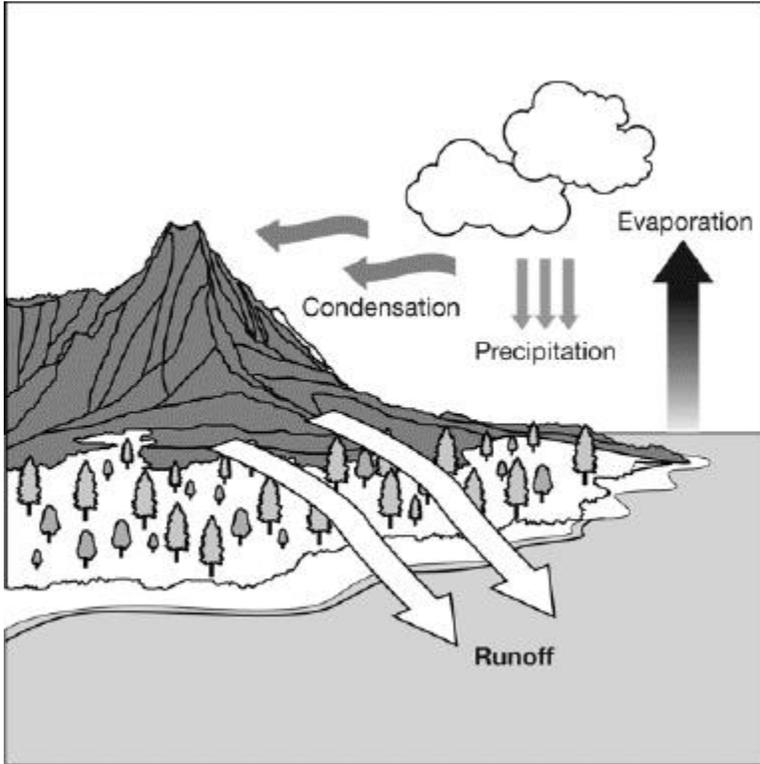


1. Several Earth's spheres can interact together at any given time. Study the diagram below, which shows interactions among Earth's spheres.



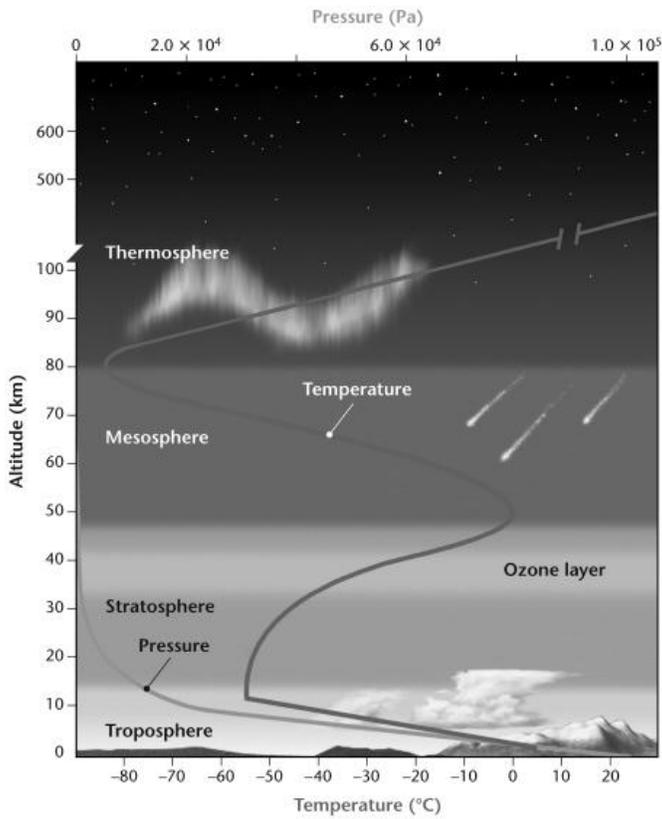
The arrows in the diagram represent interactions among which spheres?

- A) hydrosphere, cryosphere, and geosphere
- B) atmosphere, cryosphere, and geosphere
- C) ecosphere, geosphere, and atmosphere
- D) hydrosphere, geosphere, and atmosphere

2. Earth's spheres interact in many ways. What is one way that the cryosphere and biosphere interact?

- A) A volcanic eruption destroys the plants on an island.
- B) A melting glacier provides fresh water for plants and animals in the valley below the glacier.
- C) Heavy rains bring an end to a dry period on the African savannah.
- D) A glacier picks up rock and sediment as it moves down a valley.

3. The layers of Earth's atmosphere perform specific functions. Study the illustration below, which shows the layers of the atmosphere.



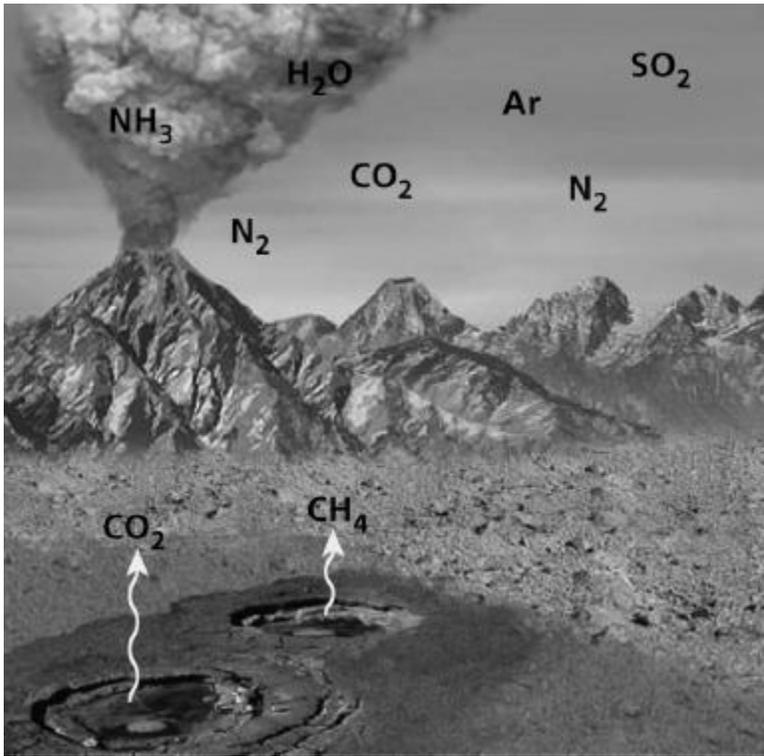
Which layer of the atmosphere absorbs solar radiation that would be harmful to certain elements of the biosphere?

- A) mesosphere
- B) thermosphere
- C) stratosphere
- D) troposphere

4. Water evaporates from a lake into the air, forming clouds. The clouds eventually form rain and it falls to the ground. In which spheres does this cycle happen?

- A) thermosphere and atmosphere
- B) hydrosphere and atmosphere
- C) geosphere and cryosphere
- D) cryosphere and hydrosphere

5. Look at the illustration below. The volcanic eruption is sending out clouds of dust and ash. An interaction between which two spheres is being demonstrated?



- A) geosphere and atmosphere
- B) atmosphere and hydrosphere
- C) cryosphere and biosphere
- D) biosphere and geosphere

6. Earth's spheres interact in many ways. Which describes how the hydrosphere and atmosphere interact?

- A) Magma erupts and releases trapped gases.
- B) Polluted air kills several animal species.
- C) A heavy snowfall adds mass to a glacier.
- D) Ocean currents influence weather patterns.

7. Which of the following makes up the cryosphere?

- A) ice
- B) air
- C) rocks
- D) plants

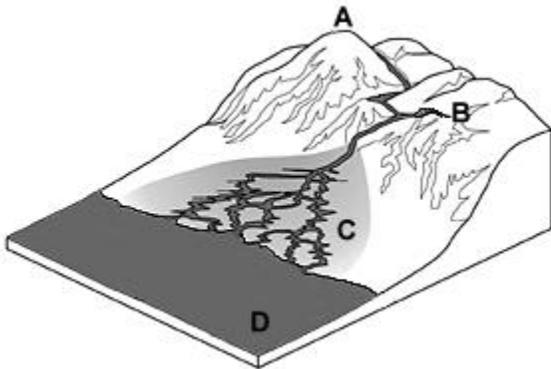
8. Certain rocks contain minerals that are easily dissolved by water. This is why rain, especially acid rain, can break down rock. Of what process in the rock cycle is this an example?

- A) chemical weathering
- B) mechanical weathering
- C) metamorphism
- D) pollution

9. The formation of igneous rock is a multistep process. Which series lists the steps in the process of igneous rock formation?

- A) melting, cooling, crystallization
- B) weathering, erosion, deposition
- C) heat, pressure, uplift
- D) burial, compaction, cementation

10. The illustration shows a river flowing into the ocean.



Where would the **most** deposition of sediment take place?

- A) at sea, far from the ocean shore
- B) along a tributary of the river
- C) near the top of the mountain
- D) at the mouth of the river

11. Imagine a metamorphic rock that has been subjected to intense heat and pressure. Over time, it gets pulled underground as part of a tectonic plate that is sinking beneath another plate along a convergent boundary. The rock melts as it goes deeper; then the molten rock rises up and seeps out of a crack in the ocean floor and hardens. What type of rock is it now?

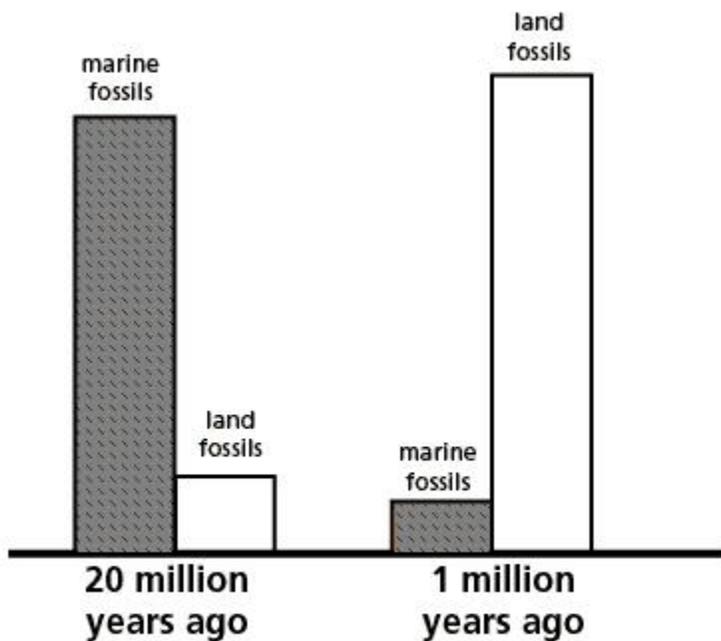
- A) sedimentary
- B) clastic
- C) igneous
- D) metamorphic

12. Weathering and erosion both act on the surface of Earth. In what way is weathering similar to erosion?

- A) They both move materials long distances.
- B) Neither changes Earth's surface quickly.
- C) Wind and water are agents of both.
- D) Both are usually caused by freezing water.

13. Jacob learned that many fossils have been found in the Peace River in Florida. He does some additional research, and finds out that both land and marine fossils have been found there. The bar graph below shows the ratio of marine fossils to land fossils dating from 20 million years ago, and the ratio of marine fossils to land fossils dating from 1 million years ago.

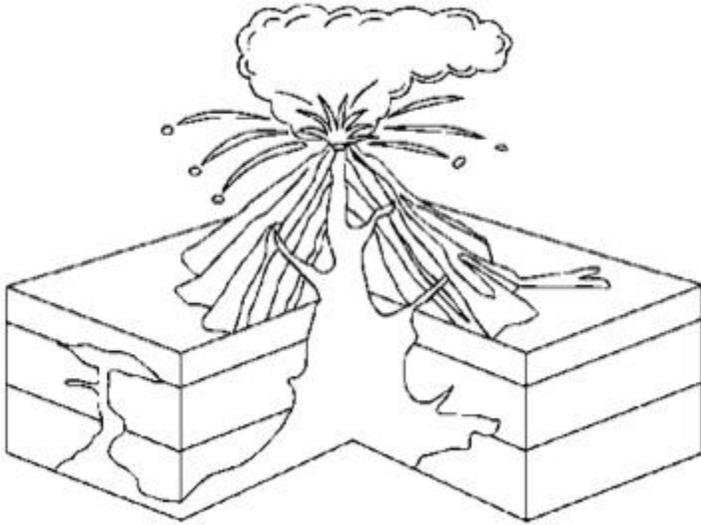
FOSSILS FROM PEACE RIVER, FLORIDA



Based on the graphs above, what conclusion can you make about the Peace River?

- A) Twenty million years ago, land animals lived on islands in Peace River.
- B) Earthquakes have disturbed the layers of fossils in the Peace River.
- C) Over time, the number of land animals in the Peace River area increased as they preyed on marine animals.
- D) The area where Peace River now flows was part of a seafloor 20 million years ago.

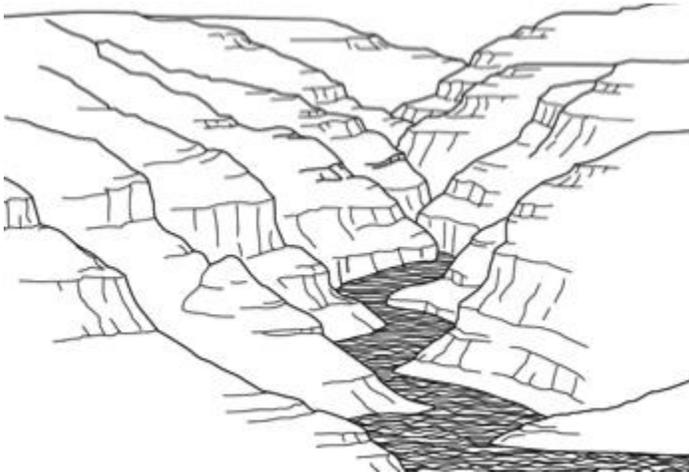
14. The diagram below shows a volcanic eruption.



How does this natural process change Earth over time?

- A) The eruption causes erosion of Earth's surface.
- B) The lava hardens to become new rock on Earth's surface.
- C) The eruption causes faults in Earth's crust.
- D) The dust forms a permanent cloud over the area surrounding the volcano.

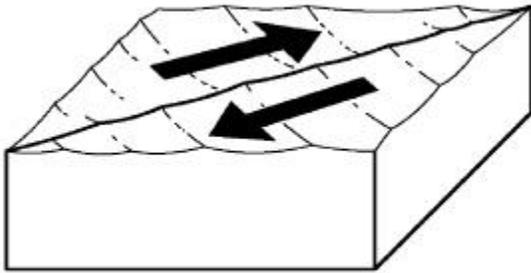
15. The picture below shows a river flowing through a canyon.



What can you infer about how the canyon looked a thousand years ago?

- A) The canyon looked exactly like it does today.
- B) The canyon was much deeper than it is today.
- C) The canyon was not as deep as it is today.
- D) The canyon was just as deep but had no water.

16. This rectangular solid represents a portion of Earth's lithosphere where two tectonic plates meet. The arrows show the direction that each plate moves on either side of the boundary.



What type of plate boundary is represented by the illustration?

- A) transform
- B) divergent
- C) convergent
- D) normal

17. The concept of continental drift was developed by Alfred Wegener. Which statement represents the main idea of his hypothesis?

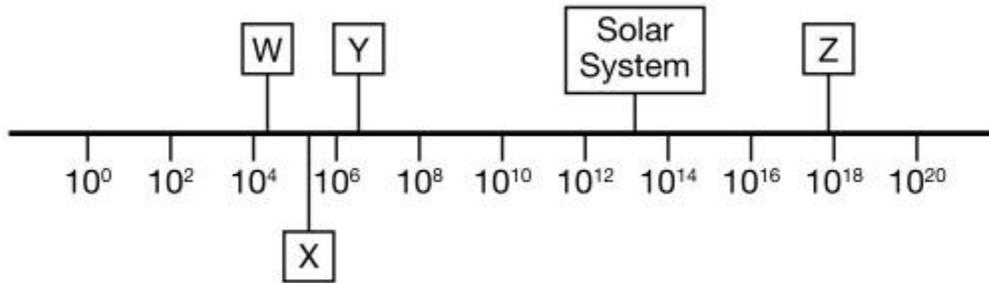
- A) Earth contracted as it cooled, causing the continents to move and change shape.
- B) All of Earth's continents were once a single supercontinent, which then broke up and drifted to their present locations.
- C) Large earthquakes caused displacement that made the continents drift to their present locations.
- D) Earth's surface is composed of tectonic plates that move slowly and continuously in relation to one another.

18. Objects in outer space include planets, stars, and galaxies. Which of the following objects is farthest from Earth?

- A) Sun
- B) North Star
- C) Andromeda Galaxy
- D) Neptune

19. The points labeled on the chart below represent the approximate sizes of Jupiter, Earth, the Milky Way, and the sun. The approximate size of the solar system is given.

SIZES OF ASTRONOMICAL OBJECTS (km)



Which point on the chart **best** represents the size of the Earth?

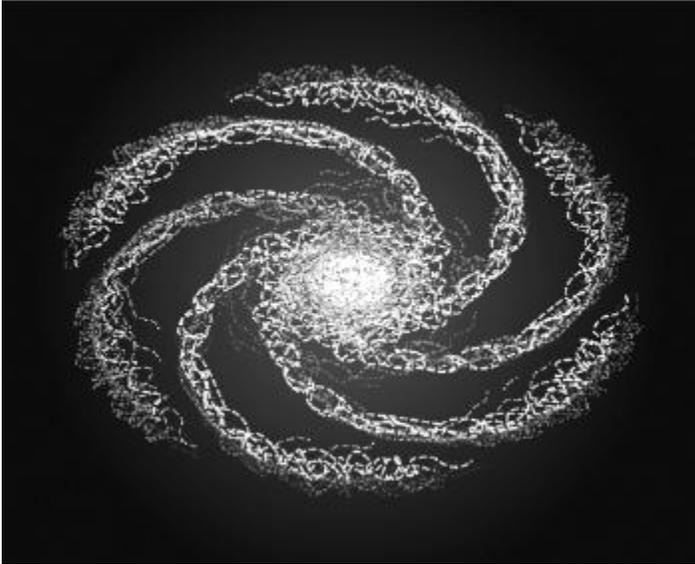
- A) point Y
- B) point X
- C) point W
- D) point Z

20. Planets, stars, and galaxies are composed of different forms of matter. What material makes up the planets in our solar system?

- A) heavy metals created in the Big Bang
- B) material captured from a passing galaxy about 10 billion years ago

- C) debris from previous stars which had exploded
- D) material that shot out of the Sun about 10 billion years ago

21. Planets, stars, and galaxies are made of different forms of matter. Which of the following **best** describes the composition of the Milky Way?

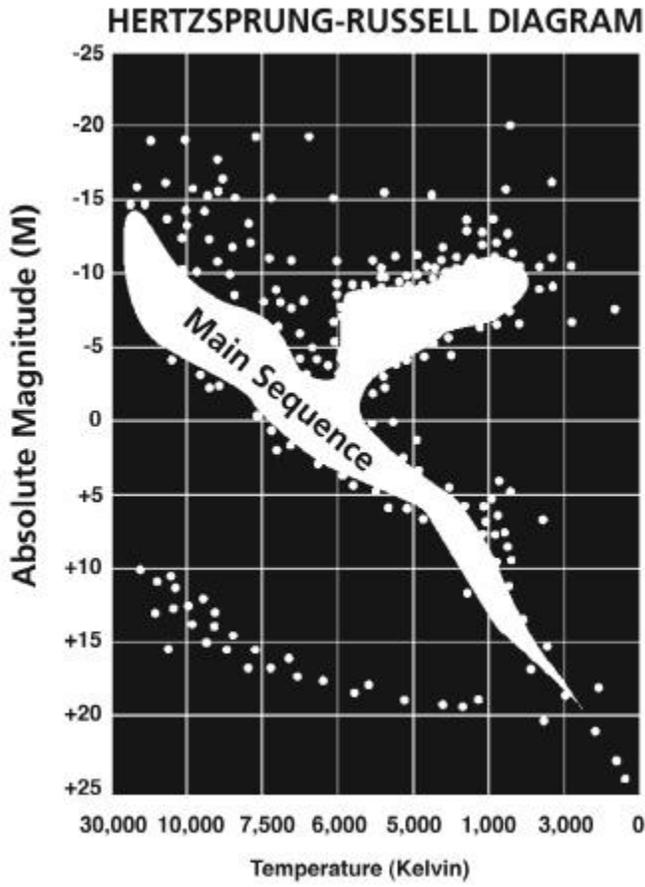


- A) billions of black holes
- B) billions of stars
- C) billions of planets
- D) billions of moons

22. The brightness of a star as seen from Earth is its apparent magnitude. How is apparent magnitude different from absolute magnitude?

- A) Apparent magnitude depends on the color of a star; absolute magnitude does not.
- B) Apparent magnitude depends on the size of a star; absolute magnitude does not.
- C) Apparent magnitude depends on the temperature of a star; absolute magnitude does not.
- D) Apparent magnitude depends on the distance of a star from Earth; absolute magnitude does not.

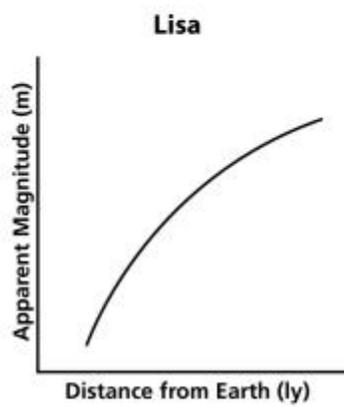
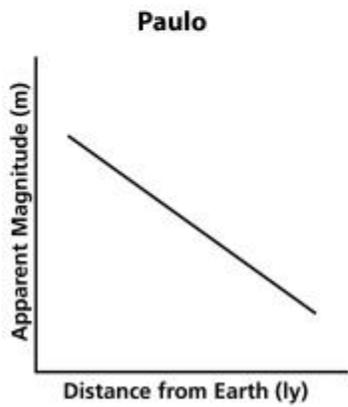
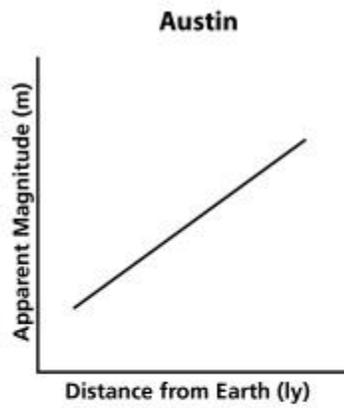
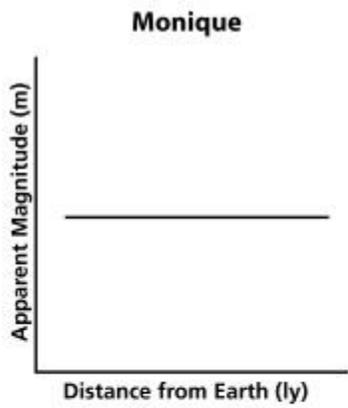
23. Main sequence stars appear as a band on Hertzsprung-Russell (HR) diagrams. The HR diagram below shows the relationship between luminosity and temperature. Luminosity is measured here using an absolute brightness scale, called *absolute magnitude*.



In a main sequence star, what is the relationship between a star's luminosity (measured as absolute magnitude) and its temperature?

- A) The lower the temperature, the brighter the star.
- B) The higher the temperature, the brighter the star.
- C) Most stars have the same temperature, but differ in absolute brightness.
- D) Most stars have the same absolute brightness, but differ in temperature.

24. Monique, Austin, Paulo, and Sara plotted graphs to show how distance affects the brightness of stars.



Which student's graph correctly represents the relationship between the apparent magnitude of a star and its distance from Earth?

- A) Paulo's graph
- B) Austin's graph
- C) Sara's graph
- D) Monique's graph

25. Generally, a planet's surface temperature varies with its distance from the sun. The table below shows the distances of several planets from the sun.

DISTANCE OF THE PLANETS FROM THE SUN

Planet	Distance from Sun (AU)
Earth	1.00
Mars	1.52
Jupiter	5.20
Saturn	9.54

Which of the following planets should have the lowest surface temperature?

- A) Jupiter
- B) Saturn
- C) Mars
- D) Earth

26. A person's weight is a measure of the gravitational force exerted on his or her mass. An important factor in determining the gravitational field of a planet is the planet's mass. The chart below shows the masses of the planets.

MASSES OF THE PLANETS

Planet	Mass (kg)
Mercury	3.30×10^{23}
Venus	4.87×10^{24}
Earth	5.97×10^{24}
Mars	6.42×10^{23}
Jupiter	1.90×10^{27}
Saturn	5.68×10^{26}
Uranus	8.68×10^{25}
Neptune	1.03×10^{26}

On which of the following planets would a person weigh the least?

- A) Mars
- B) Jupiter

- C) Saturn
- D) Venus

27. The moon has many more impact craters than Earth. Which of the following gives the **best** explanation for the moon having more craters than Earth?

- A) The moon rotates much slower than Earth does.
- B) The moon has no atmosphere.
- C) The moon has one side facing away from Earth at all times
- D) The moon orbits between Earth and the sun.

28. The Greek astronomer Ptolemy invented a model of the solar system in 150 CE. The Polish astronomer Nicholas Copernicus published his model of the solar system in 1543 CE. How was Copernicus' model different from Ptolemy's?

- A) Copernicus' model was based on circular orbits of the planets.
- B) Copernicus' model was based on elliptical orbits of the planets.
- C) Copernicus' model was heliocentric.
- D) Copernicus' model was geocentric.

29. The solar system contains many types of objects, including planets, moons, comets, meteoroids, and asteroids. What do all these objects have in common?

- A) They are closer to the sun than Pluto.
- B) They orbit the sun.
- C) They are spherical.
- D) They are solid.

30. The moon has many more impact craters than Earth. Which of the following gives the **best** explanation for the moon having more craters than Earth?

- A) The moon rotates much slower than Earth does.
- B) The moon has no atmosphere.
- C) The moon has one side facing away from Earth at all times
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