Student Name: _____ Date: ____ / ____ / _2022__ Score:_____
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Reading Explorer 4: Unit 12 Lesson A

DIRECTIONS: Choose the best answer for each question.

Planet Hunters

[A] It took humans thousands of years to explore our own planet, and centuries to comprehend our neighboring planets. Nowadays, though, new worlds are being discovered every week.

[B] To date, astronomers have identified more than 3,900 "exoplanets" - worlds orbiting[1] stars other than the sun. There's a "hot Saturn" 260 light-years from Earth that orbits its parent star so rapidly that a year there lasts less than three days. Circling another star 150 light-years out is a "hot Jupiter," whose upper atmosphere is being blown away by the star's solar winds. Astronomers have also found five planets orbiting a pulsar - the remains of a once mighty star shrunk into an atomic city-size nucleus[2] that spins. Some worlds have fallen into their suns. Others have been thrown out of their systems to become "floaters" that wander in eternal darkness.

[C] Among all these, astronomers are eager to find a hint of the familiar: planets that resemble Earth. That is, they are looking for planets that orbit their stars at just the right distance - neither too hot nor too cold - to support life. However, we have not yet found planets that are quite like our own. To see a planet as small and dim as ours amid the glare of its star is like trying to see a firefly in a fireworks display. Yet by pushing technology to the limits, astronomers are rapidly approaching the day when they can find another Earth.

In Search of Other Earths

[D] The most direct approach to finding a planet is to take a picture of it with a telescope. Astronomers have detected more than half of the confirmed exoplanets this way. All of them are big and bright and conveniently far away from their stars.

[E] A more effective way to detect an exoplanet, though, is to use a method known as the Doppler technique. This involves analyzing starlight for evidence that the star's movement is affected by the gravitational pull of a planet. In recent years, astronomers have refined the technique. They can now tell when a planet is pulling its star by only one meter a second - about human walking speed. That's enough to detect a giant planet in a big orbit, or a small planet if it's close to its star.

[F] Another approach is to watch a star for a slight dip in its brightness. This occurs when an orbiting planet passes in front of the star and blocks part of its light. At most, a tenth of all planetary systems are oriented so that these mini-eclipses[3] - called transits - are visible from Earth. So, astronomers have to monitor a lot of stars to capture just a few transits.

[G] The dream of astronomers is to discover a rocky planet roughly the size of Earth orbiting in a habitable zone - that is, not so close to a star that the planet's water has boiled away, but not so far out that it has frozen into ice. If they succeed, they will have found what biologists believe could be a promising abode[4] for life.

[H] The best places to look may be dwarf stars, which are smaller than the sun. Dwarf stars are plentiful; seven of the ten stars nearest to Earth are dwarf stars. They also provide a steady supply of sunlight to any life-bearing planets within their habitable zone.

[I] Additionally, dwarf stars are dim, so the habitable zone lies closer in. If the planet is closer to the star, it's easier for astronomers to detect a transit observation. A close-in planet also has a stronger pull on its star. That makes it easier to detect with the Doppler method. Indeed, one of the most promising planets yet found - the "super Earth" Gliese 581 d - orbits in the habitable zone of a red dwarf star only one-third the mass of the sun.

Life - But Not as We Know It?

[J] If an Earth-like planet is found within a star's habitable zone, a space telescope could be used to look for signs of life. Most likely, scientists will examine the light coming from the planet for possible indications of past or present life, such as atmospheric methane and oxygen. They might also look for the "red edge" produced when chlorophyll[5]-containing plants reflect red light.

[K] Directly detecting and analyzing the planet's own light will not be easy. Its light might be just one ten-billionth the light of the star's. But when a planet transits, starlight shining through the atmosphere could reveal clues to its composition that a space telescope might be able to detect.

[L] The challenge facing scientists is not just having to perform a chemical analysis of planets they cannot see. They must also keep in mind that life there may be very different from life here at home. The lack of the red edge from an exoplanet, for instance, does not exclude the possibility of life. Life thrived on Earth for billions of years before land plants appeared and populated the continents.

[M] The problem is that biological evolution is very unpredictable. It is possible that life originated on an Earth-like planet at the same time it did here. But life on that planet today would almost certainly be very different. As the biologist Jacques Monod once commented, life evolves not only through necessity, but also through chance - the unpredictable intervention of countless accidents.

[N] Chance has played a role many times in our own planet's history. The most dramatic examples are the mass extinctions that wiped out millions of species and created room for new life forms to evolve. Some of these accidents appear to have been caused by asteroids[6] or comets[7] colliding with Earth. An impact 66 million years ago, for instance, helped kill off the dinosaurs and opened up opportunities for the distant ancestors of human beings. Hence, scientists look not just for exoplanets identical to modern Earth, but for planets resembling the Earth as it used to be, or that it might have been.

[O] It was not easy for earlier pioneers to undertake explorations of the ocean floors, map the far side of the moon, or find evidence of oceans beneath the frozen surfaces of Jupiter's moons. Neither will it be easy to find life on the planets of other stars. But we now have reason to believe that billions of such planets exist. They hold the promise of expanding not only the scope of human knowledge, but also the richness of the human imagination.

[1] If a planet **orbits** a star, it circles or goes around it.
[2] The **nucleus** is the central part of an atom or cell.

[3] An eclipse occurs when the light from an object in the sky cannot be seen because another object has come between it and the observer.
[4] An **abode** is another word for *home*.
[5] **Chlorophyll** is the green substance in plants that enables them to convert sunlight into energy.
[6] An **asteroid** is a large rock moving through outer space.
[7] A **comet** is a bright, icy object that travels around the sun and has a long "tail" of gas.

____ 1. Where would the following sentence be best placed?

Throughout most of history, planets beyond our solar system existed only in theory and science fiction.

a. before the second sentence of paragraph A
b. after the second sentence of paragraph A
c. before the first sentence of paragraph B
d. after the first sentence of paragraph B

____ 2. At the time the passage was written, astronomers had discovered more than 3,900 ____.
a. exoplanets
b. suns
c. pulsars
d. floaters

____ 3. How long does a year last on the exoplanet "hot Saturn"?
a. 24 hours
b. 3 days
c. 365 days
d. 260 years

____ 4. In paragraph C, what does the author mean by *To see a planet as small and dim as ours amid the glare of its star is like trying to see a firefly in a fireworks display*?
a. Stars are very small.
b. Stars can look like fireflies.
c. Stars are difficult to spot.
d. Stars appear small to us but are actually huge.

____ 5. In paragraph F, what can we infer about recording transits?
a. The use of this method is very expensive.
b. Astronomers do not like recording transits.
c. This approach requires a lot of time and patience.
d. This method of recording transits is the most effective.

____ 6. What is NOT mentioned as a method of detecting exoplanets?
a. taking a picture with a telescope
b. analyzing starlight
c. monitoring stars to capture transits
d. observing known dwarf planets

____ 7. Why does the habitable zone of a dwarf star lie closer in?
a. Because there are so many dwarf stars.
b. Because rocky planets around dwarf stars tend to be smaller.
c. Because dwarf stars are dim.
d. Because dwarf stars exert a stronger gravitational pull.

____ 8. According to Jacques Monod, why does life evolve?
   a. Because it is predestined by fate.
   b. Because it is a result of predictable processes.
   c. Because it happens in response to crisis.
   d. Because it is necessary but also accidental.

____ 9. According to paragraph N, why did the dinosaurs go extinct?
   a. A volcanic eruption wiped them out.
   b. A large object collided into Earth.
   c. There were more predators than prey.
   d. They died of starvation during the Ice Age.

____ 10. In the last sentence of paragraph O, what does *They* refer to?
   a. exoplanets
   b. pioneers
   c. other stars
   d. humans

DIRECTIONS: Complete the sentences using the words in the box.

atmosphere	atomic	exclude	hence	spin

11. Astronauts need to use oxygen tanks to breathe when they leave the Earth's _____.

12. There's something wrong with my bicycle; the wheels seem to be jammed, and can't _____ when I pedal.

13. When writing a report, remember to be concise and _____ irrelevant information.

14. Scientists are researching ways to make _____ energy cheaper and safer.

15. The fog around the airport was too thick, _____ all flights had to be delayed till it cleared.

DIRECTIONS: Read each sentence, paying attention to the underlined words. Decide if the use of the word in each sentence makes the statement True (T) or False (F).

____ 16. The composition of something is what it is made up of.

____ 17. If two things resemble each other, they don't look anything alike.

____ 18. If a task is part of your job scope, you are expected to do it.

____ 19. To date means up until the present time.

____ 20. A thriving business is not doing very w