearby fence appears to shift more than distance scenery.
c) Planets shift their position in the sky partly because Earth moves, shifting *our* position.
d) Stars shift their position at different times of the year as Earth orbits the Sun.
e) all of the above

A star near the top of the main sequence has a mass about

a) twice the Sun's mass.
b) five times the Sun's mass.
c) 60 times the Sun's mass.
d) 10,000 times the Sun's mass.

A star near the top of the main sequence has a mass about

a) twice the Sun's mass.
b) five times the Sun's mass.
c) 60 times the Sun's mass.
d) 10,000 times the Sun's mass.

A star near the top of the main sequence has a luminosity about

a) twice the Sun's luminosity.
b) five times the Sun's luminosity.
c) 20 to 30 times the Sun's luminosity.
d) 10,000 times the Sun's luminosity.

A star near the top of the main sequence has a luminosity about

a) twice the Sun's luminosity.
b) five times the Sun's luminosity.
c) 20 to 30 times the Sun's luminosity.
d) 10,000 times the Sun's luminosity.

How would you expect the lifetime of a massive star near the top of the main sequence to compare to the Sun's?

a) It would be longer.
b) It would be about the same.
c) It would be shorter.
d) It would be much shorter.

How would you expect the lifetime of a massive star near the top of the main sequence to compare to the Sun's?

a) It would be longer.
b) It would be about the same.
c) It would be shorter.
d) It would be much shorter.

Chapter 14-16 Review

Clusters in the disk of our galaxy, with hundreds of stars in them, are called

a) open clusters.
b) globular clusters.

Chapter 14-16 Review

Clusters in the disk of our galaxy, with hundreds of stars in them, are called

a) open clusters.
b) globular clusters.

Chapter 14-16 Review

Clusters in the halo of our galaxy, with hundreds of *thousands* of stars in them, are called

a) open clusters.
b) globular clusters.

Chapter 14-16 Review

Clusters in the halo of our galaxy, with hundreds of *thousands* of stars in them, are called

a) open clusters.
b) globular clusters.

Chapter 14-16 Review

Why do photographs of a star field show some stars to be larger than others?

a) Some stars are larger than others and therefore appear larger.
b) Some stars are nearer than others and therefore appear larger.
c) Photographs make brighter stars appear larger than fainter stars, although they should all be points of light.
d) Sometimes what looks like a single star is actually a small group of stars and therefore appears larger.

Chapter 14-16 Review

Why do photographs of a star field show some stars to be larger than others?

a) Some stars are larger than others and therefore appear larger.
b) Some stars are nearer than others and therefore appear larger.
c) Photographs make brighter stars appear larger than fainter stars, although they should all be points of light.
d) Sometimes what looks like a single star is actually a small group of stars and therefore appears larger.

Chapter 14-16 Review

What do the colors of stars in the Hertzsprung-Russell diagram tell us?

a) the size of the star
b) the luminosity of the star
c) the surface temperature of the star
d) the core temperature of the star
e) the mass of the star

Chapter 14-16 Review

What do the colors of stars in the Hertzsprung-Russell diagram tell us?

a) the size of the star
b) the luminosity of the star
c) the surface temperature of the star
d) the core temperature of the star
e) the mass of the star

Chapter 14-16 Review

True or False?: Two stars that look very different must be made of different kinds of elements.

a) True, stars have a wide range of compositions.
b) True, stars appear different because of their different composition.
c) False, stars appear different due to their different ages and masses, not composition.
d) False, stars appear different because of their varying distances from us.

Chapter 14-16 Review

True or False?: Two stars that look very different must be made of different kinds of elements.

a) True, stars have a wide range of compositions.
b) True, stars appear different because of their different composition.
c) False, stars appear different due to their different ages and masses, not composition.
d) False, stars appear different because of their varying distances from us.

Chapter 14-16 Review

True or False?: Stars that begin their lives with the most mass live longer than less massive stars because it takes them a lot longer to use up their hydrogen fuel.

a) True, with more hydrogen to burn, massive stars can live for billions of years.
b) True, low mass stars run out of hydrogen very quickly and have very short lifetimes.
c) False, stars have similar lifetimes despite their different masses.
d) False, more massive stars are much more luminous than low mass stars and use up their hydrogen faster, even though they have more of it.

Chapter 14-16 Review

True or False?: Stars that begin their lives with the most mass live longer than less massive stars because it takes them a lot longer to use up their hydrogen fuel.

a) True, with more hydrogen to burn, massive stars can live for billions of years.
b) True, low mass stars run out of hydrogen very quickly and have very short lifetimes.
c) False, stars have similar lifetimes despite their different masses.
d) False, more massive stars are much more luminous than low mass stars and use up their hydrogen faster, even though they have more of it.

Chapter 14-16 Review

What is the first step in the formation of a protostar?

a) Conservation of angular momentum causes galactic material to collapse into a disk.
b) Gravity causes planetesimals to begin to accumulate.
c) Gravity causes a cloud of gas and dust to begin to contract.
d) Nuclear fusion heats material and causes it to glow.

Chapter 14-16 Review

What is the first step in the formation of a protostar?

a) Conservation of angular momentum causes galactic material to collapse into a disk.
b) Gravity causes planetesimals to begin to accumulate.
c) Gravity causes a cloud of gas and dust to begin to contract.
d) Nuclear fusion heats material and causes it to glow.

Chapter 14-16 Review

True or False?: A protostellar cloud spins faster as it contracts, even though its angular momentum stays the same.

a) True, angular momentum is conserved and if the cloud contracts, it must spin faster.
b) True, clouds spin faster as they contract but their angular momentum must also increase.
c) False, if the angular momentum stays the same, the cloud must spin at the same rate.
d) False, if the angular momentum stays the same, the cloud cannot contract.

Chapter 14-16 Review

True or False?: A protostellar cloud spins faster as it contracts, even though its angular momentum stays the same.

a) True, angular momentum is conserved and if the cloud contracts, it must spin faster.
b) True, clouds spin faster as they contract but their angular momentum must also increase.
c) False, if the angular momentum stays the same, the cloud must spin at the same rate.
d) False, if the angular momentum stays the same, the cloud cannot contract.

Chapter 14-16 Review

Why do we think that clouds of gas and dust form stars?

a) We see young star clusters with gas and dust around them.
b) Infrared and microwave telescopes let us see protostars inside dust clouds.
c) Computer models predict that if a cloud has enough mass, it will contract, heat up, and form a star.
d) The Hubble Telescope lets us watch stars form before our eyes.
e) All but D

Chapter 14-16 Review

Why do we think that clouds of gas and dust form stars?

a) We see young star clusters with gas and dust around them.
b) Infrared and microwave telescopes let us see protostars inside dust clouds.
c) Computer models predict that if a cloud has enough mass, it will contract, heat up, and form a star.
d) The Hubble Telescope lets us watch stars form before our eyes.
e) All but D

Chapter 14-16 Review

If gas and dust are dark, how do we know they exist in space?

a) We sometimes see absorption lines from interstellar gas.
b) Infrared telescopes can see cool dust.
c) Radio telescopes can detect interstellar gas.
d) All of the above.

Chapter 14-16 Review

If gas and dust are dark, how do we know they exist in space?

a) We sometimes see absorption lines from interstellar gas.
b) Infrared telescopes can see cool dust.
c) Radio telescopes can detect interstellar gas.
d) All of the above.

Chapter 14-16 Review

When starlight passes through interstellar dust,

a) it gets fainter.
b) the blue light tends to scatter while the red continues toward us.
c) wavelengths all get longer (redder).
d) all of the above
e) A and B

Chapter 14-16 Review

When starlight passes through interstellar dust,

a) it gets fainter.
b) the blue light tends to scatter while the red continues toward us.
c) wavelengths all get longer (redder).
d) all of the above
e) A and B

Chapter 14-16 Review

What is the energy source that heats a contracting protostar?

a) friction
b) pressure
c) gravitational potential energy
d) fusion
e) kinetic energy

Chapter 14-16 Review

What is the energy source that heats a contracting protostar?

a) friction
b) pressure
c) gravitational potential energy
d) fusion
e) kinetic energy

Chapter 14-16 Review

Why do protostars rotate rather fast and end up surrounded by disks of material?

a) The galaxy is rotating, so all the stars that form are rotating as well.
b) If a cloud spins even a little bit, the spin increases as it contracts.
c) conservation of angular momentum
d) all of the above
e) B and C

Chapter 14-16 Review

Why do protostars rotate rather fast and end up surrounded by disks of material?

a) The galaxy is rotating, so all the stars that form are rotating as well.
b) If a cloud spins even a little bit, the spin increases as it contracts.
c) conservation of angular momentum
d) all of the above
e) B and C

Chapter 14-16 Review

Why can't a cloud with less than 0.08 solar masses become a star?

a) There won't be enough time for a star to form before gas is blown away by neighboring stars.
b) Gravity will be too weak to make the cloud collapse into a star.
c) It will never get hot enough for fusion to start.
d) The cloud will form planets instead of a star.

Chapter 14-16 Review

Why can't a cloud with less than 0.08 solar masses become a star?

a) There won't be enough time for a star to form before gas is blown away by neighboring stars.
b) Gravity will be too weak to make the cloud collapse into a star.
c) It will never get hot enough for fusion to start.
d) The cloud will form planets instead of a star.

Chapter 14-16 Review

Why can't a cloud with more than about 150 solar masses become a star?

a) There's rarely enough material to make a star so massive.
b) A larger star would be so bright that radiation pressure would blow it apart.
c) Gravity would be so strong that it would become a black hole.
d) The star's energy would be so great that it would explode as a supernova.

Chapter 14-16 Review

Why can't a cloud with more than about 150 solar masses become a star?

a) There's rarely enough material to make a star so massive.
b) A larger star would be so bright that radiation pressure would blow it apart.
c) Gravity would be so strong that it would become a black hole.
d) The star's energy would be so great that it would explode as a supernova.

Chapter 14-16 Review

If a protostar doesn't have enough mass to become a star, it becomes a

a) dark dwarf.
b) brown dwarf.
c) white dwarf.
d) black dwarf.

Chapter 14-16 Review

If a protostar doesn't have enough mass to become a star, it becomes a

a) dark dwarf.
b) brown dwarf.
c) white dwarf.
d) black dwarf.

What stops the contraction of a protostar?

a) degeneracy pressure
b) density
c) nuclear reactions
d) solidification of the core
e) none of the above

Chapter 14-16 Review

What stops the contraction of a protostar?

a) degeneracy pressure
b) density
c) nuclear reactions
d) solidification of the core
e) none of the above

Chapter 14-16 Review

Compared to stars like the Sun, how common are massive (10, 20, 30 solar mass) stars?

a) much more common
b) more common
c) less common
d) much less common
e) equally common

Chapter 14-16 Review

Compared to stars like the Sun, how common are massive (10, 20, 30 solar mass) stars?

a) much more common
b) more common
c) less common
d) much less common
e) equally common