Name: _____ **Date:** _____

Dissect Cosmic Ballistics: 11th Grade Earth-Space Orbital Quiz

Calculate orbital perturbations and analyze barycentric motion to determine how gravitational anomalies reshape planetary paths in this rigorous challenge.

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1. A planet's orbital eccentricity increases due to a passing massive body. According to Kepler's Second Law, how does this change the planet's orbital velocity at perihelion compared to its original state?

A. The velocity remains constant as angular momentum is conserved relative to the barycenter.
B. The velocity at perihelion increases to conserve total angular momentum for the more elliptical path.
C. The velocity decreases to satisfy the Law of Equal Areas over longer distances.
D. The orbital period must shorten, causing a global increase in velocity across all points.

2. The slow, cyclical shift in the orientation of Earth's rotational axis, which completes a cycle approximately every 26,000 years and alters the timing of the equinoxes, is known as _____.

A. Obliquity
B. Axial Precession
C. Orbital Eccentricity
D. Apsidal Precession

3. Milankovitch cycles suggest that Earth's glaciation periods are primarily triggered when high-latitude summer insolation is at a maximum.

A. True
B. False

4. If the Earth's axial tilt (obliquity) were to increase from 23.5° to 28.5°, what would be the specific atmospheric result regarding the Tropics of Cancer and Capricorn?

A. The tropics would migrate toward the equator, narrowing the equatorial climate zone.
B. The tropics would remain stationary, but the Arctic circle would expand significantly.
C. The tropics would migrate further toward the poles, increasing the latitudinal range of the tropical zone.
D. The Hadley cell circulation would weaken, causing deserts to shift toward the poles.

5. In a three-body system, the specific points where a small mass can orbit in a constant pattern with two larger masses are called _____ points.

A. Keplerian
B. Barycentric
C. Lagrange
D. Chandrasekhar

Name: _____ Date: _____

6. Amphidromic points are locations in the ocean where the tidal range is zero because of the canceling effects of the Coriolis force and basin geometry.

A. True
B. False

7. The Saros cycle is a period of approximately 18 years used to predict eclipses. What underlying synchronization causes this cycle?

A. The alignment of the Earth’s perihelion with the Moon’s apogee.
B. The harmonic resonance between the Moon's synodic, draconic, and anomalistic months.
C. The precession of the Earth’s axis relative to the Galactic Center.
D. The intersection of the Moon's orbit with the Ecliptic plane every 24 hours.

8. The phenomenon where the Earth's rotation causes a moving object to veer off course, calculated by the formula $2v\omega \sin \phi$, is the _____.

A. Doppler Effect
B. Coriolis Frequency
C. Centrifugal Force
D. Euler Force

9. Analyze the impact of Tidal Locking. If the Earth were to become tidally locked with the Sun, what would be the most significant consequence for the Earth's atmosphere?

A. Atmospheric collapse on the dark side due to extreme radiative cooling and gas solidification.
B. Uniform global temperatures due to the cessation of the Coriolis effect.
C. An increase in global ozone production due to constant UV exposure on one hemisphere.
D. The Earth's magnetosphere would disappear, immediately stripping the atmosphere.

10. Syzygy refers to the straight-line configuration of three celestial bodies in a gravitational system, such as during a solar eclipse.

A. True
B. False