

INTERNATIONAL AEROSPACE OLYMPIAD 2025



SYLLABUS - GRADE 7TH - 9TH

1. Advanced Fundamentals of Aerospace

1.1 Aerospace, Aeronautics, and Astronautics

- Detailed comparison and applications of aerospace, aeronautics, and astronautics.
- Subfields of aerospace: Propulsion systems, aerodynamics, and avionics.

1.2 Forces of Flight

- Lift, thrust, drag, and gravity: Detailed exploration with real-world examples.
- The Bernoulli principle and its role in flight.

1.3 Introduction to Aerodynamics

- How air moves over wings: Concepts of air pressure, turbulence, and airflow.
- Streamlining: Reducing drag for efficient flight.

2. Aircraft and Aeronautics

2.1 Parts of an Aircraft

- In-depth study of airplane parts: Winglets, flaps, ailerons, fuselage, and tailplane.
- Role of cockpit instruments: Altimeter, airspeed indicator, and artificial horizon.

2.2 Types of Aircraft

- Fixed-wing vs. rotary-wing aircraft.
- Jets, cargo planes, gliders, and stealth aircraft.

2.3 Principles of Flight Operations

- Takeoff, cruising, and landing: How they work.
- Role of air traffic control and navigation systems.

3. History and Evolution of Aerospace

3.1 Milestones in Aviation

- From the Wright brothers to supersonic jets.
- The advent of commercial aviation and air travel.

3.2 Space Exploration Timeline

- Key events: Sputnik, Apollo 11, Mars Rovers, and space stations.
- Modern innovations: Reusable rockets, space tourism, and interplanetary missions.

3.3 Indian Contributions

- ISRO's achievements: Chandrayaan, Mangalyaan, and Gaganyaan.
- Vision for India's aerospace future.

4. Space Exploration and Astronautics

4.1 Rocket Science

- Basic principles of propulsion: Newton's third law of motion.
- Multi-stage rockets and their functions.

4.2 Spacecraft and Satellites

- Types of spacecraft: Manned, unmanned, and space probes.
- Orbits: Geostationary vs. polar orbits and their applications.

4.3 Life Beyond Earth

- Search for extraterrestrial life: Habitable zones and exoplanets.
- Challenges of interplanetary travel and colonization (e.g., Mars).

5. The Atmosphere and Its Role in Aerospace

5.1 Layers of the Atmosphere

- Troposphere to exosphere: Effects on aviation and space travel.
- The role of the stratosphere in jet flight and ozone protection.

5.2 Space Weather

- Solar flares and their impact on satellites and astronauts.
- The importance of shielding in spacecraft.

6. Innovations in Aerospace

6.1 Future Technologies

- Electric and supersonic aircraft.
- Space tourism and colonization: Companies like SpaceX, Blue Origin.
- AI and robotics in aerospace: Drones, autonomous planes, and rover missions.

7. Famous Aerospace Achievements and Personalities

7.1 Global Icons

- Neil Armstrong, Yuri Gagarin, and Buzz Aldrin.
- Innovators like Elon Musk (SpaceX) and Sir Richard Branson (Virgin Galactic).

7.2 Indian Icons

- Rakesh Sharma: First Indian in space.
- Kalpana Chawla and Sunita Williams: Indian-origin astronauts.
- Visionaries behind ISRO's success: Vikram Sarabhai and Abdul Kalam.

