

Solar System (On the team schedule - 30 minutes)



Description: Teams will answer questions on a written assessment on the eight planets and their main identifying features, their moons, and any NASA missions that were sent to determine their habitability.

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Participants per assigned Team Number:

- If your school has 1 team you will send 2 students
- If your school has 2 teams you will send 2 students per team number; team numbers may not intermix
- If your school has 3 teams you will send 2 students per team number; team numbers may not intermix

Spirit of the Problem:

- The goal of competition is to give one's best effort while displaying honesty, integrity, and good sportsmanship. Everyone is expected to display courtesy and respect (see Science Olympiad Pledges below). Teams are expected to make an honest effort to follow the rules and the spirit of the problem (not interpret the rules so they have an unfair advantage).
- It is a rules violation if coaches, parents, mentors, or spectators enter the competition area or communicate with the team members at any time during the competition. Violation of this rule will place the team below all other teams.

Teams need to bring: Pencils

Safety Requirements: None

The Competition:

This written assessment will contain 25-50 questions on the eight planets and their main identifying features, their moons, and any NASA missions that were sent to determine their habitability. The assessment may include topic questions based on the following planet classifications and characteristics information:

- Planet relative distance from the sun
- Planet relative size
- Planet temperature
- Planet composition and density
- Planet length of day
- Planet length of year
- Planet number of and composition of moons
- Planet atmospheres
- NASA satellite and surface visits by spacecraft
- Understand the astronomical definitions for the terms: zenith, horizon, celestial meridian, celestial poles, celestial equator, and ecliptic as they help locate the planets in the night sky on the day of the competition.

Scoring:

- Points will be awarded for each correct response.
- Ties will be broken by the accuracy or quality of answers to select questions chosen by the test writer prior to the competition.

Possible Resources:

- a. Division A will not release previous tests, or the exact resources used by the Event Supervisor or test writer for any events.

- b. Use the listed resources and study guides as starting points. The study guide was created using Gemini AI and is meant as a beginning foundation! It may or may not contain topics occurring within the competition. It is up to the competitor to research further.
- i. [NASA: About the Planets](#)
 - ii. [The Nine Planets](#)

Astronomy Study Guide: Planets and the Night Sky

I. The Eight Planets: Key Features

A. Terrestrial (Rocky) Planets

1. Mercury:
 - Closest to the Sun.
 - Smallest planet.
 - Extreme temperature variations (day very hot, night very cold).
 - Thin atmosphere (exosphere).
 - Heavily cratered surface.
 - Length of day: About 59 Earth days.
 - Length of year: About 88 Earth days.
 - No moons.
 - NASA Missions: Messenger, BepiColombo (joint ESA/JAXA).
2. Venus:
 - "Earth's sister planet" (similar size).
 - Hottest planet (thick CO₂ atmosphere creates a greenhouse effect).
 - Rotates slowly in the opposite direction (retrograde rotation).
 - Length of day: About 243 Earth days.
 - Length of year: About 225 Earth days.
 - No moons.
 - NASA Missions: Magellan, Pioneer Venus.
3. Earth:
 - Only known planet to support life.
 - Liquid water on the surface.
 - Nitrogen and oxygen-rich atmosphere.
 - Length of day: About 24 hours.
 - Length of year: 365.25 days.
 - One moon (Luna).
4. Mars:
 - "Red Planet" (iron oxide in the soil).
 - Thin atmosphere.
 - Polar ice caps.
 - Evidence of past liquid water.
 - Length of day: Slightly longer than Earth's.
 - Length of year: About 687 Earth days.
 - Two moons (Phobos, Deimos).
 - NASA Missions: Mars rovers (Curiosity, Perseverance), Mars Reconnaissance Orbiter.

B. Gas Giant Planets

5. Jupiter:

- Largest planet.
- Great Red Spot (giant storm).
- Strong magnetic field.
- Many moons (including Galilean moons: Io, Europa, Ganymede, Callisto).
- Length of day: About 10 Earth hours.
- Length of year: About 12 Earth years.
- Composition: Mostly hydrogen and helium.
- NASA Missions: Voyager, Galileo, Juno.

6. Saturn:

- Prominent ring system (ice and rock).
- Titan (largest moon, with a thick atmosphere).
- Length of day: About 10.7 Earth hours.
- Length of year: About 29 Earth years.
- Composition: Mostly hydrogen and helium.
- NASA Missions: Voyager, Cassini-Huygens.

7. Uranus:

- Rotates on its side.
- Blue-green color (methane in the atmosphere).
- Ring system.
- Length of day: About 17 Earth hours.
- Length of year: About 84 Earth years.
- Composition: Ices, hydrogen, and helium.
- NASA Missions: Voyager 2.

8. Neptune:

- Blue color (methane in the atmosphere).
- Strong winds.
- Triton (largest moon, with retrograde orbit).
- Length of day: About 16 Earth hours.
- Length of year: About 165 Earth years.
- Composition: Ices, hydrogen, and helium.
- NASA Missions: Voyager 2.

II. Astronomical Terms

- Zenith: The point directly overhead.
- Horizon: The line where the sky and Earth appear to meet.
- Celestial Meridian: An imaginary line passing from the north celestial pole through the zenith to the south celestial pole.
- Celestial Poles: The points in the sky directly above Earth's north and south poles.
- Celestial Equator: An imaginary circle in the sky directly above Earth's equator.
- Ecliptic: The apparent path of the Sun through the sky over a year.

III. NASA Missions and Habitability

- Focus on missions that searched for evidence of past or present water, and conditions that could support life.

- Key missions:
 - Mars rovers (Spirit, Opportunity, Curiosity, Perseverance).
 - Galileo (Jupiter and its moons, especially Europa).
 - Cassini-Huygens (Saturn and its moons, especially Titan and Enceladus).

IV. Study Tips

- Use visual aids (images, diagrams).
- Create flashcards for planet facts.
- Draw diagrams of the solar system, labeling distances and sizes.
- Practice identifying planets in the night sky using star charts or astronomy apps.
- Practice defining and drawing the astronomical terms.

By studying these points, you should be well prepared to answer the questions on the planets and astronomical terms.