



## Planetary Nebula Lesson Plan

**Time:** 40 minutes

**Goals:** To gain an understanding of the distance to far away planetary nebula and the methods used to calculate their distance.

**Objectives:** Students will:

- Watch the “Planetary Nebula” segment of the “How far away is it” video book
- Optionally, find NGC 2818 on the Hubble Archive website.
- Take a short quiz.

**Materials:**

- Internet connection with a computer for viewing [“Planetary Nebula” segment on YouTube](#)

**Directions:**

- Introduce the Planetary Nebula segment as our first deep look at the Hubble Space Telescope photographs. Point out that we’ll be covering how these photographs are made and how we know how far away these nebulae are.
- Show the video.
- Review what they saw:
  - How we do astro-photography.
  - How a Planetary Nebula is created.
  - How we measure expansion parallax.
  - What the Doppler Effect is.
  - How beautiful yet fearsome Planetary Nebulae are.
  - How our Sun will end its life.

## How Far Away Is It – Planetary Nebula



- Look up NGC 2818 on the Hubble Space Telescope website.
  - With a computer connection, go to <http://hla.stsci.edu/>
  - Click on 'Enter site here'.
  - Enter "NGC 2818" into the designated area, and click 'Search'.
  - You now have the table of photos for NGC 2818.
  - Click 'Display' for one with an exposure time of 2000 seconds. (You'll see the exposure column by scrolling to the right.)
    - Note how little there is to see.
  - Now click 'Display' for one with an exposure time of 9600 seconds.
    - Note the improvement.
  - Feel free to look here for any object noted in this and future "How Far Away Is It" segments.

### Assessment:

1. Take a simple quiz. Print and distribute the quiz on page 3. Here are the answers:
  - What kind of star is left behind after a nova explosion creates a planetary nebula?  
**Answer:** a) White Dwarf
  - If the Doppler Effect shows a blue shift in a star's light, is it moving towards you or away from you?  
**Answer:** Towards you.
  - How long will it be before our Sun explodes into its own Planetary nebula?  
**Answer:** Billions of years from now.



## Planetary Nebula quiz

- What kind of star is left behind after a nova explosion creates a planetary nebula?
  - a) White dwarf
  - b) Neutron star
  - c) Pulsar
  - d) Black Hole
  
- If the Doppler Effect shows a blue shift in a star's light, is it moving towards you or away from you?
  
- How long will it be before our Sun explodes into its own Planetary nebula?
  - a) Thousands of years
  - b) Millions of years
  - c) Billions of years
  - d) Never

