Grade 12 Earth and Space Science Testible Question

SES4U

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November 5, 2025

Contents

Chapter 2

Testible questions

2.1 Formation of the solar system

2.1.1 Question 1

According to the Nice Model, what caused the "reorganization of the solar system?"

- Jupiter's and Saturn's 2:1 orbital resonance.

2.1.2 Question 2

Summary the Nebular Theory:

- Collapse of a nebular due to gravity
- Majority of the material from the clouded ended up in the center - forming the early Sun
- The shrinking and accelerating caused the cloud to flatten into a protoplanetary disk.
- The disk was the birth place of the planet

2.1.3 Question 3

Match the letters or dates to their correct imper period of events

4.6 billion years ago

The Birth of our solar system

4.59 billion years ago

- Jupiter and Saturn's migration towards the sun
- Formation of outer planet

4.5 billion years ago

- Earth, Venus, Mars and Mercury are formed
- Proto-Earth's collision with "Theia", leading to the formation of our Moon

4.48 billion years ago

- The outward migration of the outer planet
- The Kuiper Belt is formed

4.1 to 3.8 billion years ago

- The late Heavy Bombardment (Large-scale asteroid and comet impact events)

2.2 The Moon

2.2.1 Question 1

Explain two ways the Moon's surface preserves historical evidence better than the Earth's surface:

- Lack an atmosphere, so no weathering or erosion occurs
- Has no tectonic activity - which would recycle surface materials.

2.2.2 Question 2

Why the discovery of water ice on the Moon could support future exploration.

- Provide drinking water
- Split into hydrogen and oxygen, using hydrogen for rocket fuel and the oxygen for human respiration

2.3 The space race

2.3.1 Question 1

: The intercontinental ballistic missiles designed for nuclear weapons

2.3.2 Question 2

It challenged the US. claims of technological superiority

It starts a psychological and politcal crisis, leading to the creation of NASA

2.4 Other objects in our solar system

2.4.1 Question 1

Two required characteristics of a planet is that it orbits the Sun and must have enough mass so that it is a mostly spherical shape? What is the third characteristic?

- The planet must be big enough for its gravity to clear the way of other objects

2.4.2 Question 2

- (Meteoroid): A small body moving in the solar system
- (Meteor): The streak of light that appears when a meteoroid passes thourht Earth's atmosphere
- (Meteorite): The portion f a meteorid that hits the ground.

2.5 Tech used to study the properties of the planets in our solar system

2.5.1 Question 1

How do magnetometers work?

- Similar to a fine turned compass

2.5.2 Question 2

Explain one important reason why scientists care about measuring a planets' properties?

- Help us to identify the gaps in astrophysics that we do not know yet

2.5.3 Question 3

The differences between **spectroscope** and a **spectrometer**?

- (Spectroscope): is an instrument that separates light into its wavelength to from a spectrum
- (Spectrometer): is a specialized spectroscope that takes samples of a spectrum to study different components

2.5.4 Question 4

Explain one method or instrument used to measure the mass of a planet?

- Use telescopes to observe gravitational influence

2.6 Rockets

2.6.1 Question 1

4 major systems of a rocket:

- Structural, guidance, payload, propulsion

2.6.2 Question 2

What are the two factors that determine whether something is a rocket?

- Carries its own fuel and oxidizer
- Eject material out for thrust

2.6.3 Question 3

: Purpose of orbital launch vehicles:

- Fireworks: Rockets are used to launch fireworks to a safe altitude.
- Atomospheric Research: Rockets are used to transport data collection equipment to areas of our atmosphere that neither weather ballons nor satellites can reach

2.7 The Canadarm

2.7.1 Question 1

Three joints of Canadarm

- Shoulder
- Elbow
- Wrist

2.7.2 Question 2

Characterists of Canadarm:

- (Controlled by): Autonomously by AI, people in Canada, or astronauts on Gateway
- (Base): Move from End to End on Gateway
- (Degree of Freedom): 7

2.8 The militarization of space

2.8.1 Question 1

Why is the weaponization of space difficult to regulate under the 1967 Outer space treaty?

- Because it bans only nuclear weapon in space

2.8.2 Q2

Why are anti-satellite weapons considered a global risk?

- Destroying a satellite creates debris that can collide with other satellite.
- This may cause a chain reaction
- The could put the ISS and important civilian satellites at risk

2.9 Space debris

2.9.1 Q1

Kessler Syndrome?

- A chain reaction which collisions of space debris creates even more debris over time

2.9.2 Q2

One strategy for reducing space debris

Laser:

- Lasers are used to push smal pieces of debris and change their orbits
- Works by slightly heating one side of them

2.10 Planned development on the Moon

2.10.1 Q1

Artemis:

- To establish a long-term human presence on the Moon

2.10.2 Q2

Outer Space Treaty states:

- No country owns the Moon
- Military bases on celestial bodies are prohibited

2.11 Potential human missions to Mars

2.11.1 Q1

Why was Mars chosen as a potential future habitat for humans beyond Earth?

- It has usable resources like frozen watern and is the most like Earth

2.11.2 Q2

Describe the risk of cosmic rays on Mars?

- Excessive exposure to radiation
- This can cause health problems

2.12 Biology and Psychology long space mission

2.12.1 Q1

During the first few days in microgravity, astronauts experience motion sickness and fluid shifting towards the upper body. What is this condition called?

- Space Adapitation Syndrome

2.12.2 Q2

What is the primary cause of bone loss experienced by astronauts during long-duration space missions?

- The "weightless" environment reduces the mechanical load on bones

2.12.3 Q3

Two important pyschological challenges that astronauts experience during long space mission

- Isolation
- Homesick

2.12.4 Q4

Circle one of your answers above and for that challenge explain one countermeasure that helps astronauts manage it. (1 mark)

- Isolation & Homesick: Communication with families and friends on Earth

2.13 Why have aliens not visited us yet?

2.13.1 Q1

Describe two reasons why technology may be a limiting factor when it comes to communicating with extraterrestrial life.

- there are too far away to contact with our current technology
- Extraterrestrials may use a form of communication that we cannot detect

2.13.2 Fermi Paradox

There is a discrepancy between:

- the lack of conclusive evidence of advanced extraterrestrial life, and
- the high probability of existence.