Lifetime of Stars—9 Oct

• How are giants and dwarfs related?
• Does the sun have a finite life or does it last forever?
• Clues
  – H-R diagram
  – Luminosity depends on mass
  – Fuel consumption rate

Globular cluster M15

Pleiades & M15

• Stars in a cluster were born at the same time. They are at the same distance.
  – Study a cohort of thousand-tuplets. How are they different? What is their lifetime?
• What are differences between the Hertzsprung-Russell diagrams of M15 and the Pleiades? (Vertical axes are aligned.)
**Pleiades & M15**

- What are differences between the Hertzsprung-Russell diagrams of M15 and the Pleiades? (Vertical axes are aligned.)

1. Are there any MS stars with abs mag $M_v=6$ in M15 & Pleiades? A. YY. B. YN. C. NY. D NN.
2. Are there any MS stars with abs mag $M_v=2$ in M15 & Pleiades?


**Valid Answers:**

- **1.** A. YY.
- **2.** A. YY. B. YN.
- **3.** A: Pleiades.
Lifetime of Stars

- Lifetime = Amount of fuel/Rate of consumption
  -Lifetime of a tank of gas for a car
  -For a star
    -Amount of fuel = mass
    -Rate of consumption = luminosity
- Lifetime = mass / luminosity
- Stars have a finite life. The sun will not live forever!

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<td>-6</td>
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<td>10</td>
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Cluster of Stars

- In a cluster of stars
  - All stars were born at the same time.
  - Some are massive and live a short life.
    - On a human scale: 20T if the sun scales to 100lb.
    - On a human scale: 5 wk if the sun scales to 70yr.
  - Some have little mass.

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Pleiades & M15

3. Why does M15 not have any main sequence stars with B-V=0.2?
   A. They were not born in M15.
   B. They died already.
   C. They became redder main-sequence stars.
Pleiades & M15

3. Why does M15 not have any main sequence stars with B-V=0.2?
   A. They were not born in M15.
   B. They died already.
   C. They became redder main-sequence stars.

4. Why are there so few giants in the Pleiades?

5. How are giants related to main sequence stars?