Table of Contents

1. Overview of Mercury

- Position in Solar System: 1st planet from the Sun
- Distance from Sun: ~57.9 million km (0.39 AU)
- Orbital Period: 88 Earth days (1 Mercury year)
- Rotation Period: 59 Earth days (1 Mercury day)
- Diameter: 4,880 km (about 38% of Earth's)
- Gravity: 3.7 m/s² (38% of Earth's)
- Temperature:
  - Daytime: Up to 430°C (800°F)
  - Nighttime: Down to -180°C (-290°F)
- Moons: None
- Atmosphere: Thin exosphere (oxygen, sodium, hydrogen, helium, potassium)

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2. Key Characteristics

- Size: Smallest planet in the solar system.
- Surface: Cratered and similar to the Moon, covered in dust and rock.
- Color: Dark gray.
- Core: Large metallic core (accounts for about 85% of its radius).
- Density: Second densest planet (after Earth).

- No Tilt: Almost no axial tilt (0.034°), meaning minimal seasons.

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3. Orbital and Rotational Facts

- Orbital Speed: 47.87 km/s (fastest planet).
- Eccentric Orbit: Highly elliptical; distance from the Sun varies greatly.
- 1 Day-Night Cycle: 176 Earth days (due to spin-orbit resonance).
- Tidal Locking: Experiences 3 rotations for every 2 orbits around the Sun.

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4. Atmosphere and Magnetic Field

- Exosphere Composition:
  - Contains traces of oxygen, sodium, and hydrogen.
  - Created by solar wind and micrometeorite impacts.
- Weak Magnetic Field: ~1% of Earth’s magnetic strength.
  - Suggests a partially molten core.

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5. Surface and Geological Features

- Surface Resembles the Moon:
  - Covered in impact craters.
  - Caloris Basin: One of the largest impact craters (1,550 km wide).
- Scarps (Cliffs): Evidence of planetary shrinking as Mercury’s core cools.
- Plains: Smooth plains likely formed by ancient volcanic activity.

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6. Temperature Extremes

- Daytime: Extremely hot due to proximity to the Sun.
- Nighttime: Frigid, as Mercury lacks a thick atmosphere to retain heat.
- Temperature Variation: Greatest in the solar system.

7. Exploration of Mercury

- Mariner 10 (1974-75): First spacecraft to visit Mercury (three flybys).
- MESSENGER (2011-2015): Orbited Mercury, mapping 100% of the surface.
- BepiColombo (2025 Arrival): Joint ESA-JAXA mission currently en route.

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8. Interesting Facts

- Mythology: Named after Mercury, the Roman messenger god (Greek: Hermes).
- Fastest Planet: Completes an orbit faster than any other planet.
- Double Sunrises: At certain points in its orbit, the Sun appears to rise, set, and rise again.
- No Moons/Rings: Mercury is one of only two planets (along with Venus) with no moons or rings.

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9. Why is Mercury Important?

- Understanding Planet Formation: Studying Mercury helps scientists understand how rocky planets form.
- Unique Core: Its large iron core provides clues about the solar system’s early history.
- Extreme Environment: Helps study the effects of solar radiation on planetary surfaces.

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10. Key Measurements

Property	Value
Diameter	4,880 km
Distance from Sun	57.9 million km (0.39 AU)

Property	Value
Orbital Period	88 Earth days
Rotation Period	59 Earth days
Gravity	3.7 m/s²
Surface Temperature	-180°C to 430°C
Moons	0
Magnetic Field	Weak (1% of Earth’s)