13. Cepheid variable stars are extremely useful to astronomers because ___________.
A) their radius is directly related to their metal content (heavy element abundance)
B) their absolute magnitude is directly related to their age
C) their absolute magnitude is directly related to their period of pulsation
D) their period of pulsation is directly related to their location in the galaxy
E) each Cepheid has at least one large planet which periodically dims the star's brightness when the large planet passes in front of the star

14. The star, Procyon, has a parallax angle of 0.287 arcsec (seconds of arc) and a proper motion of 1.25 arcsec per year. The tangential velocity is the star's ___________ and has a value for Procyon of ___________**km/s.**
A) speed along (on) our line of sight, 210
B) speed perpendicular to (across) our line of sight, 21
C) speed along (on) our line of sight, 140
D) speed perpendicular to (across) our line of sight, 14
E) actual direction of motion in space, 3.8

15. The proper motion of a star is ___________.
A) the diameter of the circle through which the star **appears** to move in one year, due to the motion of the Earth
B) the angular displacement per unit time of the star as it moves on a path perpendicular to our line of sight
C) the speed of the star in km/s, measured perpendicular to (across) our line of sight to the star
D) the speed of the star in km/s, measured along (or parallel to) our line of sight to the star
E) the total distance in km traveled by a star each century

16. The smallest parallax angle that we can measure is about 0.001 arcseconds. We are about 8000 parsecs from the center of our own Milky Way Galaxy. If we ignore the effects of galactic dust and other obstacles and assume ideal conditions, we can see about ___________ of the way to the galactic center.
A) 1/8
B) 7/8
C) 1/2
D) 1/125 = 0.008
E) all the way

17. A **typical** white dwarf has a surface temperature of ___________, but a very old white dwarf, which has a radius of $R_\odot/100$, has cooled to the same surface temperature as the sun ($T_\odot = 5800$ K). This ancient white dwarf now has a luminosity of ___________.
A) 1500 K, $1/10\ L_\odot$
B) 15000 K, the same as the sun because it has the same surface temperature
C) 15×10^6 K, zero; it is nearly invisible
D) 1500 K, 4 times the Sun's luminosity ($4L_\odot$)
E) 15000 K, 3.90×10^{22} W

18. Our galactic neighbor, the Andromeda Galaxy, has an apparent magnitude of +3.5. The star, Sirius, has an apparent magnitude of -1.5 and Sirius is the brightest star in the constellation Canis Major (the big dog). An alternate designation for Sirius is ___________ and, as seen from Earth, Sirius is ___________ the Andromeda Galaxy.
A) Omega canis majoris, twice as bright as
B) Alpha canis majoris, only about 1/100 as bright as
C) Alpha canis majoris, about 100 times brighter than
D) Beta Andromedae, 5 times brighter than
E) Alpha Andromedae, only 1/5 as bright as