1. Why is it that electrons become degenerate long before ions?

2. Why is $\mu$ higher in M dwarfs and red giant cores than in B stars?

3. How does the pressure depend on the internal energy density?

4. Does degeneracy affect the adiabatic relation $P=K\rho^{\gamma}$ ?

5. How do high temperatures affect (i) the equation of state and (ii) radiative Rosseland mean opacities?

6. How do low T high g and low T – low g affect the partial degeneracy electron equation of state?

7. What is meant by LTE in stellar interiors?

8. Under what conditions is the standard radiative transfer equation valid?

9. Why is a negative gradient in $\mu$ a stabilizing effect in radiative regions?

10. Why are radiative losses from a rising element also a stabilizing effect?

11. What does the convective flux depend on the mixing length?

12. Why do partial ionization and radiation pressure tend to favor the efficiency of convection? What does this imply about stellar stability ?

13. What are typical values of scale heights, temperature excesses, convective velocities and mixing times in convection zones?

14. Why does $v_{cond} \alpha T^{5/2}$ and for what $\rho$ is $v_{cond} > v_{rad}$?

15. Why does the mean free path of the electron increase with $\eta$?

16. What are the frequency dependencies of the monochromatic absorption coefficients?

17. How does degeneracy affect the Rosseland means?

18. Under what conditions of X, Z, $\rho$ and T is $\kappa_{bf} > \kappa_{ff}$?

19. How important are Bound-Bound Opacities?

20. Will $.20(1 + X)$ be a lower bound to $\kappa$ for all T?

21. Does $\varepsilon_g$ refer only to gravitational energy generation?

22. What is the mean thermal energy/particle at $10^7$ degrees K? How does this compare with the energy of the Coulomb barrier?

23. What is the "Gamow Peak" and how does it determine whether a reaction is resonant or non-resonant?

24. What are the temperature dependencies of resonant and non-resonant reactions? For which type of reaction does $\varepsilon_{nuc}$ depend most strongly on T?

25. We generally think of Enuc as increasing with increasing T; can it decrease?

26. What is the effect of electron screening on Enuc? Why?

27. What is the significance or important of the second half of the CNO bi-cycle?

28. How are neutrino losses accounted for in H and He burning?

29. Consider a $20M_0$ star with Z=0 and Y=0. How will this star start generating nuclear energy? By which branch or cycle? When does this happen in cosmic history?

30. When the CNO cycle has reached equilibrium, which of the three elements is by far the most abundant?

31. At approximately what T does the CNO cycle dominate the p-p cycle?

32. Is He burning resonant or non-resonant? Is the triple $\alpha$ process the most important part of He-burning?

33. Why is it so difficult to measure experimentally the cross sections of nuclear reactions important in stellar interiors?

34. What are the possible mechanisms for energy loss by neutrinos and under what conditions are they important?

35. What is the effect of degeneracy on all neutrino processes?

36. What is the chief problem associated with fragmentation?

37. Why is a protostar isothermal during its initial states?

38. What are the principal collapse stages for star formation? What is 60-80 Msun an upper limit for Pop I stars, but perhaps is a much larger mass for extreme Pop II?

39. In the late stages of collapse, how do modern models differ from Hayashi's?

40. What are the pre-main seq. lifetimes for 1 Msun and 15 Msun stars?

41. Why does a star's luminosity dip once or twice just before reaching the main sequence?

42. During H-burning why do the central parts of the star contract?

43. Why does the convective core of an Upper MS star ($M < 10$ Msun) shrink in mass? How does this affect the distribution of $\mu$?

44. How long does H-burning last for the different masses?

45. How does nuclear burning drive oscillation for the massive stars?

46. Why do semi-convection zones develop? How is energy transported through them?

47. How does one determine the distribution of velocities, scale heights and energy transport in a semiconvection zone?

48. How does the size of the semi-convection zone vary with time and mass?

49. How does the main sequence phase of a star with Z=0 differ from that of a Pop I star? Where would you look for Z=0 stars?

50. How does the evolution of a low mass star (during H burning) differ from that of an Upper Main Sequence star? How have L, R and Te for the Sun changed in the past 4 Gyears?

51. What is the significance of the Schonberg-Chandrasekhar limit?

52. Approximately what fraction of the total luminosity is due to gravitational contraction before the onset of He-burning?

53. How does the H-burning shell develop and change with time?

54. What effect does $N^{14}$ burning have on star's evolution?

55. What is the "mirror principle," and is it always valid?

56. Where in H-R diagram are the two main phases of He core burning?

57. What factor appears most strongly to affect the length of the horizontal branch?

58. What is the giant branch for a low mass star particularly long?

59. Why and for which stars does the He-flash occur? What problems does it cause to simulators of stars?

60. During the He flash a large amount of energy is produced, why is this $10^{11}$ Lsun never seen?

61. What is the critical mass for He burning?

62. How do mass, Y and Z affect the steepness of the subgiant branch?

63. Why does theory support high initial helium abundance?

64. Why do giants in a particular Te range become unstable?

65. Describe the He shell burning instability and the computational problems it causes.

66. What is the critical mass for C-burning? Under what conditions does C-detonation occur?

67. After He exhaustion, how does the subsequent evolution depend on mass?

68. Is there any evidence that mass loss affects evolution?

69. How does rotation affect the brightness and color of a star?

70. What are some of the possible models for supernovae? Are neutron stars always formed?

71. What are some of the problems encountered (by astrophysicists, not nature) in evolving a star from the main sequence to the white dwarf stage? How have they been avoided?

72. What is the evidence for neutrino loss by the universal Fermi interactions?

73. In the pre-white dwarf range, what is the relative importance of ν-loss by photoneutrinos, plasma neutrinos and pair-annihilation neutrinos? How does the neutrino luminosity compare with the photon luminosity?

74. Why is a cold, black dwarf a good model for a hot white dwarf?

75. Why do electron degenerate configurations (white and black dwarfs) have maximum and minimum masses? What are some of the mechanisms which affect the max mass?

76. How would the radius of Jupiter change if you multiplied its mass by a factor of 10? 100? 1000? Why?

77. Why has there been considerable interest in the convective envelopes of white dwarfs?

78. What are the energy sources for white dwarfs? What is a typical absolute magnitude for a young white dwarf? An ancient WD?

79. What is the approximate minimum mass for a stable neutron star? What is its radius?

80. Why is the maximum mass of a neutron star uncertain?

81. What are subdwarf stars? How and where are they found? How many exist in the Milky Way?

82. What is a brown dwarf? Describe the subclasses and evolution of brown dwarfs. How important are brown dwarfs in making up the total mass of the Galaxy? How would you survey for brown dwarfs if you wanted to detect EVERY BD in the Galaxy?

83. Where are O and B stars found? Why? How many exist in our Galaxy?

84. What is a Wolf-Rayet star (i) observationally (ii) theoretically ? What is the difference between a WN and a WC star? Where are they distributed in the Galaxy? Is this in accord with theory? How many must exist in our Galaxy? How could you find every WR star in the Milky Way?

85. Approximately, what is the ratio of number of O/B/A/F/G/K/M dwarfs near the Sun? Is this ratio different in Open clusters? Globular Clusters? Why?

86. You have guaranteed access to all the world's telescopes. How do you determine the true fraction of stars in binary systems? The true mass ratio distribution?

87. What is the observed period distribution for binary stars? Do we have any information about this for extragalactic binaries? How would you improve the situation in the Galaxy, and in the Magellanic Clouds?

88. What is the Algol paradox? How is it resolved?

89. Describe the evolution of Algol

90. Describe the constituents of a Cataclysmic Binary. What is the singular event that made such a star system possible?

91. What powers a classical nova eruption? Do novae recur? What does the chemistry of the ejecta teach us about the eruption? What is the peak luminosity of a classical nova compared to a type Ia supernova?

92. What powers a dwarf nova eruption? What is the ratio of classical nova/dwarf nova luminosity? Eruption frequency?

93. Where are Cataclysmic Variables found in the Galaxy? In external galaxies?

94. What is a contact binary star? What is its lifetime? What is its fate?

95. Why are binary pulsars so astrophysically valuable? How would you search for more of them?

96. Describe the evolution of a binary system that leads to a binary pulsar.

97. Describe the evolution of a binary system that leads to a pulsar + black hole binary. Approximately, how many black hole binaries must exist in the Galaxy? In M31?

98. How is the evolution of a star similar to that of a star cluster? What is meant by feedback between stellar evolution and stellar dynamics?

99. What is the effect of binaries on star cluster evolution?

100. What kinds of exotic stars are preferentially manufactured in star clusters? What are the mechanisms to make and/or destroy them? How would you survey for these systems?