

Names: _____

Teamwork (5)	Discussion (5)	Completeness (5)	Correctness (5)	Total (20)

The HR Diagram & Globular Clusters

Walk on the living,

They don't even mumble.

Walk on the dead,

They mutter and grumble.

What is it?

Pre-Lab Quiz

Record your team's answers as well as your reasoning and explanations.

1.

2.

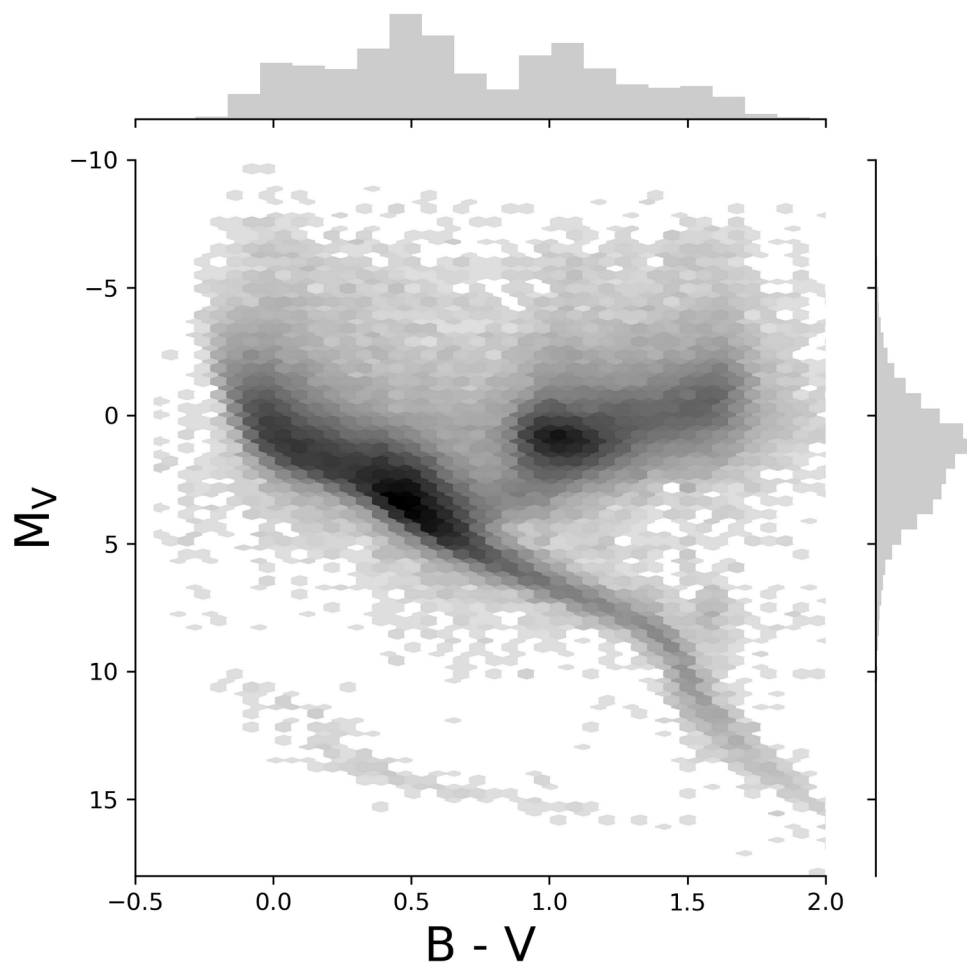
3.

4.

Part 1: The HR Diagram

We'll be using magnitudes for much of today's lab. Note that B and V represent the apparent magnitude in the blue and green (visual) photometry bands respectively.

1. Are stars becoming brighter or fainter with increasing V magnitude?
2. Are stars becoming redder or bluer with increasing $B - V$ color?
3. On the HR diagram below indicate
 - the direction of increasing temperature
 - the direction of increasing luminosity
 - the location of the Main Sequence, Giants, Supergiants, and White Dwarfs
 - the location of the Sun ($B - V = 0.65$, $M_V = 4.83$)



4. Using the HR Diagram Explorer, estimate the various quantities for each of the stars below.

Star	Arcturus	Deneb	α Centauri A	Sirius B
B – V	+1.23	+0.09	+0.71	-0.03
M_V	-0.30	-8.38	+4.38	+11.18
Spectral Type				
Luminosity Class				
Temperature (K)				
Luminosity (L_\odot)				
Radius (R_\odot)				

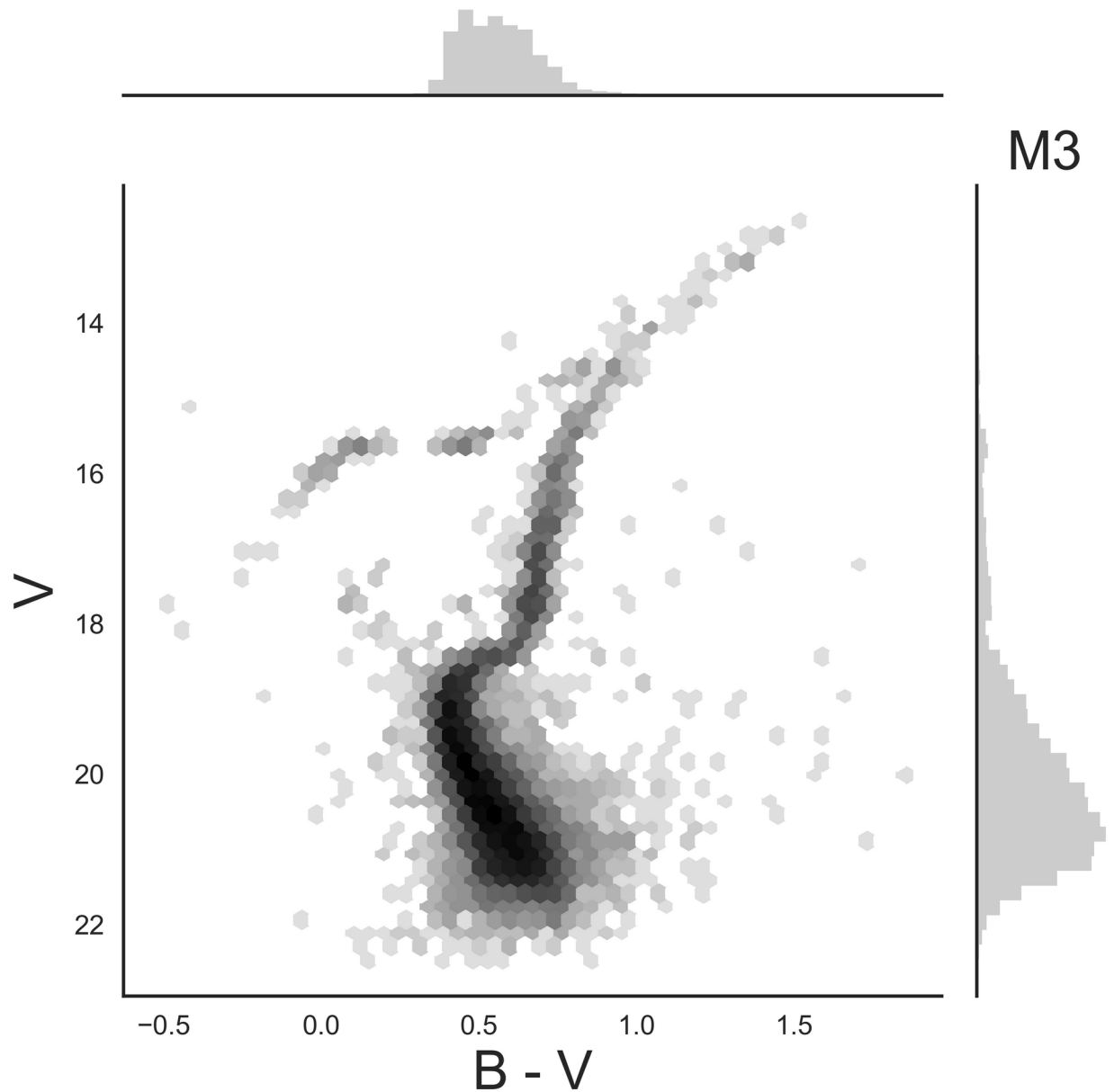
5. **Class Discussion** At the bottom of the HR Diagram explorer click the button to plot the nearest stars, which you'll find are mostly red dwarfs. If you look at the HR Diagram on the previous page, however, very few of these are plotted. Why is there a discrepancy here?

Part 2: Globular Clusters

1. What are globular clusters?

2. Draw an edge-on schematic of the Milky Way Galaxy in the space below and indicate where the globular clusters are located. Label the bulge, disk, and halo components.

3. For the HR Diagram of the globular cluster M3 below, label the main sequence (MS), the main sequence turnoff point (TP), the giant branch (GB), the horizontal branch (HB), and the blue stragglers (BS).



4. Using the $B - V$ color associated with the TP, determine the spectral type associated with these stars by examining the plot on the website.

$B - V$		Spectral Type	

Work with another group as you answer the remaining questions.

5. Determine the age of the globular cluster using the TP from the previous problem. Explain your answer.

6. Suppose we looked at an identical globular cluster that was simply farther away. How would the increased distance affect the V magnitude and $B - V$ color?

7. Suppose a dust cloud moved between us and the globular cluster. How would this change the V magnitude and $B - V$ color? Note that dust particles preferentially scatter blue light.

8. How might the distance or the presence of dust complicate our age estimates when using the TP? Explain your answer.

9. Examine the HR Diagrams of the four star clusters on the website and rank them from youngest to oldest. Explain your rankings.

Hint: Think about your answer to question 8 for why using the TP won't work in this case. How else can we rank the relative ages of the clusters?