MARS

- Mars is the fourth planet from the Sun.
- It is often called the **Red Planet**.
- The red color comes from iron oxide (rust) on its surface.
- Mars is a **terrestrial** planet with a rocky surface.
- It is about half the size of Earth.
- Mars has a diameter of about 6,779 km.
- Its gravity is about 38% of Earth's gravity.
- A 100 kg object on Earth would weigh 38 kg on Mars.
- One day on Mars is called a **sol** and lasts about 24.6 hours.
- A year on Mars lasts about **687 Earth days**.
- Mars has **two moons**: Phobos and Deimos.
- Both are small, irregularly shaped, likely captured asteroids.
- Mars has **seasons**, like Earth, due to its axial tilt.
- Its axial tilt is about **25 degrees**.
- Mars has a **very thin atmosphere**.
- The atmosphere is about **95% carbon dioxide**.
- Other gases include nitrogen and argon.
- There's only about 0.13% oxygen.
- Atmospheric pressure is less than 1% of Earth’s.
- It cannot support human life without technology.
- Mars is much **colder** than Earth.
- The average surface temperature is about **-63°C** (-81°F).
- Temperatures can range from **-140°C to 30°C**.
- Mars has the **largest volcano** in the solar system: Olympus Mons.
- Olympus Mons is about **22 km high** — almost 3 times Mount Everest.
- Mars also has the **longest canyon**, Valles Marineris.
- Valles Marineris stretches over **4,000 km long**.

MARS

- Mars has **polar ice caps** made of water and dry ice (frozen CO_2).
- These caps grow and shrink with the seasons.
- Water ice has been found just below the surface.
- Ancient Mars may have had **liquid water**.
- Evidence includes dried riverbeds and minerals that form in water.
- Mars has dust storms that can **cover the entire planet**.
- These storms can last for **weeks or even months**.
- The Martian sky appears **orange-pink** due to dust.
- Mars has a very thin **magnetosphere**.
- It once had a stronger magnetic field.
- Without a strong magnetic field, solar wind stripped away its atmosphere.
- Mars' surface is covered in **basalt rock and iron-rich dust**.
- The soil is toxic to humans due to perchlorates.
- Mars experiences **quakes** — called **marsquakes**.
- NASA's InSight lander has detected many marsquakes.
- Mars exploration began with telescopes centuries ago.
- In the 19th century, observers thought they saw "canals" on Mars.
- These led to speculation about Martian civilizations.
- In 1965, **NASA's Mariner 4** sent back the first close-up photos.
- It revealed a cratered, lifeless surface.
- Many missions followed, both orbiters and landers.
- NASA’s **Viking 1 and 2** landed on Mars in the 1970s.
- They were the first successful Mars landers.
- NASA’s **Pathfinder** in 1997 included the first Mars rover, **Sojourner**.
- In 2004, **Spirit** and **Opportunity** rovers landed.
- They found strong evidence of past water.
- **Curiosity**, a larger rover, landed in 2012.

MARS

- It explored Gale Crater and found organic molecules.
- **Perseverance** landed in 2021 in Jezero Crater.
- It is collecting samples for a future return mission.
- Perseverance is also testing oxygen production from Martian air.
- It carried the **Ingenuity helicopter**, the first aircraft on another planet.
- Ingenuity has completed dozens of successful flights.
- **Mars Reconnaissance Orbiter** captures high-resolution images.
- **ESA**, **ISRO**, **China**, and the **UAE** have also sent missions to Mars.
- Mars is a prime target for **searching for life**.
- No direct evidence of life has been found yet.
- Some meteorites from Mars have been found on Earth.
- They may contain hints about Mars' history.
- Scientists think ancient Mars may have had a **habitable environment**.
- NASA and ESA plan to **return Mars samples** to Earth in the 2030s.
- Human missions to Mars are being planned.
- NASA's **Artemis program** may lead to Mars exploration after the Moon.
- **SpaceX** is developing **Starship** for crewed Mars missions.
- Elon Musk aims to build a **colony on Mars**.
- Challenges include radiation, low gravity, and life support.
- Mars is about **225 million km (140 million mi)** from the Sun.
- It takes **light about 13 minutes** to travel from Mars to Earth.
- Mars has **no global magnetic field**.
- Solar and cosmic radiation is a serious concern for future explorers.
- Mars may have had a **thick atmosphere** billions of years ago.
- Volcanic activity played a big role in Mars' early history.
- Mars has many **impact craters** from asteroids.
- Some craters are billions of years old.

MARS

- **Dust devils** — mini-tornadoes — are common on Mars.
- Mars' atmosphere can **freeze out** during winter in the poles.
- Earth-based telescopes continue to study Mars.
- Mars is visible to the naked eye as a red "star" in the night sky.
- The **opposition of Mars** occurs every 26 months.
- That’s when it’s closest and brightest as seen from Earth.
- Terraforming Mars is a popular science fiction idea.
- It would involve warming the planet and thickening its atmosphere.
- Some propose mirrors, greenhouse gases, or nuclear options.
- Terraforming remains speculative and far off.
- Mars has inspired countless books, movies, and games.
- From **H.G. Wells** to **The Martian**, it captures human imagination.
- Mars has no permanent human presence — yet.
- It represents a stepping stone to interplanetary colonization.
- Mars helps us understand Earth's past and future.
- It could offer clues about life beyond our planet.
- Mars may one day be humanity’s second home.
- For now, it remains a world of wonder and challenge.
- Mars is dry, cold, and harsh—but full of scientific promise.

THANK YOU