StellarXplorers Qualifying Round 1 (QR1) Quiz Study Guide

The Qualifying Round 1 (QR1) Quiz will come from Chapter 4, Sections 4.1-4.3, and Chapter 5, Sections 5.1 and 5.3, in the Understanding Space textbook. The correct answers will be based on information found in the textbook.

Chapter 4

Section 4.1

1. Know how the speed of an object determines whether it will get into orbit.
2. Know the speed needed for an object to match Earth's curvature.

Section 4.2

3. Know the definitions of weight, mass, inertia, and momentum.
4. Know Newton's Three Laws of Motion.
5. Know how to calculate linear momentum and how to compare the linear momentum of two objects.
6. Know the definitions of Angular Momentum and Moment of Inertia.
7. Know Newton's Law of Universal Gravition.

Section 4.3

8. Know what happens to ice skaters who are facing each other and one skater pushes the other skater.
9. Know the definitions of Total Mechanical Energy, Kinetic Energy, and Potential Energy.
10. Know how the Total Mechanical Energy, Kinetic Energy, and Potential Energy of a person changes when a person is riding on a playground swing.

Chapter 5

Section 5.1

11. Know the definitions of apogee and perigee.
12. Know how each of the following six Classical Orbital Elements (COE) describe an orbit and a spacecraft's location within the orbit:
    a. Semi-major Axis, a
    b. Eccentricity, e
    c. Inclination, i
    d. Right Ascension of the Ascending Node (RAAN), Ω
    e. Argument of Perigee, ε
    f. True Anomaly, ν
13. Know the relationship between an orbit's shape and it's eccentricity.
14. Know the value or range of values of inclination (i) for the following types of orbits:
    a. Equatorial
    b. Polar
    c. Direct
    d. Retrograde

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15. Know the characteristics of the following types of orbits:
    a. Geostationary
    b. Geosynchronous
    c. Semi-synchronous
    d. Sun-synchronous
    e. Molniya
16. Know what type of space missions correspond to each of the orbits above.

Section 5.3

17. Know how a satellite's ground track shifts or moves as a result of Earth's rotation.
18. Know the relationship between the inclination of an orbit and its ground track.
19. Know how to use a satellite's ground track to determine if its orbit is circular or elliptical.