

Read the passage. Then answer the questions that follow.

Star Clusters

by Maya Sanchez

1 Our star, the Sun, is what astronomers call a field star. It is so far away from other stars that it doesn't really interact with them. Based on our experience with the Sun, it's easy to think all stars are field stars. However, scientists know this isn't true. Stars actually have all kinds of relationships. One type of relationship is called a star cluster.

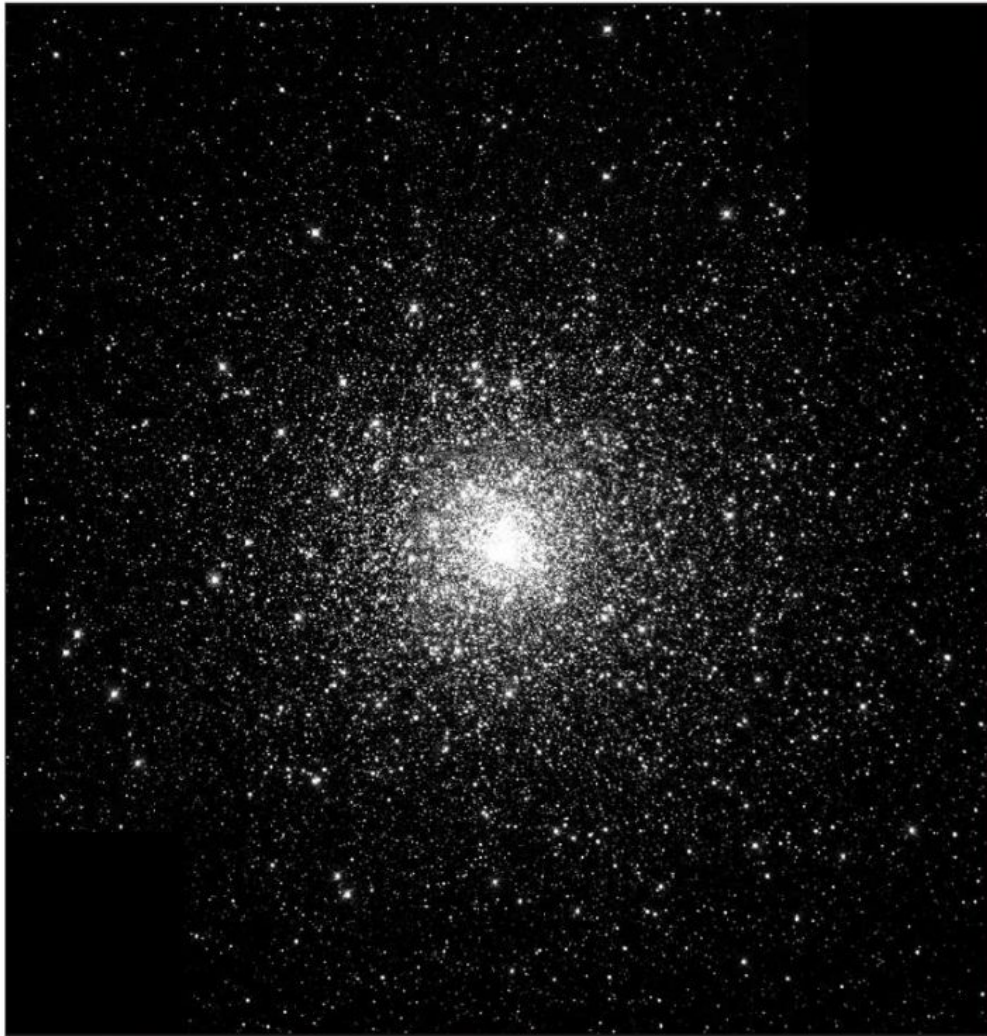
2 A star cluster is a group of stars in a small area. They are so close that their gravity keeps them from drifting away from each other. (Gravity is the invisible pulling force that all objects make. The Earth's gravity holds you on the planet, and the Sun's gravity keeps the solar system together.) As a star cluster moves, its stars move as a group. If you can imagine the stars being connected by invisible rods, then you've got the idea. Astronomers talk about two types of clusters: globular and open. Many globular clusters are as much as a few hundred light years¹ across. Open clusters can be about 50 light years across. This makes them millions of times larger than our solar system. The two types of clusters do not have a lot in common.

3 Globular clusters are spherical (ball-shaped). They hold millions of stars. Most globular clusters are many billions of years old; some of them are nearly as old as the universe. Many of the stars are red giants, which are much larger, cooler, and older than our Sun. You can't find a globular cluster with your own eyes; they are too distant and too dim. Even with a good telescope, most globular clusters look like tiny smudges. Only the most powerful telescopes can get a good look at one of them.

4 Open clusters can be any shape. They have hundreds or thousands of stars, not millions. Compared with globular clusters, open clusters are young—just hundreds of millions of years old, not billions. The brightest stars in open clusters are blue giants, which are much larger, hotter, and younger than our Sun. Finally, some open clusters are close enough to Earth that you can find them with a small telescope. You can even see one with your own eyes. The open cluster called the Pleiades appears in the sky between late fall and early spring.

5 Globular and open clusters are different in many other ways, including how they form, what their stars are made of, and where they appear in the universe. One of the things they do have in common is that studying clusters has helped astronomers better understand the place of our own Sun—that lonely field star—in the vast universe.

¹ **light year:** the distance a beam of light in space can travel in one year. A light year is a measure of distance, not of time.



Globular Cluster M80 contains hundreds of thousands of stars.

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Assessment 1

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This question has two parts. First, answer part A. Then, answer part B.

Part A

Which sentence states two main ideas in "Star Clusters"?

- A** Globular clusters hold millions of stars; open clusters hold hundreds or thousands of stars.
- B** There are two types of star clusters; globular clusters are much older than open clusters.
- C** Globular clusters contain stars called red giants; open clusters contain stars called blue giants.
- D** The open cluster Pleiades can be seen with the naked eye; you need a strong telescope to see globular clusters.

Part B

Which sentence from the article **best** supports the answer to part A?

- A** "Many globular clusters are as much as a few hundred light years across."
- B** "You can't find a globular cluster with your own eyes; they are too distant and too dim."
- C** "Compared with globular clusters, open clusters are young—just hundreds of millions of years old, not billions."
- D** "Globular and open clusters are different in many other ways, including how they form, what their stars are made of, and where they appear in the universe."

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What is the meaning of the word "astronomer" as it is used in the article?

- A** a designer and maker of telescopes
- B** an astronaut who travels to distant solar systems
- C** a writer who creates descriptive names for stars and planets
- D** a scientist who studies stars and other objects in space

- 9** Select the sentence from paragraph 3 that explains why globular clusters can only be seen with a telescope.
- A** "Globular clusters are spherical (ball-shaped)."
 - B** "They hold millions of stars."
 - C** "Most globular clusters are many billions of years old; some of them are nearly as old as the universe."
 - D** "Many of the stars are red giants, which are much larger, cooler, and older than our Sun."
 - E** "You can't find a globular cluster with your own eyes; they are too distant and too dim."
 - F** "Even with a good telescope, most globular clusters look like tiny smudges."

- 10** Look at the photograph on page 7. Which detail about globular clusters does this photograph make clear?
- A** Globular clusters are spherical in shape.
 - B** Globular clusters are made up of billions of stars.
 - C** Globular clusters are extremely old.
 - D** Globular clusters are impossible to see without a good telescope.

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