

Physics Department

Physics 200
Final Exam

Feb. 4, 2000
Time: 1 1/2 hours

Name: _____

I.D No.: _____

cross the name of your instructor:

Isber

Eid

Information:

- No make up for this exam without legal reason.
- Only one answer is valid for multiple choice questions.
- All questions are obligatory
- Physical constants:
 - the speed of light is $c = 3 \times 10^8$ m/s*
 - Gravitational constant $G = 6.67 \times 10^{-11}$ m³/kg.s²*
 - Mass of the sun $M_s = 2 \times 10^{30}$ kg*
 - 1 parsec (PC) = 3.26 light year (ly)*
 - Planck's constant $h = 6.626 \times 10^{-34}$ J.s*

Page _____ Grade _____

(1)

(2)

(3)

(4)

(5)

(6)

(7)



TOTAL:

True or False

- | | True | False |
|---|-------------------------------------|-------------------------------------|
| • The sidereal day is based on the rotation of the Earth with respect to distant stars. | <input type="checkbox"/> | <input type="checkbox"/> |
| • When a particular event happens, Beirut clocks indicate 2 hours later than Greenwich clocks. | <input type="checkbox"/> | <input type="checkbox"/> |
| • Seismic transverse waves (s-waves) cannot travel through a liquid. | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| • The celestial coordinate corresponding to latitude on earth is called right ascension. | <input type="checkbox"/> | <input type="checkbox"/> |
| • The occasion when the sun crosses the celestial equator is called solstice. | <input type="checkbox"/> | <input type="checkbox"/> |
| • Kepler's third law is relation between the period of rotation of a planet and the planet's diameter. | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| • The central temperature of the Sun is less than 10^7 K | <input type="checkbox"/> | <input type="checkbox"/> |
| • Earth's atmosphere is composed primarily of oxygen | <input type="checkbox"/> | <input type="checkbox"/> |
| • The lifetime of a star depends on its initial temperature and radius. | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| • In order for hydrogen fusion to occur, the temperature must be about 100,000 K. | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| • The energy of a photon of wavelength λ is two times bigger than these of a photon of wavelength $\lambda/2$. | <input type="checkbox"/> | <input type="checkbox"/> |
| • The amount of the doppler shift varies with the inverse of the velocity. | <input type="checkbox"/> | <input type="checkbox"/> |
| • A 6-meter diameter telescope will collect 9 times More light than a 2-meter diameter telescope. | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

4

Multiple choices.

- When the Earth is between the sun and the moon, what kind of eclipse viewed from the earth can occur?
 - a) total solar eclipse
 - b) partial solar eclipse
 - c) annular solar eclipse
 - d) lunar eclipse
- If the wave's frequency increases by a factor of 3, by what factor would the wavelength change?
 - a) three
 - b) one (no change)
 - c) one ninth
 - d) one third
- The star Altair is a B1a star with a surface temperature of 8000k. Its apparent magnitude is $m = +0.77$ and its distance is 16.5 light years.

(a) The absolute magnitude of Altair is:

Answer: _____

(b) What kind of star is this?

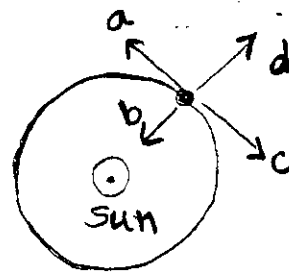
Main sequence star red giant red dwarf blue supergiant

(c) Assuming that this stars emits like a black body, what is the maximum wavelength of its radiation?

Answer: _____ (Å)

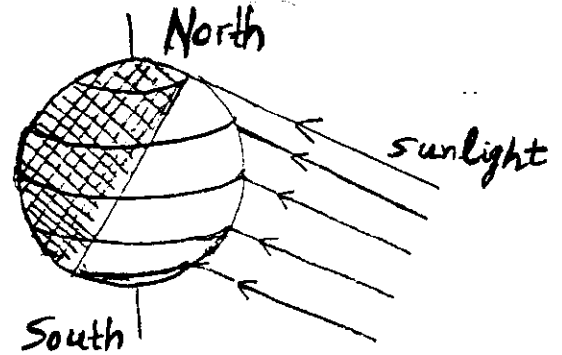
- What kind of object is formed after a supernovae?
 - a) a red giant star
 - b) a white dwarf
 - c) a neutron stars
 - d) a black hole
 - (e) either c) or d) depending on the mass of the star.
- A star has a distance of 10 parsecs. What is its parallax?
 10 minutes of arc 10 seconds of arc 0.1 seconds of arc 0.01 seconds of arc
- The radius of the solar system is about 40AU. The time for the light to cover this distance is about
 4 min 40 min 1600 min 32 min
none of the above, my answer is _____ min

- In the adjacent figure which line indicates the direction of the force of gravity on the earth as it orbits the sun.



- a. b. c. d.

- What time of the year does the figure on the right represent for the northern hemisphere.



- a) vernal equinox
 b) spring equinox
 c) winter solstice
 d) summer solstice

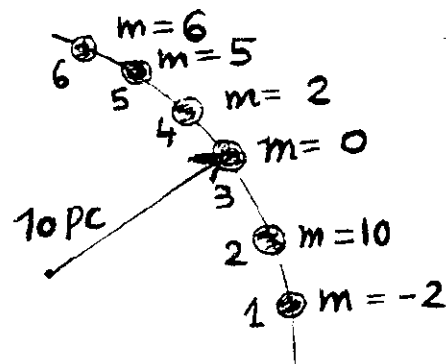
- What gas in the Earth's atmosphere absorbs ultraviolet radiation from the sun?

- carbon dioxide nitrogen oxygen ozone

- If two stars have the same surface area, but one star has 3 times the temperature of the other. How many times more energy is radiated by the hotter star?

- a) 3 b) 12 c) 9 d) 81 e) 27

- In the figure on the right, 6 stars are lined up at 10 parsecs with their given apparent magnitude at that distance.



- a) which star could be the sun?
 1 2 3 4 5 6
- b) Which star has 100 times the luminosity of the sun?
 1 2 3 4 5 6
- c) what is the absolute magnitude of star 2?
 a) -10
 b) +1
 c) 10
 d) -0.02
 e) 0.0004

- The table below shows some properties of various stars. On the basis of these data answer the following questions (a) to (f)

star	Absolute Magnitude (M)	Apparent Magnitude (m)	Spectral Type
Elnath	-1.13	1.65	B7 IV
Deneb	-7.2	1.25	A2 Ia
Mirfak	-2.2	1.79	F5 Ib
Betelgeuse	-7.0	0.50	M2 Ia

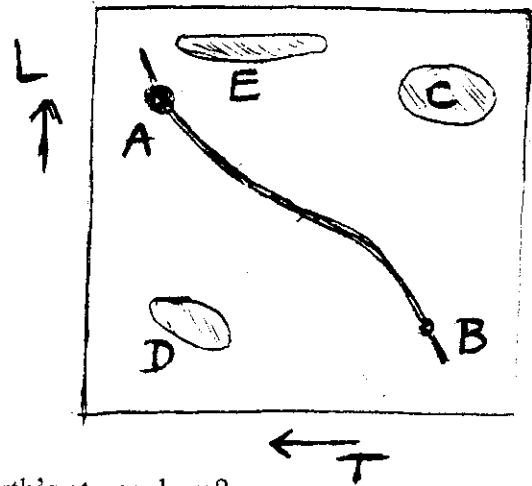
- (a) Which star is intrinsically the brightest _____
- (b) Which star has the greatest apparent magnitude _____
- (c) Which star has the greatest surface temperature _____
- (d) Which star is a reddish supergiant? _____
- (e) What is the distance of the star Betelgeuse from us? _____
- (f) The star Elnath has a parallax of 0.028 arc sec. What is its distance from Earth?

Answer : _____ parsec

- The sun gets its energy supply from:
 - a) Slow contraction
 - b) Nuclear fusion of oxygen in the core
 - c) Nuclear fusion of hydrogen in the core
 - d) From the motion of convective material
- What is the semi-major axis of a planet whose period is 111 years?
 - a) 35 AU
 - b) 2.5 AU
 - c) 5 AU
 - d) 4.2 AU
 - e) none of the above my answer is : _____ AU
- A planet has a radius twice the Earth's radius and a mass twice the Earth's mass. The planet gravitational force is :
 - a) the same as that of the Earth's
 - b) twice the Earth's
 - c) half the Earth's gravitational force
 - d) one fourth the Earth's gravitational force

- The figure on the right shows an HR-diagram in schematic way. Answer the following questions:

- a) where do you expect the white dwarfs?
A B C D E
- b) where do you expect to find a high mass main sequence star?
A B C D E
- c) where do you expect to find the subgiants?
A B C D E



- What are the two major greenhouse gases in Earth's atmosphere?

- O_2 and N_2
- N_2 and CO_2
- CO_2 and CH_4
- H_2O vapor and CO_2

- P-waves can travel through:

- liquid and solid
- liquid only
- solid only
- neither solid nor liquid

- Which spectral type has the highest positive color index?

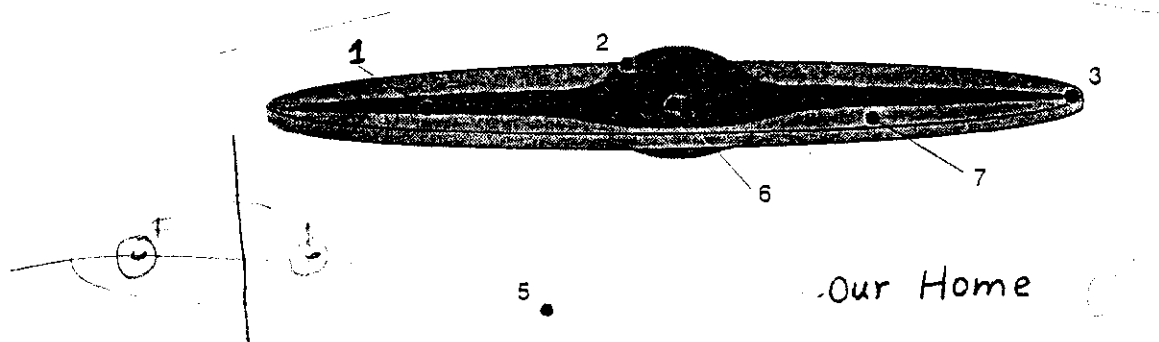
- O-type stars, since they have the highest temperature.
- G-type stars, since they are like the sun.
- Any spectral type, since this is a question of the metallicity of the star.
- M-type stars, because they have the lowest surface temperature.

- What causes a meteor shower?

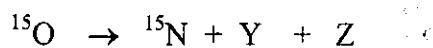
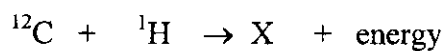
- Earth crosses the asteroid belt
- A comet is heated by sunlight
- Meteor shower is just optical illusion
- Earth crosses the debris littered by a comet.

- The graph below a schematic structure of the Milky Way. What number best represent the location of the sun?

Answer: 1



- Given are the following nuclear reactions:



Answers:

X: ^{13}C

Y: e

Z: g

Choose X, Y and Z from the following list:

a) ^4He

b) ^{14}N

c) ^3He

d) ^{13}N

e) Neutrino

f) ^{13}C

g) Positron

- How many protons are consumed in the CNO cycle?

a) none

b) 2

c) 4

d) 3

- When the chromosphere can be seen during a total solar eclipse, what is its color?

a) white

b) blue

c) green

d) red

e) yellow

- If you double the radius and the temperature surface of a star, its luminosity increases by a factor of:

a) 4

b) 8

c) 16

d) 32

e) 64

- How many times brighter would a star appear through a 20-cm diameter telescope than through a 10-cm diameter telescope?
 - a) 1
 - b) 2
 - c) 3
 - d) 4
 - e) 5