

# The HR Diagram

Name \_\_\_\_\_

## Purpose:

- To provide you with necessary skills to understand the HR diagram and how to use it
- To give you practice performing simple mathematical calculations using spectroscopic parallax

Estimated Completion Time: 45 minutes

## Resources needed:

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

## Questions

1. Find the following stars using Stellarium and record the data in the table below:

Star	Spectral Type	Absolute Magnitude	Apparent Magnitude	B-V	Parallax	Distance Modulus
Procyon						
Castor						
Antares						
Altair						
Regulus						
Capella						
Mizar						
Algol						

2. Find the distance modulus for each star and record that in the last column of the table in question 1.
3. Place each of the stars in the table from question 1 on the HR diagram that is attached to this exercise.

4. From the absolute magnitude that you found for each star determine the star's luminosity in solar units. (Hint – the absolute magnitude of the Sun is 4.84. Polaris has an absolute magnitude of -3.66. This means that Polaris is  $4.84 - (-3.66) = 8.5$  magnitudes brighter than the Sun. Use the magnitude-brightness rule to convert this into a brightness factor **or luminosity**. See [Chp 2.1](#) in the online notes to do this. You will find that Polaris is 2513 times more luminous than the Sun.) Record this information in the following table:

Star	Luminosity (Lo)	Mass (Mo)	Radius (Ro)
Procyon			
Castor			
Antares			
Altair			
Regulus			
Capella			
Mizar			
Algol			

5. Find the mass of each of the stars by using the Mass-Luminosity Relation (See online notes [Chp 8.5](#)) Record this in the table shown above. Also estimate the radius for each star from the HR diagram and where you placed these stars.
6. Use the distance modulus found earlier to compute the distance to these stars. (See [Chp 8.1](#))

Star	Distance Modulus	Distance (pc)
Procyon		
Castor		
Antares		
Altair		
Regulus		
Capella		
Mizar		
Algol		

7. The star Sirius B has an apparent magnitude of 8.3 and is located 2.6 pc away. The surface temperature of this star is 25 000 K. Find the star's absolute magnitude and use the applet [HR explorer](#) to indicate where this star should be placed on the HR diagram. What class of star is this?

