

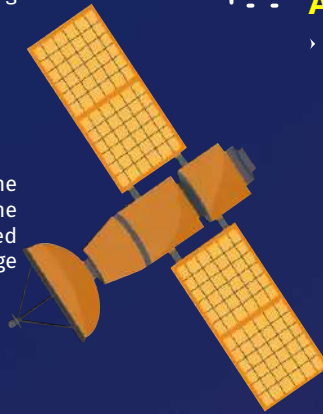
# LAGRANGE POINTS

## Context

- › The Aditya-L1 mission, which will launch on Saturday, will add India to a select group of countries that have deployed probes to investigate the Sun. While India has previously conducted satellite-based experiments to study the Sun, Aditya-L1, which intends to land a spacecraft at the 'L1' spot in space (see box and figure), is the country's first dedicated solar mission.
- › Aditya-L1 is also ISRO's second observatory-class mission, following AstroSat (2015).

## Numbers and Nature of Lagrange points

- › There are five numbers of Lagrange points i.e L1, L2, L3, L4 and L5.
- › Of the five Lagrange points, three are unstable and two are stable. The unstable Lagrange points - labeled L1, L2 and L3 - lie along the line connecting the two large masses. The stable Lagrange points - labeled L4 and L5 - form the apex of two equilateral triangles that have the large masses at their vertices. L4 leads the orbit of earth and L5 follows.



## What is Lagrange Points?

- › Lagrange points are positions in space where objects sent there tend to stay put. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. These points in space can be used by spacecraft to reduce fuel consumption needed to remain in position.
- › Lagrange points are named in honor of Italian-French mathematician Joseph-Louis Lagrange.

## About

- › There are five special points where a small mass can orbit in a constant pattern with two larger masses. The Lagrange Points are positions where the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. This mathematical problem, known as the "General Three-Body Problem" was considered by Lagrange in his prize winning paper (Essai sur le Problème des Trois Corps, 1772).

## L4 POINT

- › The L4 and L5 points are home to stable orbits so long as the mass ratio between the two large masses exceeds 24.96. This condition is satisfied for both the Earth-Sun and Earth-Moon systems, and for many other pairs of bodies in the solar system. Objects found orbiting at the L4 and L5 points are often called Trojans after the three large asteroids Agamemnon, Achilles and Hector that orbit in the L4 and L5 points of the Jupiter-Sun system.

## L1 POINT

- › The L1 point of the Earth-Sun system affords an uninterrupted view of the sun and is currently home to the Solar and Heliospheric Observatory Satellite SOHO.

## L2 POINT

- › The L2 point in the Earth-Sun system was home to the WMAP spacecraft, is now home to Planck, and will be home to the James Webb Space Telescope in the future. L2 is great for astronomy since a spacecraft can maintain the Sun, Earth, and Moon behind the spacecraft for solar power, and (with sufficient shielding) affords a clear view of deep space for our telescopes. On a time scale of around 23 days, the L1 and L2 points are unstable, necessitating regular course and attitude corrections for spacecraft orbiting these positions.

## L3 POINT

- › NASA is unlikely to find any use for the L3 point since it remains hidden behind the Sun at all times.

