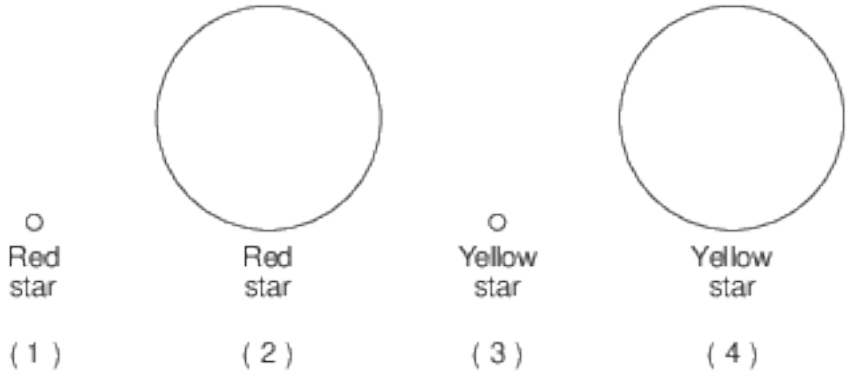
# Characteristics Of Stars

1 The diagram below represents a model of the size of the Sun and indicates the color of the Sun.


Which diagram best represents the relative size and indicates the color of Polaris compared to the Sun?




(1) 1
(2) 2
(3) 3
(4) 4

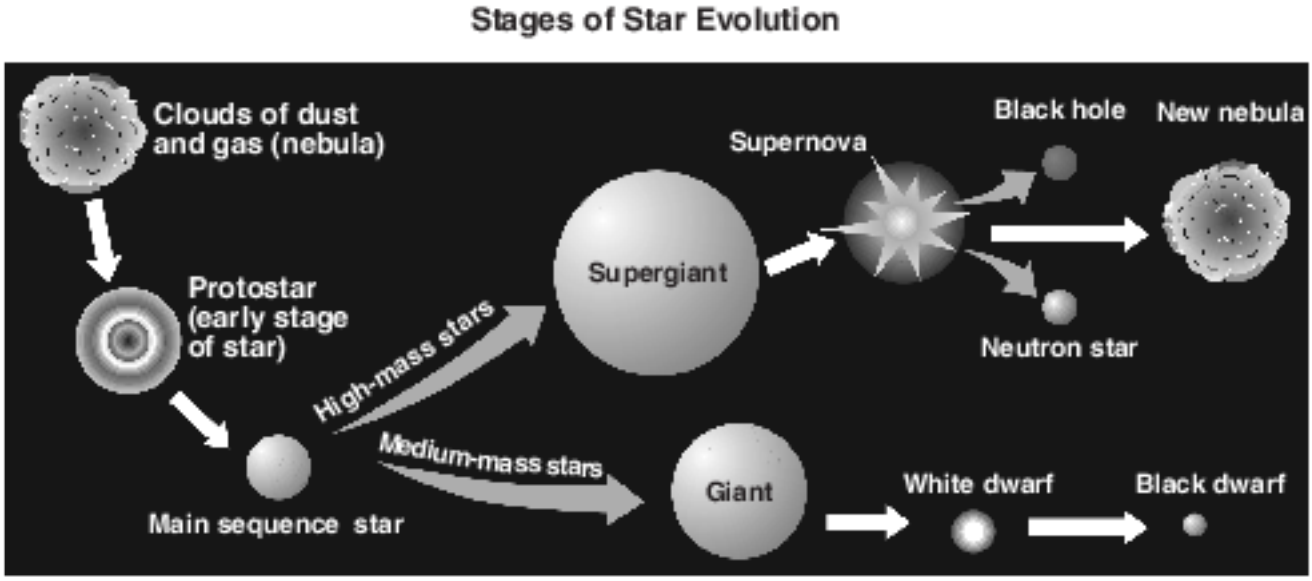
2 The altitude of Polaris measured by an observer at the Tropic of Cancer is
(1) 15°
(2) 23.5°
(3) 66.5°
(4) 90°

3 Compared to the Sun, the star Betelgeuse is
(1) less luminous and warmer
(2) less luminous and cooler
(3) more luminous and warmer
(4) more luminous and cooler

4 The star Vega has an average surface temperature of 10,000 K and has a luminosity 70 times greater than that of the Sun. Which type of star is Vega?
(1) supergiant
(2) giant
(3) white dwarf
(4) main sequence

5 Which star is cooler and less luminous than the Sun?
(1) Proxima Centauri
(2) Pollux
(3) Rigel
(4) 40 Eridani B

Base your answers to questions 6 on the diagram below and on your knowledge of Earth science. The diagram represents two possible sequences in the evolution of stars.




(Not drawn to scale)

6 Which table includes data that are characteristic of the surface temperature and luminosity of some white dwarf stars?

(1)

| | |
|---|---|
| **Surface Temperature** | 5000 K |
| **Luminosity** | 100 |

(2)

| | |
|---|---|
| **Surface Temperature** | 5000 K |
| **Luminosity** | 0.001 |

(3)

| | |
|---|---|
| **Surface Temperature** | 10,000 K |
| **Luminosity** | 100 |

(4)

| | |
|---|---|
| **Surface Temperature** | 10,000 K |
| **Luminosity** | 0.001 |

7 Which characteristics best describe the star Betelgeuse?
(1) reddish orange with low luminosity and high surface temperature
(2) reddish orange with high luminosity and low surface temperature
(3) blue white with low luminosity and low surface temperature
(4) blue white with high luminosity and high surface temperature

8 Which star is more massive than our Sun, but has a lower surface temperature?
(1) 40 Eridani B
(2) Sirius
(3) Aldebaran
(4) Barnard's Star

9 Compared to the luminosity and surface temperature of red main sequence stars, blue supergiants are
(1) less luminous and have a lower surface temperature
(2) less luminous and have a higher surface temperature
(3) more luminous and have a lower surface temperature
(4) more luminous and have a higher surface temperature

10 Astronomers have determined that the star Arcturus has a surface temperature of 4560 K and a luminosity of 170. Based on these characteristics, Arcturus is classified as which type of star?

(1) giant
(2) supergiant
(3) white dwarf
(4) main sequence

11 Which star has a surface temperature most similar to the surface temperature of Alpha Centauri?

(1) Polaris
(2) Betelgeuse
(3) Procyon B
(4) Sirius

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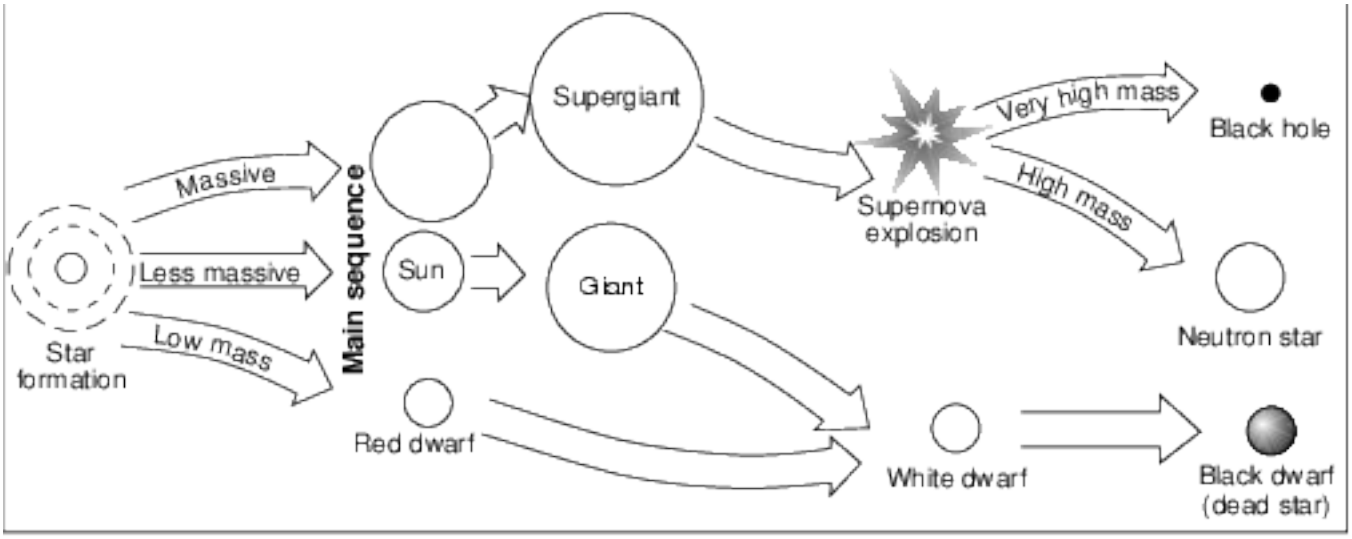
Base your answers to questions 12 on the diagram below and on your knowledge of Earth science. The diagram represents some of the inferred stages in the life cycle of stars according to their original mass.




(Not drawn to scale)

12 Which star may once have been similar to our Sun in mass and luminosity?

(1) Deneb
(2) Spica
(3) Procyon B
(4) Proxima Centauri

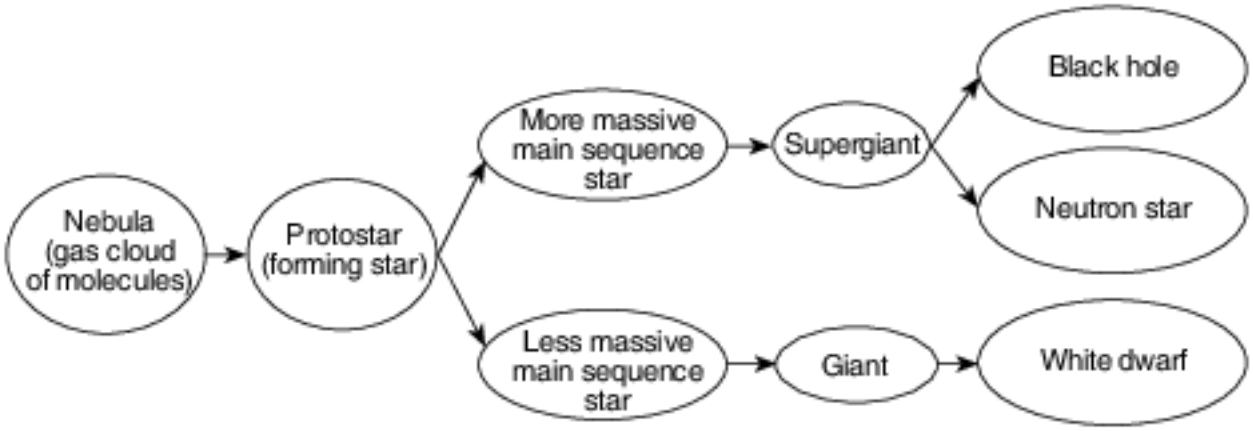
Base your answers to questions 13 on the table below and on your knowledge of Earth science. The table shows the velocities, in kilometers per second (km/s), for several galaxies, represented by letters A, B, C, D, and E, that are moving away from Earth. The vast majority of stars and galaxies in the universe are moving away from our solar system. Scientific evidence indicates that the farther away a galaxy is, the faster it is moving away.

**Velocities of Galaxies Moving Away From Earth**

| Galaxy | Velocity (km/s) |
|---|---|
| A | 61,000 |
| B | 15,000 |
| C | 1200 |
| D | 39,000 |
| E | 22,000 |

13 A star in one of these galaxies has a surface temperature of 8000 K and a luminosity of 10. Identify the stage and color of this star. [1]
Stage: _____
Color: _____

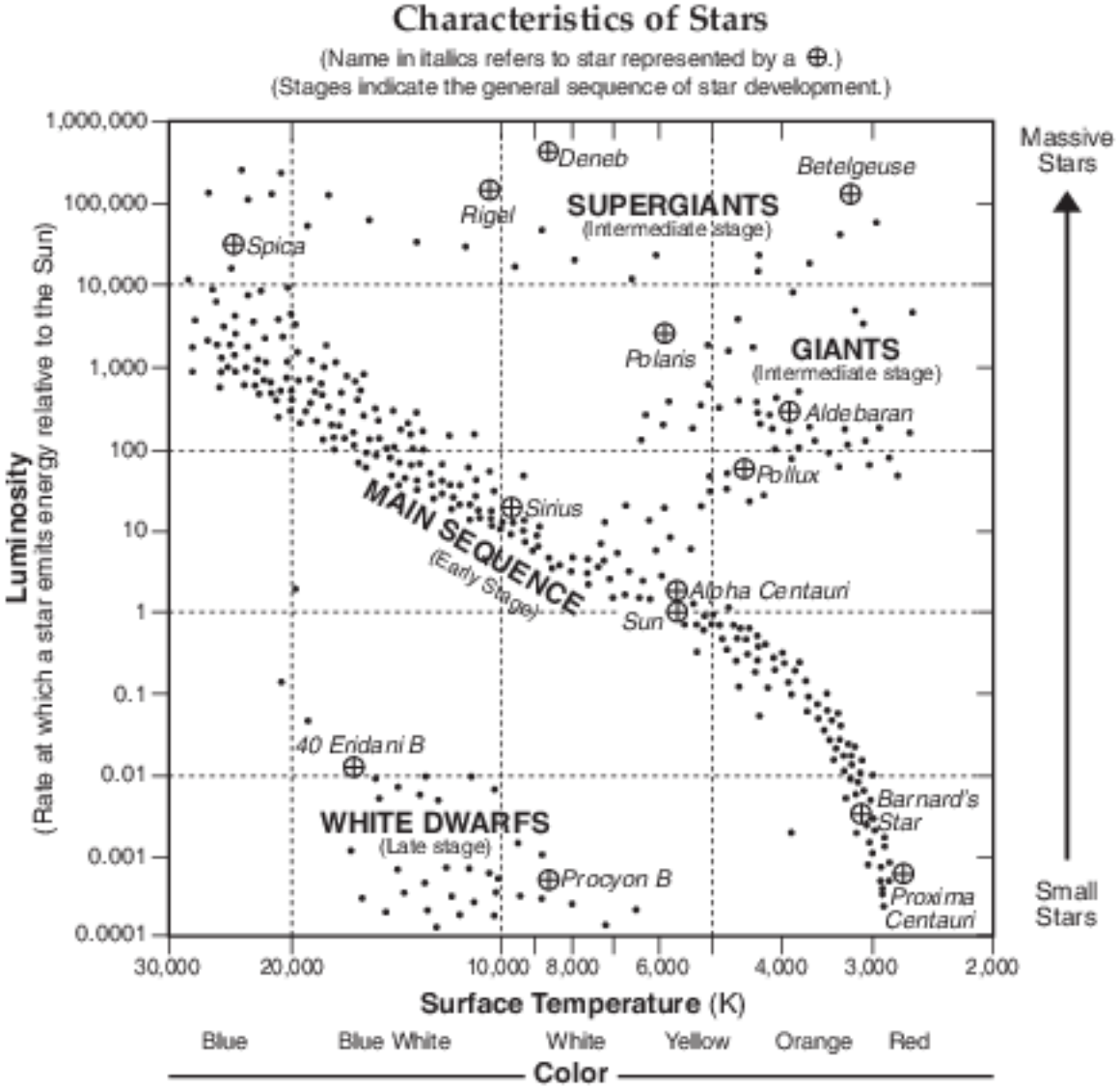
Base your answers to questions 14 on the flowchart below and on your knowledge of Earth science. The flowchart represents possible pathways in the evolution of stars.




14 State the name of one star labeled on the Characteristics of Stars graph in the Earth Science Reference Tables that may become either a black hole or neutron star. [1]

Base your answers to questions 15 on the Characteristics of Stars graph in image provided and on your knowledge of Earth science.

15 The star Canopus has a surface temperature of 7400 K and a luminosity (relative to the Sun) of 1413. In your answer booklet, use an X to plot the position of Canopus on the graph, based on its surface temperature and luminosity. [1]



**Answer Keys**

1 4

2 2

3 4

4 4

5 1

6 4

7 2

8 3

9 4

10 1

11 1

12 3

13 Allow 1 credit if both responses are acceptable.

- Stage: main sequence or early stage
- Color: white

14 Allow 1 credit for Rigel or Deneb or Betelgeuse or Spica or Polaris.

15 Allow 1 credit if the center of the X is placed within or touches the box shown below.

- Note: Allow credit if a symbol other than an X is used.
- It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.
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