Quizbank/Test

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Astronomy midterm Test 4 Study Guide

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Study guide links reading materials and/or relevant equations.

Astronomy midterm Test 4 Study Guide-v1s1

1. Stellar parallax is

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

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

___ 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) an astronomical object with known luminosity.

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

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___ a) collisions between protoplanets

___ b) chemical reactions

___ c) the release of gravitational energy

___ d) the fusion of Helium to Carbon

___ e) the fission of Carbon from Helium

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

___ a) 1% their mass

___ b) 50% their mass

___ c) all of their magnetic field

___ d) 10% their mass

___ e) 10% of their magnetic field

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

___ a) through a cluster as they are born

___ b) through an HR diagram as they are born

___ c) Two of these are true

___ d) through a cluster as they die

___ e) through an HR diagram as they die

25. How do low-mass stars change as they are born?

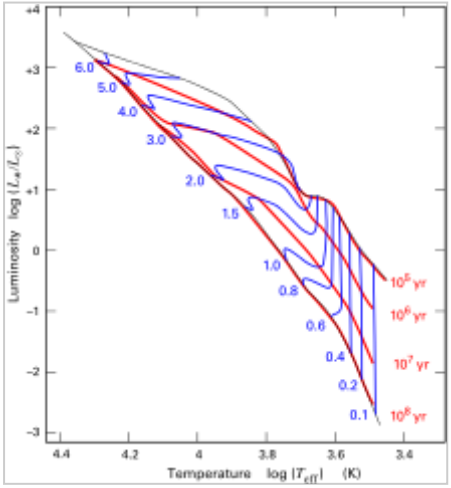
___ a) Increasing luminosity with no change in temperature

___ b) Decreasing luminosity with no change in temperature

___ c) Increasing temperature with no change in luminosity

___ d) Decreasing temperature and increasing luminosity

___ e) Decreasing temperature with no change in luminosity



Birth of stars HR path tracks

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

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

___ b) 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.

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

___ d) it fuses helium to carbon and then ceases to produce more energy

___ e) ceases to convert nuclear energy.

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

___ a) carbon and other elements fusing into iron

___ b) the conversion of carbon into diamonds,

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

___ d) iron fusing into heavier elements such as uranium

___ e) electrons being driven into protons to form neutrons

28. 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...red dwarf

___ b) blue giant....red giant

___ c) white dwarf....neutron star

___ d) neutron star....black hole

___ e) white dwarf....black hole

29. 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 year

___ c) 10 billion years

___ d) 1 million years

___ e) 1 billion years

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

___ a) elliptical galaxy

___ b) dwarf galaxy

___ c) open cluster

___ d) globular cluster

___ e) A-B association

31. A grouping with a hundred stars is probably a

___ a) globular cluster

___ b) dwarf galaxy

___ c) open cluster

___ d) A-B association

___ e) elliptical galaxy

32. I gravity is what holds stars in a cluster together, what is the most important process that causes them to spread apart?

___ a) random motion

___ b) anti-gravity

___ c) magnetism

___ d) supernovae

___ e) solar wind

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

___ a) True

___ b) False

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

___ a) True

___ b) False

35. Members of a globular cluster tend to be

___ a) of all ages

___ b) old

___ c) young

36. Members of a globular cluster tend to have

___ a) low mass

___ b) high mass

___ c) a wide range of masses

37. In 1917, the astronomer Harlow Shapley was able to estimate the Sun's distance from the galactic centre using

___ a) open clusters

___ b) goblular clusters

___ c) a combination of open and globular clusters

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

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

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

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

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

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

___ a) True

___ b) False

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

___ a) True

___ b) False

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

___ a) 150

___ b) 15 thousand

___ c) 15 million

___ d) 1,500

42. The location of open clusters can be described as

___ a) in the spiral arms

___ b) uniformly distributed within the galactic disk

___ c) between the spiral arms

___ d) uniformly distributed in a sphere centered at the Milky Way's center

43. Stars can "evaporate" from a cluster. What does this mean?

___ a) Close encounters between 3 or more cluster members gives one star enough speed to leave the cluster

___ b) The solar wind from neighboring stars blows the atmosphere away

___ c) The gravitational attraction between stars evaporates the gas from stars

44. At the center of the Crab nebula is

___ a)b) a pulsar

___ b)d) a neutron star

___ c)a) all of these is correct

___ d)c) none of these is correct

___ e)e) the remnants of a supernova

45. Aside from its location on the HR diagram, evidence that the white dwarf has a small radius can be found from

___ a) the mass as measured by Kepler's third law (modified by Newton)

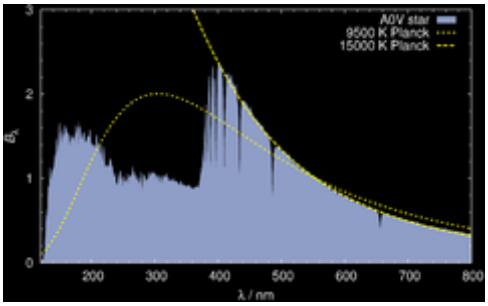
___ b) the temperature

___ c) the expansion of the universe

___ d) the doppler shift

___ e) the gravitational redshift

46.



This spectrum of the star Vega suggests that

___ a) all of these are true

___ b) it can be associated with an "effective" temperature

___ c) it's surface can be associated with a range of temperatures

___ d) if is not really a black body

___ e) it is an approximate black body

47. Which of the following is NOT an essential piece of a a strong argument that a white dwarf is not only the size of the earth, but typically has the same mass as the Sun.

___ a) the distance to Sirius A

___ b) the relative magnitude of Sirius B

___ c) the "color" (spectral class) of Sirius B

___ d) all of these are true

___ e) the wobble of Sirius A

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

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

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

___ c) all of these are true

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

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

49. As of 2008, the percent uncertainty in the distance to the Crab nebula is approximately,

___ a) 10%

___ b) 25%

___ c) 1%

___ d) 100%

___ e) 0.1%

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

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

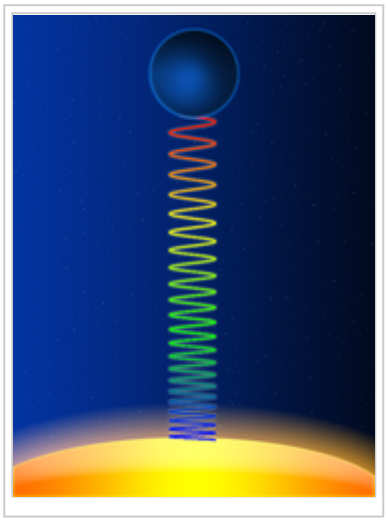
___ b) Trying to measure the orbital radius of a planet

___ c) Attempting to count asteroids

___ d) Attempting one of the first star charts

___ e) Looking for lobsters

51.



What best explains this figure?

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

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

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

52. 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

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

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

___ d) the Gravitational blue shift

___ e) the Doppler blue shift

53. 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 B, because it exhibits less angular expansion

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

___ c) either cluster might be more distant

___ d) cluster A, because it exhibits a blue Doppler shift

___ e) cluster A, because it exhibits greater angular expansion

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

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

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

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

___ d) cyclotron motion, causing the electrons to strike oxygen molecules

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

55. $KE = \frac{4\pi^2}{5}\frac{MR^2}{P^2}$ 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) $power = \frac{4\pi^2}{5\tau}\frac{MR^2}{P^2}$

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

56. 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) cosmic expansion

___ c) recalibration of supernovae luminosity

___ d) cosmic redshift

___ e) chimps typing Shakespeare

57. 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) 100,000

___ d) 10,000

___ e) 10

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

___ a) entire galaxies

___ b) novae

___ c) red giants

___ d) supernovae

___ e) Cepheid variables

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

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60. 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

___ b) 4

___ c) 3

___ d) 2

___ e) 8

61. 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 8 cm (twice yours).

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

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

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

___ e) expansion from 1 cm to 3 cm (since 3-1=2)

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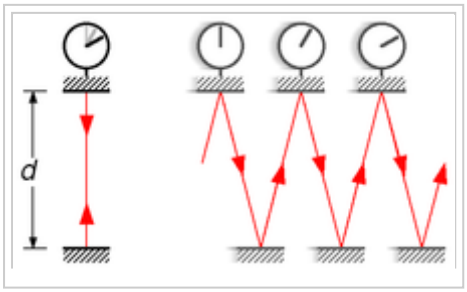


___ a) general relativity

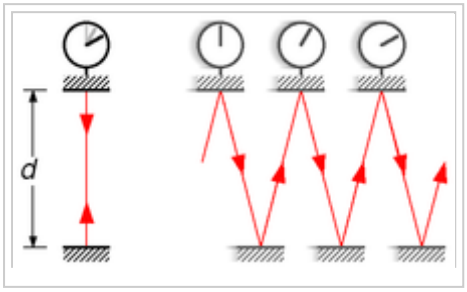
___ b) gravitational shift

___ c) doppler shift

___ d) special relativity

___ e) all of these are true

64. 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 width the train to be smaller.

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

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

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Key to Astronomy midterm Test 4 Study Guide-v1s1

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- a) collisions between protoplanets
- b) chemical reactions
+ c) the release of gravitational energy
- d) the fusion of Helium to Carbon
- e) the fission of Carbon from Helium

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

- a) 1% their mass

+ b) 50% their mass

- c) all of their magnetic field

- d) 10% their mass

- e) 10% of their magnetic field

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

- a) through a cluster as they are born

+ b) through an HR diagram as they are born

- c) Two of these are true

- d) through a cluster as they die

- e) through an HR diagram as they die

25. How do low-mass stars change as they are born?

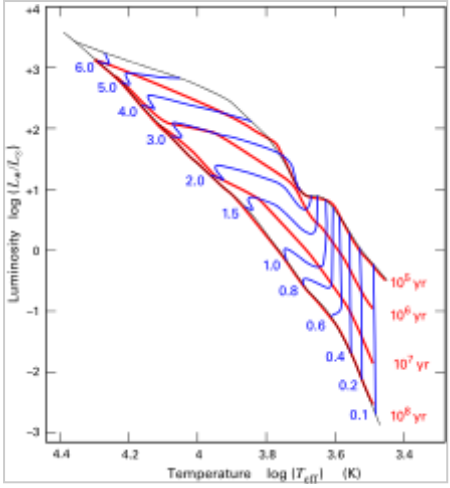
- a) Increasing luminosity with no change in temperature

+ b) Decreasing luminosity with no change in temperature

- c) Increasing temperature with no change in luminosity

- d) Decreasing temperature and increasing luminosity

- e) Decreasing temperature with no change in luminosity



Birth of stars HR path tracks

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

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

- b) 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.

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

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

- e) ceases to convert nuclear energy.

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

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

28. 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...red dwarf
- b) blue giant....red giant
- c) white dwarf....neutron star
+ d) neutron star....black hole
- e) white dwarf....black hole

29. 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 year
- c) 10 billion years
- d) 1 million years
- e) 1 billion years

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

- a) elliptical galaxy
- b) dwarf galaxy
- c) open cluster
+ d) globular cluster
- e) A-B association

31. A grouping with a hundred stars is probably a

- a) globular cluster
- b) dwarf galaxy
+ c) open cluster
- d) A-B association
- e) elliptical galaxy

32. I gravity is what holds stars in a cluster together, what is the most important process that causes them to spread apart?

+ a) random motion
- b) anti-gravity
- c) magnetism
- d) supernovae
- e) solar wind

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

- a) True
+ b) False

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

+ a) True
- b) False

35. Members of a globular cluster tend to be

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

36. Members of a globular cluster tend to have

+ a) low mass
- b) high mass
- c) a wide range of masses

37. In 1917, the astronomer Harlow Shapley was able to estimate the Sun's distance from the galactic centre using

- a) open clusters
+ b) goblular clusters
- c) a combination of open and globular clusters

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

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

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

- a) True
+ b) False

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

+ a) True

- b) False

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

+ a) 150

- b) 15 thousand

- c) 15 million

- d) 1,500

42. The location of open clusters can be described as

+ a) in the spiral arms

- b) uniformly distributed within the galactic disk

- c) between the spiral arms

- d) uniformly distributed in a sphere centered at the Milky Way's center

43. Stars can "evaporate" from a cluster. What does this mean?

+ a) Close encounters between 3 or more cluster members gives one star enough speed to leave the cluster

- b) The solar wind from neighboring stars blows the atmosphere away

- c) The gravitational attraction between stars evaporates the gas from stars

44. At the center of the Crab nebula is

- a)b) a pulsar

- b)d) a neutron star

+ c)a) all of these is correct

- d)c) none of these is correct

- e)e) the remnants of a supernova

45. Aside from its location on the HR diagram, evidence that the white dwarf has a small radius can be found from

- a) the mass as measured by Kepler's third law (modified by Newton)

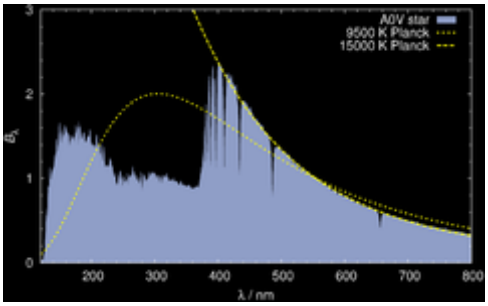
- b) the temperature

- c) the expansion of the universe

- d) the doppler shift

+ e) the gravitational redshift

46.



This spectrum of the star Vega suggests that

+ a) all of these are true

- b) it can be associated with an "effective" temperature

- c) it's surface can be associated with a range of temperatures

- d) if is not really a black body

- e) it is an approximate black body

47. Which of the following is NOT an essential piece of a a strong argument that a white dwarf is not only the size of the earth, but typically has the same mass as the Sun.

- a) the distance to Sirius A

- b) the relative magnitude of Sirius B

- c) the "color" (spectral class) of Sirius B

+ d) all of these are true

- e) the wobble of Sirius A

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

- a) doppler-shift...period-of-pulsation...temperature-luminosity
- b) HR-diagram-location...X-ray-emmision...spectral-lines
- c) all of these are true
+ d) temperature-luminosity...redshift...quantum-theory-of-solids
- e) x-ray-emmission...doppler-shift...rotation-rate

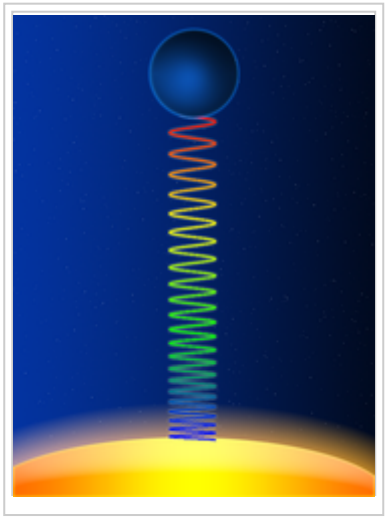
49. As of 2008, the percent uncertainty in the distance to the Crab nebula is approximately,

- a) 10%
+ b) 25%
- c) 1%
- d) 100%
- e) 0.1%

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

+ a) Looking for a comet that he knew would be appearing in that part of the sky.
- b) Trying to measure the orbital radius of a planet
- c) Attempting to count asteroids
- d) Attempting one of the first star charts
- e) Looking for lobsters

51.



What best explains this figure?

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

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

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

52. 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

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

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

- d) the Gravitational blue shift

- e) the Doppler blue shift

53. 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 B, because it exhibits less angular expansion

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

- c) either cluster might be more distant

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

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

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

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

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

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

- d) cyclotron motion, causing the electrons to strike oxygen molecules

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

55. $KE = \frac{4\pi^2}{5}\frac{MR^2}{P^2}$ 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) $power = \frac{4\pi^2}{5\tau}\frac{MR^2}{P^2}$

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

56. 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) cosmic expansion

- c) recalibration of supernovae luminosity

- d) cosmic redshift

+ e) chimps typing Shakespeare

57. 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) 100,000
- d) 10,000
+ e) 10

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

+ a) entire galaxies
- b) novae
- c) red giants
- d) supernovae
- e) Cepheid variables

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

- a) novae
+ b) supernovae
- c) Cepheid variables
- d) red giants
- e) entire galaxies

60. 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

- b) 4

- c) 3

- d) 2

- e) 8

61. 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 8 cm (twice yours).

- b) expansion from 1 cm to 2 cm (half of yours)

+ c) expansion from 1 cm to 4 cm (just like yours).

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

- e) expansion from 1 cm to 3 cm (since 3-1=2)

62. 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) 6

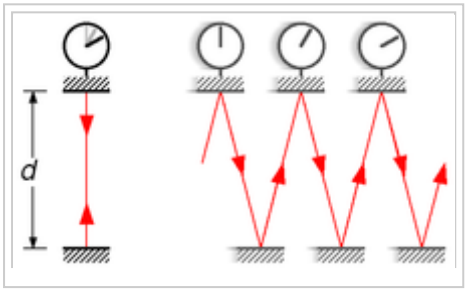
- b) 4

+ c) 8

- d) 3

- e) 2

63. This light clock is associated with



- a) general relativity

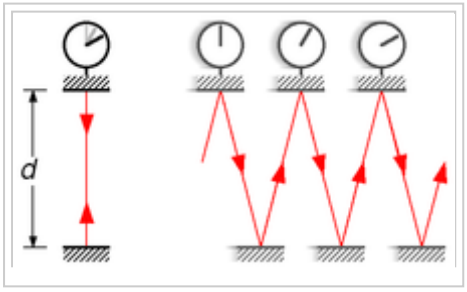
- b) gravitational shift

- c) doppler shift

+ d) special relativity

- e) all of these are true

64. 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 width the train to be smaller.

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

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

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

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