

Astronomy – Interpreting Main Sequence Star Data

The classification of stars by surface temperature and spectral pattern is a painstaking process requiring the efforts of many scientists from hundreds of observatories around the world. To make it easier to refer to the different types of main sequence stars, a series of broad categories of star types was developed. These were named O, B, A, F, G, K, and M.

Seven main sequence star types are listed in the data table below. Use this information, as well as what you have already learned about the evolution of stars, to answer the questions.

Star Type	Colour	Surface Temperature (°C)	Mass (Sun = 1)	Luminosity (Sun = 1)	Lifetime on Main Sequence (Years)
O	Blue	35 000	40	405 000	1 million
B	Blue-white	21 000	15	13 000	11 million
A	White	10 000	3.5	80	440 million
F	Yellow-white	7 500	1.7	6.4	3 billion
G	Yellow	6 000	1.1	1.4	8 billion
K	Orange	4 700	0.8	0.46	17 billion
M	Red	3 300	0.5	0.08	56 billion

Analyze the above data and answer the following questions:

1. How does the color of stars relate to their temperature?
2. How does the mass of stars relate to how long they live?
- 3.a) How would our sun be classified?
b) How long is the life time of our sun?
c) As our sun ages how will it change?
4. Which star type in the table would be considered a dwarf star? Explain your answer.
5. Which star type is most similar to the Sun? Explain your answer.
6. Which star types are likely to become supernovas? How do you know?
7. Which star types are likely to become a black hole? How do you know?
8. Which of the above types of stars might support a planet with life? Explain your answer.
9. Assume all seven stars formed at the same time. If a G type star is half way through its life which of the other stars could still be observed? Explain.