Review questions for Solar System and the Universe answer

1) distance between Earth and Sun.
   $1.5X10^{11}$ meters
2) distance light travels in 1 year

1 parsec= 3.3 ly

3) "Sun-centered universe" copernicus
4) "Earth-centered universe" aristotle
5) spots on Sun, craters on the Moon, 4 moons orbiting Jupiter
6) elliptical
7) 13.6 BYA
8) 5 BYA
9) 1) nebula 2) protostar 3) star 4) brown dwarf 5)Main Sequence 6) red giant 7) white dwarf8) giant main sequence 9) super giant 10) supernova 11)neutron star 12) black hole
10) Mercury = Me Venus =V Earth = E Mars = M Jupiter = J Saturn = S Uranus = U Neptune = N

Me V E M	J S U N
Me V E M	J S U N
Me V E M	M J S U N

11) optional: spherical, in orbit around Sun, "cleared neighborhood of debris"

12) a) $T^2 = R^3$ b) $F_g = \frac{G M_1 M_2}{r^2}$ c) $r_s = \frac{2GM}{c^2}$

time yrs

dist AU

13) XXXXX

14) universe originally very small point that exploded outward 13.6 BYA

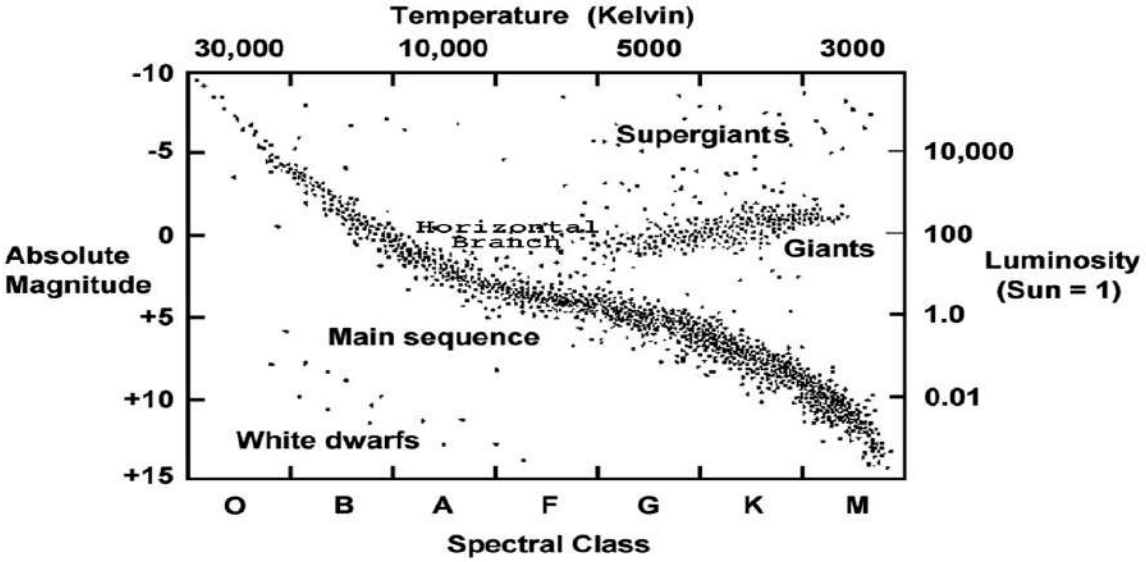
15) size [mass]

16) and temperature [color]

17) analyze small sample of data and apply to entire population

18) ½ angle star "moves" ; closer objects appear to move further than distance objects.

19) The H-R Diagram



20) Red , blue

21) Sun

22) Satisfy relationship of luminosity and mass
Relationship given by $L = Lo[M/Mo]^{3.5}$

23) Fusing hydrogen into helium in core; stable gravity balances pressure keep stars stable, when pressure increases, star expands and cools, when pressure decreases, stars collapse from gravity

24) spiral, elliptical, irregular

25) dwarf elliptical

26) spiral, supermassive black hole at center

27) supermassive star collapsed at end of life, so dense light cannot escape.

28) Yes and accelerating apart

29) As stars move away, wavelength appears longer; as stars approach, wavelength appears shorter

30) $F_g = [G M_1 M_2] / r^2$ $F_g = \frac{[6.67X10^{-11}] [5.98X10^{24}][1.99X10^{30}]}{[3X10^8][3X10^8]}$

$Fg = 3.53X10^{22}$ N

31) $T^2 = R^3$ $T2 = [6]^3$ T = 14.7 years

third page of questions:

Question 20 true
Question 21 false
Question 22 true
Question 23 true
Question 24 true

Question 25 false
Question 26 C
Question 27 A
Question 28 D
Question 29 A
Question 30 C
Question 31 horizontal axis: absolute temperature AT
vertical axis relative luminosity RL

diagonal line MSS oval that contains B: SGS oval that contains D: WD
other oval :GS

32: use Fgrav mass of sun, mass of Neptune distance r in meters

$$F_{grav} = \frac{[6.67 \times 10^{-11}][1.99 \times 10^{30}][1.02 \times 10^{26}]}{[4.5 \times 10^{12}][4.5 \times 10^{12}]} = \frac{13.54 \times 10^{45}}{20.25 \times 10^{24}}$$

$$F_{grav} = 0.669 \times 10^{21} = 6.69 \times 10^{20} \text{ N}$$

33. use $T^2 = R^3$ use distance in AU for Neptune; answer in years
T2 = [30][30][30] = 27000
T = 164.3 years

34 use rs = 2MG/c2 c = 3×10^8

$$rs = \frac{2[1.02 \times 10^{26}][6.67 \times 10^{-11}]}{[3 \times 10^8][3 \times 10^8]} = \frac{13.61 \times 10^{15}}{9 \times 10^{16}} = 1.51 \times 10^{-1} = 0.151 \text{ m}$$