ACHIEVEMENTS OF CONTEMPORARY BHARAT

सत्यमेव जयते
MINISTRY OF EDUCATION
Government of India

CHANDRAYAAN UTSAV

CODE 1.8HS

SPECIAL MODULE

विद्ययाऽमृतमश्नुते

एन सी ई आर टी
NCERT

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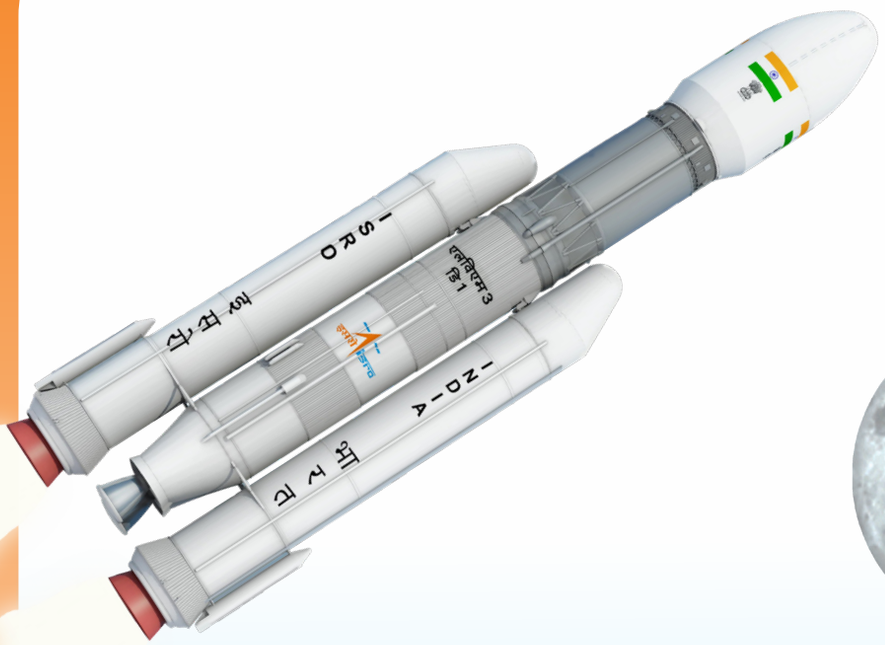


Bharat on the Moon

Higher Secondary Stage

The Moon – How fascinating is the word? Do you agree?

Let us read this riddle

Some planets have many of these,

But for our planet there is only one.

It causes a solar eclipse,

When it gets between the Earth and the Sun.

The Moon

Have you ever wondered if life exists outside the Earth? Wouldn't it be exciting to live on the Moon? Now the most important question; Do you want to go on the Moon? Well for your information there are people who are finding ways to live on the moon.

So, wear your spacesuits and get ready for your journey in The Space Express.

Chandrayaan

Chandrayaan missions are specifically designed to explore the surface of the Moon. Bharat's lunar space program is known as "CHANDRAYAAN". It is derived from a Sanskrit word *Chandra*, which means "Moon", and Yaana which means "craft vehicle". *Bhartiya* lunar exploration program is an ongoing series of outer space missions by the Indian Space Research Organisation (ISRO) for the exploration of the Moon.

India's third lunar mission CHANDRAYAAN-3 shed light on a completely unexplored region of the Moon, its South Polar region. Do you realise what a remarkable mission was Chandrayaan-3 Mission. The scientific approach must have

ignited your curiosity. I am sure you will be interested to know more about Chandrayaan-3.

Chandrayaan-3 consists of an indigenous Lander Module (LM), Propulsion Module (PM) and a Rover with an objective of developing and demonstrating new technologies required for inter planetary missions. The Lander has the capability to soft-land at a specified lunar site and deploy the Rover which carried out in-situ chemical analysis of the lunar surface during the course of its mobility. The Lander and the Rover have scientific payloads to carry out experiments on the lunar surface. The main function of PM is to carry the LM from launch vehicle injection till final lunar 100 km circular polar orbit and separate the LM from PM. Apart from this, the PM also has one scientific payload SHAPE as a value addition which has operated post separation of Lander Module. The launcher identified for Chandrayaan-3 is LVM3 M4.

Source: www.ncertofficialyoutube.com

The Moon: Earth's Best Friend

The Moon, our nearest neighbour in space, is a natural satellite of the Earth. It is our planet's only satellite as well. It is the second brightest object we see in the sky after the sun. The moon does not have any light of its

own. Its observed silvery glow is only due to the light of the sun. The Moon's gravity is six times weaker than the Earth's gravity. It is so weak that it does not have any atmosphere. That is why we cannot hear sound on the surface of the Moon.

Do you know?

How astronauts talk on the moon? Since there is no atmosphere on the lunar surface, they communicate through the radio waves.
It is about 3,84,400 km from the earth.

Lunar Missions

You might have heard about different space missions. Can you name a few of them? Now, the space missions which are designed to collect information about the Moon and its environment are known as LUNAR MISSIONS. These missions are not only for scientific purposes, but also to be used in the planning of future LM including manned missions to the Moon.

Successful Lander Missions on Lunar Surface

Name of the Mission	Operator	Launch Date	Landing Date
Luna 9	GSMZ	31 January 1966	3 February 1966
Surveyor-1	Lavochkin (Russia) NASA (USA)	30 May 1966	2 June 1966
Apollo 11	NASA (USA)	16 July 1969	24 July 1969
Chang'e 4	CNSA (China)	7 December 2018	3 January 2019
Chandrayaan-3	ISRO (India)	14 July 2023	23 August 2023

Rocket: As a research vehicle

Suppose you want to travel a very long distance so you need vehicle like bus, rail, aeroplane, etc.

Similarly, if you want to go outside our planet Earth, you would require a space vehicle known as the ROCKET.

Once a rocket reaches the right altitude from the Earth, it injects the satellite or the spacecraft. The propellants give the rocket enough thrust to boost away from the Earth's surface. Due to the pull of the Earth's gravity, large and heavy spacecrafts need huge rockets and large amount of propellant.

Chandrayaan-1

Chandryaan-1 was launched by the Indian Space Research Organisation (ISRO) on 22 October 2008, and operated until August 2009. It was designed for remote sensing observations of the Moon's surface.

Chandrayaan-2

Chandrayaan-2 was launched in 2019 to map and study the variations in the lunar surface composition, as well as the location and abundance of lunar water.

Chandrayaan-2 was a composite module consisting of three components:

- A Lunar Orbiter
- A Lander named *Vikram*
- A Rover named *Pragyan*

The *Pragyan* was housed inside the *Vikram* lander. After the landing of *Vikram*, *Pragyan* was to roll out on the Moon's surface. Chandrayaan-2 was inserted in the lunar orbit on 19 August 2019. While the orbiter module remained in the lunar orbit, the composite spacecraft released the *Vikram* Lander on 6 September 2019 for landing. At approximately at 2.1 kilometres altitude, it lost contact from ground station. *Vikram* crash landed due to some hardware and software errors. Although the Lander was lost, the orbiter still continues to work to send back high-definition imagery of lunar surface.

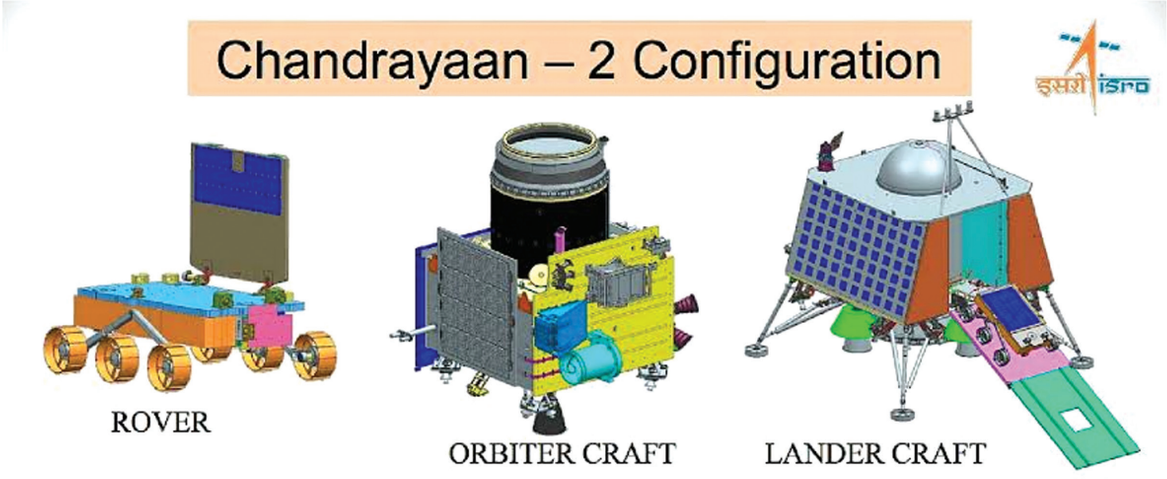


Figure 1: Components of Chandrayaan-2

The primary objectives of Chandrayaan-3 were to demonstrate the capability of the *Vikram* Lander's soft landing near the South Polar region of the Moon, where no country has attempted to reach so far and to put the *Pragyan* Rover on the lunar surface.

The hon'ble Prime Minister, Shri Narendra Modi, congratulated ISRO for this great achievement. You can watch the official video by scanning the code:

The Chandrayaan-3 Mission was conducted in different phases, and the sequence of phases is given below.

The various mission phases are classified as follows:

Earth Centric Phase (Phase-1)

- Pre-launch Phase
- Launch and Ascent Phase
- Earth-bound Manoeuvre Phase

Lunar Transfer Phase (Phase-2)

- Transfer Trajectory Phase

Moon Centric Phase (Phase-3)

- Lunar Orbit Insertion Phase (LOI)-(Phase-3)
- Moon bound Manoeuvre Phase (Phase-4)
- PM and Lunar Module Separation (Phase)
- De-boost Phase (Phase-6)
- Pre-landing Phase (Phase-7)
- Landing Phase (Phase-8)
- Normal Phase for Lander and Rover (Phase-9)
- Moon Centric Normal Orbit Phase
- (100 km circular orbit) - For Propulsion Module (Phase-10)

Source: isro.gov.in

Fun Fact Neil Armstrong was the first human to step on the Moon on July 20 1969.

Figure 2: Three-dimensional view of Chandrayaan-3

Chandrayaan-3 Mission was a remarkable mission and it created history in space for INDIA.

ISRO went live on YouTube and shared the launching of chandrayaan-3.

You all can scan the code below to watch the official video.

SCAN ME

EVER DREAMT OF BECOMING AN ASTRAUNAUT?

Indian Space Research Organisation is organising a special programme for School Children called "Young Scientist Programme" "YUva VIgyani KAryakram", YUVIKA, to impart basic knowledge on Space Technology.

This is an annual program conducted to develop interest of young minds in astronomy.

Activities

You must have heard different poems and stories about Moon from your grandparents. Try to recall and share them with your classmates.

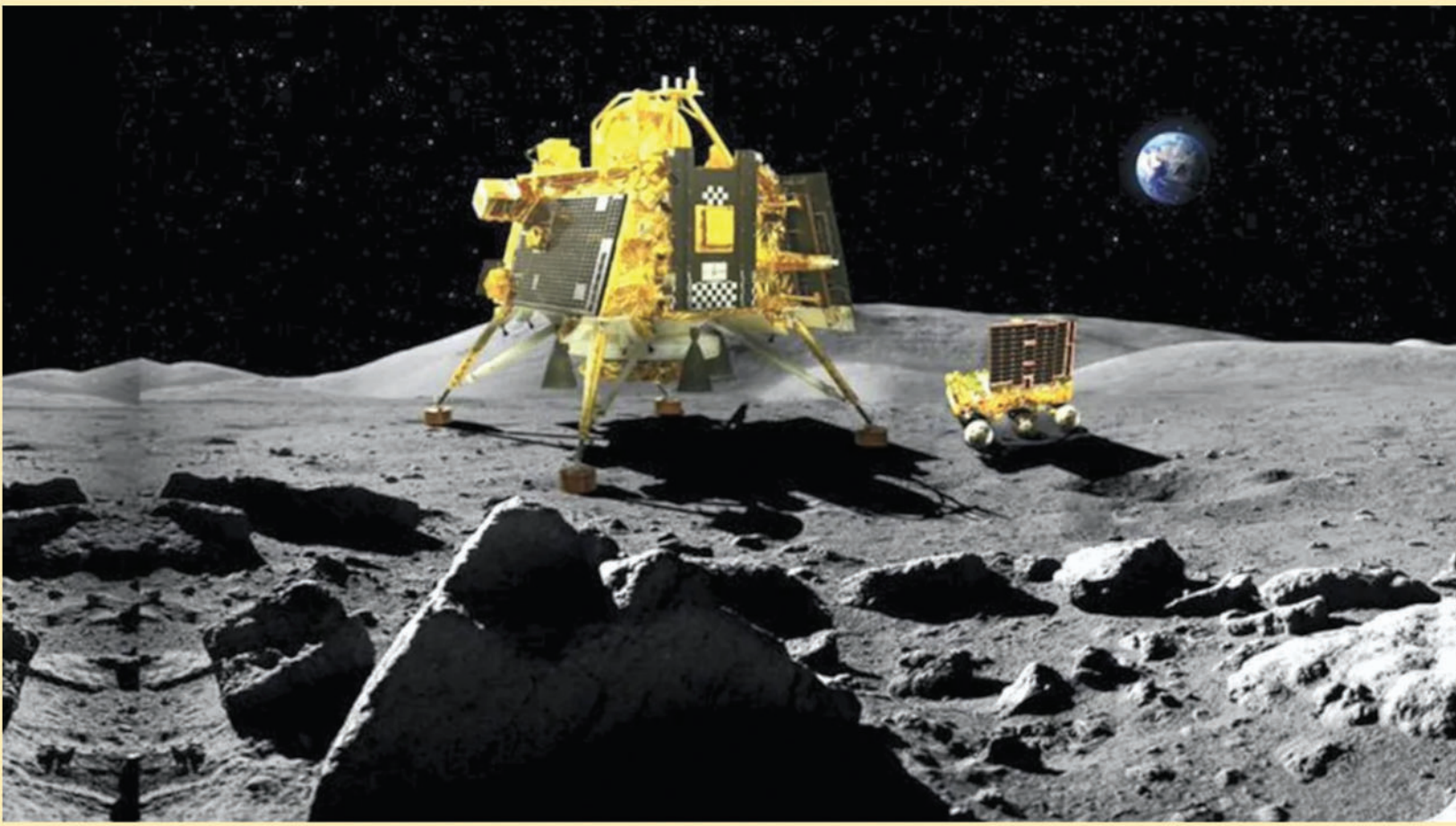
- Write a story about what you think who would be found on the moon.
- There are various new issues emerging from the space, for example: Space junk. Try to find more of such issues and the ways to solve them.
- Make a group of four students and demonstrate the landing of Chanrayaan-3 on the lunar surface.
- Institution/schools should try to take their students on a scientific picnic to any space centre, ISRO Headquarters, launch sites, etc.

Theme 1.0 Chandrayaan Utsav

1.1	F	हमारा चंद्रयान Our Chandrayaan
1.2	P	*Mera Pyara Chanda: Rani ki Khoj*
1.3	M	Chandrayaan Mission: Bharat's Expedition to the Moon
1.4	S	Chandrayaan: Journey Towards the Moon
1.5	S	Exploring the Moon Mission of Bharat
1.6	S	Towards Moon and Beyond
1.7	S	Exploring Chandrayaan-3: Bharat's Lunar Mission
1.8	HS	Bharat on the Moon
1.9	HS	Bharat Space Mission: The Chandrayaan Mission
1.10	HS	Physics of Chandrayaan-3

For participation in the activities related to Apna Chandrayaan:
Visit : www.bharatonthemoon.ncert.gov.in

For more information:
Email: dceta.ncert@nic.in
PMeVIDYA IVRS: 8800440559



An image of Rover *Pragyan* with Lander *Vikram*

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