

Name of the student: *Date:* 14/10/2020

Satellites:

A satellite is an object in space that orbits or circles around a bigger object.

There are two kinds of satellites, such as—

1. Natural (such as the moon orbiting the Earth)
2. Artificial (such as the International Space Station orbiting the Earth)

Natural Satellite:

A **natural satellite** is any celestial body in space that orbits around a larger body.

Artificial Satellite:

Artificial satellites are man-made objects that orbit the Earth and other planets in the Solar System.

- ✓ An artificial satellite is a space vehicle designed to orbit a large body, usually the earth.
- ✓ Soviet Sputnik 1 mission was the first artificial satellite that was launched in 1957.

Q. Why is the moon a satellite?

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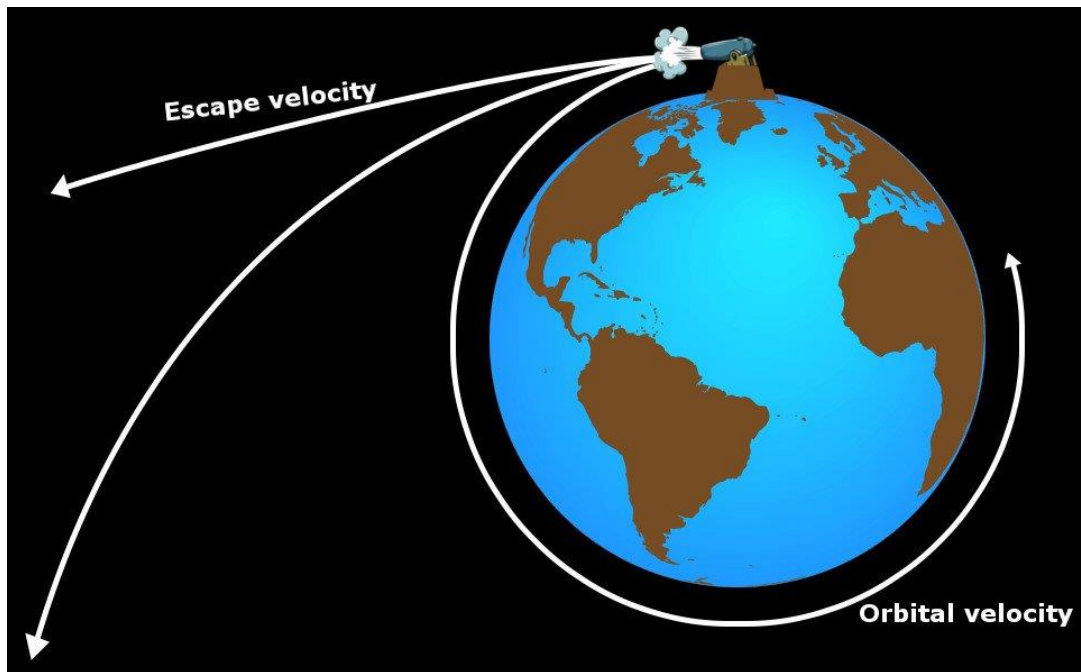
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Q. Write three differences between a natural satellite and an artificial satellite.

Natural satellite	Artificial satellite

Principal of launching an artificial satellite:

Like planet and the sun, the gravitational force between satellite and planet provides the necessary centripetal force for the orbital motion of satellite. Artificial satellite has been engineered using this principle. The main thing one can understand about a satellite is that at the end of the day, they are projectiles. Three rockets carry an artificial satellite at required height and a fixed velocity is provided parallel to the earth surface. As a result, artificial satellite revolves around the earth.



It has been calculated, if an artificial satellite at height 250 km from the ground can be provided with a velocity of 8 kms⁻¹ parallel to the earth surface, it will revolve around the earth.

Launching of Satellites

The process of placing the satellite in a proper orbit is known as **launching process**. During this process, from earth stations we can control the operation of satellite. Mainly, there are four stages in launching a satellite.

- **First Stage** – The first stage of launch vehicle contains rockets and fuel for lifting the satellite along with launch vehicle from ground.
- **Second Stage** – The second stage of launch vehicle contains smaller rockets. These are ignited after completion of first stage. They have their own fuel tanks in order to send the satellite into space.
- **Third Stage** – The third (upper) stage of the launch vehicle is connected to the satellite fairing. This fairing is a metal shield, which contains the satellite and it protects the satellite.

- **Fourth Stage** – Satellite gets separated from the upper stage of launch vehicle, when it has been reached to out of Earth's atmosphere. Then, the satellite will go to a “transfer orbit”. This orbit sends the satellite higher into space.

When the satellite reached to the desired height of the orbit, its subsystems like solar panels and communication antennas gets unfurled (expand). Then the satellite takes its position in the orbit with other satellites. Now, the satellite is ready to provide **services** to the public.

Satellite Launch Vehicles

Satellite launch vehicles launch the satellites into a particular orbit based on the requirement. Satellite launch vehicles are nothing but multi stage rockets. Following are the **two types** of satellite launch vehicles.

- Expendable Launch Vehicles (ELV)
- Reusable Launch Vehicles (RLV)

Expendable Launch Vehicles

Expendable launch vehicles (ELV) get destroyed after leaving the satellites in space. The following image shows how an ELV looks.

Reusable Launch Vehicles

Reusable launch vehicles (RLV) can be used **multiple times** for launching satellites. Generally, this type of launch vehicles will return back to earth after leaving the satellite in space.

The importance and uses of artificial satellites

Artificial satellites are used for different purposes. They are named according to their uses, such as—

a) Communication Satellite

These are used for television, phone or internet transmissions.

b) Weather Satellite

These are used to image clouds and measure temperature and rainfall.

c) Earth Observation Satellite

These are used to photograph and image the Earth.

d) Military Satellite

These act as spies in the sky and used to locate enemy positions.

e) Navigation Satellite

The GPS (global positioning system) is made up of 24 satellites that orbit at an altitude of 20,000 km above the surface of the Earth.

f) Astronomical Satellite

These are used to monitor and image space.

Q. Why are artificial satellites launched?

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