



QUIZ STUDY GUIDE

StellarXplorers Qualifying Round 1 (QR1)

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

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

Section 4.2

- Know the definitions of weight, mass, inertia, and momentum.
- Know Newton's Three Laws of Motion.
- Know how to calculate linear momentum and how to compare the linear momentum of two objects.
- Know the definitions of Angular Momentum and Moment of Inertia.
- Know Newton's Law of Universal Gravitation.

Section 4.3

- Know what happens to ice skaters who are facing each other when one skater pushes the other skater.
- Know the definitions of Total Mechanical Energy, Kinetic Energy, and Potential Energy.
- 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

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

- Know the characteristics of the following types of orbits:
 - Geostationary
 - Geosynchronous
 - Semi-synchronous
 - Sun-synchronous
 - Molniya
- Know what type of space missions correspond to each of the orbits above.

Section 5.3

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