READING PASSAGE · LEVEL 3 · ADVANCED

URANUS: A WORLD ON ITS SIDE

A reading passage for advanced readers (Ages 10–12)

Uranus, the seventh planet from the Sun, is one of the strangest worlds in our solar system. Unlike Jupiter and Saturn, which are gas giants made primarily of hydrogen and helium, Uranus is an ice giant — composed mostly of a hot, dense slush of water, methane, and ammonia ices, surrounding a small rocky core. With a diameter of about 51,000 kilometres, it is the third-largest planet by size but only the fourth most massive.

The most distinctive feature of Uranus is its extreme axial tilt. While Earth's axis is tilted 23.5 degrees, Uranus is tipped roughly 98 degrees — essentially lying on its side as it orbits the Sun. The most likely explanation is a colossal impact billions of years ago with a body perhaps the size of Earth, which knocked Uranus permanently off-axis. As a result, its rotation, ring system, and moons all share this sideways orientation.

The tilt creates the most extreme seasons of any planet. As Uranus takes 84 Earth years to complete one orbit, each pole spends 21 years in continuous sunlight followed by 21 years of darkness. Curiously, despite this strange day–night pattern, Uranus is more uniform in temperature than Neptune. Its cloud-top temperature averages around −224°C, the coldest in the solar system.

Uranus's blue-green colour is caused by methane in its upper atmosphere, which absorbs red light from the Sun and scatters blue light back into space. Below the visible cloud tops, the atmosphere contains thick layers of hydrogen sulfide — the gas that gives rotten eggs their smell.

Uranus has 28 known moons, all named after characters from plays by William Shakespeare and poems by Alexander Pope. The five largest — Miranda, Ariel, Umbriel, Titania, and Oberon — show heavily fractured surfaces, suggesting tectonic activity in the distant past. Miranda in particular has spectacular cliffs and grooves that may have formed when the moon was broken apart and re-formed by gravity. Only Voyager 2 has ever visited Uranus, briefly in 1986. Many planetary scientists are calling for a dedicated orbital mission, similar to Cassini at Saturn, to finally study this ice giant in detail.

★ WORDS TO KNOW 5 TERMS

axial tilt
The angle a planet's spin axis is tipped at compared to its orbit.

hydrogen sulfide
A smelly gas — the one that makes rotten eggs stink.

orbital mission
A spacecraft that goes into orbit around a planet rather than just flying past.

ice giant
A planet made mostly of icy slush of water, methane, and ammonia.

tectonic
Relating to the slow movement of pieces of a planet's or moon's surface.

★ COMPREHENSION QUESTIONS 6 QUESTIONS

1. How does the composition of Uranus differ from that of gas giants like Jupiter?

2. What evidence supports the idea that a giant impact tilted Uranus over?

3. How does Uranus's extreme tilt affect its seasons?

4. What gives Uranus its blue-green colour, and what would the lower atmosphere smell like?

5. What is special about Uranus's moon Miranda?

6. Why do many scientists want a new mission to Uranus?