Homework #4

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Number of Questions: 20

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Question 1: (5 points)

The major constituents of the Earth's atmosphere are

- 1. 95% carbon dioxide and some water vapor.
- 2. methane, ammonia, water vapor, and carbon dioxide in about equal amounts.
- 3. 77% oxygen, 21% nitrogen.
- 4. 77% nitrogen, 21% oxygen.

Save answer

Question 2: (5 points)

Why did the Earth's earliest atmosphere, composed primarily of hydrogen and helium, not last long?

- 1. Hydrogen is highly reactive and soon became bound into chemical compounds in the Earth's rocks.
- 2. Hydrogen and helium are light gases and they soon escaped into space.
- 3. Biological activity very quickly combined the hydrogen with oxygen to form water.
- 4. The hydrogen soon became dissolved in the Earth's oceans.

Save answer

Question 3: (5 points)

Where did the majority of the large amount of carbon dioxide (CO2) from the second major atmosphere to form on the early Earth end up on the Earth?

- 1. As nitrogen oxides and carbon, after chemical reactions with the majority component of the atmosphere, the nitrogen molecules.
- 2. Absorbed by plant life and transformed into solid carbon and gaseous oxygen.
- 3. Dissolved in the oceans and, via the shells of living creatures, in the limestone of many mountain ranges.

- 4. It is still in the atmosphere, but the abundances of N2 and O2 have since risen to make these constituents the most abundant, and delegate CO2 to a minor constituent.

Save answer

Question 4: (5 points)

Photosynthesis in plants on the Earth maintains a balance between which of the two atmospheric gases?

- 1. Carbon dioxide and water vapor.
- 2. Oxygen and water vapor.
- 3. Nitrogen and oxygen.
- 4. Oxygen and carbon dioxide.

Save answer

Question 5: (5 points)

Ozone in the stratosphere performs one important task that is protective to life on Earth. What is this?

- 1. It absorbs the solar wind as it streams into Earth, thereby protecting life from these dangerous ionizing radiations.
- 2. It absorbs much of the dangerous solar ultraviolet light.
- 3. It acts as a disinfectant, killing dangerous viruses and bacteria that drift in all the time from space before they can reach Earth.
- 4. It absorbs infrared radiation, thereby providing us with a comfortable atmospheric temperature on the surface of Earth.

Save answer

Question 6: (5 points)

In which layer of the Earth's atmosphere does all of the weather occur?

- 1. The stratosphere.
- 2. The mesosphere.
- 3. The thermosphere.
- 4. The troposphere.

Save answer

Question 7: (5 points)

As discussed in class, the Earth's atmosphere cannot retain hydrogen gas. In a future industrial accident, the Earth is moved to a circular orbit around the Sun with a radius closer than 1 AU. After the accident, would the Earth still be unable to retain hydrogen?

- 1. yes
- 2. no
- 3. depends on how close the Earth was moved

Save answer

Question 8: (5 points)

The process of sea floor spreading and plate tectonic movement on the Earth's surface takes place at a speed of

- 1. a few meters per year.
- 2. a few centimeters per year.
- 3. a few centimeters per century.
- 4. less than a millimeter per year.

Save answer

Question 9: (5 points)

The great mountain ranges of the Earth have been produced by

- 1. collisions between tectonic plates.
- 2. volcanic eruptions.
- 3. asteroid impacts, because they are just worn-down crater walls.
- 4. wrinkling of the crust as the interior cools and contracts.

Save answer

Question 10: (5 points)

"Continental drift" on the Earth is now thought to be caused by

- 1. tidal flexing of the Earth's solid crust by the Moon's gravitational pull.
- 2. circulation currents in the deep interior, causing slabs of the Earth's crust to move slowly.
- 3. precession of the Earth's spin axis.
- 4. the forces of oceanic tides on the continental shelves around the landmasses.

Save answer

Question 11: (5 points)

The Earth's magnetic field protects the Earth and its inhabitants from

- 1. all the high-energy cosmic rays or hydrogen nuclei moving through our universe.
- 2. the majority of tiny but high-speed micrometeorites, which otherwise would crater the Earth and cause significant damage to property.
- 3. a significant proportion of the solar neutrinos, the enormous flux of which could otherwise produce damage to genetic material in life-forms.
- 4. the solar wind, which would otherwise irradiate and damage life forms if not deflected.

Save answer

Question 12: (5 points)

The Earth has an atmosphere but the Moon does not. From this we can conclude that the escape speed on the Moon is _____ the escape speed on the Earth.

- 1. lower than
- 2. higher than
- 3. the same as
- 4. none of the above

Save answer

Question 13: (5 points)

If there are at least a million asteroids, how did a spacecraft like Galileo survive the trip across the asteroid belt?

- 1. in fact, NASA has lost over a dozen spacecraft to collisions with asteroids

- 2. the known asteroids are typically less than a centimeter across, so they do not represent a danger to spacecraft
- 3. NASA sends spacecraft above and below the asteroid orbits to avoid collisions
- 4. although there are many asteroids, there is a lot of space between them

Save answer

Question 14: (5 points)

The fact that craters are very rare on the Earth's surface indicates that

- 1. most impacts are deflected by the Moon
- 2. Earth's gravity shields it from all impacts
- 3. the Earth is geologically active
- 4. impact events only happened in the early Solar System

Save answer

Question 15: (5 points)

A human hair is about 0.1 mm (millimeters) thick, and is made of atoms which are about 10^{-7} mm across. About how many atoms span the thickness of a human hair?

- 1. 10^{-8}
- 2. 10^{3}
- 3. 10^{6}
- 4. 10^{8}
- 5. 10^{10}

Save answer

Question 16: (5 points)

Astronauts at a Moonbase that can be seen from Earth will always see

- 1. the Earth in the sky
- 2. the Sun in the sky
- 3. both (1) and (2)

- 4. none of the above

Save answer

Question 17: (5 points)

Which of the following processes has played the greatest role in shaping the surface of the Moon?

- 1. Impacts of interplanetary bodies of all sizes.
- 2. Motions of tectonic plates, producing mountain ranges wherever they collide.
- 3. Erosion by wind and atmospheric gases.
- 4. Recent volcanic activity, producing large numbers of crater-like volcanic calderas.

Save answer

Question 18: (5 points)

Maria are

- 1. ancient riverbeds, now dry.
- 2. uplifted regions surrounding large volcanoes.
- 3. heavily cratered highland regions.
- 4. ancient lava flood-plains.

Save answer

Question 19: (5 points)

What is the lunar regolith?

- 1. The part of the lunar surface that is not covered with lava flows.
- 2. The layer of fine powder covering the lunar surface.
- 3. The lunar crust and mantle together.
- 4. The deeper part of the lunar crust that has not been extensively cracked by impacts.

Save answer

Question 20: (5 points)

When do neap tides occur?

1. Only when the Moon and Sun line up on the same side of the Earth.
2. Whenever the Earth, Moon, and Sun form a straight line, regardless of which side of the Earth the Moon is on.
3. Only when the Moon, Earth, and Sun form a straight line, with the Moon on the opposite side of the Earth from the Sun.
4. Whenever the Earth-Moon line makes a 90° angle to the Earth-Sun line.

Save answer

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