Main Sequence Stars

I. Physical Characteristics

1. **Define the term main sequence star.**

Main Sequence Star - star that forms from the nuclear fusion of nebula hydrogen (73%) + helium (25%) (protostar forms when gravity pulls in gas + dust)

2. 90 **% of all known stars are main sequence stars.**

3. **What are the two main characteristics used to classify main sequence stars?**

1. Matter 2. Temperature

4. **List the four main types and examples of main sequence stars.**

1.	Brown Dwarf	Gliese 229B, AB Pictoris
2.	Red Dwarf	Proxima Centauri, Barnard's Star
3.	Low-Mass Star	Sun, Sirius B, Procyon B
4.	High-Mass Star	LBV 1806-20, Pistol Star, Eta Carinae

II. Main Sequence Star Discovery & Classification

1. **How did each of the following advance the understanding of main sequence stars?**

Harvard Classification Scheme: (1901) - Method of categorizing stars

Ejner Hertzsprung: (1906) - Identified the Main Sequence (based on color)

Henry Norris Russell: (1927) - Identified absolute magnitude

Bengt Stromgren: (1933) - Developed the Hertzsprung-Russell Diagram

W.W. Morgan & P.C. Keenan: (1943) - Created O, B, A, F, G, K, M System

2. **Identify the letter classification and star color for each star on the Hertzsprung-Russell Diagram.**

O	Bluish	- Above 31,000 kelvin
B	Blue / White	- 9,750 - 31,000 kelvin
A	White	- 7,100 - 9,750 kelvin
F	Yellow / White	- 5,950 - 7,100 kelvin
G	Yellowish	- 5,250 - 5,950 kelvin
K	Orange	- 3,800 - 5,250 kelvin
M	Reddish	- 2,200 - 3,800 kelvin

III. Main Sequence Star Existence

1. **What stage of stellar evolution do main sequence stars develop?**

Most of a star's existence (Middle stage of evolution)

2. **With regards to stellar evolution, how long do each type of main sequence star exist?**

Low-Mass Star : 200 billion years

Medium-Mass Star : 10 billion years

High-Mass Star : 10 million years

3. **What is the eventual fate of main sequence stars?**

Low-Mass Star : Expands to a Red Giant

High-Mass Star : Expands to a Supergiant

IV. The Sun

1. **The Sun is considered to be a** Medium **-mass main sequence star.**

2. **Match each layer of the Sun with the correct characteristics.**

1. E.	Corona	A. 2,000 km above photosphere; (4,000-20,000 kelvin)
2. A.	Chromosphere	B. Center of the Sun; (15,000,000 kelvin)
3. C.	Photosphere	C. Surface of the Sun; (6,000 kelvin)
4. F.	Convection Zone	D. Individual photon collisions; (2,500,000 kelvin)
5. D.	Radiative Zone	E. Outermost layer of the Sun; (1,000,000 kelvin)
6. B.	Core	F. Hot plasma rises & cold sinks; (2,000,000 kelvin)

3. **Identify characteristics of each of the following phenomenon produced by the Sun.**

1. Sunspots : "Black spots on the Sun" (Cooler areas)
2. Prominence : Reddish loops of gas (magnetic release)
3. Solar Flare : Large, violent eruption of gas/plasma
4. Coronal Mass Ejection : Huge balloon-shaped volumes of electrically-charged gas/plasma