Estimating the Age of a Star Cluster

Turn in one copy of this lab with each group member's printed name and signature. By signing, you certify that you have actively participated in the exercise and have put forth effort in equal share to your fellow group members.

Printed Name	**Signature**
_____	_____
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Part 1 – Estimating the main sequence lifetime of a star

1. Using the information in Table 1 and the fact that stars shine by converting mass into energy, explain in two or three sentences why high mass stars have short lifetimes compared to low mass stars.

2. Using the fact that the Sun has a main sequence lifetime of $1x10^{10}$ years, use a proportionality to estimate the lifetimes of the stars in the table below.

Table 1

Mass (M_{sun})	**Luminosity (L_{sun})**	**Estimated age (years)**
18	$5x10^5$	
6.5	800	
3.2	80	
2.1	20	
1.7	6.0	
1.3	2.5	
1.1	1.26	
1.0	1.0	$1.0x10^{10}$
0.93	0.79	
0.78	0.40	
.69	0.16	
.47	0.063	
.21	0.0079	

<u>Part 2</u> – Estimating the age of a cluster

1. Look at Figure 2. Assuming that all of the stars in a given cluster have the same birthday, which of the two clusters is older? How do you know?

2. Explain in two or three sentences why the **Main Sequence Turnoff** is an indicator of the age of a star cluster.

3. Find the Main Sequence Turnoff for the cluster that you have plotted and use it, Table 1, and your answers to **Part 2 Question 2** to estimate the age of your cluster.

<u>Part 3</u> – Distances

Table 2

Color Index (B-V)	Apparent Magnitude (V)	Temperature	Absolute Magnitude	Distance (pc)
			Average:	

1. How easy (or hard) was it to find absolute magnitude from the graph? What was challenging? What was easy?

2. How well do your distance measurements agree? For comparison, this cluster is about 30pc in radius.

3. What were some sources of error that could have caused the distances to vary?

4. What might be some things you could do to reduce the error in the actual distance to this cluster of stars? (In other words, what would make your estimate more accurate?)