Suborbital Flight

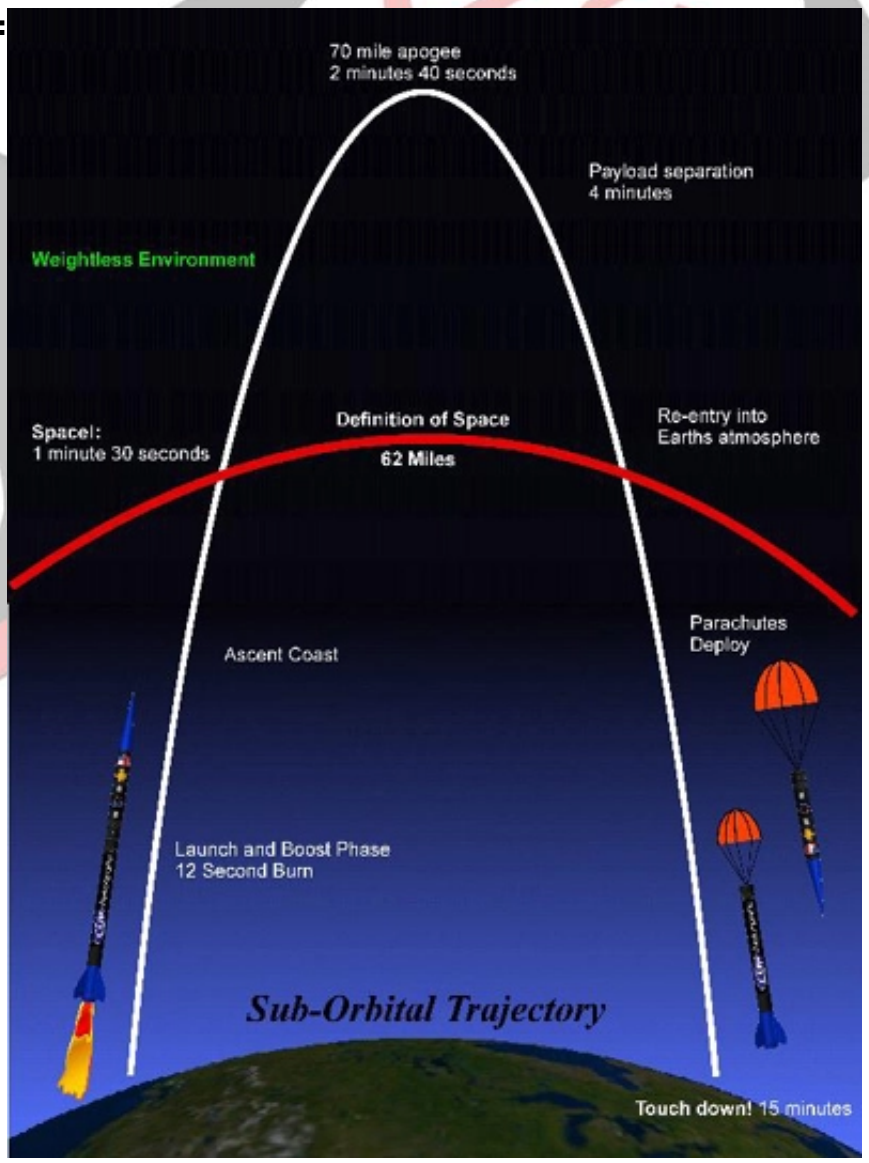
Why in News

Recently, a six person crew on **Virgin Galactic's VSS Unity spaceship** undertook a brief trip to the **"edge of space"** which is known as **Suborbital Flight.**

- **Sirisha Bandla, an astronaut born in India**, was a part of the crew. She was the **third woman of Indian origin** to go to space after **Kalpana Chawla and Sunita Williams.**
- **Virgin Galactic** is a British-American **spaceflight company**, operating in the United States.

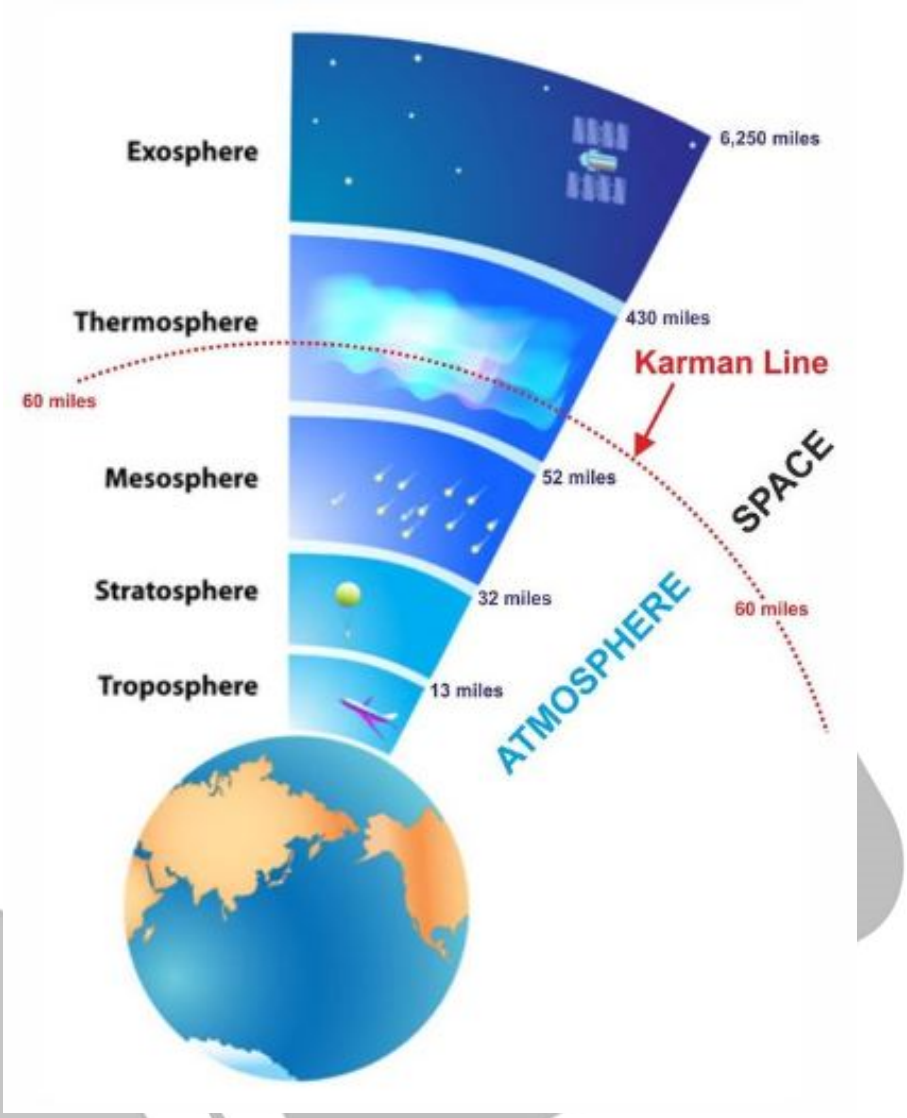
Key Points

- **Suborbital Flight/Trajectory:**



- When an **object travels at a horizontal speed of about 28,000 km/hr or more**, it **goes into orbit** once it is above the atmosphere.
    - The **satellites need to reach that threshold speed (orbital velocity)** in order to orbit Earth.
- Such a satellite would be **accelerating towards the Earth due to gravity**, but its **horizontal movement is fast enough to offset the downward motion** so that it moves along a circular path.
- Any object travelling **slower than 28,000 km/hr must eventually return to Earth.**
- Any object that launches to space but **does reach sufficient horizontal velocity to stay in space falls back to Earth.** Hence they **fly in a suborbital trajectory.**
    - It means that while these **vehicles will cross the ill-defined boundary of space**, they will **not be going fast enough to stay in space** once they get there.

- **Significance of Suborbital Flights:**
    - **Increased Access:**
        - It would provide **increased flight access for design innovation** and experimental manipulation due to high projected flight rates.
    - **Research:**
        - Suborbital flights will be helpful **for microgravity research.** Microgravity is the **condition in which people or objects appear to be weightless.**
        - Suborbital flights **could also be an alternative to parabolic flights** in aeroplanes that space agencies currently use to simulate **zero gravity.**
            - **Zero Gravity** or Zero-G can simply be defined as the **state or condition of weightlessness.**
    - **Cost Effective:**
        - They would be **far less expensive** than carrying experiments and people to the International Space Station**.**
- **Edge of Space/Karman Line:**



- The most widely accepted boundary of space is known as the **Karman line**. The **Fédération Aéronautique Internationale (FAI)** defines Karman Line as the altitude of 100 kilometres above Earth's mean sea level.
    - FAI is the world governing body for air sports, and also stewards definitions regarding human spaceflight.
- The Kármán line has been compared to international waters, as there are no national boundaries and human laws in force beyond the line.
- It is named after **Theodore von Karman (1881–1963)**, a Hungarian American engineer and physicist, who was active primarily in aeronautics and astronautics.
    - He was the **first person to calculate the altitude at which the atmosphere becomes too thin to support aeronautical flight** and arrived at 83.6 km himself.
- However, other organizations do not use this definition. **There is no international law defining the edge of space**, and therefore the limit of national airspace.

Source: IE