

1-1-20  
Explain formation of Lunar eclipse. (CSS-2018)

**Eclipse** — An eclipse takes place when one heavenly body (such as moon or another planet) moves into the shadow of another heavenly body.

### Lunar Eclipse :

An astronomical event, in which moon moves into the shadow of earth and is darkened, totally or partially.

### Formation of a Lunar Eclipse :

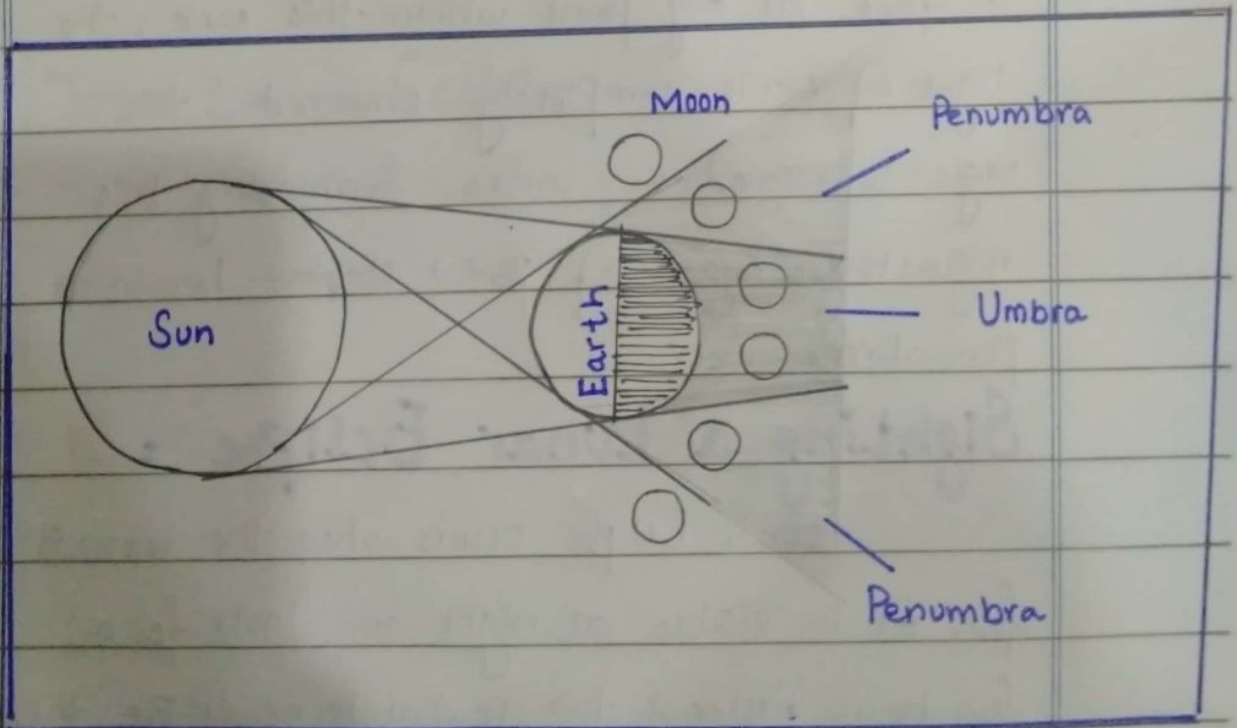


Fig 1 : Solar Lunar Eclipse

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The moon moves in an orbit around the earth. At the same time, the earth moves in an orbit around the sun. Sometimes the earth may move between the ~~earth~~ sun and the moon, thus blocking the sun's light that is refracted by the moon. This light causes the moon to shine. Instead of light hitting the moon surface, earth's shadow falls on it, making it appear darker. This is known as a lunar eclipse.

The earth casts a long conical shadow in space. At any point within this cone, the light of the sun is completely obscured, this region is named as umbra. Surrounding this region is a region of partial shadow known as penumbra.

## Sighting a Lunar Eclipse :

Lunar Eclipse occurs when the moon is full. It is visible at night and lasts for a few hours. At least two partial lunar eclipses take place every year, but total lunar eclipses are rare.



## Types of Lunar Eclipse :

There are three types of lunar eclipse :-

### i- **Penumbral Lunar Eclipse** - Penumbral

Lunar eclipse takes place when the moon moves in the penumbral region of earth's shadow. It is rarely visible from earth and only slight change in moon's colour take place.

### ii- **Partial Lunar Eclipse** - Partial Lunar

eclipse takes place when part of moon is in umbral region - and not all light is obscured.

### iii- **Total Lunar Eclipse** - Total Lunar

eclipse takes place when moon is in umbral region of earth's shadow and is totally obscured.

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Differentiate between occurrence of solar and lunar eclipse.

### Solar Eclipse

An astronomical event, in which moon comes directly between sun and earth obscuring the sun either totally or partially.

### Lunar Eclipse

An astronomical event, in which earth moves between sun and moon, thereby causing a dark shadow on moon's surface.

### Visibility

It lasts for a few minutes or seconds and is visible from a small part of earth.

It lasts for a few hours and is more common phenomenon.

### Occurrence

It occurs when there is new moon. Solar eclipse usually happen after 18 months.

It occurs when the moon is full. Partial lunar eclipse may take place twice a year. Total lunar eclipse are rare.

### Types

Solar eclipse has 3 types :  
total eclipse - total blocking of solar radiation reaching earth

Partial eclipse - partial

Lunar eclipse are of 3 types :  
total eclipse - when moon is in earth's umbra region.

Partial eclipse - when part



blocking of incoming solar radiations.

annular eclipse - characterized by the formation of a ring around sun.

of moon is in umbral region of earth's shadow.

penumbral eclipse - when moon is in penumbral region of earth's shadow

## Safety Precautions

Solar eclipse should be avoided. Direct sighting may cause damage to eyes.

Lunar eclipse does not cause any damage to eyes.

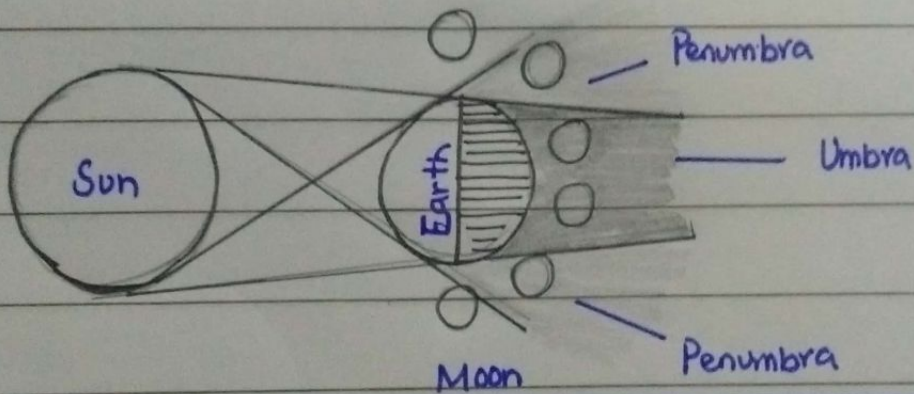


Fig 1: Lunar eclipse

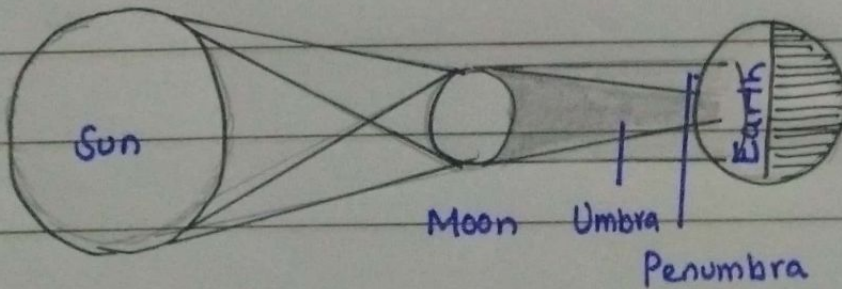


Fig 2 = Solar eclipse

Briefly describe the most popular and accepted theory about the origin of universe. (2021)

## Origin of Universe : THE BIG BANG THEORY

One of the leading explanation about the origin of universe is the Big Bang Theory which suggests that the universe came into being as a result of massive explosion about 13.7 billion years ago. This led to the creation and expansion of universe as we know today. Since astronomers lack instruments that can peer back the origin of universe, they mostly rely on mathematical theories and models about origin of universe -

## Big Bang : Explained

According to Big Bang Theory, the universe came from a single mass of high density and extremely high temperature, named as singularity. A massive explosion occurred called Big Bang which led to the origin of universe about 13.7 billion years ago. Even today, the universe continues to expand.



Within seconds, matter and anti-matter were created. These particles destroyed each other. But some survived creating photons and neutrons and forming atoms. As universe further cooled down, it was filled with clouds of gases like Hydrogen and Helium which later formed celestial bodies like stars and planets.

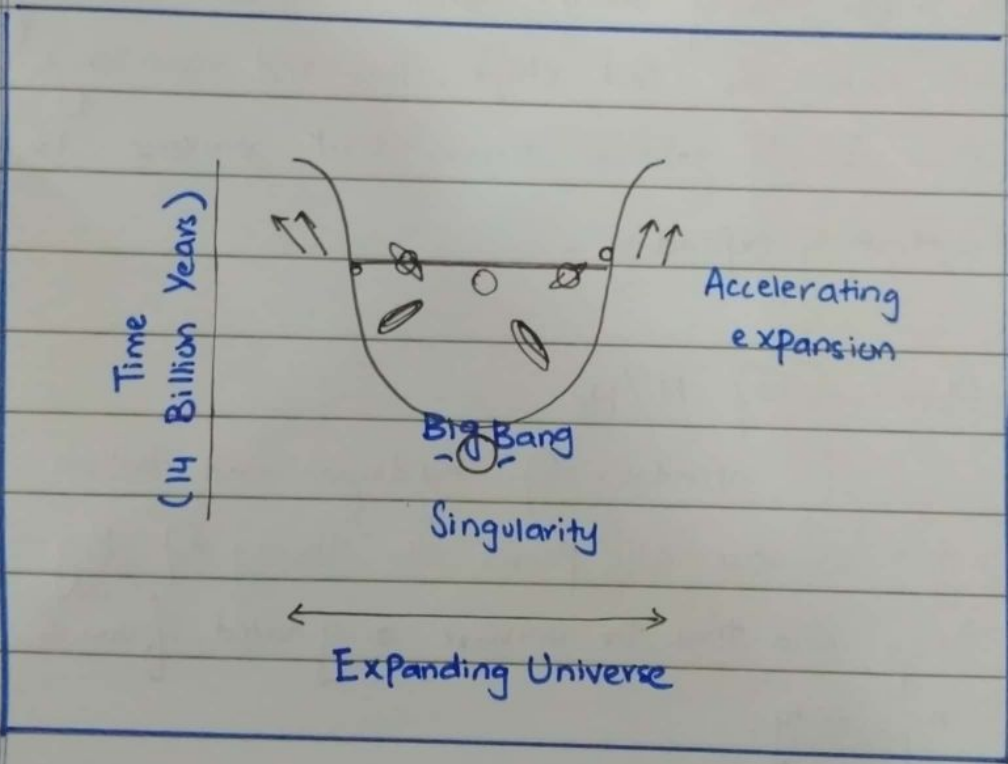


Fig 1: Big Bang: The Origin of Universe

## Evidence for Big Bang

There are several evidences that prove that Big Bang Theory is the closest theory

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The predicts about the origin of universe. Some of these are listed as ;

### 1) Spectrum from Distant Galaxies (Red / Blue Shift)

It is observed that galaxies moving toward earth produce blue wavelength of shorter length, also known as blue shift while galaxies or bodies moving away shift to red wavelength also known as red shift. This red wavelength from far-off galaxies proves that universe is continuously expanding -

### 2) Abundance of H/He

The abundance of hydrogen and helium within universe also proves the theory of Big Bang and that the universe originated from a singularity.

### 3) Cosmic Background Microwave (CBM) Radiations

Cosmic Background Microwave radiations are received from all corners of universe. These radiations were discovered Arno Penzias and Wilson while studying radio waves. These radiations



are believed to be leftover of heat from the  
original explosion known as Big Bang.