READING PASSAGE · LEVEL 3 · ADVANCED

VENUS: A LESSON IN CLIMATE

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

Venus is often called Earth's twin — and for good reason. With a diameter of 12,104 kilometres, it is just 5% smaller than our planet, and its mass and density are also remarkably similar. Beneath the clouds, Venus has volcanic plains, mountains, and craters, much like a rocky world should. But there the similarities end. Venus is, in many ways, what Earth might have become if things had gone catastrophically wrong.

The surface of Venus is the hottest place in the solar system, averaging 464°C. This is not because of its proximity to the Sun — Mercury is closer — but because of an extreme runaway greenhouse effect. Venus's atmosphere is composed almost entirely of carbon dioxide, with thick clouds of sulfuric acid suspended in it. Sunlight passes down through these clouds and warms the surface, but heat cannot escape back into space because the dense atmosphere traps it.

The atmospheric pressure at the surface is 92 times that of Earth — equivalent to being almost a kilometre underwater. Soviet probes that landed on Venus in the 1970s and 1980s, such as Venera 13 and 14, sent back the only photographs ever taken from its surface, but they survived only minutes to a few hours before the heat and pressure destroyed them.

Venus also rotates oddly. It spins once every 243 Earth days, making a Venusian day longer than its 225-day year. Stranger still, Venus spins backwards relative to most other planets — a feature scientists call retrograde rotation. The cause is uncertain, but a giant ancient impact may have flipped the planet upside down.

Despite its hostile surface, the upper atmosphere of Venus is surprisingly Earth-like. About 50 kilometres up, temperatures and pressures resemble those at Earth's surface. Some researchers have proposed that floating airships could one day explore Venus from above. A few have even speculated that ancient Venus may once have had oceans, before its runaway greenhouse changed everything. Studying Venus may help us understand how habitable worlds can become uninhabitable.

★ WORDS TO KNOW — 5 TERMS

density
How much matter is packed into a given amount of space.

runaway greenhouse effect
A feedback loop where trapped heat keeps making a planet hotter and hotter.

habitable
Able to support life.

retrograde
Going in the opposite direction from the usual or expected one.

probe
A robotic spacecraft sent to explore another world.

★ COMPREHENSION QUESTIONS — 6 QUESTIONS

1. In what ways are Venus and Earth similar, and in what ways are they extremely different?

2. Explain how the runaway greenhouse effect on Venus works.

3. What did Soviet Venera probes accomplish, and what limited them?

4. What does "retrograde rotation" mean, and how might scientists explain Venus's unusual spin?

5. Where on Venus might Earth-like conditions actually be found?

6. Why is studying Venus important for understanding Earth's future?