tpo_16_passage_2

Note: The following text indicates that Pluto is a planet. It was written before the matter of Pluto being defined as a planet became unsettled in the scientific community. The associated questions are answerable based on the content in the text. The Sun is the hub of a huge rotating system consisting of nine planets, their satellites, and numerous small bodies, including asteroids, comets, and meteoroids. An estimated 99.85 percent of the mass of our solar system is contained within the Sun, while the planets collectively make up most of the remaining 0.15 percent. The planets, in order of their distance from the Sun, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Under the control of the Sun's gravitational force, each planet maintains an elliptical orbit and all of them travel in the same direction. The planets in our solar system fall into two groups: the terrestrial (Earth-like) planets (Mercury, Venus, Earth, and Mars) and the Jovian (Jupiter-like) planets (Jupiter, Saturn, Uranus, and Neptune). Pluto is not included in either category, because its great distance from Earth and its small size make this planet's true nature a mystery.The most obvious difference between the terrestrial and the Jovian planets is their size. The largest terrestrial planet, Earth has a diameter only one quarter as great as the diameter of the smallest Jovian planet, Neptune, and its mass is only one seventeenth as great. Hence, the Jovian planets are often called giants. Also, because of their relative locations, the four Jovian planets are known as the outer planets, while the terrestrial planets are known as the inner planets. There appears to be a correlation between the positions of these planets and their sizes. Other dimensions along which the two groups differ markedly are density and composition. The densities of the terrestrial planets average about 5 times the density of water, whereas the Jovian planets have densities that average only 1.5 times the density of water. One of the outer planets, Saturn, has a density of only 0.7 that of water, which means that Saturn would float in water. Variations in the composition of the planets are largely responsible for the density differences. The substances that make up both groups of planets are divided into three groups-gases, rocks, and ices-based on their melting points. The terrestrial planets are mostly rocks: dense rocky and metallic material, with minor amounts of gases. The Jovian planets, on the other hand, contain a large percentage of the gases hydrogen and helium, with varying amounts of ices: mostly water, ammonia, and methane ices. The Jovian planets have very thick atmospheres consisting of varying amounts of hydrogen, helium, methane, and ammonia. By comparison, the terrestrial planets have meager atmospheres at best. A planet's ability to retain an atmosphere depends on its temperature and mass. Simply stated, a gas molecule can "evaporate" from a planet if it reaches a speed known as the escape velocity. For Earth, this velocity is 11 kilometers per second. Any material, including a rocket, must reach this speed before it can leave Earth and go into space. The Jovian planets, because of their greater masses and thus higher surface gravities, have higher escape velocities (21–60 kilometers per second) than the terrestrial planets. Consequently, it is more difficult for gases to "evaporate" from them. Also, because the molecular motion of a gas depends on temperature, at the low temperatures of the Jovian planets even the lightest gases are unlikely to acquire the speed needed to escape.On the other hand, a comparatively warm body with a small surface gravity, like Earth's moon, is unable to hold even the heaviest gas and thus lacks an atmosphere. The slightly larger terrestrial planets Earth, Venus, and Mars retain some heavy gases like carbon dioxide, but even their atmospheres make up only an infinitesimally small

portion of their total mass. The orderly nature of our solar system leads most astronomers to conclude that the planets formed at essentially the same time and from the same material as the Sun. It is hypothesized that the primordial cloud of dust and gas from which all the planets are thought to have condensed had a composition somewhat similar to that of Jupiter. However, unlike Jupiter, the terrestrial planets today are nearly void of light gases and ices. The explanation may be that the terrestrial planets were once much larger and richer in these materials but eventually lost them because of these bodies' relative closeness to the Sun, which meant that their temperatures were relatively high.

question 1

According to the passage, each of the following statements comparing terrestrial planets with Jovian planets is true EXCEPT:

A Terrestrial planets are closer to the Sun than Jovian planets.

B Terrestrial planets have smaller diameters than Jovian planets.

C Terrestrial planets have smaller masses than Jovian planets.

D Terrestrial planets travel in a different direction than Jovian planets do.

question 2

Paragraph 4 mentions which of the following as a reason why terrestrial planets are dense?

A They are made up of three groups of substances.

B They are composed mainly of rocky and metallic materials.

C They contain more ice than Jovian planets.

D They contain relatively small amounts of water.

question 3

Paragraph 4 supports each of the following statements about Saturn EXCEPT:

A It is less dense than any of the terrestrial planets.

B It contains no rocky material.

C It contains ices.

D It contains a large percentage of gases.

question 4

According to paragraph 5, which of the following statements is true of both Jovian and terrestrial planets?

A The thicker the atmosphere, the smaller the planet' s mass

B The more varied the gases in the atmosphere, the higher the temperature

C The higher the surface gravity, the higher the escape velocity

D The less the atmosphere contributes to the total mass, the lower the temperature

question 5

According to paragraph 5, what is a major reason that Jovian planets have much thicker atmospheres than terrestrial planets do?

A Jovian planets have lower surface gravities.

B Jovian planets have lower temperatures.

C Jovian planets have lower escape velocities.

D Jovian planets' gas molecules have higher average speeds.

question 6

Paragraph 5 supports which of the following statements about the ability of planets to retain gases?

A More-massive planets are less able to retain gases than less-massive ones.

B Planets are more likely to retain heavy gases than light gases.

C Jovian planets are unlikely to retain the lightest gases.

D Only terrestrial planets have been able to retain carbon dioxide.

question 7

In calling the cloud of gas and dust from which the Sun and all the planets are thought to have condensed "primordial" the author means that the cloud was

A immense in size

B composed of similar particles

C present at the very beginning of our solar system’ s formation

D created from a great variety of different materials

question 8

According to paragraph 6, what is a possible explanation for the lack of light gases and ices on terrestrial planets?

A The location of terrestrial planets caused them to lose some of the materials they once contained.

B Terrestrial planets were formed much later than Jovian planets.

C The composition of terrestrial planets was different from that of Jupiter.

D Terrestrial planets were formed out of different material than the Sun was.

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

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question 10

Directions: From the seven answer choices below, select the two phrases that correctly characterize the terrestrial planets and the three phrases that correctly characterize the Jovian planets. Drag each phrase you select into the appropriate column of the table. Two of the phrases will NOT be used. This question is worth 3 points.

A. Have relatively small sizes

B. Are grouped in the same category as Pluto

C. Contain relatively high proportions of ices

D. Have relatively high temperatures

E. Have densities that are generally lower than the density of water

F. Have relatively high escape velocities

G. Have a composition closer to that of the cloud from which they condensed