

## StellarXplorers IV Practice Round 1 (PR1) Quiz Study Guide

For each Qualifying Round of the competition, 20% of the total score will be based on an online Quiz. The Quizzes will be timed (30 minutes) and taken as a team (not individually). The Quizzes will consist of 20 Multiple Choice or Matching questions from various Chapters of the *Understanding Space* textbook. For each Quiz, teams will be given a Study Guide to let team “study” prior to the competition round. Teams will not be very successful if they wait to look at the textbook for the first time when they are given the Quiz. In order to be successful, we highly recommend teams find the answers to the Study Guide Questions before the Quiz.

For Practice Round 1 (PR1), we will give a Practice Quiz from Chapters 1-3 in the *Understanding Space* textbook. This Round will not be timed but we highly recommend teams find the answers to the Study Guide questions prior to taking the Quiz. Teams could prepare for the Qualifying Rounds by self-timing themselves.

### Chapter 1

#### Chapter 1 Introduction

1. What areas of knowledge are studied in the field of astronautics?

#### Section 1.1

2. Know the 5 key advantages of space that make its exploration essential for modern society.
3. What is scintillation? Free fall?
4. The most common space missions fall into which four general areas?
5. What are the names of a couple communications satellites in geostationary orbit? In Low-Earth orbit?
6. Know the mission(s) of the following spacecraft: Pioneer, Mariner, Viking, and Magellan.

#### Section 1.2

7. Be able to define the following key pieces of information needed to describe the scope of any space mission: Need, Goal and Objective, Stakeholders, and Concept of Operations (ConOps).
8. Any spacecraft can be divided into two basic parts; payload and bus. Know which part of a spacecraft can be categorized as each part.
9. Know the definitions of a trajectory and an orbit.
10. Know the definitions of Field of Regard (FOR), Field of View (FOV), and Swath Width.
11. Know the definitions of Parking Orbit, Transfer Orbit, and Final Orbit and the purpose of an upper stage.
12. Mission operations includes all of the people, processes, and equipment needed to get the spacecraft into orbit and conduct the mission. Know the components of Mission Operations Systems and Flight Control Operations and how the two relate to each other.
13. Know the definitions of Systems Engineering and Project Management.

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## **Chapter 2 Introduction**

14. Be able to use the Timeline in Section 2 Introduction to determine when key events related to space occurred.

## **Section 2.1**

15. Know the key concepts of the ancient astronomers Aristotle and Ptolemy.
16. Know the key contributions of the Renaissance astronomers Nicholas Copernicus, Tycho Brahe, and Johannes Kepler.
17. Know Kepler's three Laws of Planetary Motion
18. Know the key contributions of astronomers in the 18<sup>th</sup> and 19<sup>th</sup> centuries, such as William Herschel, John Couch Adams, Urbain Leverrier, William Huggins, and Joseph Norman Lockyer.
19. Know the definition of spectroscopy and perturbation and how they are used in the study of space.
20. Know the key contributions of the following astronomers: Harlow Shapely, Edwin Hubble, and Georges Lemaitre.

## **Section 2.2**

21. Know the key contributions to rocketry made by the following individuals: William Congreve, Konstantin E. Tsiolkovsky, Robert H. Goddard, Hermann Oberth, and Werner von Braun.
22. Know the missions of the following early American Vanguard and Redstone rockets and the communications satellites Echo I and Telstar.

## **Section 3.1**

23. Know where different organizations define the beginning of space, in both kilometers and miles.
24. Be able to relate the relative size and distances of objects within our Solar System and the Cosmos.

## **Section 3.2**

25. Describe the effects on spacecraft to the following hazards in the space environment: Gravity, Atmosphere, Vacuum, Micrometeorites and Debris, Charged Particles, and Electromagnetic Radiation.

## **Section 3.3**

26. Know how free fall affects the human body.
27. Know the major types of Electromagnetic Radiation and how to protect humans from the effects of exposure.