EPS 100 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formation of Our Solar System, Part 2

18. The Sun’s energy comes from nuclear fusion. Most of this nuclear fusion is the fusion of hydrogen atoms into helium atoms. In this process, the nuclei (centers) of four hydrogen atoms get squeezed together with so much force that they fuse to create one helium atom. Fortunately for us, one helium atom does not have as much mass as four hydrogen atoms. This means some mass gets “lost” during the fusion process. This mass isn’t really lost; it is turned into energy.

a. The amount of energy that is produced by nuclear fusion can be calculated using the formula E=mc2. E = the energy. m = the mass that is “lost.” c = the speed of light. c2 = the speed of light, squared. Even if the lost mass is very small, an enormous amount of energy is produced by this process. Use the formula to explain why.

b. Atomic nuclei are all positive, and positive charges are repelled by other positive charges. It takes an incredible amount of force to slam hydrogen atoms together and cause them to fuse. Where in the solar nebula did nuclear fusion begin? Why?

c. The main products of hydrogen fusion are helium and energy. Why don’t we use hydrogen fusion as a source of clean energy?

19. Before nuclear fusion began in the sun, the solar system had been a rotating disk of ice (“frozen gas”) and dust. When nuclear fusion began and the sun was born, what do you suppose happened to the frozen gases near the center of the center of the solar system?

20. The ice in the solar system was mostly hydrogen gas that had been so cold that it was frozen. As the sun heated up, where did most of this gas survive, near the center or at the edge of the solar system?

21. The planets near the sun (inner planets) are rocky, with very little gas around them. The outer planets are *gas giants*, made of mostly hydrogen gas. What accounts for this difference between the inner and outer planets?

22. What force caused the dust and gas in the solar system to clump together to form planets?

23. Today we have a solar system of planets that orbit the sun in relatively stable orbits. In a stable orbit, two opposing tendencies are in balance. One tendency pulls planets away from the sun. The other pulls them toward the sun.

a. What prevents planets from flying away from the sun?

b. What prevents planets from falling into the sun?

Cartoon Summary

