

Stars, Galaxies, and the Universe • Enrich

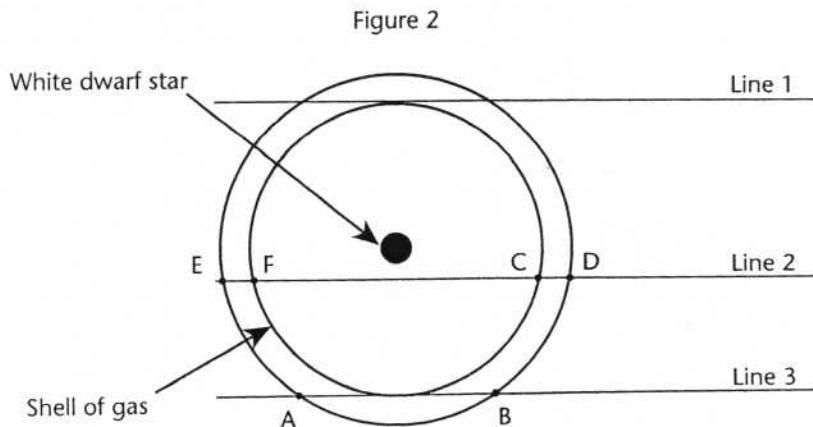
# Planetary Nebulas - *Must be typed*

Medium-sized stars, such as the sun, eventually consume all of the nuclear fuel available. The core shrinks and becomes hotter, while the surface expands. The star becomes a red giant. In the very last stage of its life as a star, the core collapses into a white dwarf, while the remaining hydrogen drifts away into a shell of gas called a planetary nebula. Planetary nebulas are considered by many astronomers and photographers to be the most beautiful astronomical objects that can be seen with a telescope. They are called planetary nebulas because the astronomers who first saw them thought they resembled planets in size and color. One of the most attractive planetary nebulas is found in the constellation Lyra. It is called the Ring Nebula.



Figure 1

The gas surrounds the white dwarf in a three-dimensional sphere. Why does a three-dimensional spherical shell of gas appear to be a two-dimensional ring? Figure 2 shows the cross section of a shell of gas around a white dwarf. If you look at the shell from the right along line 1 or line 3, it appears bright. But if you look at the shell along line 2, it is less bright.



Examine the figures and answer the questions below on a separate sheet of paper. *Must be typed*

1. How far is it from A to B in millimeters?
2. How far is it from C to D in millimeters, plus from E to F?
3. Are you looking through more of the shell along line 2 or along line 3?
4. Would the shell appear to be thicker and brighter along line 2 or along line 3?
5. Why does the Ring Nebula appear to us as a ring?