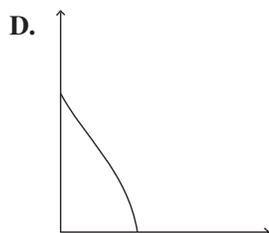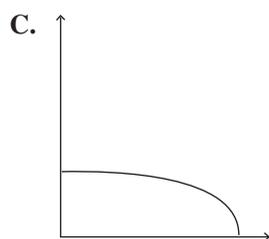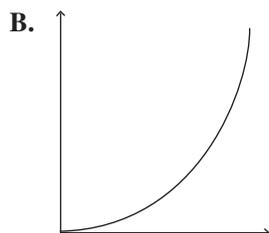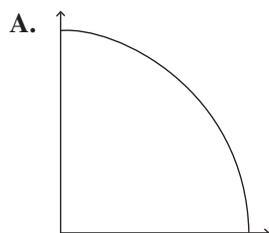# Mini-Test 3

Passage III

Stars begin their lives composed of roughly 70% hydrogen. Nuclear fusion of hydrogen atoms at the cores of stars drives the majority of energy and luminosity. After the majority of hydrogen has been exhausted from the star's core, the star enters into the red giant branch and begins the fusion of hydrogen in the surrounding shell, as well as the fusion of helium in its core. The hydrogen in the surrounding shell is quickly exhausted, as is the helium in the core, and near the end of the star's life, it begins to fuse hydrogen and then helium in its outermost shell until all of it is exhausted. The figure below shows the percentage of hydrogen present in a star over the course of its life cycle.

12. Based on the figure, the percentage of hydrogen in the surrounding shell after 8 billion years will be closest to which of the following:

   F. 30%
   G. 35%
   H. 40%
   J. 45%

13. Based on the figure, at how many billions of years will there be roughly 0% hydrogen remaining in the core?

   A. Between 7 and 8
   B. Between 8 and 9
   C. Between 9 and 10
   D. Between 10 and 11

14. After the fusion of hydrogen is exhausted in the core and fusion of hydrogen begins in the surrounding shell, the fusion of helium begins in the core. Which of the following is most likely true about the percentage of helium in the core as time increases?

   F. The percentage of helium decreases over time.
   G. The percentage of helium increases over time.
   H. The percentage of helium does not change over time.
   J. The percentage of helium over time cannot be determined.

15. A star's core is approximately 28% helium at the beginning of its lifetime. A scientist theorizes that the amount of helium present begins to drop only after the percentage of hydrogen present in the core drops below 20%. According to this theory, which of the following is the best graphical representation of the percentage of helium over time?

A.

B.

C.

D.

16. After 11 billion years, the star will shed nearly all of its mass and become a white dwarf, surviving for billions of years before fading out. Which of the following most likely catalyzes the transition from red giant to white dwarf?

F. The exhaustion of hydrogen in the core
G. The exhaustion of hydrogen and helium in the core
H. The exhaustion of hydrogen in the core and the exhaustion of helium in the shells
J. The exhaustion of hydrogen in the shells and the exhaustion of helium in the shells and core

END OF MINI-TEST THREE
STOP! DO NOT GO ON TO THE NEXT PAGE
UNTIL TOLD TO DO SO.