

Chp 9-Review Questions. Probing the Dynamic Sun

1. What is meant by the luminosity of the Sun?
2. What is thermonuclear fusion? Why is this fusion fundamentally unlike the burning of a log in a fireplace?
3. Why do thermonuclear reactions occur only in the Sun's core, not in its outer regions?
4. If thermonuclear fusion in the Sun were suddenly to stop, what would eventually happen to the overall radius of the Sun? Justify your answer using the ideas of hydrostatic equilibrium and thermal equilibrium.
5. Give some everyday examples of conduction, convection, and radiative diffusion.
6. What is a neutrino? Why is it useful to study neutrinos coming from the Sun? What do they tell us that cannot be learned from other avenues of research?
7. Briefly describe the three layers that make up the Sun's atmosphere. In what ways do they differ from each other?
8. How do astronomers know when the next sunspot maximum and sunspot minimum will occur?
9. Why do astronomers say that the solar cycle is 22 years long, even though the number of sunspots varies over an 11-year period?
10. Explain how the magnetic-dynamo model accounts for the solar cycle.
11. Why should solar flares and coronal mass ejections be a concern for businesses that use telecommunication satellites?

Chp 9-Discussion Questions. Probing the Dynamic Sun

1. Discuss the extent to which cultures around the world have worshiped the Sun as a deity throughout history. Why do you suppose there has been such widespread veneration?
2. In the movie *Star Trek IV: The Voyage Home*, the starship Enterprise flies on a trajectory that passes close to the Sun's surface. What features should a real spaceship have to survive such a flight? Why?
3. Discuss some of the difficulties in correlating solar activity with changes in Earth's climate.
4. Describe some of the advantages and disadvantages of observing the Sun (a) from space and (b) from Earth's south pole. What kinds of phenomena and issues might solar astronomers want to explore from these locations?

Chp 9-Collaborative Group Exercises. Probing the Dynamic Sun

1. Figure 9-16 shows variations in the average latitude of sunspots. Estimate the average latitude of sunspots in the year you were born and estimate the average latitude on your twenty-first birthday. Make rough sketches of the Sun during those years to illustrate your answers.
2. Create a diagram showing a sketch of how limb darkening on the Sun would look different if the Sun had either a thicker or thinner photosphere. Be sure to include a caption explaining your diagram.
3. Solar granules, shown in Figure 9-6, are about 600 miles (1000 km) across. What city is about that distance away from where you are right now? What city is that distance from the birthplace of each group member?
4. Magnetic arches in the corona are shown in Figure 9-20. How many Earths high are these arches, and how many Earths could fit inside one arch?