Quizbank/Test

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Contents

- 1 AstroTest4
  - 1.1 AstroTest4-v1s1
    - 1.1.1 Key to AstroTest4-v1s1
  - 1.2 AstroTest4-v2s1
    - 1.2.1 Key to AstroTest4-v2s1
  - 1.3 AstroTest4-v1s2
    - 1.3.1 Key to AstroTest4-v1s2
  - 1.4 AstroTest4-v2s2
    - 1.4.1 Key to AstroTest4-v2s2

AstroTest4

If you are reading this as a Wikiversity page, proper pagebreaks should result if printed using your browser's print option. On Chrome, Explorer, and Firefox, this option is available in the upper right hand corner of your screen. But, pagebreaks do not render properly if you use "Printable version" on Wikiversity's Print/export option on the left-hand sidebar.

This document contains either a study guide OR pairs of exams taken from the same exam bank

If two exams have the same s-number, then v1 and v2 have the same questions, presented in different (random) order.
Exams with different s-numbers have different questions and may not have the same difficulty.
Click items in the table of contents and appropriate page should be reached. This feature should allow you to print only those pages that you need.

At the end of this document

Attribution for the quizzes identifies where the questions were obtained
Study guide links reading materials and/or relevant equations.

AstroTest4-v1s1

1. The range of wavelength for visible light is between

___ a) 600 and 1200 nanometers

___ b) 400 and 700 nanometers

___ c) 0.1 and 10 nanometers

___ d) 5000 and 6000 nanometers

___ e) 1 and 10 nanometers

2. The number of globular clusters in the Milky way galaxy is about

___ a) 15 million

___ b) 150

___ c) 15 thousand

___ d) 1,500

3. $KE = \frac{4\pi^2}{5}\frac{MR^2}{P^2}$ is the kinetic energy of a solid rotating ball, where M is mass, R is radius, and P is period. And, $power = \frac{energy}{time}$.
You are banging espressos in a little coffeehouse with your astronomy friends, talking about a new SN remnant that closely resembles the Crab. You have observed the pulsar, and wonder what the total power output of the nebula might be. You know both the period of the pulsar, as well as τ, which represents the amount of time you think the pulsar will continue pulsing if it continues slowing down at its present rate. What formula do you write on your napkin?

___ a) $power = \frac{4\tau\pi^2}{5}\frac{MR^2}{P^2}$

___ b) $power = \frac{4\pi^2}{5\tau^2}\frac{MR^2}{P^2}$

___ c) $power = \frac{5}{4\tau\pi^2}\frac{MR^2}{P^2}$

___ d) $power = \frac{4\pi^2}{5\tau}\frac{MR^2}{P^2}$

___ e) $power = \frac{4\pi^2}{5}\frac{MR^2}{P^2}\tau^4$

4. The Hayashi and Henyey tracks refer to how T Tauri of different masses will move

___ a) through an HR diagram as they are born

___ b) Two of these are true

___ c) through a cluster as they are born

___ d) through a cluster as they die

___ e) through an HR diagram as they die

5. A dying star with more than 1.4 solar masses becomes a _____, and those with more than 5 solar masses becomes a _____

___ a) white dwarf....neutron star

___ b) white dwarf...red dwarf

___ c) white dwarf....black hole

___ d) neutron star....black hole

___ e) blue giant....red giant

6. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 2 cm expands out to 4 cm. To what distance would a raisin originally situated at a distance of 4 cm expand?

___ a) 4

___ b) 3

___ c) 2

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7. What causes the blue glow of the Crab nebula?

___ a) the curving motion of electrons in a magnetic field; such motion resembles a radio antenna

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___ c) the Gravitational blue shift

___ d) the curving motion of electrons in a magnetic field; such motion traps ultra-violet and blue light

___ e) the Doppler blue shift

8. Many stars in a typical open cluster are nearly as old as the universe

___ a) True

___ b) False

9. Stars that begin with more than 50 solar masses will typically lose _____ while on the main sequence.

___ a) 10% of their magnetic field

___ b) 10% their mass

___ c) 50% their mass

___ d) 1% their mass

___ e) all of their magnetic field

10. You at the center raisin of an expanding raisinbread model of Hubble expansion, and from your location a raisin originally situated at a distance of 1 cm expands out to a distance of 4 cm. The nearest raisin with intelligent life is situated exactly halfway between your (central) location and the edge. How would this second "intelligent" raisin view an expansion of a raisin 1 cm away?

___ a) expansion from 1 cm to 9 cm (since 5-1=4)

___ b) expansion from 1 cm to 4 cm (just like yours).

___ c) expansion from 1 cm to 8 cm (twice yours).

___ d) expansion from 1 cm to 2 cm (half of yours)

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11. Stellar parallax is

___ a) an annual change in angular position of a star as seen from Earth

___ b) an astronomical object with known luminosity.

___ c) a numerical measure of brightness as seen from Earth

___ d) a numerical measure of brightness as seen from a distance of approximately 33 light-years

___ e) the total amount of energy emitted per unit time.

12. Members of an open cluster feel significant forces only due to gravitational interaction with each other

___ a) True

___ b) False

13. Pre–main sequence stars are often surrounded by a protoplanetary disk and powered mainly by

___ a) chemical reactions

___ b) the fusion of Helium to Carbon

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14. What was Messier doing when he independently rediscovered the Crab in 1758?

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15. In 1989 the satellite Hipparcos was launched primarily for obtaining parallaxes and proper motions allowing measurements of stellar parallax for stars up to about 500 parsecs away, which is about ____ times the diameter of the Milky Way Galaxy.

___ a) 15

___ b) 1.5

___ c) .015

___ d) 0.15

___ e) 150

16. Members of a globular cluster tend to be

___ a) old

___ b) of all ages

___ c) young

17. What causes the "finger-like" filamentary structure in the Crab nebula?

___ a) a heavy (high density) fluid underneath a light (low density) fluid, like a lava lamp

___ b) electrons striking oxygen molecules, like a lava lamp

___ c) electrons striking hydrogen molecules, like a lava lamp

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___ a) cosmic expansion

___ b) recalibration of supernovae relative magnitude

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19. When a star with more than 10 solar masses ceases fuse hydrogen to helium, it

___ a) it fuses helium to carbon to iron (and other elements), then continues to release more energy by fusing the iron to heavier elements such as uranium.

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20. Based on the HR diagrams and images in stars shown in the materials, a very large red supergiant has a diameter that is about ____ greater than a small white dwarf.

___ a) $3x10^{11}$

___ b) $3x10^{7}$

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21. The location of open clusters can be described as

___ a) uniformly distributed within the galactic disk

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22. According to Wikipedia, a star with over 20 solar masses converts its Hyrogen to Helium in about 8 billion years, but the conversion of Oxygen to heavier elements take about _____

___ a) 1 thousand years

___ b) 1 million years

___ c) 1 billion years

___ d) 10 billion years

___ e) 1 year

23. An object emits thermal (blackbody) radiation with a peak wavelength of 250nm. How does its temperature compare with the Sun?

___ a) 2 times hotter than the Sun

___ b) 5 times colder than the Sun

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24. Most globular clusters that we see in the sky orbit _____ and have _____ orbits

___ a) the center of the Milky way ... nearly circular

___ b) within the disk of the Milky way ... nearly circular

___ c) within the disk of the Milky way ... elliptic orbits

___ d) the center of the Milky way ... elliptic orbits

25. Members of a globular cluster tend to have

___ a) low mass

___ b) high mass

___ c) a wide range of masses

26. Luminosity is

___ a) a numerical measure of brightness as seen from a distance of approximately 33 light-years

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27. What happens if you increase the size of a giant molecular cloud while keeping temperature and mass fixed?

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28. The course materials presented three arguments suggesting that a white dwarf is roughly the size of the earth. Which best summarizes them?

___ a) x-ray-emmission...doppler-shift...rotation-rate

___ b) HR-diagram-location...X-ray-emmision...spectral-lines

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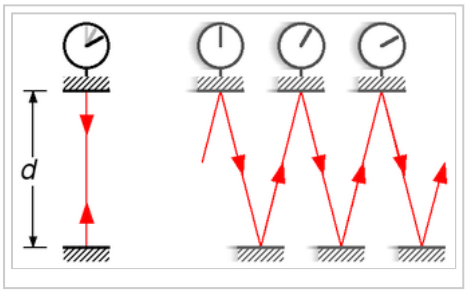
___ d) temperature-luminosity...redshift...quantum-theory-of-solids

___ e) doppler-shift...period-of-pulsation...temperature-luminosity

29. This light clock is associated with



___ a) general relativity

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30. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 4 cm expands out to 12 cm. To what distance would a raisin originally situated at a distance of 2 cm expand?

___ a) 6

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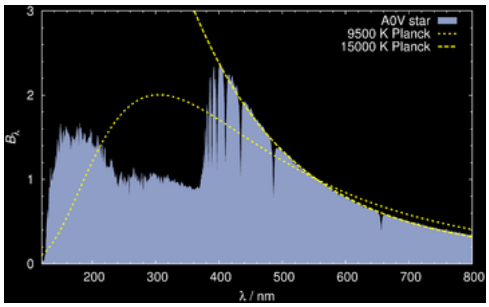

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Key to AstroTest4-v1s1

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- b) electrons striking oxygen molecules, like a lava lamp
- c) electrons striking hydrogen molecules, like a lava lamp
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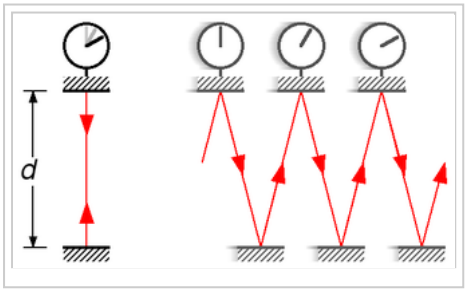

- a) general relativity
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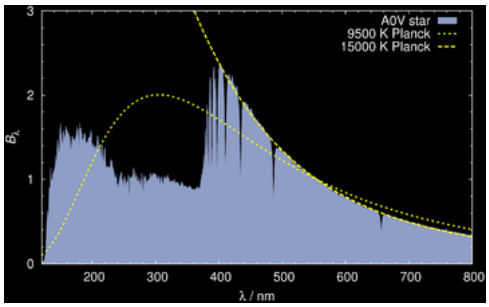

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- a) usually is a result of collisions between galaxies

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35. One way to determine the distance to a nebula or small cluster of clouds is to compare the angular expansion to the spectroscopic Doppler shift. Two clusters (A and B) have the same spectroscopically measured velocity. Cluster A is moving towards the observer and exhibits the greater angular expansion. Which cluster is closer?

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AstroTest4-v2s1

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___ e) $3x10^{11}$

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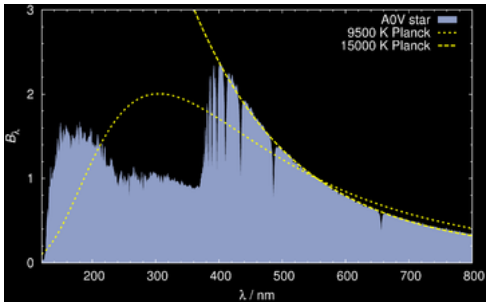
13.



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16. Most globular clusters that we see in the sky orbit _____ and have _____ orbits

___ a) within the disk of the Milky way ... elliptic orbits

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___ a) through a cluster as they are born

___ b) through an HR diagram as they are born

___ c) Two of these are true

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18. You at the center raisin of an expanding raisinbread model of Hubble expansion, and from your location a raisin originally situated at a distance of 1 cm expands out to a distance of 4 cm. The nearest raisin with intelligent life is situated exactly halfway between your (central) location and the edge. How would this second "intelligent" raisin view an expansion of a raisin 1 cm away?

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19. The number of globular clusters in the Milky way galaxy is about

___ a) 1,500

___ b) 15 thousand

___ c) 15 million

___ d) 150

20. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 4 cm expands out to 12 cm. To what distance would a raisin originally situated at a distance of 2 cm expand?

___ a) 3

___ b) 6

___ c) 2

___ d) 4

___ e) 8

21. What causes the blue glow of the Crab nebula?

___ a) the same emission found in a Lava lamp (ultra-violet)

___ b) the Doppler blue shift

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22. In 1989 the satellite Hipparcos was launched primarily for obtaining parallaxes and proper motions allowing measurements of stellar parallax for stars up to about 500 parsecs away, which is about ____ times the diameter of the Milky Way Galaxy.

___ a) .015

___ b) 1.5

___ c) 15

___ d) 150

___ e) 0.15

23. What happens if you increase the size of a giant molecular cloud while keeping temperature and mass fixed?

___ a) It is more likely to collapse because larger things have more gravity

___ b) It is less likely to collapse because temperature can never be kept fixed

___ c) It is equally likely to collapse because size is not part of the Jean's criterion.

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24. Members of an open cluster feel significant forces from nearby giant molecular clouds

___ a) True

___ b) False

25. What causes the "finger-like" filamentary structure in the Crab nebula?

___ a) electrons striking oxygen molecules, like a lava lamp

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26. According to Wikipedia, a star with over 20 solar masses converts its Hyrogen to Helium in about 8 billion years, but the conversion of Oxygen to heavier elements take about _____

___ a) 10 billion years

___ b) 1 million years

___ c) 1 billion years

___ d) 1 thousand years

___ e) 1 year

27. Stellar parallax is

___ a) the total amount of energy emitted per unit time.

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31. Stars that begin with more than 50 solar masses will typically lose _____ while on the main sequence.

___ a) 10% of their magnetic field

___ b) 10% their mass

___ c) all of their magnetic field

___ d) 1% their mass

___ e) 50% their mass

32. What was Messier doing when he independently rediscovered the Crab in 1758?

___ a) Attempting one of the first star charts

___ b) Looking for a comet that he knew would be appearing in that part of the sky.

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___ d) Trying to measure the orbital radius of a planet

___ e) Looking for lobsters

33. The course materials presented three arguments suggesting that a white dwarf is roughly the size of the earth. Which best summarizes them?

___ a) x-ray-emmission...doppler-shift...rotation-rate

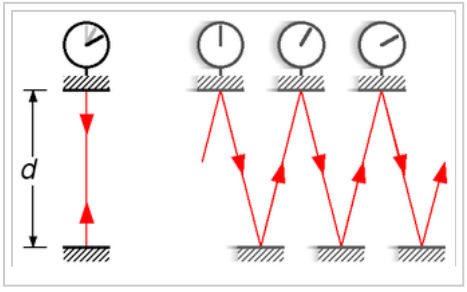
___ b) HR-diagram-location...X-ray-emmision...spectral-lines

___ c) temperature-luminosity...redshift...quantum-theory-of-solids

___ d) doppler-shift...period-of-pulsation...temperature-luminosity

___ e) all of these are true

34. This light clock is associated with



___ a) doppler shift

___ b) general relativity

___ c) all of these are true

___ d) gravitational shift

___ e) special relativity

35. $KE = \frac{4\pi^2}{5}\frac{MR^2}{P^2}$ is the kinetic energy of a solid rotating ball, where M is mass, R is radius, and P is period. And, $power = \frac{energy}{time}$.

You are banging espressos in a little coffeehouse with your astronomy friends, talking about a new SN remnant that closely resembles the Crab. You have observed the pulsar, and wonder what the total power output of the nebula might be. You know both the period of the pulsar, as well as τ, which represents the amount of time you think the pulsar will continue pulsing if it continues slowing down at its present rate. What formula do you write on your napkin?

___ a) $power = \frac{4\pi^2}{5}\frac{MR^2}{P^2}\tau^4$

___ b) $power = \frac{4\tau\pi^2}{5}\frac{MR^2}{P^2}$

___ c) $power = \frac{5}{4\tau\pi^2}\frac{MR^2}{P^2}$

___ d) $power = \frac{4\pi^2}{5\tau}\frac{MR^2}{P^2}$

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Key to AstroTest4-v2s1

1. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 2 cm expands out to 4 cm. To what distance would a raisin originally situated at a distance of 4 cm expand?

- a) 2
- b) 4
- c) 6
+ d) 8
- e) 3

2. Based on the HR diagrams and images in stars shown in the materials, a very large red supergiant has a diameter that is about ____ greater than a small white dwarf.

- a) $3x10^7$
- b) $3x10^3$
- c) $3x10^9$
+ d) $3x10^5$
- e) $3x10^{11}$

3. Members of a globular cluster tend to be

- a) young
- b) of all ages
+ c) old

4. A starburst galaxy.

- a) usually is a result of collisions between galaxies
+ b) Two of these are correct
- c) has only dead or dying stars
- d) is a region of active stellar birth
- e) All of these are correct

5. The range of wavelength for visible light is between

+ a) 400 and 700 nanometers

- b) 0.1 and 10 nanometers

- c) 600 and 1200 nanometers

- d) 5000 and 6000 nanometers

- e) 1 and 10 nanometers

6. In one respect, the universie is arguably "young", considering how much complexity it contains. This is often illustrated by a calculation of

- a) recalibration of supernovae relative magnitude

- b) recalibration of supernovae luminosity

+ c) chimps typing Shakespeare

- d) cosmic expansion

- e) cosmic redshift

7. One way to determine the distance to a nebula or small cluster of clouds is to compare the angular expansion to the spectroscopic Doppler shift. Two clusters (A and B) have the same spectroscopically measured velocity. Cluster A is moving towards the observer and exhibits the greater angular expansion. Which cluster is closer?

+ a) cluster A, because it exhibits greater angular expansion

- b) cluster B, because it exhibits a red Doppler shift

- c) cluster A, because it exhibits a blue Doppler shift

- d) either cluster might be more distant

- e) cluster B, because it exhibits less angular expansion

8. A dying star with more than 1.4 solar masses becomes a _____, and those with more than 5 solar masses becomes a _____

- a) white dwarf....black hole

+ b) neutron star....black hole

- c) white dwarf....neutron star

- d) blue giant....red giant

- e) white dwarf...red dwarf

9. Members of a globular cluster tend to have

+ a) low mass

- b) high mass

- c) a wide range of masses

10. When a star with more than 10 solar masses ceases fuse hydrogen to helium, it

- a) it fuses elements up to uranium, and continues to produce energy by the fission of uranium.

- b) ceases to convert nuclear energy.

- c) it fuses helium to carbon and then ceases to produce more energy

- d) it fuses helium to carbon to iron (and other elements), then continues to release more energy by fusing the iron to heavier elements such as uranium.

+ e) it fuses helium to carbon and other elements up to iron and then ceases to produce more energy

11. Many stars in a typical open cluster are nearly as old as the universe

- a) True

+ b) False

12. An object emits thermal (blackbody) radiation with a peak wavelength of 250nm. How does its temperature compare with the Sun?

- a) 5 times hotter than the Sun
- b) The temperature is the same
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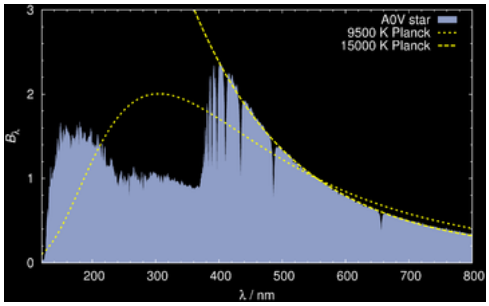

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- b) 15 thousand
- c) 15 million
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- b) False

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- a) electrons striking oxygen molecules, like a lava lamp
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- a) the total amount of energy emitted per unit time.
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- a) True
+ b) False

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- a) a numerical measure of brightness as seen from a distance of approximately 33 light-years
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- a) x-ray-emmission...doppler-shift...rotation-rate
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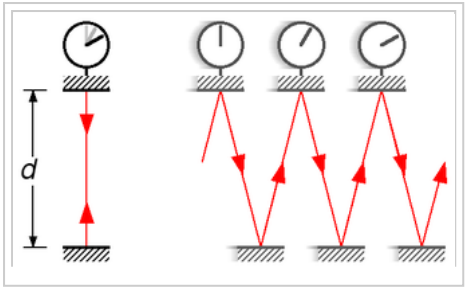

- a) doppler shift
- b) general relativity
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AstroTest4-v1s2

1. Many stars in a typical open cluster are nearly as old as the universe

___ a) True

___ b) False

2. A grouping with a hundred stars is probably a

___ a) elliptical galaxy

___ b) open cluster

___ c) globular cluster

___ d) dwarf galaxy

___ e) A-B association

3. Giant molecular clouds with sufficient conditions to form a star cluster would have formed them long ago. Any stellar births in the past couple of billions years probably resulted from _____ between clouds.

___ a) None of these is correct.

___ b) collisions

___ c) ion exchange

___ d) Two of these are correct

___ e) photon exchange

4. A dying star with more than 1.4 solar masses becomes a _____, and those with more than 5 solar masses becomes a _____

___ a) neutron star....black hole

___ b) blue giant....red giant

___ c) white dwarf....neutron star

___ d) white dwarf....black hole

___ e) white dwarf...red dwarf

5. Why is a star made of plasma?

___ a) plasma is generic word for "important"

___ b) plasma is always present when there are strong magnetic fields

___ c) it is so hot that electrons are stripped away from the protons

___ d) the interstellar gas was mostly plasma

___ e) the intense gravity liquifies the substance, just as red blood cells liquify plasma in the body

6. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 2 cm expands out to 4 cm. To what distance would a raisin originally situated at a distance of 4 cm expand?

___ a) 8

___ b) 3

___ c) 2

___ d) 4

___ e) 6

7. Members of an open cluster feel significant forces from nearby giant molecular clouds

___ a) True

___ b) False

8. What causes the blue glow of the Crab nebula?

___ a) the Gravitational blue shift

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9. The range of wavelength for visible light is between

___ a) 1 and 10 nanometers

___ b) 400 and 700 nanometers

___ c) 5000 and 6000 nanometers

___ d) 0.1 and 10 nanometers

___ e) 600 and 1200 nanometers

10. What is the difference between a constellation and an asterism?

___ a) constellations represent regions of the sky, like state boundaries on a map of the USA

___ b) asterisms are larger than constellations

___ c) constellations consist of never more than ten stars.

___ d) none of these is correct

___ e) asterisms are smaller than constellations

11. Based on the HR diagrams and images in stars shown in the materials, a very large red supergiant has a diameter that is about ____ greater than a small white dwarf.

___ a) $3x10^{11}$

___ b) $3x10^{5}$

___ c) $3x10^{7}$

___ d) $3x10^{9}$

___ e) $3x10^{3}$

12. The "normalized intensity" of a Sun-like star situated one parsec from Earth would be $4\pi I = 1$. What is $4\pi I$ for a star with 100 times the Sun's energy output that is situated 10pc from Earth?

___ a) 10^{-2}

___ b) 10^{-1}

___ c) 10^{-4}

___ d) 1

___ e) 10^{-3}

13. Which of the following changes in the properties of a giant molecular cloud might cause it to collapse?

___ a) Increase size at fixed pressure and mass

___ b) Two of these are correct

___ c) Increase temperature at fixed mass and size

___ d) Increase mass at fixed temperature and size

___ e) Decrease mass at fixed temperature and size

14. Most globular clusters that we see in the sky orbit _____ and have _____ orbits

___ a) the center of the Milky way ... elliptic orbits

___ b) within the disk of the Milky way ... nearly circular

___ c) the center of the Milky way ... nearly circular

___ d) within the disk of the Milky way ... elliptic orbits

15. Relative magnitude is

___ a) an astronomical object with known luminosity.

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___ c) the total amount of energy emitted per unit time.

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___ e) a numerical measure of brightness as seen from a distance of approximately 33 light-years

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___ e) It is less likely to collapse spreading it out weakens the force of gravity

17. Members of an open cluster feel significant forces only due to gravitational interaction with each other

___ a) True

___ b) False

18. Comparing Hubble's original (1929) plot of redshift versus distance with the later one in 2007, the latter extends farther into space by a factor of

___ a) 100

___ b) 1000

___ c) 10,000

___ d) 100,000

___ e) 10

19. The course materials present two cosmic expansion plots. The more recent (2007) plot used

___ a) novae

___ b) entire galaxies

___ c) supernovae

___ d) Cepheid variables

___ e) red giants

20. A grouping with 100 thousand stars would probably be a

___ a) globular cluster

___ b) A-B association

___ c) dwarf galaxy

___ d) elliptical galaxy

___ e) open cluster

21. A standard candle is

___ a) an annual change in angular position of a star as seen from Earth

___ b) a numerical measure of brightness as seen from Earth

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22. Place yourself in an expanding raisinbread model of Hubble expansion. A raisin originally situated at a distance of 4 cm expands out to 12 cm. To what distance would a raisin originally situated at a distance of 2 cm expand?

___ a) 2

___ b) 4

___ c) 6

___ d) 3

___ e) 8

23. A star that is increasing it's temperature while maintaining constant luminosity is

___ a) getting smaller in size

___ b) on the verge of becoming a supernovae

___ c) in the process of dying

___ d) turning red

___ e)e) getting larger in size

24. An object emits thermal (blackbody) radiation with a peak wavelength of 250nm. How does its temperature compare with the Sun?

___ a) 5 times colder than the Sun

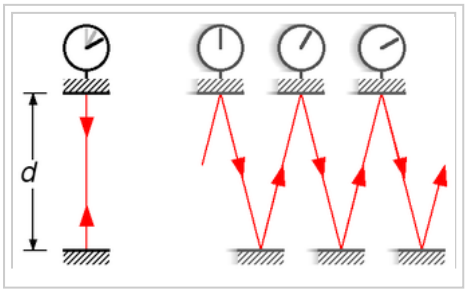
___ b) 2 times colder than the Sun

___ c) The temperature is the same

___ d) 2 times hotter than the Sun

___ e) 5 times hotter than the Sun

25. Suppose the light clock involved a ball being tossed back and forth on a train going just under the speed of sound. In contrast to the situation for light reflecting back and forth on a train going just under the speed of light, there is virtually no time dilation. Why?



___ a) Special relativity is valid only for objects travelling in a vacuum.

___ b) The observer on the ground would perceive the ball to be travelling faster.

___ c) The observer on the ground would perceive the width the train to be smaller.

___ d) The observer on the ground would perceive the width the train to be greater.

___ e) The observer on the ground would perceive the ball to be travelling more slowly.

26. Many supernovae begin as a shock wave in the core that was caused by

___ a) all of these processes contribute to the shock wave

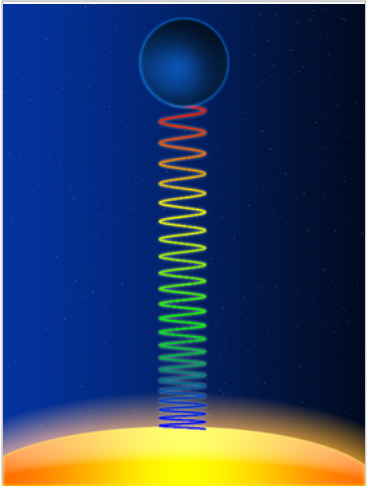
___ b) carbon and other elements fusing into iron

___ c) iron fusing into heavier elements such as uranium

___ d) the conversion of carbon into diamonds,

___ e) electrons being driven into protons to form neutrons

27.



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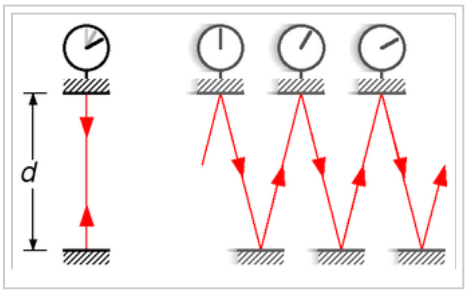

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Key to AstroTest4-v1s2

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- c) globular cluster

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3. Giant molecular clouds with sufficient conditions to form a star cluster would have formed them long ago. Any stellar births in the past couple of billions years probably resulted from _____ between clouds.

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13. Which of the following changes in the properties of a giant molecular cloud might cause it to collapse?

- a) Increase size at fixed pressure and mass
- b) Two of these are correct
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+ a) the center of the Milky way ... elliptic orbits
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- a) an astronomical object with known luminosity.
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- e) a numerical measure of brightness as seen from a distance of approximately 33 light-years

16. What happens if you increase the size of a giant molecular cloud while keeping temperature and mass fixed?

- a) It is more likely to collapse because larger things have more gravity
- b) It is less likely to collapse because temperature can never be kept fixed
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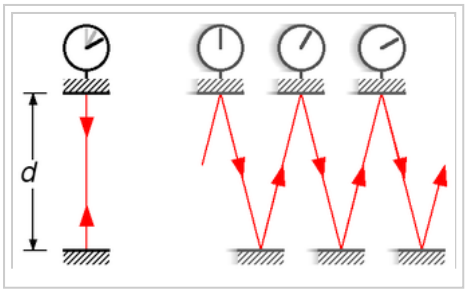

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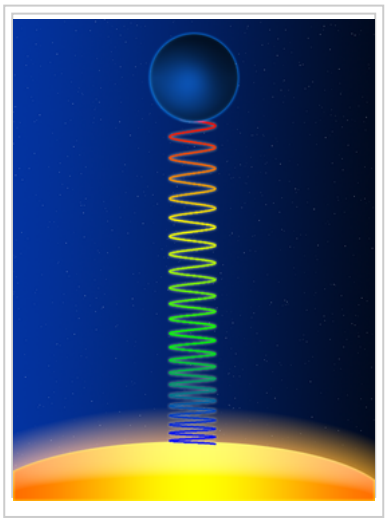

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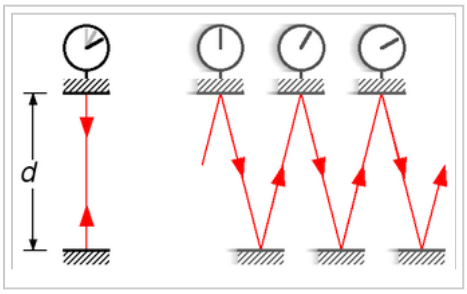

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AstroTest4-v2s2

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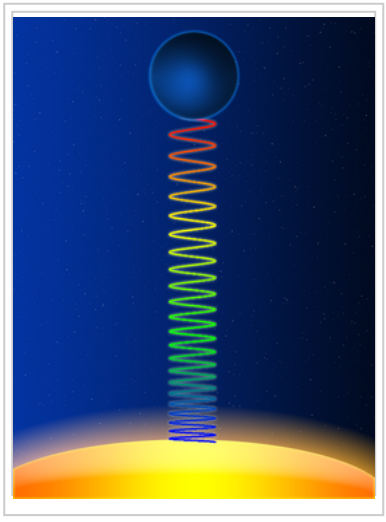

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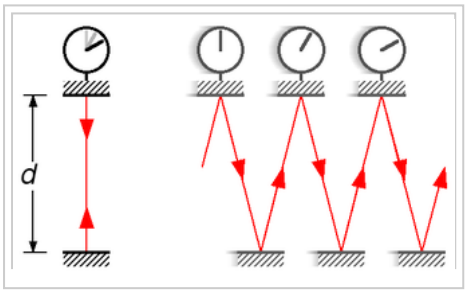

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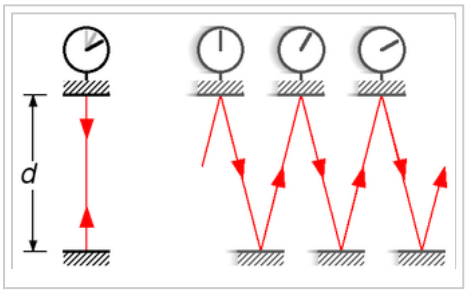

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- d) 2

- e) 4

11. The "normalized intensity" of a Sun-like star situated one parsec from Earth would be $4\pi I = 1$. What is $4\pi I$ for a star with 100 times the Sun's energy output that is situated 10pc from Earth?

- a) 10^{-4}

- b) 10^{-2}

+ c) 1

- d) 10^{-3}

- e) 10^{-1}

12. A grouping with a hundred stars is probably a

+ a) open cluster

- b) elliptical galaxy

- c) dwarf galaxy

- d) globular cluster

- e) A-B association

13. A star that is increasing it's temperature while maintaining constant luminosity is

- a) in the process of dying

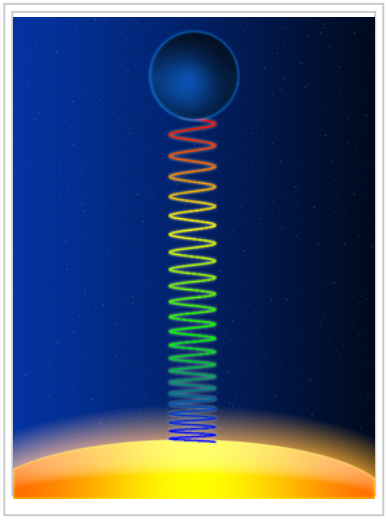
+ b) getting smaller in size

- c) on the verge of becoming a supernovae

- d)e) getting larger in size

- e) turning red

14.



What best explains this figure?

- a) The photon slows down, by the Doppler shift, E=hf, and therefore by c=f&lambda it turns red.

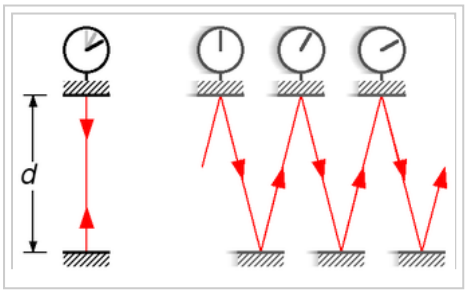
- b) The photon slows down as it goes uphill, and by c=fλ it increases wavelength therefore by E=hf, it turns red.

- c) The photon slows down, by the Doppler shift, c=fλ, and therefore by E=hf it turns red.

+ d) The photon loses energy, not speed. By E=hf, it loses frequency, and by c=fλ it increases wavelength and turns red.

- e) The photon loses energy, not speed. By c=fλ , it loses frequency, and by E=hf it increases wavelength and turns red.

15. Suppose the light clock involved a ball being tossed back and forth on a train going just under the speed of sound. In contrast to the situation for light reflecting back and forth on a train going just under the speed of light, there is virtually no time dilation. Why?



- a) The observer on the ground would perceive the width the train to be smaller.

+ b) The observer on the ground would perceive the ball to be travelling faster.

- c) The observer on the ground would perceive the ball to be travelling more slowly.

- d) Special relativity is valid only for objects travelling in a vacuum.

- e) The observer on the ground would perceive the width the train to be greater.

16. What is the difference between a constellation and an asterism?

- a) constellations consist of never more than ten stars.

- b) asterisms are smaller than constellations

+ c) constellations represent regions of the sky, like state boundaries on a map of the USA

- d) asterisms are larger than constellations

- e) none of these is correct

17. What happens if you increase the size of a giant molecular cloud while keeping temperature and mass fixed?

+ a) It is less likely to collapse spreading it out weakens the force of gravity

- b) It is more likely to collapse because larger things have more gravity

- c) It is less likely to collapse because temperature can never be kept fixed

- d) It is equally likely to collapse because size is not part of the Jean's criterion.

- e) It is more likely to collapse because this will increase the temperature

18. Members of an open cluster feel significant forces only due to gravitational interaction with each other

- a) True

+ b) False

19. Members of an open cluster feel significant forces from nearby giant molecular clouds

+ a) True

- b) False

20. What was Messier doing when he independently rediscovered the Crab in 1758?

- a) Attempting to count asteroids

- b) Attempting one of the first star charts

- c) Trying to measure the orbital radius of a planet

+ d) Looking for a comet that he knew would be appearing in that part of the sky.

- e) Looking for lobsters

21. A dying star with more than 1.4 solar masses becomes a _____, and those with more than 5 solar masses becomes a _____

- a) blue giant....red giant

- b) white dwarf....black hole

- c) white dwarf....neutron star

- d) white dwarf...red dwarf

+ e) neutron star....black hole

22. The course materials present two cosmic expansion plots. The more recent (2007) plot used

- a) red giants

- b) novae

+ c) supernovae

- d) Cepheid variables

- e) entire galaxies

23. Many supernovae begin as a shock wave in the core that was caused by

- a) all of these processes contribute to the shock wave
- b) carbon and other elements fusing into iron
- c) iron fusing into heavier elements such as uranium
+ d) electrons being driven into protons to form neutrons
- e) the conversion of carbon into diamonds,

24. A standard candle is

+ a) an astronomical object with known luminosity.
- b) a numerical measure of brightness as seen from Earth
- c) an annual change in angular position of a star as seen from Earth
- d) the total amount of energy emitted per unit time.
- e) a numerical measure of brightness as seen from a distance of approximately 33 light-years

25. Based on the HR diagrams and images in stars shown in the materials, a very large red supergiant has a diameter that is about ____ greater than a small white dwarf.

- a) $3x10^7$
- b) $3x10^9$
- c) $3x10^{11}$
+ d) $3x10^5$
- e) $3x10^3$

26. Most globular clusters that we see in the sky orbit _____ and have _____ orbits

+ a) the center of the Milky way ... elliptic orbits
- b) the center of the Milky way ... nearly circular
- c) within the disk of the Milky way ... nearly circular
- d) within the disk of the Milky way ... elliptic orbits

27. A grouping with 100 thousand stars would probably be a

- a) dwarf galaxy

+ b) globular cluster

- c) elliptical galaxy

- d) A-B association

- e) open cluster

28. Comparing Hubble's original (1929) plot of redshift versus distance with the later one in 2007, the latter extends farther into space by a factor of

- a) 10,000

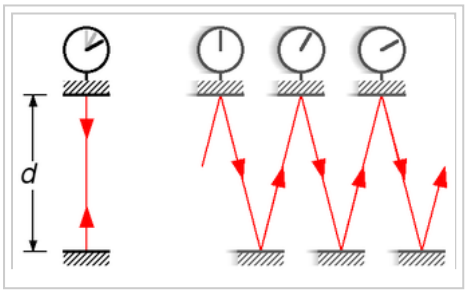
- b) 1000

- c) 100

- d) 100,000

+ e) 10

29. This light clock is associated with



+ a) special relativity

- b) gravitational shift

- c) doppler shift

- d) general relativity

- e) all of these are true

30. The range of wavelength for visible light is between

- a) 600 and 1200 nanometers

- b) 1 and 10 nanometers

- c) 5000 and 6000 nanometers

+ d) 400 and 700 nanometers

- e) 0.1 and 10 nanometers

31. What causes the blue glow of the Crab nebula?

- a) the Doppler blue shift

+ b) the curving motion of electrons in a magnetic field; such motion resembles a radio antenna

- c) the Gravitational blue shift

- d) the same emission found in a Lava lamp (ultra-violet)

- e) the curving motion of electrons in a magnetic field; such motion traps ultra-violet and blue light

32. The course materials present two cosmic expansion plots. Hubble's original (1929) plot used

- a) supernovae

- b) novae

- c) red giants

- d) Cepheid variables

+ e) entire galaxies

33. Which of the following changes in the properties of a giant molecular cloud might cause it to collapse?

- a) Decrease mass at fixed temperature and size

- b) Two of these are correct

+ c) Increase mass at fixed temperature and size

- d) Increase size at fixed pressure and mass

- e) Increase temperature at fixed mass and size

34. Many stars in a typical globular cluster are nearly as old as the universe

+ a) True

- b) False

35. Why is a star made of plasma?

+ a) it is so hot that electrons are stripped away from the protons

- b) the interstellar gas was mostly plasma

- c) plasma is generic word for "important"

- d) plasma is always present when there are strong magnetic fields

- e) the intense gravity liquifies the substance, just as red blood cells liquify plasma in the body

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