READING PASSAGES · ANSWER KEY

URANUS

All 3 reading levels · Sample answers shown — accept reasonable variations

Teacher tip: Answers shown are model responses. Many comprehension questions can be correctly answered in multiple ways — the goal is to check that students can pull key ideas from the text in their own words. For Level 1, accept any answer that shows comprehension; phrasing doesn't need to match.

1 EMERGING — AGES 6–8 · 4 QUESTIONS — Uranus: The Sideways Planet

1. What is strange about the way Uranus moves?

A: *Uranus spins on its side, like a ball rolling along the ground.*

2. What colour is Uranus?

A: *Uranus is light blue.*

3. Why is Uranus so cold?

A: *Uranus is very far from the Sun, so very little of the Sun's warmth reaches it.*

4. Why are Uranus's rings up and down instead of flat?

A: *Uranus's rings go up and down because Uranus is tipped on its side.*

2 ON-GRADE — AGES 8–10 · 5 QUESTIONS — Uranus: The Tipped-Over World

1. How is an "ice giant" like Uranus different from gas giants like Jupiter and Saturn?

A: *Ice giants are made mostly of icy slushy water, methane, and ammonia, not just hydrogen and helium gas like the gas giants.*

2. What is unusual about how Uranus rotates, and what may have caused it?

A: *Uranus is tilted nearly on its side — about 98 degrees from upright. Scientists think a giant collision with a planet-sized object early in its history may have knocked it over.*

3. Why are seasons on Uranus so strange?

A: *Because Uranus is tilted on its side, each pole points towards the Sun for about 21 Earth years at a time, then spends 21 years in darkness — leading to incredibly long summers and winters.*

4. What gives Uranus its blue-green colour?

A: *Uranus is blue-green because methane gas in its atmosphere absorbs red light and reflects blue.*

5. Which spacecraft has visited Uranus, and how recent was the visit?

A: *Only Voyager 2 has ever visited Uranus, and that was a brief flyby back in 1986.*

3 ADVANCED — AGES 10–12 · 6 QUESTIONS — Uranus: A World on Its Side

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

A: *Jupiter and Saturn are gas giants made primarily of hydrogen and helium. Uranus is an ice giant, made mostly of a hot, dense slush of water, methane, and ammonia ices, surrounding a small rocky core.*

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

A: *Uranus's rotation, rings, and moons all share its sideways tilt — a pattern that fits with a colossal impact long ago that knocked Uranus and everything that formed with it permanently off-axis.*

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

A: *Uranus is tilted nearly 98 degrees and takes 84 Earth years to orbit the Sun, so each pole spends about 21 years in continuous sunlight followed by 21 years in darkness. These are the most extreme seasons of any planet.*

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

A: *Methane in the upper atmosphere absorbs red light and scatters blue light back, giving Uranus its blue-green colour. Lower in the atmosphere, hydrogen sulfide gas would smell like rotten eggs.*

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

A: *Miranda has spectacular cliffs and grooves that suggest it was once broken apart and re-formed by gravity. Its fractured surface points to past tectonic activity.*

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

A: *Only Voyager 2 has ever visited Uranus, and that was just a brief flyby in 1986. Scientists want a dedicated orbital mission (like Cassini was for Saturn) to study Uranus in detail.*