Module 4 - Exploration
Problem-Solving Activity: The HR Diagram

Name _____
Group Name _____
Period _____

Now that you know something about the relationship between temperature and color, you are ready to explore more about the evolution of stars. Go to the HR Diagram Simulator at: http://www.astro.ubc.ca/~scharein/a311/Sim/hr/HRdiagram.html

This simulator shows information about the mass, temperature and luminosity (brightness) of stars and shows how stars change with time. Use the simulator to answer the following questions:

1. First, click the button labeled "100" one time to add one hundred stars to your diagram. The linear grouping that you see is called the main sequence.
   a) Generally speaking, how does the temperature of the blue stars compare to that of the red stars?
   b) Generally speaking, how does the luminosity of the blue stars compare to that of the red stars?

2. Now click on an individual blue star and write down its mass and main-sequence lifetime.

3. Do the same thing for a red star.

4. Explain, in general terms, what the relationship is between mass and main-sequence lifetime.

5. Now we are ready to start the simulation. Click on the button labeled "Evolve"
   a) Which stars leave the main sequence first?
   b) The stars change color as they leave the main sequence. What does this change indicate?
   c) Why do you think these changes take place?
   d) What do you suppose happens to stars after enough time goes by?

6. Start the simulation again, but this time click on an individual star and keep track of its luminosity as the simulation progresses.
   a) How does luminosity change as the star leaves the main sequence?
   b) Why do you suppose this is?