# Reading Section

Time: 75 Minutes

45 Questions

**Directions:** This section measures your ability to read and understand written English similar to that which one may expect in a college or university setting. Read each passage and answer the questions based on what is stated or implied in the passage. Circle or mark the correct answer in the book or write it on a separate piece of paper.

## Passage 1

For a time, the Hubble telescope was the brunt of jokes and subject to the wrath of those who believed the U.S. government had spent too much money on space projects that served no valid purpose. The Hubble was sent into orbit with a satellite by the Space Shuttle Discovery in 1990 amid huge hype and expectation. Yet after it was in position, it simply did not work, because the primary mirror was misshapen. It was not until 1993 that the crew of the Shuttle Endeavor arrived like roadside mechanics, opened the hatch that was installed for the purpose, and replaced the defective mirror with a good one.

Suddenly, all that had originally been expected came true. The Hubble telescope was indeed the "window on the universe," as it had originally been dubbed. When you look deep into space, you are actually looking back through time, because even though light travels at 186,000 miles a second, it requires time to get from one place to another. In fact, it is said that in some cases, the Hubble telescope is looking back eleven billion years to see galaxies already forming. The distant galaxies are speeding away from Earth, some traveling at the speed of light.

Hubble has viewed exploding stars such as the Eta Carinae, which clearly displayed clouds of gas and dust billowing outward from its poles at 1.5 million miles an hour. Prior to Hubble, it was visible from traditional telescopes on earth, but its details were not ascertainable. But now, the evidence of the explosion is obvious. The star still burns five million times brighter than the sun and illuminates clouds from the inside.

Hubble has also provided a close look at black holes, which are described as cosmic drains. Gas and dust swirl around the drain and are slowly sucked in by the incredible gravity. It has also looked into an area that looked empty to the naked eye and, within a region the size of a grain of sand, located layer upon layer of galaxies, with each galaxy consisting of billions of stars.

The Hubble telescope was named after Edwin Hubble, a 1920s astronomer who developed a formula that expresses the proportional relationship of distances between clusters of galaxies and the speeds at which they travel. Astronomers use stars known as Cepheid variables to measure distances in space. These stars dim and brighten from time to time, and they are photographed over time and charted. All the discoveries made by Hubble have allowed astronomers to learn more about the formation of early galaxies.

1. The author states that the Hubble was not always popular because

   **A.** people were afraid of what might be found.

   **B.** many people believed space exploration was a waste of time.

   **C.** it was defective for its first three years in space.

   **D.** it was more expensive than most space shuttles.

2. The word *brunt* in the first sentence is closest in meaning to

   **A.** subject.

   **B.** expense.

   **C.** contentment.

   **D.** unhappiness.

3. The word *wrath* in the first sentence is closest in meaning to

   **A.** interest.

   **B.** contentment.

   **C.** fury.

   **D.** pleasure.

4. The author implies that at the time the Hubble was initially deployed from Earth

   **A.** there was little attention paid to it.

   **B.** all attention was focused on the space shuttle, not the Hubble.

   **C.** there was considerable excitement about the potential uses.

   **D.** it was already known that the mirror was defective.

5. The word *misshapen* in the first paragraph is closest in meaning to

   **A.** unusual.

   **B.** useful.

   **C.** expected.

   **D.** distorted.

6. The word *it* in the second sentence of the second paragraph refers to

   **A.** one.

   **B.** space.

   **C.** light.

   **D.** second.

7. The author implies that the satellite that carries the Hubble was specifically designed so that

   **A.** the known defective mirror could be replaced in space rather than on Earth.

   **B.** maintenance could be done by traveling astronauts.

   **C.** the Hubble could move easily.

   **D.** the mirror could contract and expand.

8. The author compares the astronauts of the Endeavor to

   **A.** astronomers.

   **B.** scientists.

   **C.** mechanics.

   **D.** politicians.



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9. The author states that Edward Hubble

   A. developed the Hubble telescope.
   B. was the first person to use the Hubble telescope.
   C. developed a mathematical formula to measure speed and distances between galaxies.
   D. was a politician who sponsored funding in Congress.

10. The word *dubbed* in the second paragraph is closest in meaning to

   A. detracted.
   B. named.
   C. anticipated.
   D. purchased.

11. The author states that

   A. when viewing a distant galaxy through the Hubbell telescope, you are actually looking back in time.
   B. the new mirror distorts the image.
   C. the view from Hubble is not accurate, but it is interesting.
   D. you cannot discern distance or time with any kind of accuracy.

12. According to the passage, a Cepheid variable is

   A. a star.
   B. a Hubble calculation.
   C. the dimming and brightening of a star.
   D. a mirror.

13. The author indicates that the Eta Carinae was previously viewed from other telescopes, but

   A. its details could not be seen.
   B. its speed and distance were not known.
   C. its location was not known.
   D. it had not been named.

14. The word *billowing* in the third paragraph is closest in meaning to

   A. sitting.
   B. pouring.
   C. exploding.
   D. stopping.

15. The author implies that a black hole is analogous to

   A. water draining in a bathtub.
   B. a galaxy.
   C. a group of stars.
   D. a cloud.

## Passage 2

The pain of a migraine headache can virtually disable a person who suffers from it. Millions and millions of people suffer from migraines, although many of them do not even recognize that a migraine is different from a regular headache. A migraine is not at all the same as a normal headache, and it seems to have a very physical cause.

One symptom of a migraine is a precursor, which is a visual aura before an attack. Yet only about a third of patients actually experience that, and it is therefore not a requirement in the diagnosis. Other symptoms include increased pain when a person moves, nausea, and sensitivity to light and sound.

Scientists now believe that migraines are caused, not by abnormal blood vessels as previously believed, but instead by a unique electrical disorder of brain cells. Physicians used to treat migraines with medicine to constrict blood vessels because of the belief that dilated blood vessels were the cause.

The new research has been enhanced by imaging devices that allow scientists to watch patients' brains during an attack. The results show that sufferers have abnormally excitable neurons, or brain nerve cells. Prior to the attack, the neurons suddenly fire off electrical pulses at the back of the brain, which ripple like waves on a lake after a stone hits the water. They ripple across the top and then the back of the brain, ultimately affecting the brain stem where the pain centers are located. The pain then generates possibly from the brain stem itself or from blood vessels inflamed by the rapidly changing blood flow, or perhaps from both.

Scientists have experimented by applying a powerful magnet to stimulate the neurons and discovered that some people's brains react differently than others'. When stimulation was applied to the brains of people who had suffered migraines, they saw the initial aura, and some actually suffered migraines. When the same stimulation was applied to the brains of people who had never suffered migraines, they realized no effect and the neurons showed no change.

Scientists and doctors continue to work on the research in an attempt to find the perfect treatment. It is considered important to treat migraines because it is believed that prolonged untreated attacks could cause physical changes in the brain leading to chronic pain.

**16.** The word *it* in the first sentence refers to

- **A.** pain.
- **B.** migraine.
- **C.** person.
- **D.** suffering.

**17.** The author implies that a migraine

- **A.** is just a strong headache.
- **B.** can be treated with regular aspirin.
- **C.** is caused by the same things that cause a headache.
- **D.** has a specific scientific cause, unlike a headache.

**18.** The author indicates that the precursor to a migraine

- **A.** is a fiction.
- **B.** happens to all migraine sufferers.
- **C.** occurs during or after the attack.
- **D.** is something some sufferers see before an attack.

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**19.** The author implies that in the past scientists had thought migraines were caused by

- **A.** neuron firings.
- **B.** stress.
- **C.** constricted blood vessels.
- **D.** expanded blood vessels.

**20.** The prior treatment for migraines included medicine that

- **A.** eliminated any pain.
- **B.** tightened blood vessels.
- **C.** eliminated the aura.
- **D.** eliminated stress.

**21.** The word *enhanced* in the fourth paragraph is closest in meaning to

- **A.** hindered.
- **B.** augmented.
- **C.** described.
- **D.** studied.

**22.** The new research indicates that the neurons in the brain of migraine sufferers

- **A.** have more electrical charge than those of people who do not suffer migraines.
- **B.** tend to fire in an unusual pattern when a migraine begins.
- **C.** do not react.
- **D.** have no effect on migraines.

**23.** Scientists have recently learned more about the cause of migraines from

- **A.** using imaging devices that allow one to watch the neurons.
- **B.** taking blood tests.
- **C.** giving patients aspirin and watching for results.
- **D.** asking patients to describe the symptoms.

**24.** The author indicates that researchers have determined that

- **A.** neurons fire suddenly and follow a specific pattern when a migraine is coming.
- **B.** magnetic fields in the environment cause migraines.
- **C.** everybody is susceptible to migraines.
- **D.** they know what stimuli cause the neurons to react.

**25.** The author describes the firing of the neurons during a migraine as

- **A.** random.
- **B.** moving in a specific order along the brain towards the brain stem like ripples of water.
- **C.** unrelated to the migraine itself.
- **D.** starting at the brain stem and radiating towards the top of the head.

**26.** According to the passage, what is the significance of an attack reaching the brain stem?

- **A.** It is insignificant.
- **B.** The brain stem is the location of pain centers.
- **C.** The stem is at the bottom of the brain.
- **D.** An attack on the brain stem causes migraines.

**27.** According to the passage, now that scientists know that unusual neurons in certain people are the cause of migraines, they

- **A.** know all they need to know about the cause of migraines.
- **B.** have developed medicine to permanently reverse the neurons' charge.
- **C.** still do not know exactly what causes the pain.
- **D.** know that the defective neurons reside in the brain stem.

**28.** Scientists have caused neurons to react by applying

- **A.** drugs.
- **B.** a magnetic field.
- **C.** electric charges.
- **D.** imaging.

**29.** The best title for this passage would be what?

- **A.** Imaging As a Means of Studying Migraines
- **B.** How Migraines and Headaches are Different
- **C.** New Evidence of How Migraines Are Formed
- **D.** New Treatments for Migraines

**30.** Researchers believe that long-term migraine sufferers

- **A.** are susceptible to illness.
- **B.** can suffer physical changes in the brain and be in chronic pain.
- **C.** are not following instructions about their environment.
- **D.** can take a migraine medicine and avoid problems in the future.



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## Passage 3

Lightning has been a mystery since early times. People of ancient civilizations believed angry gods threw lightning bolts from the sky. Nobody understood that lightning resulted from electricity until Ben Franklin flew a kite with a key dangling from the string, and it was struck by lightning.

In current times, it is known that lightning has a very scientific cause. Generally, within a storm cloud, friction from water and ice-laden clouds creates a negative charge at the bottom of the cloud. When that charge grows too great for the air to hold it back, it is united with a positive charge from the Earth, creating a channel of electricity that flows between the two points. The charge remains invisible as it moves towards the ground until it meets the charge rising from the ground. Once they meet, a fifty thousand degree current superheats the air around the channel, resulting in an explosion of sound known as thunder. In fact, very recently it has been discovered that occasionally the positive charges appear at the bottom of the cloud, which are then met by negative charges from earth.

Florida leads the nation in lightning deaths. Approximately ten people die each year in Florida from lightning, which surpasses the number of deaths caused by the winds of other weather events such as tornados and hurricanes. Lightning is much harder to forecast than a storm. Forecasters can indicate when a storm is likely to produce lightning, but there is no way to know when or where lightning will actually strike. It is known that it can actually strike up to 25 miles from the center of a storm, which occurs when lightning originates under a cloud but travels horizontally for a time before turning towards earth. Thunder is only heard up to ten miles from where lightning strikes, so it is possible to be struck by lightning without even realizing there is a storm in the area.

Generally, people are injured by lightning when they are in the open, near or in water, or near tall structures like trees. Golfers, swimmers, beach-goers, and outdoor workers are in greatest danger. The greatest number of victims are males, but it is believed that this is because males are more likely to be in the places where lightning strikes. When lightning is about to strike, one feels an odd, tingling sensation, and one's hair stands on end. Of course, there is little chance to do anything about it, because the full blow will occur within a second and be over in a couple of seconds. The victim may be thrown, lose consciousness, be burned, die, or suffer permanent injury. Some people recover completely, but others do not.

**31.** According to the passage, the first recorded evidence that lightning came from electricity was discovered by

- **A.** people of ancient civilizations.
- **B.** Ben Franklin.
- **C.** researchers from the 1400s.
- **D.** modern researchers.

**32.** The word *dangling* in the first paragraph is closest in meaning to

- **A.** connected.
- **B.** hanging.
- **C.** tied.
- **D.** sewed into.

**33.** According to the passage, the relationship between the charge in the cloud and that from earth is that

- **A.** they meet each other in the sky.
- **B.** they are the same polarity.
- **C.** the charge from earth travels to the cloud.
- **D.** the charge from the cloud reaches the ground before they meet.

**34.** According to the passage, the primary cause of the charge in the storm cloud is

- **A.** ice build-up.
- **B.** friction.
- **C.** unknown.
- **D.** water.

**35.** The author implies that as the lightning comes towards earth, but before it strikes,

- **A.** it can be seen in the sky.
- **B.** it can turn back.
- **C.** its approach can be felt by someone about to be struck.
- **D.** thunder is heard several miles away.

**36.** The author indicates that thunder is created when

- **A.** the charge from the earth meets the charge from the cloud.
- **B.** lightning strikes the ground.
- **C.** friction occurs in the cloud.
- **D.** lightning leaves the cloud.

**37.** The author indicates that lightning can strike far from the center of a storm when

- **A.** it travels horizontally first.
- **B.** the storm cloud is large.
- **C.** lightning has already emanated from the same cloud.
- **D.** it emanates from a positive charge in the cloud.



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## Passage 4

The strangler fig tree, home to many birds and animals that enjoy the figs as nutrition, is found in the rain forests of Indonesia as well as in a 220,000-acre park known as Gunung Palung National Park on the island of Borneo.

The trees are referred to as *stranglers* because of the way they envelope other trees. Yet, the expression *strangler* is not quite accurate because the fig trees do not actually squeeze the trees on which they piggyback nor do they actually take any nutrients from the host tree. But they may stifle the host tree's growth as the fig tree's roots meet and fuse together, forming rigid rings around the host's trunk and restricting further growth of the supporting tree.

The most interesting aspect of the strangler fig is that it grows from the sky down to the ground. Birds are a major factor in the birth of new fig trees, ingesting the fruit and later dropping the seeds contained in them. Most seeds that are dropped to the ground do nothing, but those that drop into a moist mulch of decayed leaves and mosses that have collected in branches of trees have a chance of survival. They are more likely to receive some sunlight than those that drop all the way to the ground.

After the seeds of the fig trees germinate high in the canopy, their roots descend to form a menacing vise around the trees that support them. Eventually the host tree may begin to die, but it may take many years. Some types of fig trees put down roots so thick that they completely surround the host. In that case, all that is left is a moss-covered scaffold of fig roots.

**38.** According to the passage, fig trees are referred to as *stranglers* because they

- **A.** are unknown.
- **B.** are unusual.
- **C.** wrap themselves around other trees.
- **D.** kill wildlife.

**39.** The author implies that the term *strangler* is not accurate because

- **A.** while the fig trees may damage the host tree, they do not actually squeeze it.
- **B.** the host tree actually strangles the fig.
- **C.** the fig tree does not harm animals.
- **D.** the fig tree provides nutrition to the host tree.

**40.** The word *stifle* in the second paragraph is closest in meaning to

- **A.** assist.
- **B.** nourish.
- **C.** suffocate.
- **D.** live on.

**41.** The author indicates that the fig trees

- **A.** grow from seeds dropped to the ground.
- **B.** grow from the top of a tree down to the ground.
- **C.** grow from the ground up.
- **D.** receive nutrients from the host tree.