

# The HR Diagram and Stellar Evolution

Name \_\_\_\_\_

**Purpose:**

- To provide you with necessary skills to understand how the HR diagram illustrates the major ideas of stellar evolution

Estimated Completion Time: 45 minutes

**Resources needed:**

- Calculator (preferably scientific)
- Textbook
- Web access is highly desirable
- Stellarium

**Questions**

1. Explain what astronomers mean by the terms:
  - a. zero-age main sequence
  - b. main sequence lifetime
  
2. Review [online lecture 9.4](#) and estimate the main-sequence lifetimes for the following stars (in billions of years):

Star	Mass ( $M_{\odot}$ )	Main Sequence Lifetime (Ga)
Vega	2.11	
Alnitak	28	
Deneb	20	
Altair	1.79	

3. How old is Deneb? Do a web search for the absolute magnitude and temperature of Deneb and place it on the HR diagram supplied. Next, use the [applet hrEvolve](#) to investigate the age of Deneb. (Note – hrEvolve is evolving itself! There are a few minor bugs so be patient when you access the evolutionary tracks for stars!)
  
4. Will Deneb become a supernova? If so what type, when and estimate how bright it will become in the night time sky. To do this you will need to use the distance modulus relation (either the formula or graph) and the absolute magnitude that Deneb would have as a supernova. Stellarium can tell you the distance!



