INTERNATIONAL SPACE OLYMPIAD 2026

SYLLABUS - JUNIOR CATEGORY

Preliminary Level

1.1 Our Place in Space

- Earth as a planet: shape, size, rotation, and why it matters
- Day and night: how Earth spinning on its axis creates them
- Seasons: why Earth's tilt -- not its distance from the Sun -- causes them
- The Moon as Earth's companion: how big it is compared to Earth and how far away it is
- The Sun as our nearest star: its size, heat, and the light it provides
- Our address in space: Earth, Solar System, Milky Way, Universe

1.2 The Solar System

- The eight planets
- Rocky inner planets vs gas and ice outer planets: the key difference between them
- Why planets orbit the Sun: gravity explained in simple terms
- Moons across the solar system
- What makes each planet visually distinctive: rings, colours, storms, and surface features

1.3 Stars and the Night Sky

- What a star actually is
- Why the night sky looks different at different times of year: Earth orbiting the Sun
- Constellations: what they are, why they were named, and how to find a few key ones
- Why stars twinkle and planets do not: the effect of Earth's atmosphere
- What you can see with the naked eye: the Milky Way band, bright planets, and prominent stars etc

1.4 Exploring Space

- Satellites & Rockets
- Rocket Fuels
- Applications of Satellites and Its different orbits
- Astronauts: what they do aboard the International Space Station and how they live in space
- Why we explore space: advancing science, understanding our origins, and inspiring future generations

Intermediate Level

2.1 Earth, Moon, and Atmosphere

- Lunar eclipses and solar eclipses: the geometry of shadows and why they do not happen every month
- Why we always see the same face of the Moon
- Tides: how the Moon's gravity (and the Sun's) pulls on Earth's oceans
- The Moon's surface: impact craters, dark maria, and bright highlands, and what they tell us
- Earth's atmosphere: its layers, what each layer does
- Auroras: how the solar wind interacts with Earth's magnetic field creates the northern and southern lights

2.2 The Sun

- The Sun's layers from inside to outside: core, radiative zone, convective zone, photosphere, chromosphere, corona
- How the Sun produces energy: nuclear fusion of hydrogen into helium explained simply
- Sunspots and 11-year cycle
- Solar flares and prominences, and solar wind
- How the Sun affects Earth: space weather, disruptions to satellites, and connections to auroras

2.3 The Solar System in Greater Detail

- How the solar system formed: a rotating cloud of gas and dust collapsed to create the Sun and planets
- The asteroid belt: what it contains, where it is, and why no planet formed there
- Comets: their structure (nucleus, coma, dust tail, ion tail), where they come from, and famous examples
- Dwarf planets: why Pluto was reclassified in 2006 and what other dwarf planets exist
- The habitable zone: why a planet's distance from its star affects whether liquid water can exist on its surface

2.4 Stars: Colour, Size, and Brightness

- Stars come in different colours: a star's colour reveals its surface temperature
- Stars come in very different sizes: from small red dwarfs to enormous supergiants much bigger than our Sun
- Binary and multiple star systems: many stars in the galaxy have companion stars orbiting each other
- A first look at the Hertzsprung-Russell diagram: grouping stars by their brightness and temperature

Final Level

3.1 The Life Cycle of Stars

- Stellar nurseries: how giant clouds of gas and dust collapse under gravity to form new stars
- The main sequence: the long stable phase of a star's life when it fuses hydrogen in its core
- How a star's mass determines how long it lives and how it eventually dies
- The fate of Sun-like stars: expanding into a red giant, shedding a planetary nebula, leaving a white dwarf
- The fate of massive stars: swelling into a supergiant and exploding as a supernova
- What supernovae leave behind: neutron stars and the concept of black holes introduced

3.2 Galaxies

- What a galaxy is: billions of stars, gas, dust, and dark matter all held together by gravity
- The Milky Way: our galaxy's shape, size, the position of our Sun within it, and its central bulge
- Types of galaxies: spiral, elliptical, and irregular
- The Andromeda Galaxy: our nearest large galactic neighbour and its future slow collision with the Milky Way
- Why distant galaxies show us the early universe: the further away something is, the older the light we see

3.3 The Universe

- The Big Bang: what the theory says about the origin of the universe and the evidence that supports it
- An expanding universe: how Hubble showed that galaxies are moving away from us in all directions
- The age of the universe: approximately 13.8 billion years and what that number actually means
- Dark matter and dark energy
- The far future of the universe: what will eventually happen to galaxies, stars, and space itself

3.4 Exoplanets and the Search for Life

- What an exoplanet is and how many have been confirmed so far
- Detection Methods
- What makes a planet potentially habitable
- Famous discoveries: the Kepler space mission and the remarkable TRAPPIST-1 system of seven planets
- Is there life out there? What scientists look for and why this remains one of the biggest open questions

3.5 Modern Space Science

- Types of telescopes and what each reveals: optical, radio, infrared, and X-ray telescopes
- The Hubble Space Telescope: what it changed about our understanding of the universe
- The James Webb Space Telescope: how it sees further back in time than any telescope before it

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