

SPACE EXPLORATION

SNC1W

The background is a deep space image featuring a dense field of stars and a prominent, colorful nebula or galaxy structure. The colors range from deep blues and purples to bright pinks and oranges. In the center, there is a large, semi-transparent circular area. Overlaid on this circle is the text "WHAT IS SPACE?" in a bold, white, sans-serif font. The letters have a thick black outline, making them stand out against the lighter background of the circle.

**WHAT IS
SPACE?**

WHAT IS SPACE?

- **Outer space** is the universe beyond Earth's atmosphere and between celestial bodies, like planets.
- Space (the area between celestial bodies) is a **near-perfect vacuum**, which means it is basically empty.



WHAT IS SPACE?

- Outer space has very **low density** and **low pressure**.
- Sound waves cannot travel in space either, so **there is no noise**.
- Outer space is **nearly empty** because any matter has been pulled by gravity into a planet, moon, asteroid, or star.



WHAT IS SPACE?

- The **Kármán line** is the altitude where space begins.



Exosphere 10 000 km

Thermosphere 690 km

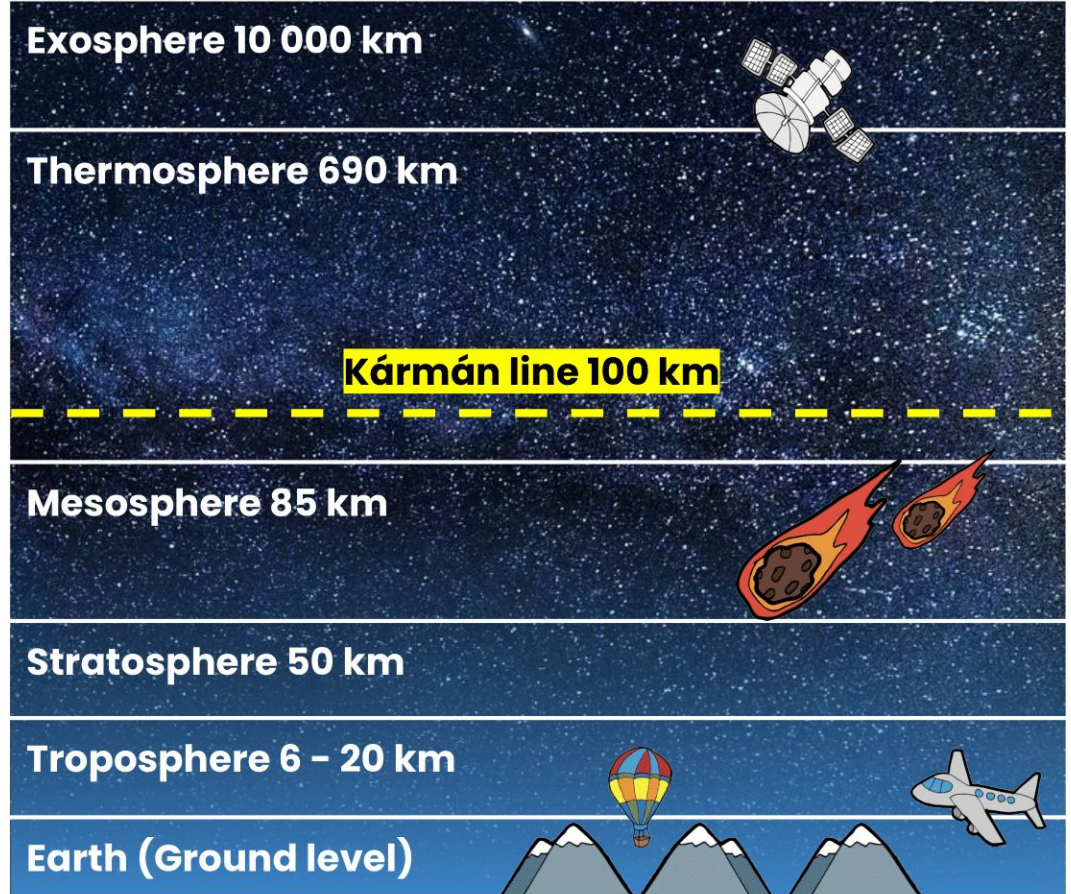
Kármán line 100 km

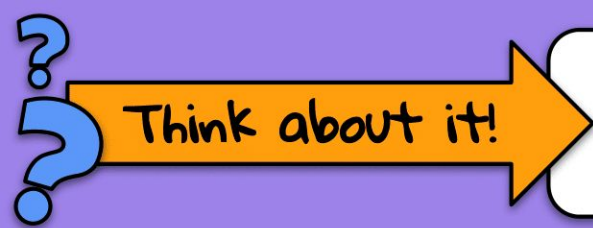
Mesosphere 85 km

Stratosphere 50 km

Troposphere 6 – 20 km

Earth (Ground level)





Drag and drop to label each component of Earth's atmosphere.

Stratosphere

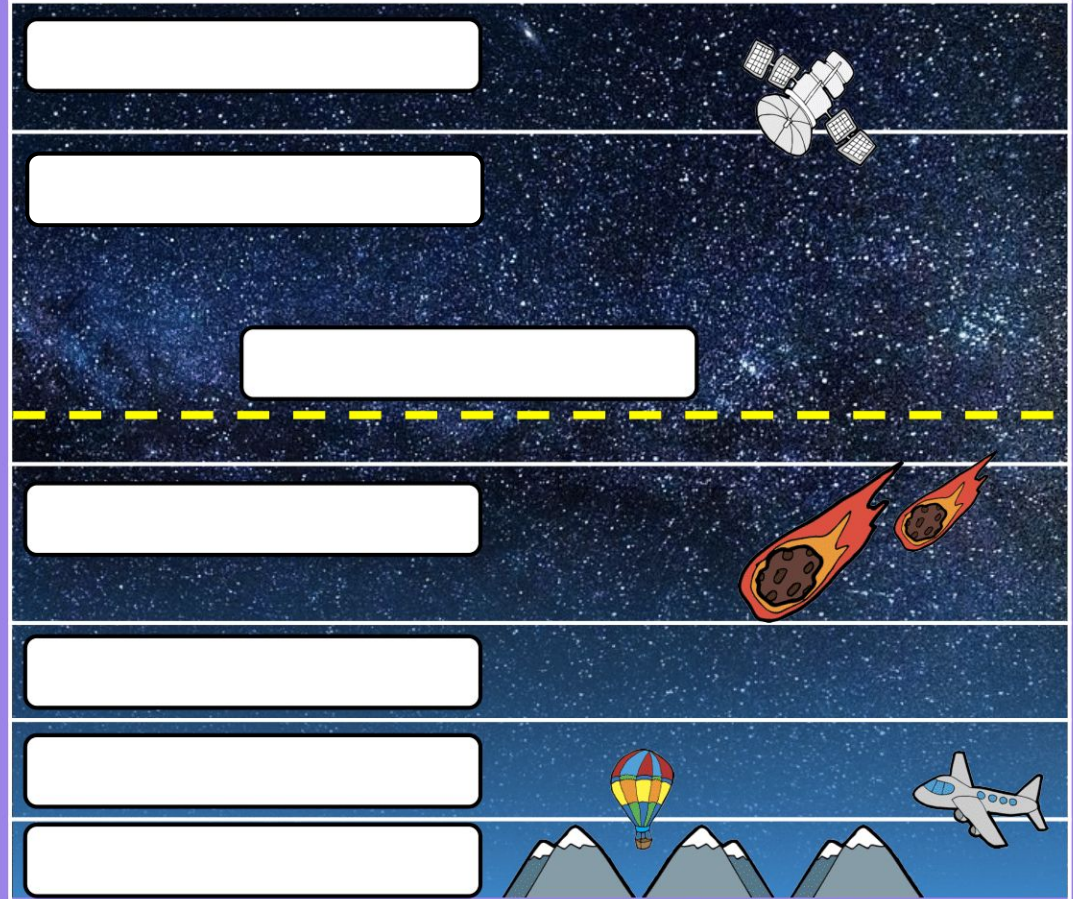
Kármán line

Ground level

Exosphere

Thermosphere

Mesosphere





What recent
innovations in
space
technology do
you know of?



???

What social,
environmental,
economic, and
political factors
affect space
exploration?



A dramatic photograph of a rocket launch. A large, white rocket with a black nose cone is ascending vertically, leaving a massive, billowing plume of white smoke and fire at its base. The launch is taking place at night or dusk, as the sky is a deep, dark blue with some lighter clouds. Two tall, dark metal service towers are visible on either side of the rocket. A large, semi-transparent white circle is centered over the rocket, containing the title text. The overall scene conveys a sense of power and technological achievement.

THE HISTORY OF SPACE

THE HISTORY OF SPACE



- In 1610, Galileo Galilei was the first to use a telescope to look at stars and celestial bodies.
- In 1957, Russian space dog Laika became the first animal to orbit Earth.



THE HISTORY OF SPACE

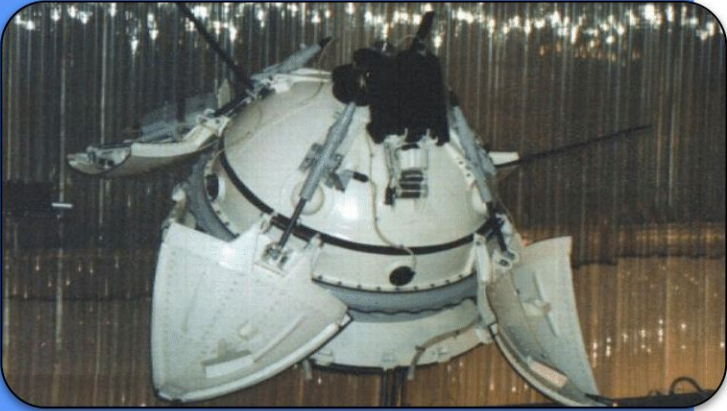


- In 1966, the first human-made object to safely land on another celestial body was Luna 9, which landed on the moon.



- In 1969, Neil Armstrong and Buzz Aldrin were the first men to step foot on the moon in the Apollo 11 spacecraft.

THE HISTORY OF SPACE

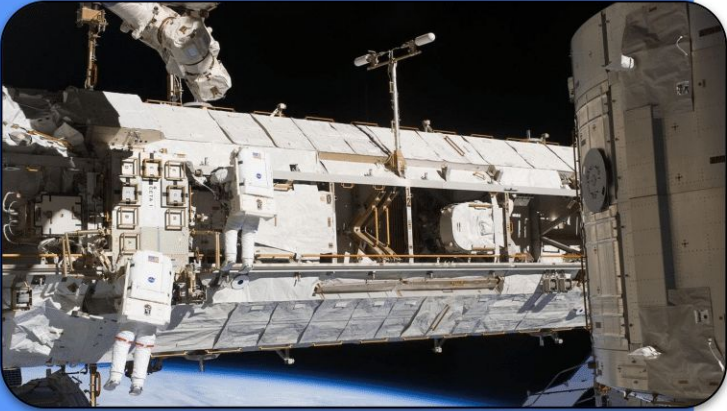


- In 1971, Russian space probe Mars 2 explored Mars. It was the first successful landing of a spacecraft on another planet.

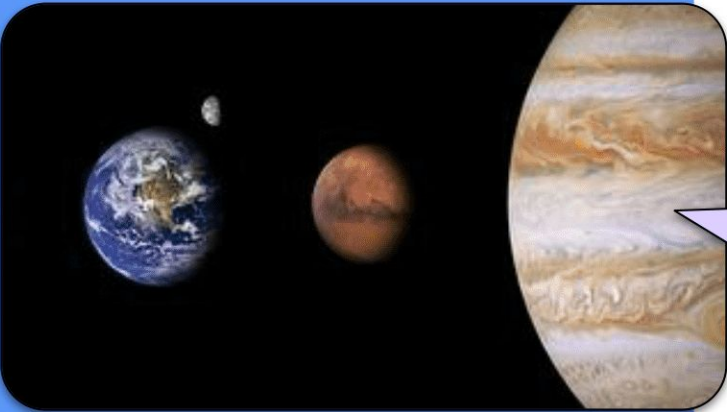


- In 1986, the space shuttle Challenger exploded 73 seconds into its flight, killing all seven crew members.

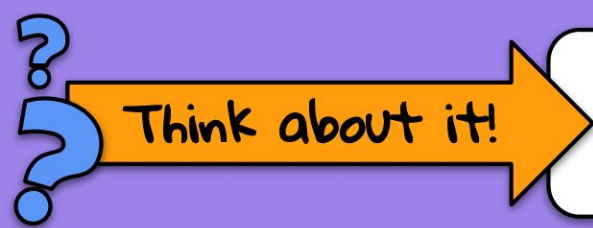
THE HISTORY OF SPACE



- In 2000, the International Space Station (ISS) was launched into a low orbit of Earth.
- NASA plans to send humans to Mars by as early as 2028.



Would you visit outer space if you had the opportunity? Explain.



What historical event do you think was most impactful in space exploration? Justify your answer.

Event:

Justification:





What space
technology
innovations do
you predict in
the next 200
years?



The image is a composite of two astronomical photographs. The top half shows a deep space view of the Milky Way galaxy, with its spiral arms and star clusters visible against a dark background. The bottom half shows a view of Earth from space, with the blue and white clouds of the planet curving across the frame. A large, semi-transparent white circle is centered over the image, containing the title text. The text is in a bold, white, sans-serif font with a black outline, making it stand out against the background.

MODELS OF THE UNIVERSE

MODELS OF THE UNIVERSE

- People have studied stars and patterns in space since the beginning of humankind.
- Originally believed that stars, including the Sun, revolve around Earth.
 - As people studied the stars, they started recognizing patterns.



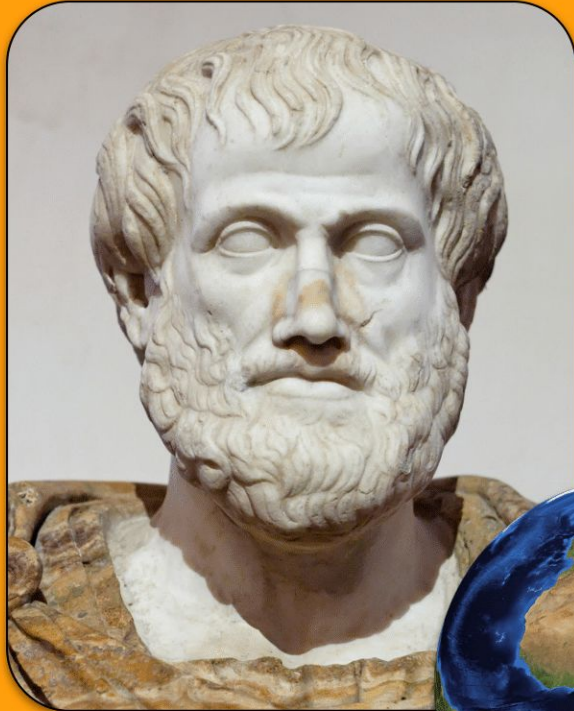
MODELS OF THE UNIVERSE

- A **constellation** is a group of stars forming a recognizable pattern.
- After studying constellations, scientists observed that any given star rises and sets four minutes earlier than the day before.

What does this observation suggest?



MODELS OF THE UNIVERSE

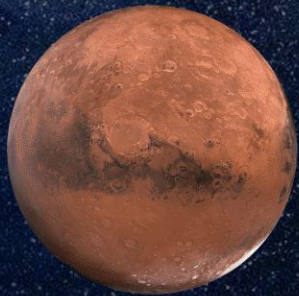
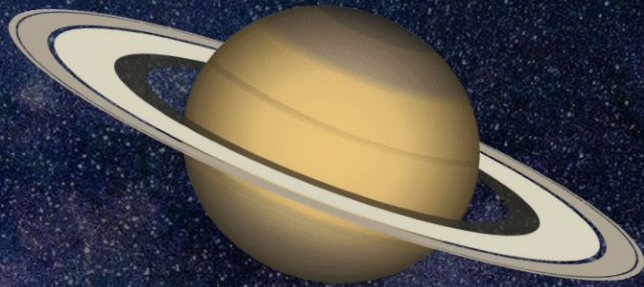


Marble bust of
Aristotle by
Lysippos, c. 330 BC



- In the past, people had a geocentric view of the universe.
- The **geocentric view** places Earth at the centre of the solar system.
 - This view is based on information from a well-known philosopher, Aristotle.

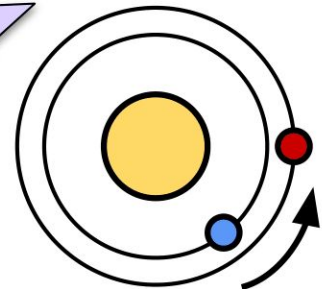
MODELS OF THE UNIVERSE



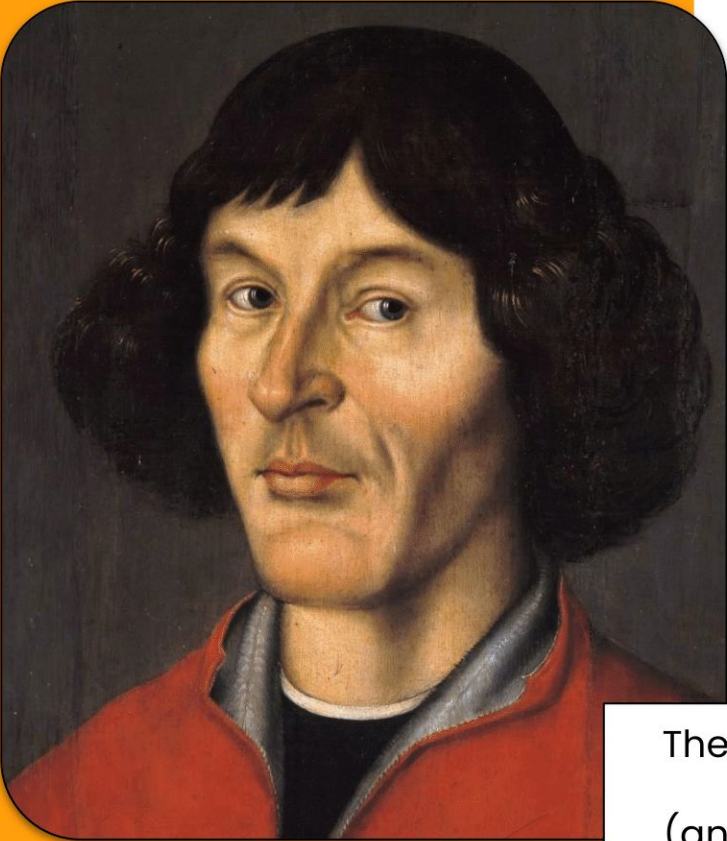
- One flaw discredited the geocentric view:
 - Mars, Jupiter, and Saturn were occasionally observed to travel in opposite directions without explanation.

Discuss with a partner:

Mars and Earth orbit the Sun at different speeds. When might it appear from Earth that Mars is travelling a different direction?



MODELS OF THE UNIVERSE

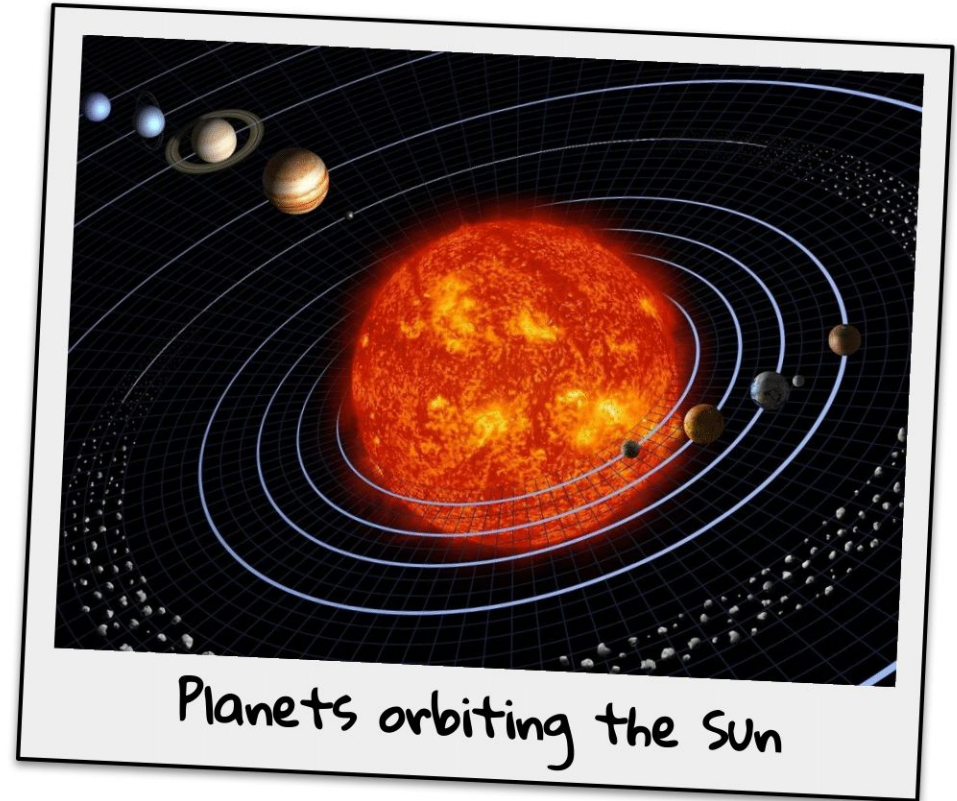


The "Toruń portrait" of
Copernicus
(anonymous, c. 1580)

- In the 1500s, an astronomer named Nicholas Copernicus developed a different model for the universe.
 - This model is known as the heliocentric model of the universe.

MODELS OF THE UNIVERSE

- The **heliocentric model** proposed that the Earth and planets revolve around the Sun at the centre of the universe.
 - This model is accepted today and supported by the scientific community.





Think about it!

Define the geocentric and heliocentric model.
Write the name of who founded each model.

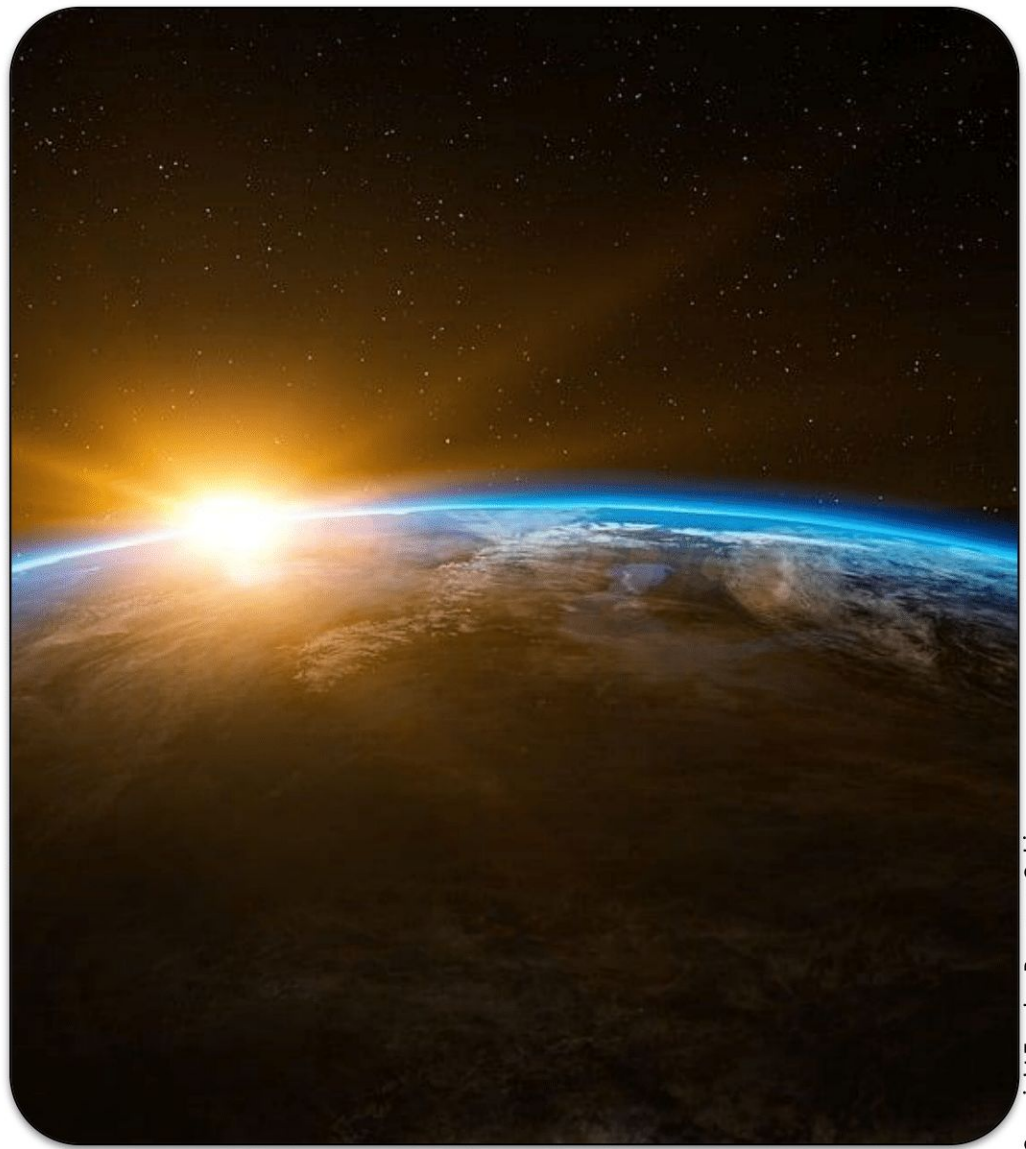
Geocentric Model

Heliocentric Model

What discovery discredited the geocentric model?



Why do you
think the
geocentric
model preceded
the heliocentric
model?

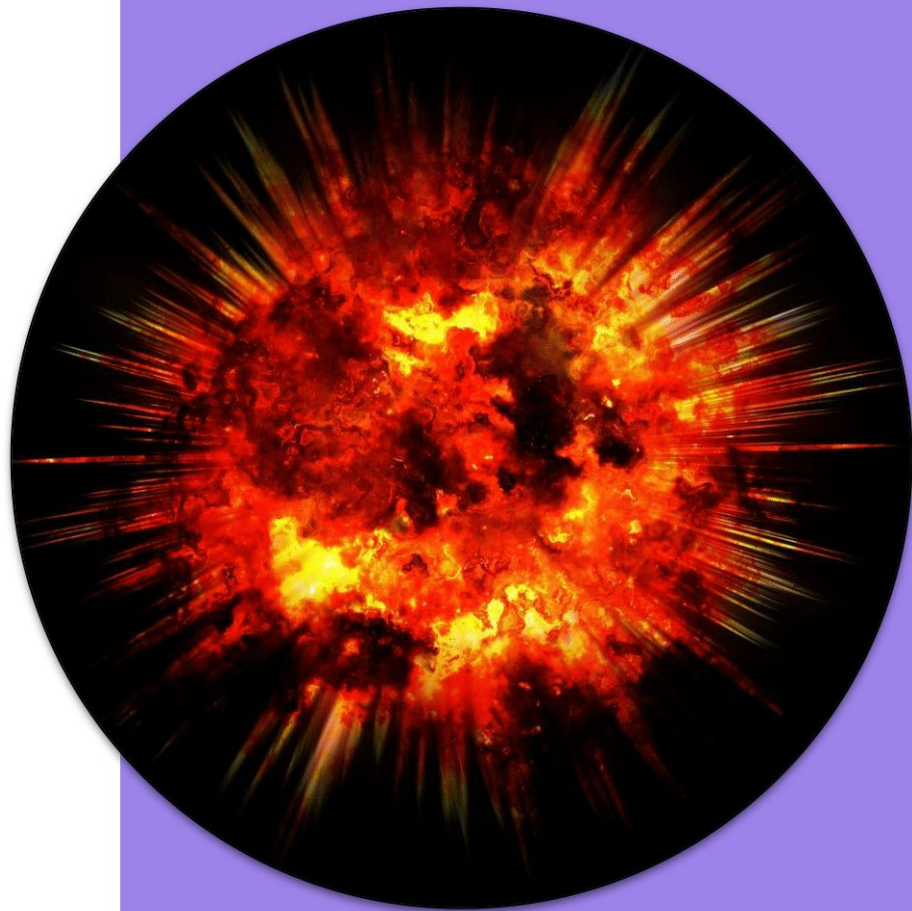




ORIGIN THEORIES

ORIGIN THEORIES

- The **Big Bang Theory** states that approximately **14 billion years ago**, the universe was a single point, microscopic in size, that was extremely hot.
 - This point rapidly expanded into the size of a galaxy, and it continues to expand even today.



ORIGIN THEORIES



- The Big Bang Theory is supported due to the scientific observation that the universe is **continually expanding**.
- It is also supported by cosmic microwave background radiation (CMB).
 - This is the first light that could ever travel freely in the universe.
 - It is believed that this light was caused by the Big Bang.

ORIGIN THEORIES

- Many religious people and scientists accept a **creationist view** of the universe.
 - Supports the belief that a divine being, or a god, influenced the creation of the universe and life on Earth.



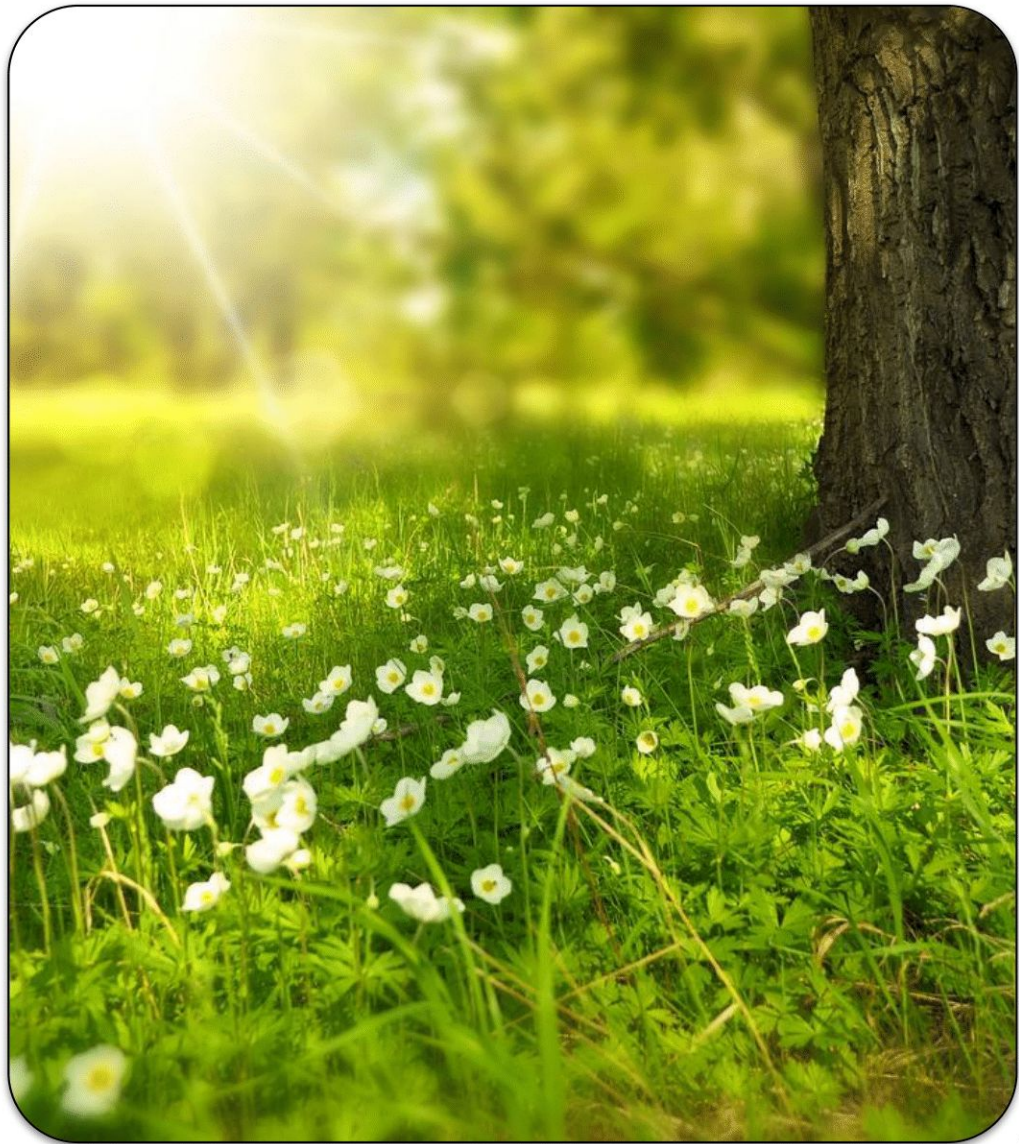
ORIGIN THEORIES

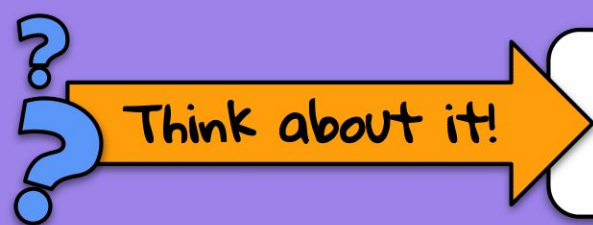


- Divine beings are transcendent—or beyond human comprehension and understanding.
- Creationists can have varying perspectives and opinions of how the universe came into existence.
- Creationist perspectives are often not exclusive from, or in denial of the Big Bang Theory or other scientific-supported theories

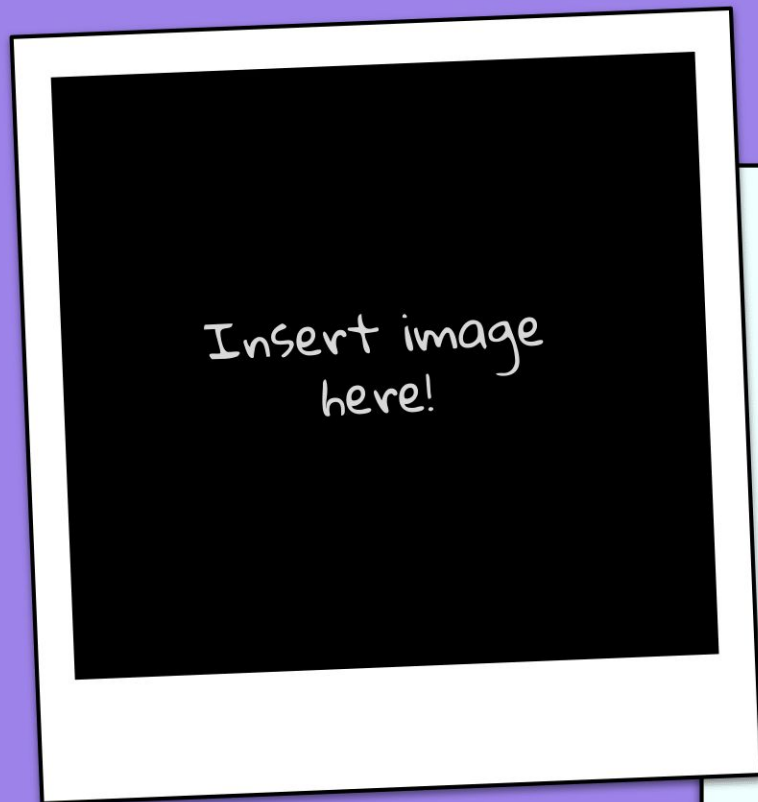


What origin
theories of
the universe
are you
familiar with?





Research a creation theory. Describe the theory in detail below. Insert an image that supports your explanation.



Theory:

Explanation: