1. If a star’s temperature is doubled but radius is kept constant, by how much does its luminosity go up by?
   1a. Goes up by a factor of $2^4 = 16$.
2. If a star’s temperature is increased by a factor of three, four, five and six, but in every case its radius is kept constant, what happens to its luminosity?
   2a. Goes up by factors of 81, 256, 625, 1296, respectively.
3. If a star’s temperature is kept constant, but its radius is doubled, tripled, quadrupled, what happens to its luminosity?
   3a. Goes up by factors of 4, 9, 16, respectively.
4. If a star’s temperature is doubled but its radius is halved, what happens to its luminosity?
   4a. Goes up by a factor of 4.
5. If a star’s temperature is tripled and its radius is halved, what happens to its luminosity?
   5a. Goes up by a factor of $81/4$.
6. If a star’s temperature is halved but its radius is quadrupled, what happens to its luminosity?
   6a. Goes up by a factor of 1.
7. Does an object at a blackbody temperature of about 6000K emit more or less total energy that a blackbody of temperature of 5500K? At what type of wavelengths does the hotter body emit more energy?
   7a. Emits more total energy and emits more at shorter wavelengths.
8. Which of the above two objects looks redder and why?
   8a. The cooler object looks redder because it emits more of its energy at those shorter wavelengths.
9. What is the main physical quantity that explains spectral type?
   9a. Temperature.
10. True or False: the largest telescope on Earth can take a picture of the two components of a spectroscopic binary.
   10a. False.
11. Star A is dim and cool and star B is bright and hot: where are they in the HR diagram?
   11a. A in the bottom right, B is top left.
12. True or False: Stars on the upper main sequence are more massive than stars on the lower main sequence.
   12a. True.
13. True or False: What can explain the luminosity difference between a white dwarf of spectral type A and a Supergiant of spectral type A?
   13a. The Supergiant is larger.
14. True or False: Our Sun is not on the main sequence.
   14a. False.
15. Why is 0.08$M_\odot$ the smallest mass a star can have? Why is 60$M_\odot$ the highest mass a star can have?
   15a. The lower limit arises from the smallest mass that can get hot enough in its core to burn hydrogen and the upper limit arises from the largest mass that gravity can hold in against radiation pressure.

Look at table 1.
16. Which star appears brightest in our sky?
   16a. Sirius.
17. Which star appears faintest in our sky?
   17a. Regulus.
18. Which star has the greatest luminosity?
   18a. Antares.
19. Which star has the lowest luminosity?
   19a. alpha Cen.
20. Which star has the highest surface temperature?
   20a. Spica.
21. Which star has the lowest surface temperature?
   21a. Antares.
22. Which star has the largest radius?
   22a. Has to be Antares.
23. Which stars are on the main sequence?
   23a. All stars with LC=V.
24. Which stars are supergiants?
   24a. All stars with LC=I.
25. If a star is cool and bright, which region of the HR diagram is it in?
   25a. Top right.
26. What is a spectrum?
   26a. The way the light emitted by an object varies with wavelength.
27. Which stars might have the most similar spectra?
   27a. Probably Regulus and Spica.
28. If a star is moved to 6 times as far away, how do its luminosity and absolute magnitude change?
   28a. Its luminosity and absolute magnitude don’t change.
30. For this same star, how does its brightness change? How does its apparent magnitude change?
   30a. Its brightness decreases by a factor of $6 \times 6 = 36$. Its apparent magnitude goes by by 4 because $2.5 \times 4 \approx 36$. 