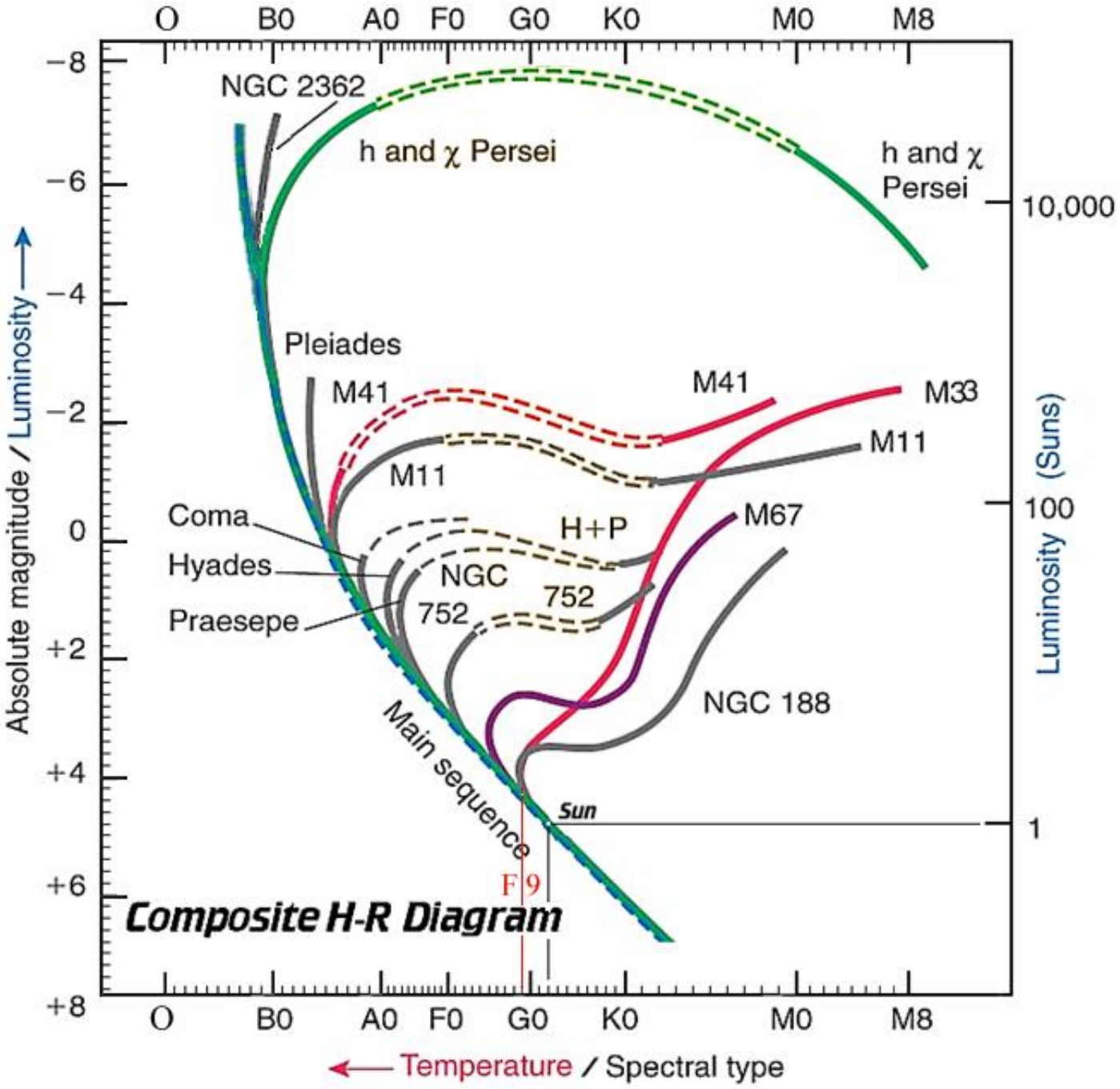
Name _____ **Date** _____ **Moravian University**

USING THE H-R DIAGRAM TO DETERMINE THE AGE OF STAR CLUSTERS

(10 points)

Instructions: Below is a composite **H**ertzsprung-**R**ussell diagram showing numerous clusters of stars on the same graph. The Y-axis on the left shows the absolute magnitude of the stars, while the Y-axis on the right depicts the luminosity (brightness) of the stars compared to the sun, which equals one. The X-axis represents the spectral classifications or temperatures of the stars. Note the turnoff points for the clusters. This location on the H-R diagram illustrates where the cluster leaves the main sequence after its primary fuel, hydrogen, has been exhausted. Using the turnoff points of the various clusters along the main sequence, suggest an approximate age of that cluster. As an example, the age of NGC 188 is 7.3 billion years, according to the graph on the following page.

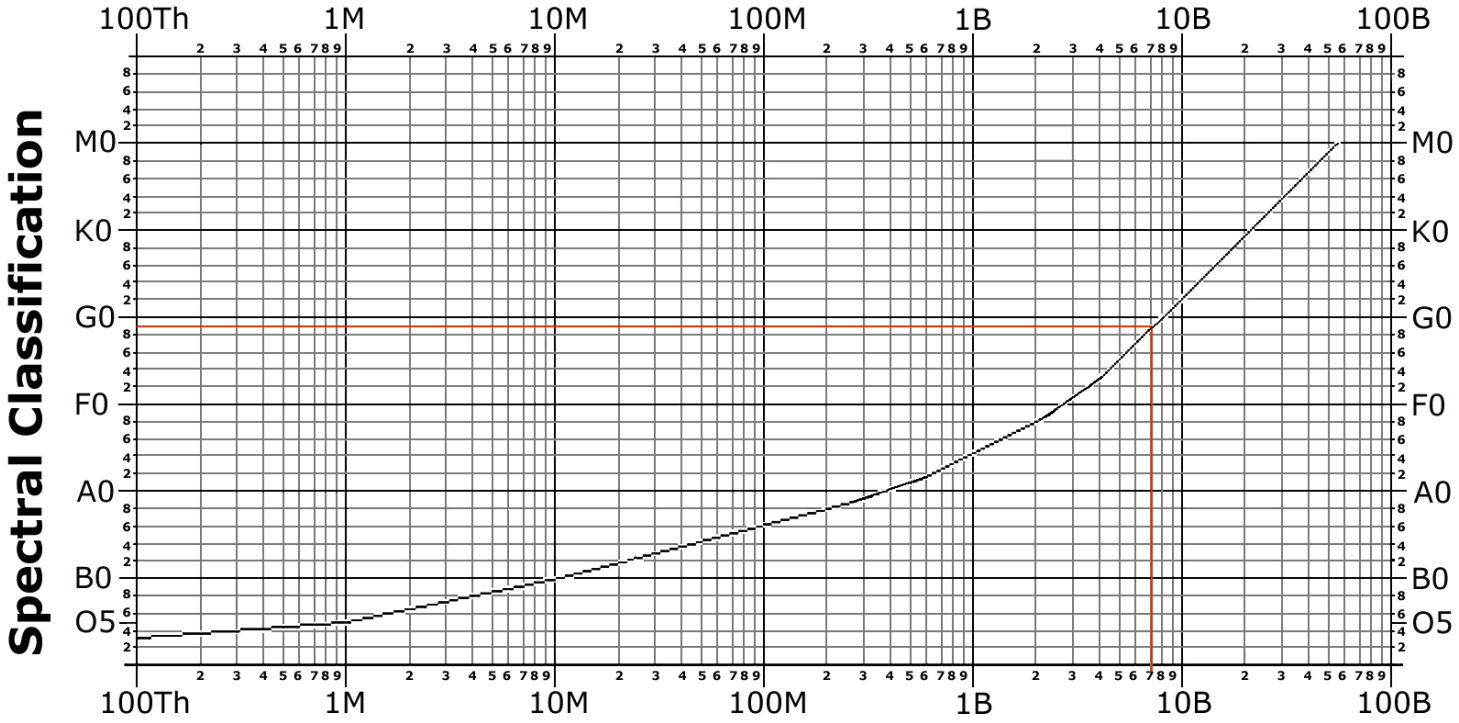


Procedure: Find the ages of the clusters in the H-R diagram by matching the turnoff position of the cluster on the main sequence of the composite H-R diagram with its spectral type. Then, compare the spectral type with the age of the stars on the graph on page three to establish an approximate age for the cluster. The graph is logarithmic.

Show how you determined the ages of the various clusters using the information and graph contained in this exercise.

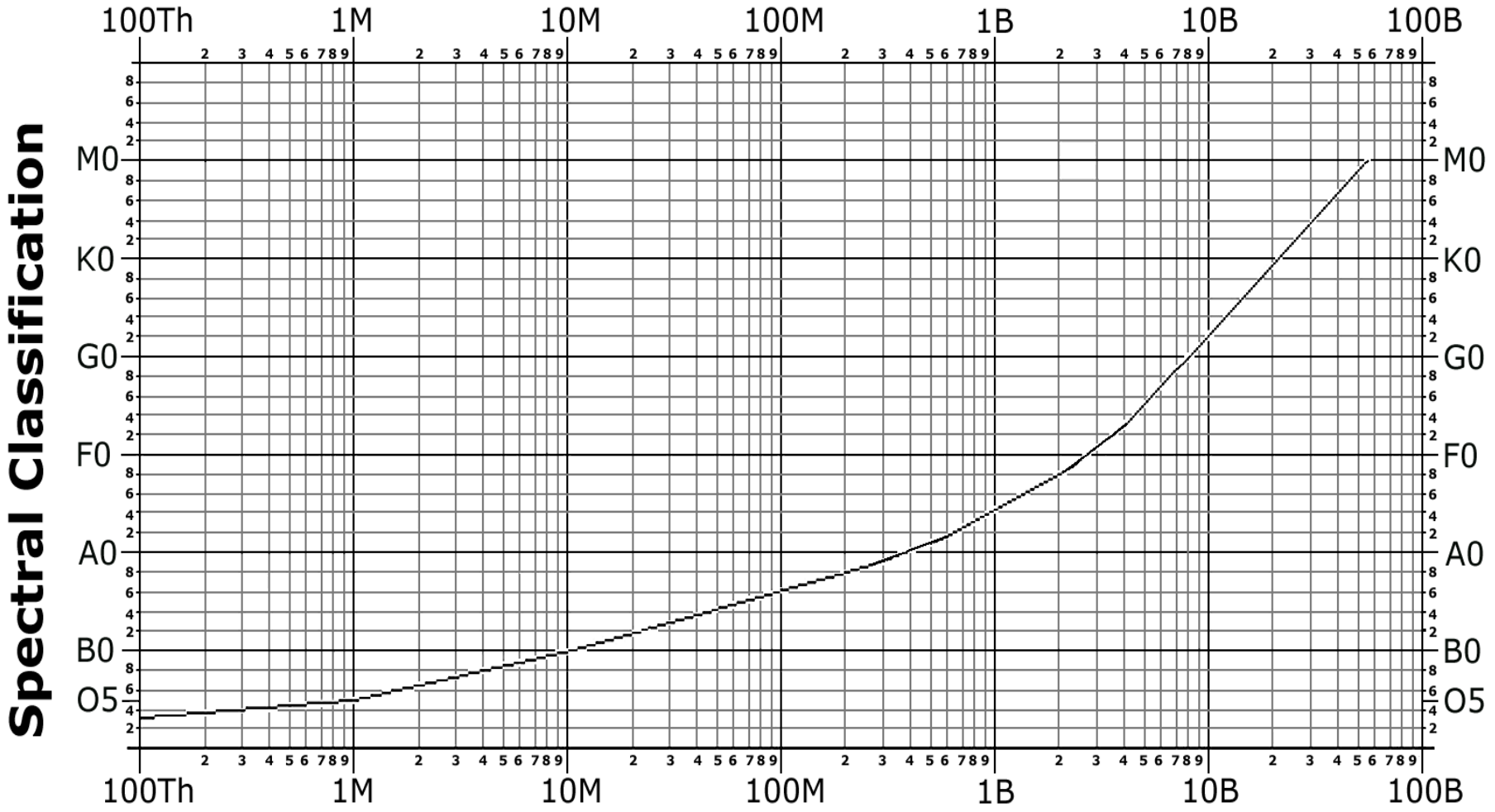
1. Show how you determined the turnoff positions. See the example found on the first page of the exercise.
2. Show how you used the turnoff positions of the clusters to find their ages using the graph on the next page.
3. Submit all pages of the laboratory exercise for examination.

Spectral Class vs. Time on Main Sequence



Cluster	Turnoff Point	/	Age In Years
Example: NGC 188	F9	/	7.1 billion years

Spectral Class vs. Time on Main Sequence



Name _____ Date _____ Moravian University

Cluster Turnoff Point /Age In Years

1. **NGC 2362:** _____/_____
2. **h and χ Persei:** _____/_____
3. **Pleiades:** _____/_____
4. **M41:** _____/_____
5. **M11:** _____/_____
6. **Coma** Berenices: _____/_____
7. **Hyades:** _____/_____
8. **Praesepe, M44:** _____/_____
9. **NGC 752:** _____/_____
10. **M67:** _____/_____

1. Show how you determined the turnoff positions.
2. Show how you used the turnoff positions of the clusters to find their ages using the graph on the previous page.
3. Submit all pages of the laboratory exercise for examination.