

# Session 1: Reading Passages

Questions #1–44

Read the passage. Then answer the questions that follow.

## Star Clusters

by Adam Raglan

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 of 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.



a globular 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-years<sup>1</sup> 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.

<sup>1</sup> **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.

**Go On**

- 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

Which sentence from paragraph 2 supports the idea that star clusters are held together by gravity?

- Ⓐ "A star cluster is a group of stars in a small area."
- Ⓑ "As a star cluster moves, its stars move as a group."
- Ⓒ "Open clusters can be about 50 light-years across."
- Ⓓ "The two types of clusters do not have a lot in common."

2

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

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

3

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Underline three sentences in paragraph 3 below that support the idea that globular clusters are very far from Earth.

- 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

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What is the relationship between stars in a cluster?

- Ⓐ The weight of each star makes the stars in the group smaller.
- Ⓑ Each star helps make the other stars become hotter.
- Ⓒ The size of each star makes the group seem closer to Earth.
- Ⓓ Each star influences how other stars in the group move.

**Go On**

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

**Part A**

How does the author support the idea that open clusters are very different from globular clusters?

- Ⓐ He cites quotations from expert scientists.
- Ⓑ He gives the reader a photograph to examine.
- Ⓒ He provides information about both formations.
- Ⓓ He relates evidence that he has seen personally.

**Part B**

Select three sentences that support the claim in Part A.

- Ⓐ "It is so far away from other stars that it doesn't really interact with them."
- Ⓑ "Based on our experience of the Sun, it's easy to think all stars are field stars."
- Ⓒ "Astronomers talk about two types of clusters: globular and open."
- Ⓓ "The two types of clusters do not have a lot in common."
- Ⓔ "They have hundreds or thousands of stars, not millions."
- Ⓕ "Only the most powerful telescopes can get a good look at one of them."

Which detail about globular clusters does the photograph on page 1 make clear?

- Ⓐ Globular clusters are billions of years old.
- Ⓑ Globular clusters contain billions of stars.
- Ⓒ Globular clusters are spherical in shape.
- Ⓓ Globular clusters contain red giants.

**Read the passage. Then answer the questions that follow.**

## **What Is a Spacesuit?**

*by David Hitt*

1           A spacesuit is much more than a set of clothes astronauts wear on spacewalks. A fully equipped spacesuit is really a one-person spacecraft. The formal name for the spacesuit used on the space shuttle and International Space Station is the Extravehicular Mobility Unit, or EMU. "Extravehicular" means outside of the vehicle or spacecraft. "Mobility" means that the astronaut can move around in the suit. The spacesuit protects the astronaut from the dangers of being outside in space.

### **Why Do Astronauts Need Spacesuits?**

2           Spacesuits help astronauts in several ways. Spacewalking astronauts face a wide variety of temperatures. In Earth orbit, conditions can be as cold as minus 250 degrees Fahrenheit. In the sunlight, they can be as hot as 250 degrees. A spacesuit protects astronauts from those extreme temperatures.

3           Spacesuits also supply astronauts with oxygen to breathe while they are in the vacuum of space. They contain water to drink during spacewalks. They protect astronauts from being injured from impacts of small bits of space dust. Space dust may not sound very dangerous, but when even a tiny object is moving many times faster than a bullet, it can cause injury. Spacesuits also protect astronauts from radiation in space. The suits even have visors to protect astronauts' eyes from the bright sunlight.

### **What Are the Parts of a Spacesuit?**

4           The spacesuit consists of several pieces. The Hard Upper Torso covers the astronaut's chest. The arm assembly covers the arms and connects to the gloves. The helmet and Extravehicular Visor Assembly are designed to protect the astronaut's head while still allowing him or her to see as much as possible.

The Lower Torso Assembly covers the astronaut's legs and feet. The flexible parts of the suit are made from several layers of material. The layers perform different functions, from keeping oxygen within the spacesuit to protecting from space dust impacts.

5           Underneath the spacesuit, astronauts wear a Liquid Cooling and Ventilation Garment. Tubes are woven into this tight-fitting piece of clothing that covers the entire body except for the head, hands and feet. Water flows through these tubes to keep the astronaut cool during the spacewalk.

6           On the back of the spacesuit is a backpack called the Primary Life Support Subsystem. This backpack contains the oxygen that astronauts breathe during a spacewalk. It also removes carbon dioxide that astronauts exhale. The backpack also provides electricity for the suit. A fan moves the oxygen through the spacesuit and life support systems, and a water tank holds the cooling water that flows through the Liquid Cooling and Ventilation Garment.

7           Also attached to the back of the suit is a device called the Simplified Aid for Extravehicular Activity Rescue, or SAFER. SAFER has several small thruster jets. If an astronaut became separated from the space station, he or she could use SAFER to fly back.

### **What Other Spacesuits Have Astronauts Worn?**

8           NASA's first spacesuits were developed for the Mercury program. Mercury was the first time NASA astronauts flew into space. These simple suits were based on pressure suits worn by U.S. Navy pilots. Astronauts did not go on spacewalks then. The Mercury suits were worn only inside the spacecraft.

9           NASA's first spacewalks took place during the Gemini program. The suits used for Gemini were more advanced than the Mercury suits. But the Gemini suits were simpler than today's spacesuits. These suits did not contain their own life support. Instead, they connected to life support systems on the Gemini spacecraft with a cord called the umbilical.

- 10            Spacesuits designed for the Apollo program had to do things the first suits did not. These spacesuits had to protect astronauts walking on the moon. Unlike the other suits, the Apollo suits had boots made to walk on a rocky surface. The Apollo suits also contained a life support system, similar to the Portable Life Support Subsystem on the current suit. Having a life support system on the spacesuit allowed the astronauts to explore away from the lunar lander.
- 11            Spacesuits similar to the Apollo suits were used on the Skylab space station. Like the Gemini suits, the Skylab suits connected to life support systems on the spacecraft via an umbilical.

### **What Spacesuits Are Worn Today?**

- 12            In addition to the EMU, NASA astronauts wear other suits today. The Advanced Crew Escape Suit is the orange suit that astronauts wear during launch and landing of the space shuttle. This suit cannot be worn during spacewalks. Sometimes, NASA astronauts will wear the Russian Orlan spacesuit. This suit is the Russian version of the EMU and is used for spacewalks. Another Russian suit is the Sokol. Like the Advanced Crew Escape Suit, the Sokol is designed only to be used inside a spacecraft. It is used on the Russian Soyuz spacecraft.

**15**

Read the following phrase from paragraph 6 of the passage.

“On the back of the spacesuit is a backpack . . .”

Which detail explains why the backpack is important?

- Ⓐ It provides electricity for the spacesuit.
- Ⓑ It contains thruster jets for the spacesuit.
- Ⓒ It stores extra food for the astronaut.
- Ⓓ It protects the astronaut from space dust.

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

**Part A**

What is the meaning of the word injury as it is used in this sentence?

“Space dust may not sound very dangerous, but when even a tiny object is moving many times faster than a bullet, it can cause injury.” (paragraph 3)

- Ⓐ harm
- Ⓑ surprise
- Ⓒ noise
- Ⓓ fear

**Part B**

Underline one word and one phrase from the sentence that help the reader determine the meaning of the word injury.

“Space dust may not sound very dangerous, but when even a tiny object is moving many times faster than a bullet, it can cause injury.”



In paragraph 3, what do the words “the vacuum of space” describe?

- Ⓐ a place with no people
- Ⓑ a place with no heat
- Ⓒ a place with no dust
- Ⓓ a place with no air

Select three reasons why today’s astronauts need spacesuits.

- Ⓐ so they have steady air pressure while inside the spacecraft
- Ⓑ so they are protected from flying bits of dust when in space
- Ⓒ so they can stay connected to the spaceship’s air supply
- Ⓓ so they have special boots for walking on rocky planets
- Ⓔ so they are guarded from dangerous radiation outside the ship
- Ⓕ so they are able to eat and drink together inside a spacecraft
- Ⓖ so they have oxygen to breathe when out in space

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

**Part A**

How are astronauts able to avoid overheating while spacewalking?

- Ⓐ A special subsystem removes the carbon dioxide from their spacesuit.
- Ⓑ Water flows through tubes in a garment worn under their spacesuit.
- Ⓒ Fans in a special device blow cool air on them during the walk.
- Ⓓ Several layers of material allow for good airflow within the spacesuit.

**Part B**

Select the sentence from the passage that supports the answer in Part A.

- Ⓐ "The flexible parts of the suit are made from several layers of material."
- Ⓑ "The layers perform different functions, from keeping oxygen within the spacesuit to protecting from space dust impacts."
- Ⓒ "Tubes are woven into this tight-fitting piece of clothing that covers the entire body except for the head, hands and feet."
- Ⓓ "It also removes carbon dioxide that astronauts exhale."

The table below contains six statements regarding the passage "What Is a Spacesuit?" Four of the statements belong in a summary, but two do not.

Spacesuits have developed over time to meet the needs of different missions in space.	Astronauts need spacesuits to protect them against heat, cold, radiation, space dust, and lack of oxygen.	Dust in space is dangerous because it moves faster than a bullet.
Spacesuits consist of several pieces that include cooling, ventilation, and life support systems.	A Russian suit called the Sokol is used inside spacecrafts such as the <i>Soyuz</i> .	Spacesuits are designed to protect astronauts from dangers in space.

Write the four statements that belong in the summary in the correct order in the graphic below.

<b>First</b>

↓

<b>Second</b>

↓

<b>Third</b>

↓

<b>Fourth</b>

Which detail from the passage tells how spacesuits helped astronauts leave their spacecraft to walk on the moon?

- Ⓐ "These simple suits were based on pressure suits worn by U.S. Navy pilots."
- Ⓑ "The Mercury suits were worn only inside the spacecraft."
- Ⓒ "The Apollo suits also contained a life support system, similar to the Portable Life Support Subsystem on the current suit."
- Ⓓ "The Advanced Crew Escape Suit is the orange suit that astronauts wear during launch and landing of the space shuttle."