Planet Earth and beyond & Systems and Control

The Solar System (Week 1&2)

The **solar system** is the **collection of the Sun and all the objects that move around it** because of its gravity.

It includes:

1. **The Sun** – a huge star at the center that gives us light and heat.
2. **Eight planets** – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
3. **Dwarf planets** – such as Pluto, Ceres, and Eris.
4. **Moons** – natural satellites that orbit planets (for example, Earth's Moon).
5. **Asteroids** – rocky objects found mostly in the asteroid belt between Mars and Jupiter.
6. **Comets** – icy bodies that form tails when they come near the Sun.
7. **Meteoroids** – small rocks or particles moving through space.

The Sun, Planets and Asteroids

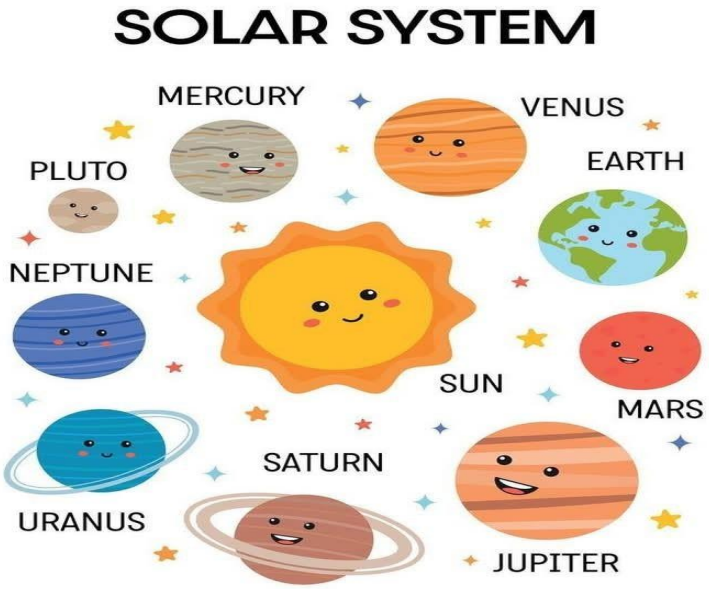
1. The Sun

- The **Sun** is a **star** made mostly of **hot gases (hydrogen and helium)**.
- It is the **center of the solar system**.
- The Sun gives us **light, heat, and energy**, making life on Earth possible.
- Its gravity keeps all the planets and other objects moving around it.

2. The Planets

- **Planets** are **large round objects** that move (orbit) around the Sun.
- There are **eight planets** in our solar system:
    1. **Mercury** – closest to the Sun, very hot.
    2. **Venus** – second planet, very bright and hot.

3. **Earth** – our home, the only planet known to have life.
4. **Mars** – called the Red Planet.
5. **Jupiter** – the largest planet.
6. **Saturn** – known for its rings.
7. **Uranus** – a blue-green planet that rotates on its side.
8. **Neptune** – farthest from the Sun and very cold.



3. Asteroids

- **Asteroids** are **rocky objects** that orbit the Sun, but they are **much smaller than planets**.
- Most are found in the **asteroid belt**, a region between **Mars and Jupiter**.
- They are made of rock and metal and are leftovers from the early formation of the solar system.

Moons

Moons are **natural satellites** — they are **objects that move (orbit)** around planets.

Here's what that means:

- A **moon** is not a star or a planet.
- It travels around a **planet**, just like planets travel around the **Sun**.

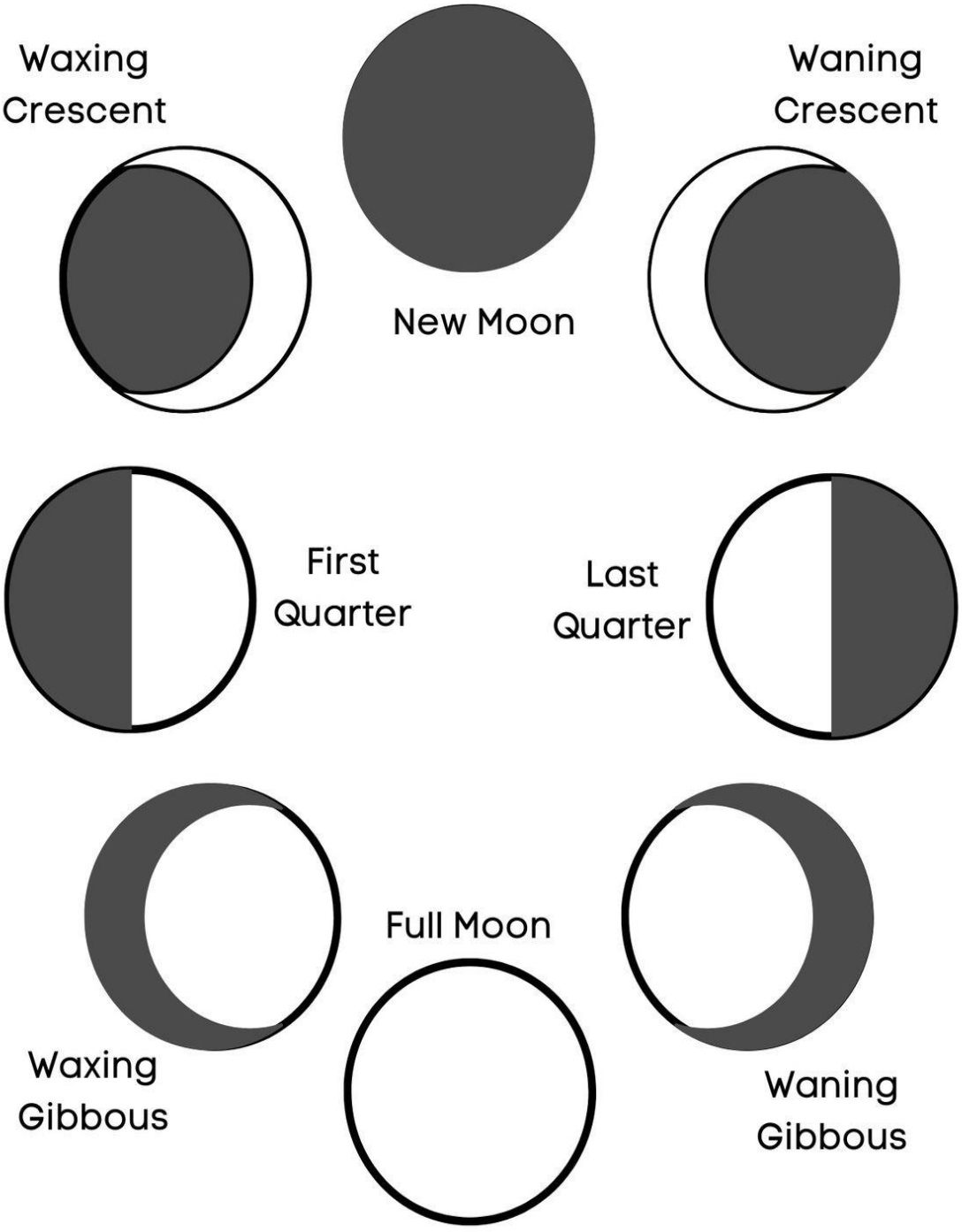
- Moons **do not make their own light**; they **reflect the Sun's light**.

Examples:

- **Earth** has **one moon** — we simply call it *the Moon*.
- **Mars** has **two small moons** — *Phobos* and *Deimos*.
- **Jupiter** has **more than 90 moons**, including *Ganymede*, the largest moon in the solar system.
- **Some planets**, like **Mercury and Venus**, have **no moons** at all.

MOON PHASES

@thechrislam



Movements of the Earth and Planets (Week 3 & 4)

1. Rotation

- **Rotation** means **spinning or turning around on an axis**.
- Every planet **spins on its own axis** (an imaginary line through its center).
- **Earth** takes **24 hours (1 day)** to make one full rotation.
- Rotation causes **day and night**.
    - When your side of Earth faces the Sun → it's **day**.
    - When it turns away → it's **night**.

2. Revolution (Orbit)

- **Revolution** means **moving around the Sun** in a path called an **orbit**.
- All planets **revolve around the Sun** because of its gravity.
- **Earth** takes **365 days (1 year)** to make one full revolution around the Sun.
- The revolution causes the **seasons** (summer, winter, spring, autumn).

Summary

Movement	Meaning	Example	What it causes
Rotation	Spinning on axis	Earth rotates once every 24 hours	Day and night
Revolution	Moving around the Sun	Earth revolves once every 365 days	Seasons

Movement of the Moon (Week 4 – 5)

The Moon has two main movements, just like the planets do — it **rotates** and **revolves**.

1. Rotation

- **Rotation** means the Moon **spins on its own axis**.
- The Moon takes about **27 days** to complete one full spin.

2. Revolution

- **Revolution** means the Moon **moves around the Earth**.
- It also takes about **27 days** to make one full trip (orbit) around the Earth.

Because the **rotation and revolution times are the same**, the **same side of the Moon always faces Earth** — that's why we only ever see one side of it! 😊

Summary

Movement	Meaning	Time it takes	What it causes
Rotation	Spinning on its axis	27 days	Keeps the same face toward Earth
Revolution	Moving around Earth	27 days	Causes Moon phases (new moon, full moon, etc.)

System for looking into space (Week 5&6)

Systems for looking into space are the **tools and machines** that help scientists **observe, study, and explore** space beyond Earth.

Here are the main systems:

1. Telescopes

- **Telescopes** are instruments that **make faraway objects look closer and clearer**.
- They collect **light or radio waves** from stars, planets, and galaxies.
- There are different types:
    - **Optical telescopes** – use **lenses or mirrors** to see visible light (like what our eyes see).
    - **Radio telescopes** – use **large dishes** to collect radio waves from space.
    - **Space telescopes** – are **placed outside Earth's atmosphere** to get a clearer view (e.g., **Hubble Space Telescope**).

2. Space Probes

- **Space probes** are **unmanned (no people inside)** spacecraft sent to **explore distant planets, moons, or asteroids**.
- They send back **pictures and data** to Earth.
- Examples:
    - **Voyager 1 and 2** – explored outer planets.
    - **New Horizons** – visited Pluto.

3. Satellites

- **Satellites** are **machines that orbit Earth or other planets**.
- They are used for **communication, weather study, navigation, and observing space**.
- Example: **The Hubble Space Telescope** is a type of satellite telescope.

4. Spacecraft and Space Stations

- **Spacecraft** carry **astronauts** or equipment into space.
- **Space stations** (like the **International Space Station – ISS**) allow astronauts to **live and work in space** for long periods.

In summary

System	What it does
Telescope	Helps us see distant stars and planets
Space Probe	Travels to study planets and sends data back
Satellite	Orbits Earth or other planets for observation
Spacecraft / Space Station	Carry astronauts and allow research in space

Systems to explore the Moon and Mars (Week 7&8)

Systems to explore the Moon and Mars are special **machines, vehicles, and spacecraft** designed to **study, land on, or send information** from these two worlds.

Here's a simple breakdown:

1. Systems to Explore the Moon

The Moon was the **first place humans explored beyond Earth**.

(a) Spacecraft

- Carry **astronauts or machines** to the Moon.
- Example: **Apollo spacecraft** (by NASA) took astronauts to the Moon in the 1960s–1970s.

(b) Lunar Landers

- **Landers** are designed to **land softly** on the Moon's surface and study it.
- Example: **Apollo Lunar Module** and **China's Chang'e landers**.

(c) Moon Rovers

- **Rovers** are small **robot cars** that move on the Moon's surface to take pictures and collect rocks.
- Example: **Lunokhod (Russia)** and **Yutu (China)**.

(d) Orbiters

- **Orbiters** circle the Moon and take detailed **photos and maps**.
- Example: **Lunar Reconnaissance Orbiter (LRO)**.

2. Systems to Explore Mars

Mars is called the **Red Planet**, and scientists explore it using robots and spacecraft.

(a) Spacecraft / Probes

- Travel from Earth to Mars to study it from space or land on it.
- Example: **Mars Pathfinder**, **InSight**, **MAVEN**.

(b) Orbiters

- Circle Mars and send pictures and weather information.
- Example: **Mars Odyssey**, **Mars Reconnaissance Orbiter**, **Hope Probe**.

(c) Rovers

- Robots that **drive on Mars** to collect data, take pictures, and test rocks and soil.
- Examples:
    - **Spirit** and **Opportunity**
    - **Curiosity**
    - **Perseverance** (still working today)

(d) Landers

- Stay in one place on Mars to study the ground and weather.
- Example: **Viking Landers**, **InSight Lander**.

In short

System	Purpose	Example
Spacecraft	Travel to Moon or Mars	Apollo, Mars Pathfinder
Lander	Land safely and study surface	Chang'e, InSight
Rover	Move around to collect data	Yutu, Perseverance
Orbiter	Circle and take pictures	LRO, Mars Reconnaissance Orbiter

Remediation, revision, and consolidation (Week 9)