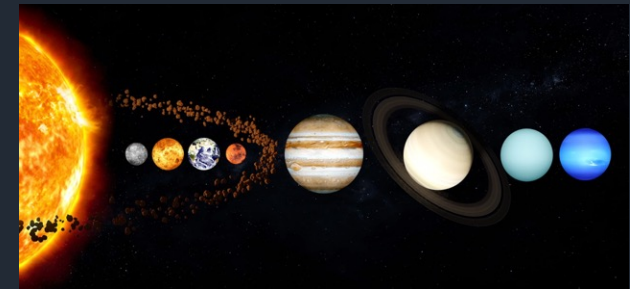


The Immensity of the Universe

- Solar Systems
- Galaxies
- The Andromeda Galaxy
- Aliens
- The Drake Equation
- Alien Inquiry



Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

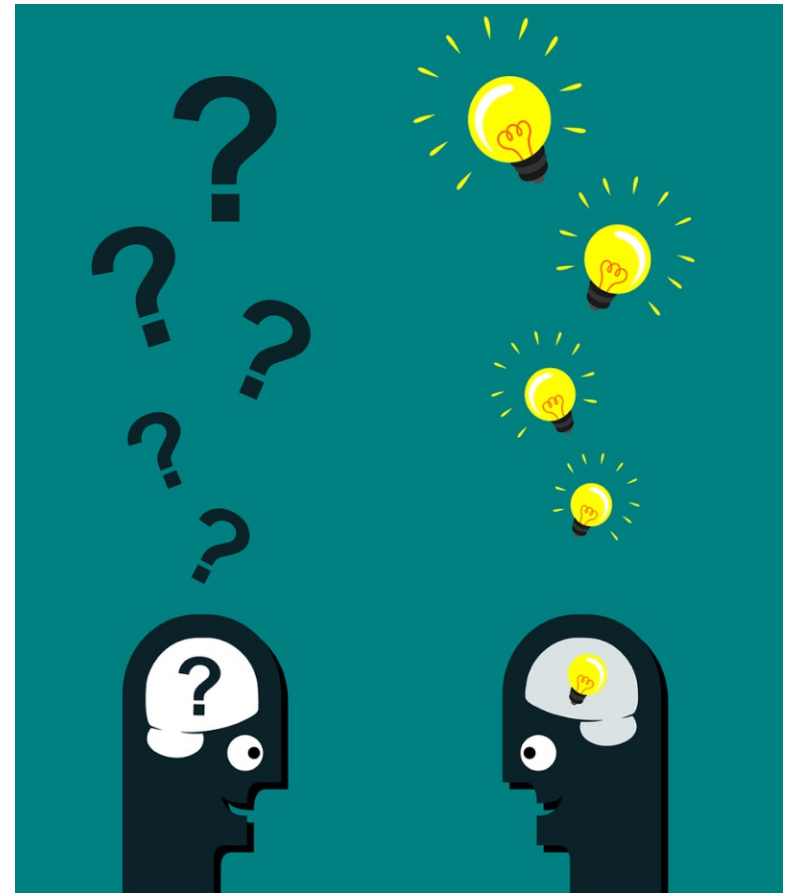
- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

The paid full version of your resource includes both Google Slides and PowerPoint and is Google Classroom Ready



Think About It

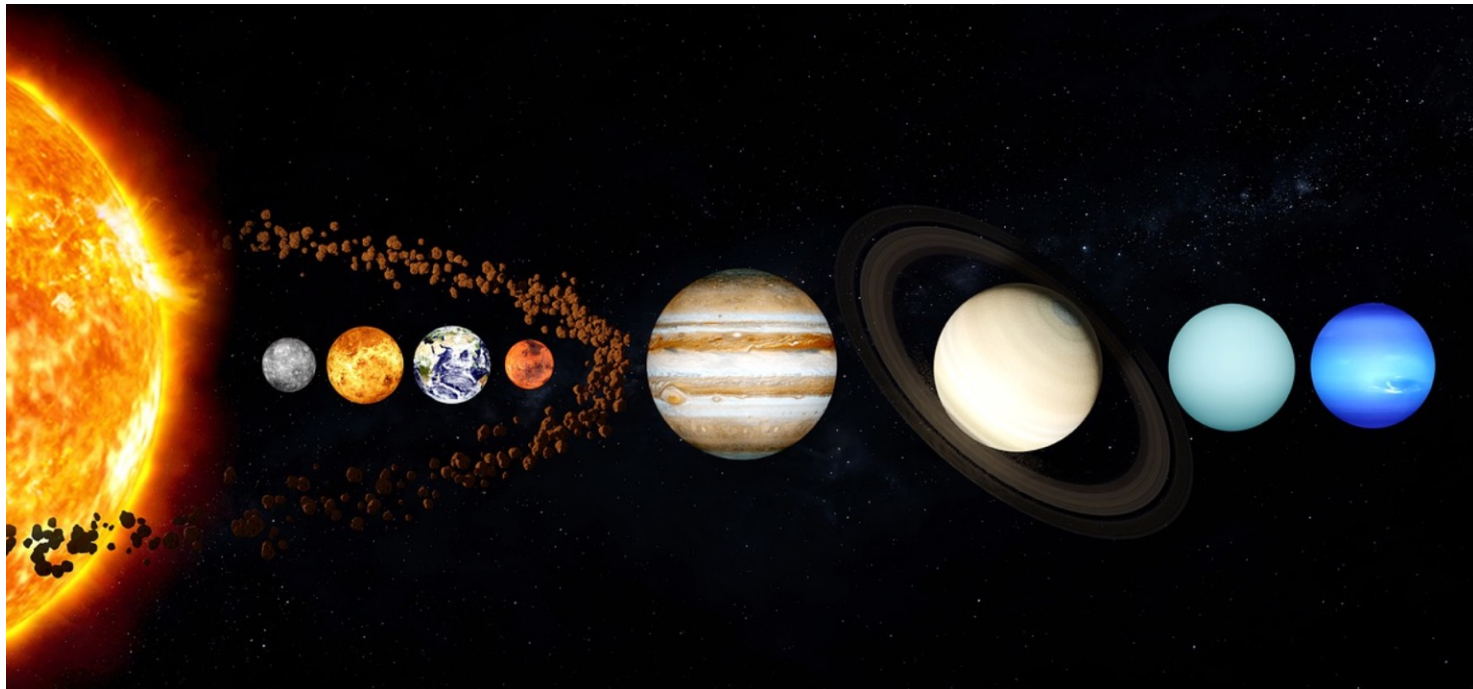
1. What is the definition of an alien?
2. If a child is born on Mars, will it be an alien?



THIS SLIDE HAS BEEN REMOVED

Solar System

- A Solar System is made up of all the _____
- Example – Our solar system consists of 1 star, 8 planets, dwarf planets, more than 200 moons and millions of asteroids and comets



Galaxy

- A group of stars (most with their own solar system)
- Example - Our galaxy is called the Milky Way Galaxy
- _____



Nearest Galaxy

- The nearest galaxy to the Milky Way is the Andromeda Galaxy
- It would take light traveling at 300,000 km/s about 2.7 million years to reach it!!

- _____



The ultraviolet side of the Andromeda Galaxy as captured by NASA's Galaxy Evolution Explorer.

THIS SLIDE HAS BEEN REMOVED

Are We Alone?

Write down what you think based on what you've learned so far. Do you think we are alone in the universe? Explain your answer.

Let's Do The Math

200,000,000,000 galaxies x 300,000,000,000
stars/galaxy



THIS SLIDE HAS BEEN REMOVED

The Drake Equation

Used to calculate the odds of intelligent alien life

$$N = R^* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

R* represents the number of stars in the Milky Way Galaxy

Answer: Current estimates are 100 billion.

f_p is the fraction of stars that have planets around them

Answer: Between 20-40%

n_e is the number of planets per star that are capable of sustaining life

Answer: Looking at our Solar System – 33%

f_l - on what percentage of the planets that are capable of sustaining life does life actually evolve?

Answer: Current estimates range from 100% (where life can evolve it will) down to close to 0%.

f_i is the fraction of **f_l** where intelligent life evolves

Answer: Estimates range from 100% (intelligence is such a survival advantage that it will certainly evolve) down to near 0%.

f_c is the fraction of **f_i** that will communicate

Answer: 10% to 20%

f_L is fraction of the planet's life during which the communicating civilizations live

Answer: This is the toughest of the questions. If we take Earth as an example, the expected lifetime of our Sun and the Earth is roughly 10 billion years. So far we've been communicating with radio waves for less than 100 years. How long will our civilization survive? Answer: If we survive for 10,000 years the answer will be 1/1,000,000th.

N, the number of communicating civilizations in the galaxy.

The Drake Equation

Let's figure it out using very conservative numbers.

$$N = R^* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

N, the number of communicating civilizations in the galaxy.

$$R^* = 100,000,000,000$$

$$f_p = 40\%$$

$$n_e = 0.33$$

$$f_l = 10\%$$

$$f_i = 10\%$$

$$f_c = 10\%$$

$$f_l = 1/10,000,000$$

$$N = 100,000,000,000 \cdot 0.4 \cdot 0.33 \cdot 0.10 \cdot 0.10 \cdot 0.10 \cdot 0.0000001$$

$$N = 1.32$$

The Drake Equation

- If $N = 1.32$, that means that there are 1.32 civilizations capable of communicating within the Milky Way Galaxy
- The number of galaxies thought to exist in the Universe is 200,000,000,000
- Therefore, the number of civilizations capable of communicating in the Universe would be approximately - _____

Inquiry Activity

Assuming aliens exist:

- 1) What do you think they would look like and why?
- 2) Why
- 3) What do you think would happen if we made contact?
- 4) Draw