READING PASSAGE · LEVEL 3 · ADVANCED

MERCURY: SECRETS OF THE SMALLEST PLANET

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

Mercury, the smallest and innermost planet, is a world of extremes. With a diameter of just 4,879 kilometres — only slightly larger than Earth's Moon — it orbits the Sun at an average distance of 58 million kilometres, completing each year in just 88 Earth days. Yet a single solar day on Mercury, from one sunrise to the next, lasts 176 Earth days. This odd mismatch is caused by a phenomenon called spin–orbit resonance: Mercury rotates exactly three times for every two orbits around the Sun.

Mercury's surface looks remarkably like our Moon's, scarred by countless impact craters preserved for billions of years. Without weather, water, or active geology to wear them away, these craters tell a story of the violent early solar system, when small bodies frequently collided.

What makes Mercury truly extraordinary is its temperature range. The planet has only a thin layer of gas called an exosphere — far too sparse to count as a real atmosphere — so it cannot regulate temperature. Sunlit surfaces can reach 430°C, while shadowed regions plunge to −180°C, a swing of more than 600°C. Astonishingly, the floors of certain deep craters near the poles never see sunlight, and they harbour permanently frozen deposits of water ice.

Mercury also has a surprisingly large iron core, making up about 75% of its diameter — a much larger fraction than any other rocky planet. Scientists believe a massive collision early in Mercury's history may have stripped away much of its outer rocky layers, leaving the iron-rich core behind. This dense core also generates a weak but measurable magnetic field, something most rocky bodies of this size lack entirely.

Three missions have unlocked most of what we know: Mariner 10 made flybys in 1974–75, MESSENGER orbited from 2011 to 2015 and produced the first complete map, and BepiColombo — a joint European and Japanese mission launched in 2018 — is scheduled to enter Mercury's orbit later in 2026. Its findings may finally help answer how the smallest planet became so unlike the others.

★ WORDS TO KNOW 5 TERMS

resonance
A regular timing pattern between two motions, like Mercury's spin and orbit.

magnetic field
An invisible force field around a planet that interacts with magnets and electric currents.

core
The deep central part of a planet, often dense and very hot.

exosphere
The very thin outer edge of a planet's atmosphere — barely an atmosphere at all.

flyby
A spacecraft passing close to a planet without entering orbit.

★ COMPREHENSION QUESTIONS 6 QUESTIONS

1. Explain how Mercury's spin–orbit resonance can make a single day on Mercury longer than a Mercury year.

2. Why has Mercury's surface kept its craters for so long?

3. What is an exosphere, and how does Mercury's thin one affect its surface temperatures?

4. Describe Mercury's core and explain why scientists think it is so unusually large.

5. Why is Mercury's magnetic field surprising?

6. Name the three space missions that have explored or will explore Mercury, and what each contributes.