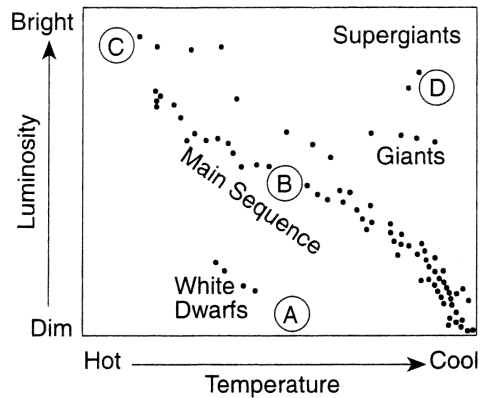


Set 1 — Characteristics of Stars

1. Which star color indicates the hottest star surface temperature?
- (1) blue (3) yellow
 (2) white (4) red 1 _____

2. The graph below represents the brightness and temperature of stars visible from Earth.



Which location on the graph best represents a star with average brightness and temperature?

- (1) A (3) C
 (2) B (4) D 2 _____
3. Compared with our Sun, the star Betelgeuse is
- (1) smaller, hotter, and less luminous
 (2) smaller, cooler, and more luminous
 (3) larger, hotter, and less luminous
 (4) larger, cooler, and more luminous 3 _____

4. Which star is cooler and many times brighter than Earth's Sun?
- (1) Barnard's Star (3) Rigel
 (2) Betelgeuse (4) Sirius 4 _____

5. Which two stars have the most similar luminosity and temperature?
- (1) Betelgeuse and Barnard's Star
 (2) Rigel and Betelgeuse
 (3) Alpha Centauri and the Sun
 (4) Sirius and Procyon B 5 _____

6. Compared to the temperature and luminosity of the star Polaris, the star Sirius is
- (1) hotter and more luminous
 (2) hotter and less luminous
 (3) cooler and more luminous
 (4) cooler and less luminous 6 _____

7. In nuclear fusion what occurs?
- (1) Lighter elements are converted to heavier elements.
 (2) Lighter elements are converted to even lighter elements.
 (3) Heavier elements are converted to lighter elements.
 (4) Heavier elements chemically combine with lighter elements. 7 _____

8. Betelgeuse and Aldebaran are both red-giant stars. Give a statement comparing their luminosity and temperature values.
- _____

9. A star located off the main sequence indicates what?
- _____

Set 2 — Characteristics of Stars

10. Compared to the surface temperature and luminosity of massive stars in the Main Sequence, the smaller stars in the Main Sequence are

- (1) hotter and less luminous
 - (2) hotter and more luminous
 - (3) cooler and less luminous
 - (4) cooler and more luminous
- 10 _____

11. Which star's surface temperature is closest to the temperature at the boundary between Earth's mantle and core?

- (1) Sirius
 - (2) Rigel
 - (3) the Sun
 - (4) Betelgeuse
- 11 _____

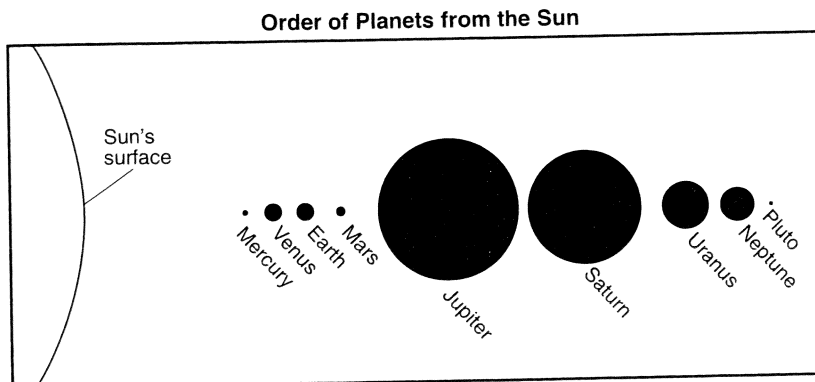
Base your answers to 12 and 13 on the passage below.

The Future of the Sun

Hydrogen gas is the main source of fuel that powers the nuclear reactions that occur in the Sun. But just like many sources of fuel, the hydrogen is in limited supply. As the hydrogen gas is used up, scientists predict that the helium created as an end product of earlier nuclear reactions will begin to fuel new nuclear reactions. When this happens, the Sun is expected to become a red giant star with a radius that would extend out past the orbit of Venus and possibly out as far as Earth's orbit. Earth will probably not survive this change in the Sun's size. But no need to worry at this time. The Sun is not expected to expand to this size for a few billion years.

12. Identify the nuclear reaction referred to in this passage that combines hydrogen gas to form helium and produces most of the Sun's energy.

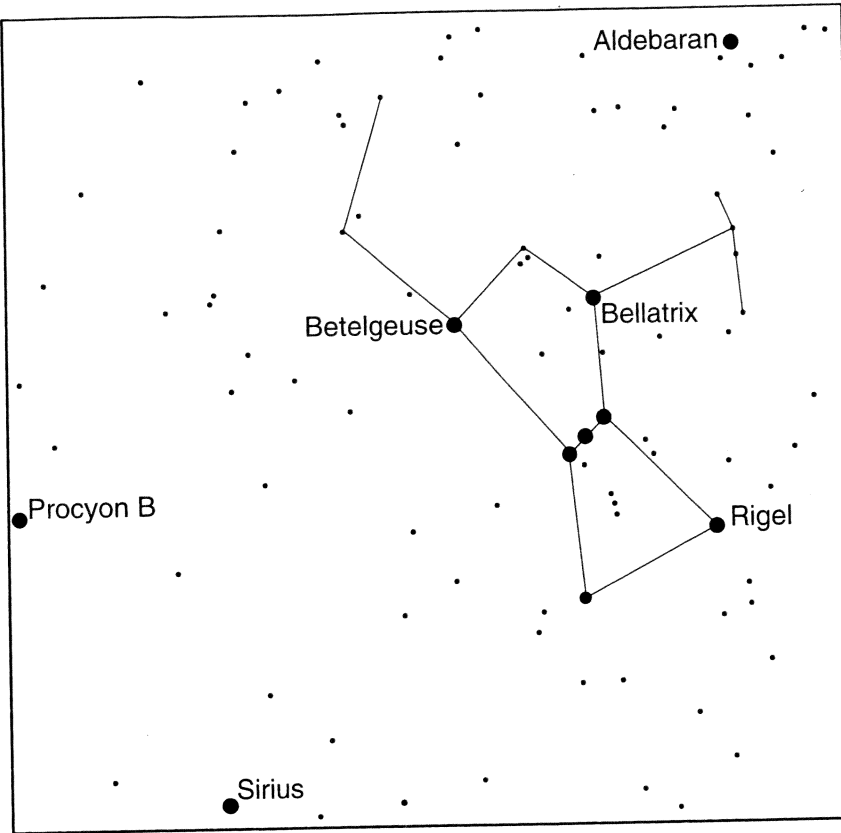
13. On the diagram of the planets and the Sun's surface, draw a vertical line to represent the inferred location of the Sun's surface when it becomes a red giant star.



(Distances are not drawn to scale)

14. Explain why a giant star that is cooler than our Sun, similar to Aldebaran, has a greater luminosity than the Sun.

Base your answers to questions 15a and b on the accompanying star chart, which shows part of the inter sky visible from New York State. Some of the brighter stars are labeled and the constellation is outlined.



1) Identify the color of the star Bellatrix, which has a surface temperature of approximately 21,000 K. _____

2) In the accompanying space, list the stars, other than Bellatrix, found on the chart in order of decreasing luminosity. Rigel, the most luminous star, has been listed.

Most luminous	(1)	Rigel
↓	(2)	_____
	(3)	_____
	(4)	_____
Least luminous	(5)	_____

Give a statement on the relationship between Temperature and Luminosity of the main sequence stars.
