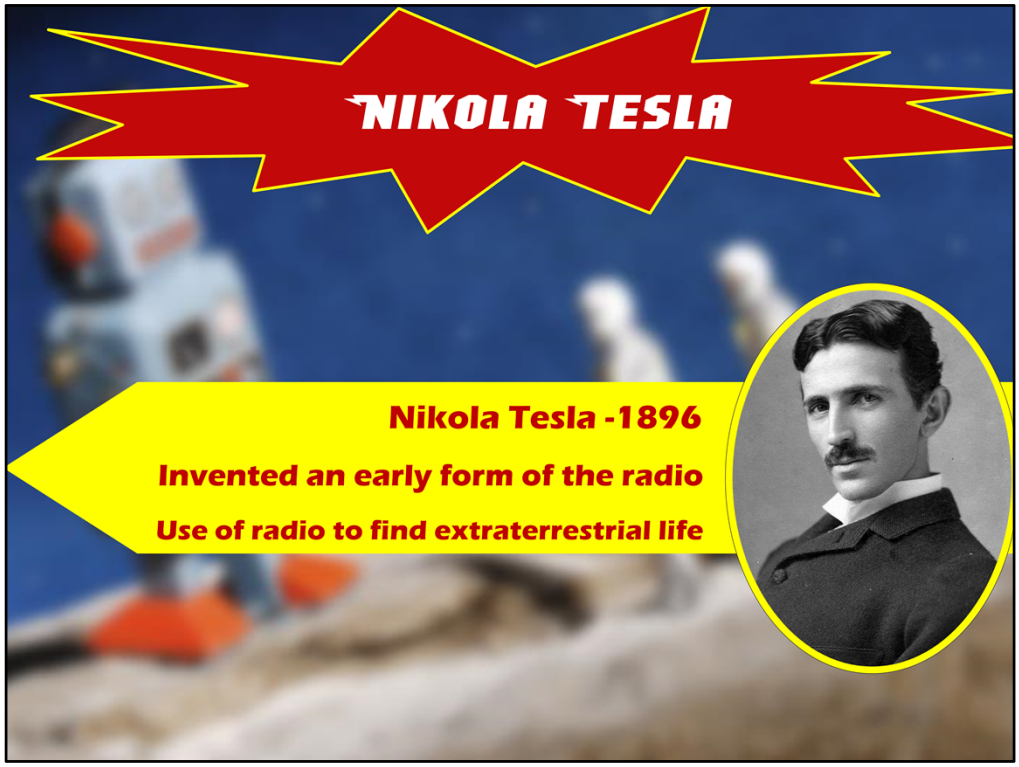
Module 10: Astronomical Organizations and Space Exploration
Topic 4 Content: The Search for Extraterrestrial Intelligence

You may have seen movies or played games related to the search for extraterrestrial life. You may have even heard songs or seen famous works of art dedicated to the topic. Since before the advent of the radio telescope, humans have wondered if they are alone in the vast universe. Many astronomers and other scientists have dedicated their life's work to the search for extraterrestrial intelligence.

With today's current technology, space travel to distant galaxies is not an option. It would take too long, be too expensive, and for now, the spacecraft technology does not exist. Most of the searches for extraterrestrial life are done using radio telescopes, which look for long wavelengths from the electromagnetic spectrum from civilizations on distant planets. Radio waves are able to penetrate the Earth's atmosphere better than any other waves from the electromagnetic spectrum.

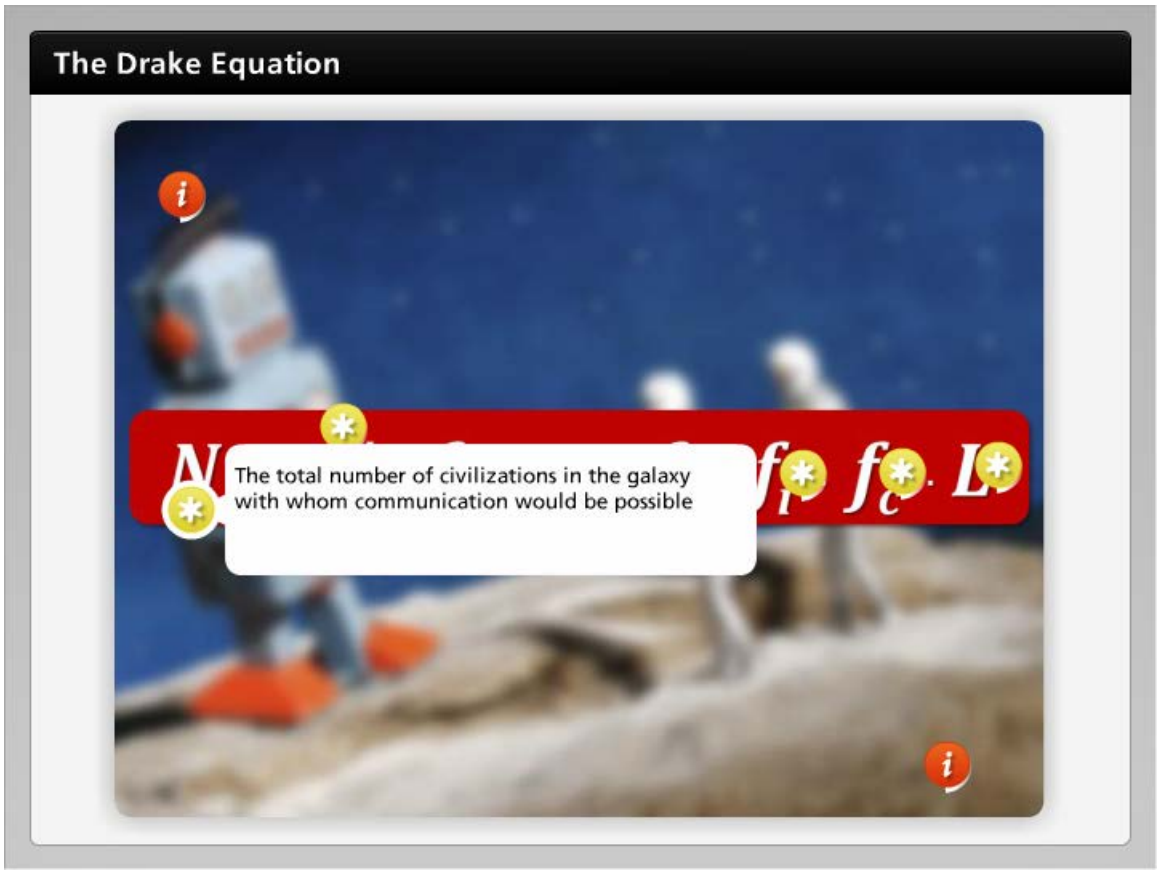


Humans have been looking for life outside of Earth for more than a hundred years. Nikola Tesla was a Serbian inventor, engineer, and physicist. He was responsible for developing an early form of the radio. In 1896, he made the hypothesis that if there is extraterrestrial life, it could be discovered by using a radio.

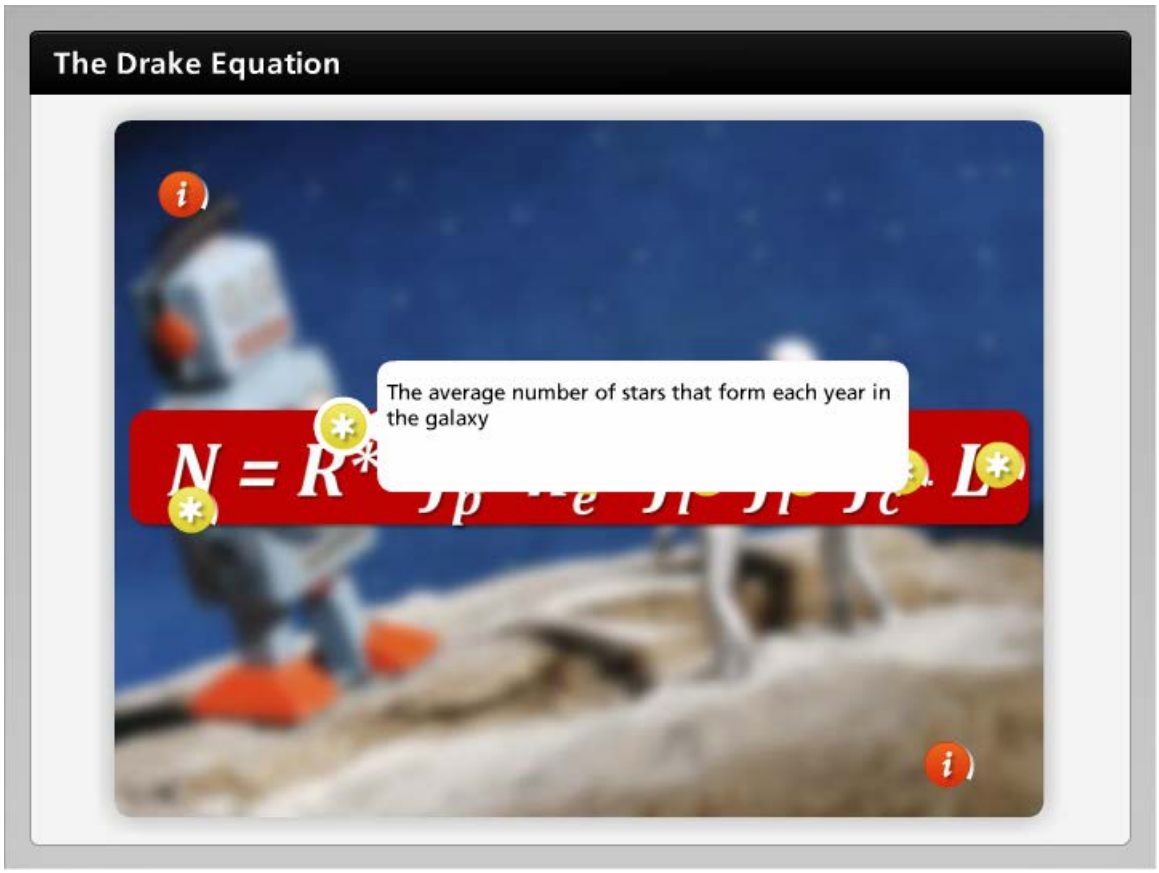
In 1960, Cornell University astronomer Dr. Frank Drake performed the first modern search for extraterrestrial intelligence, founding the organization SETI. Through an experiment named "Project Ozma," Drake used the National Radio Astronomy Observatory's radio telescope in Green Bank, West Virginia to examine the stars Tau Ceti and Epsilon Eridani. This telescope is twenty six meters in diameter and was tuned to wavelengths around twenty one centimeters.

He found nothing of great interest, but has continued a search for life beyond Earth for over fifty years. The first SETI conference took place at Green Bank in 1961. This conference brought together ten attendees with an interest in extraterrestrial intelligence.

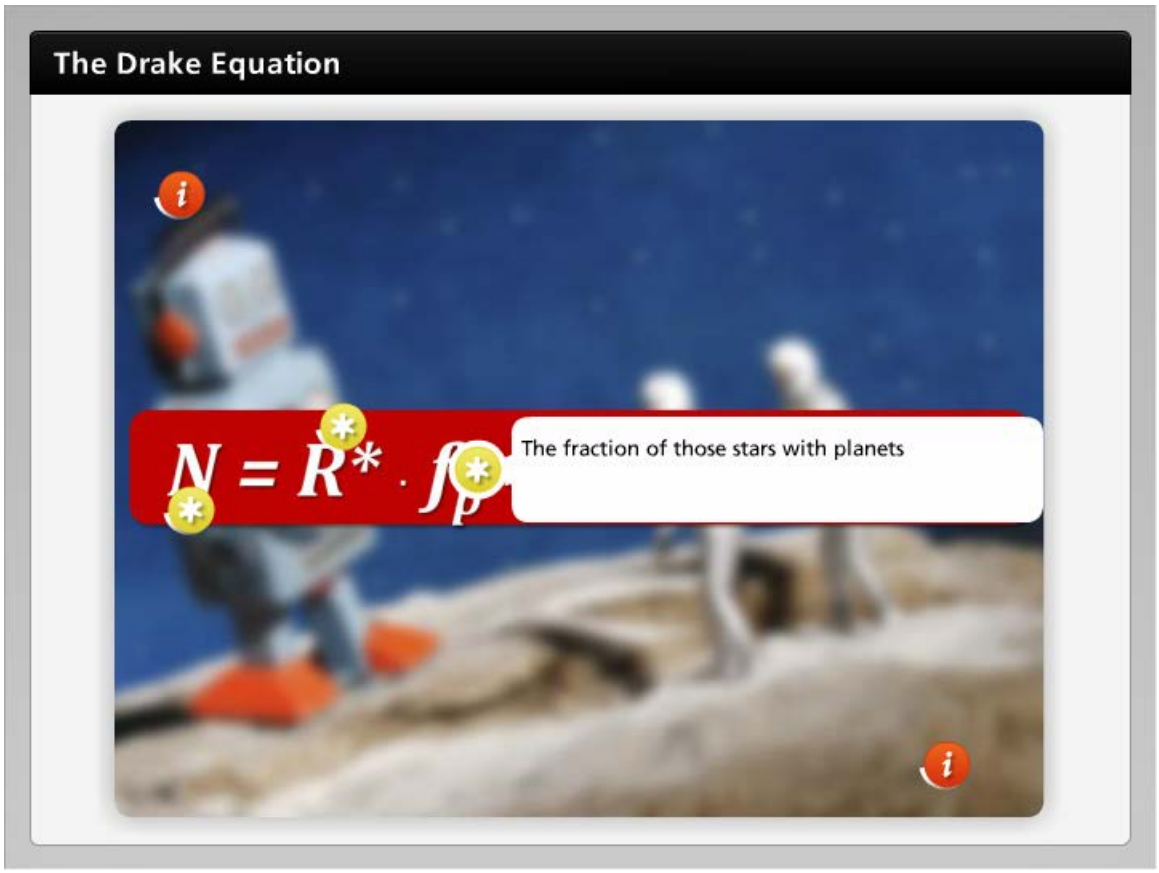
In 1961, Dr. Frank Drake created an equation to start a conversation about the number of possible extraterrestrial civilizations in the universe. Named the "Drake equation," this equation is composed of several variables that are difficult to calculate. Click on each of the spinning circles to learn more about the components of the Drake equation.



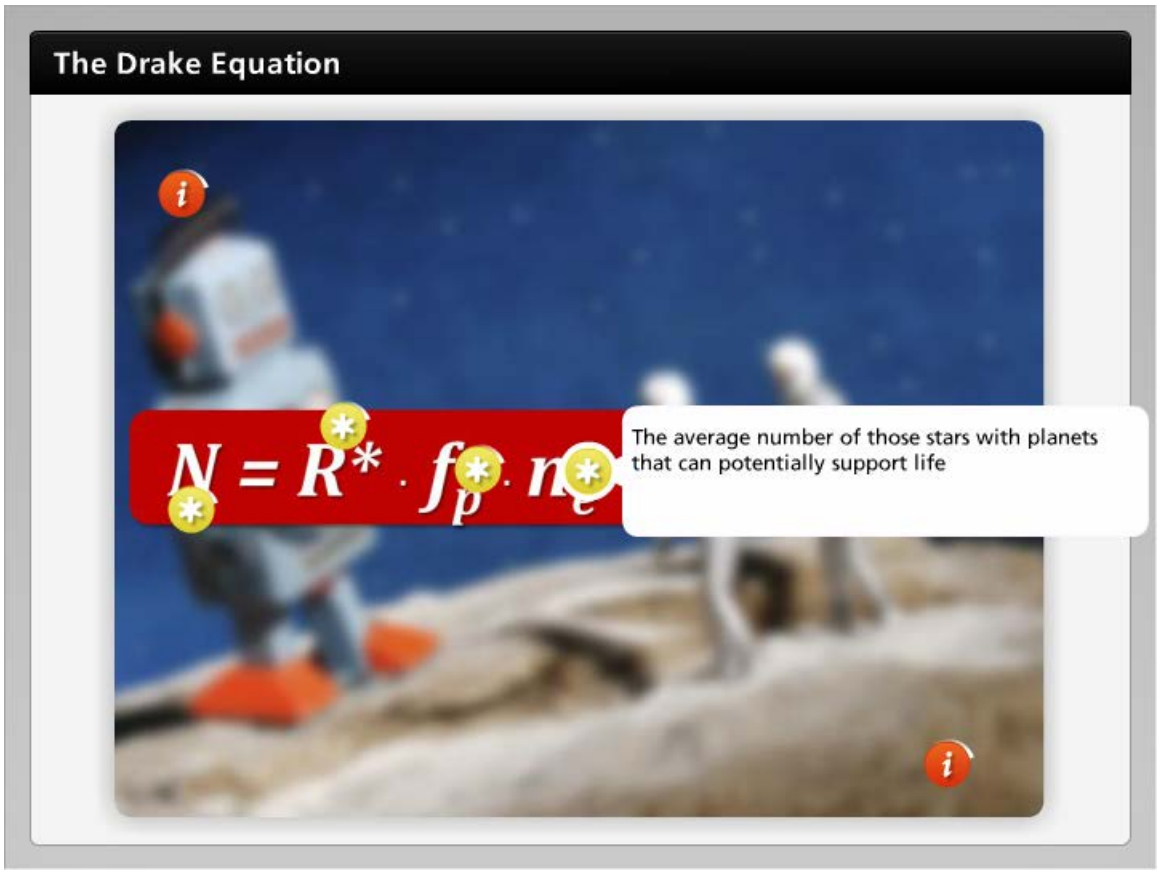
The total number of civilizations in the galaxy with whom communication would be possible



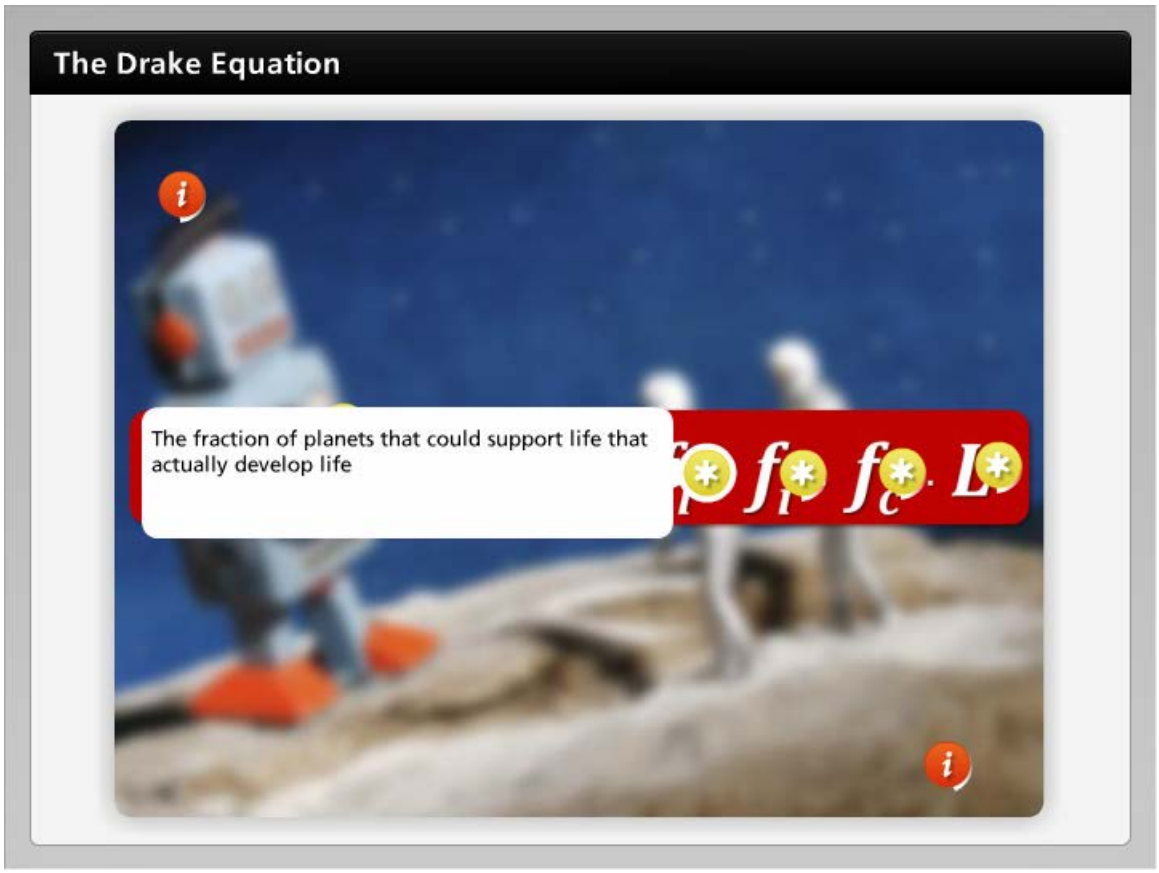
The average number of stars that form each year in the galaxy



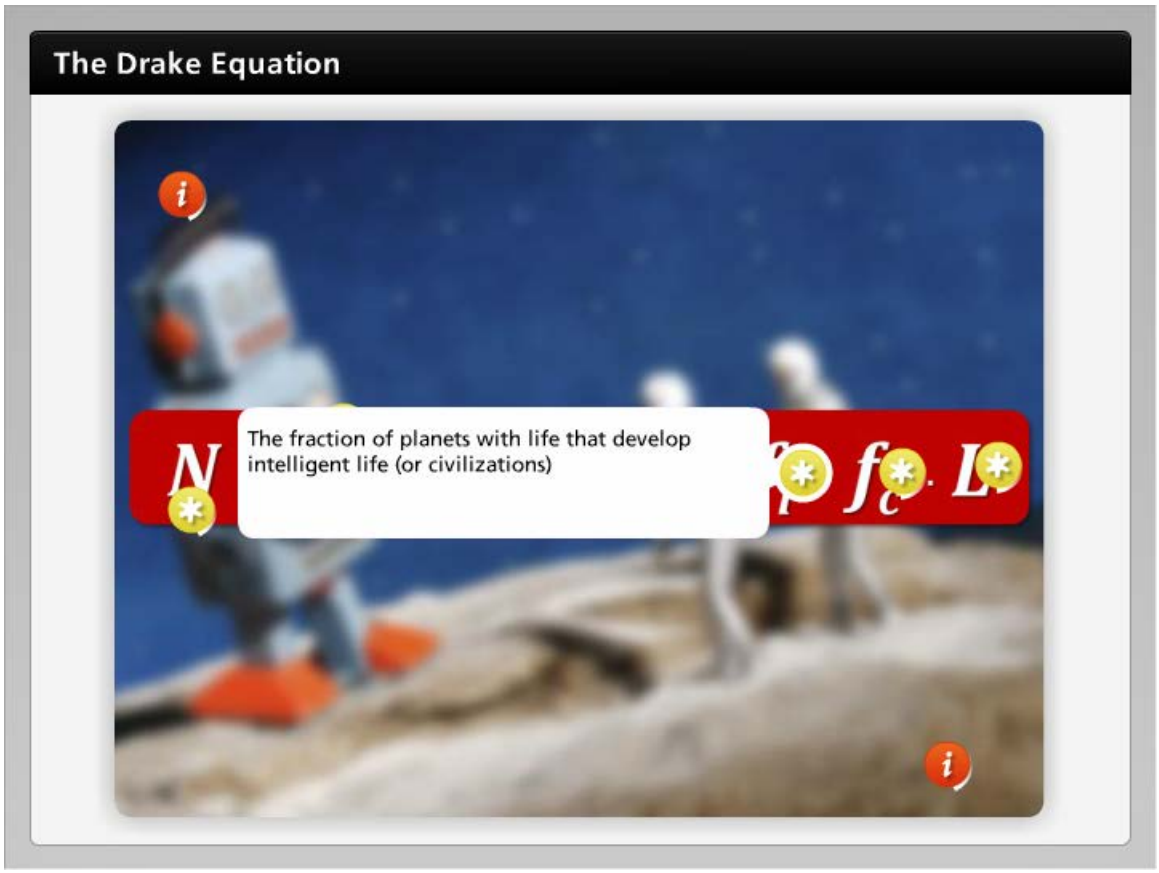
The fraction of those stars with planets



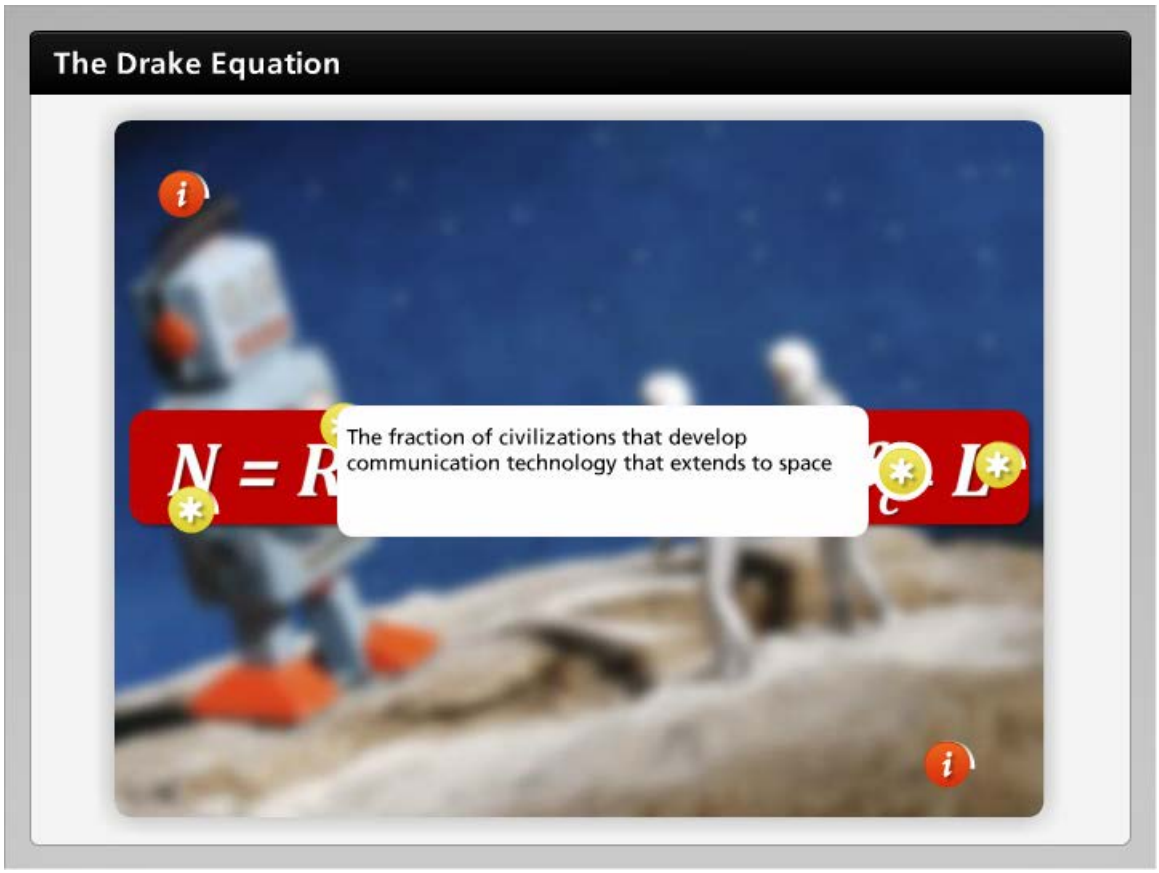
The average number of those stars with planets that can potentially support life



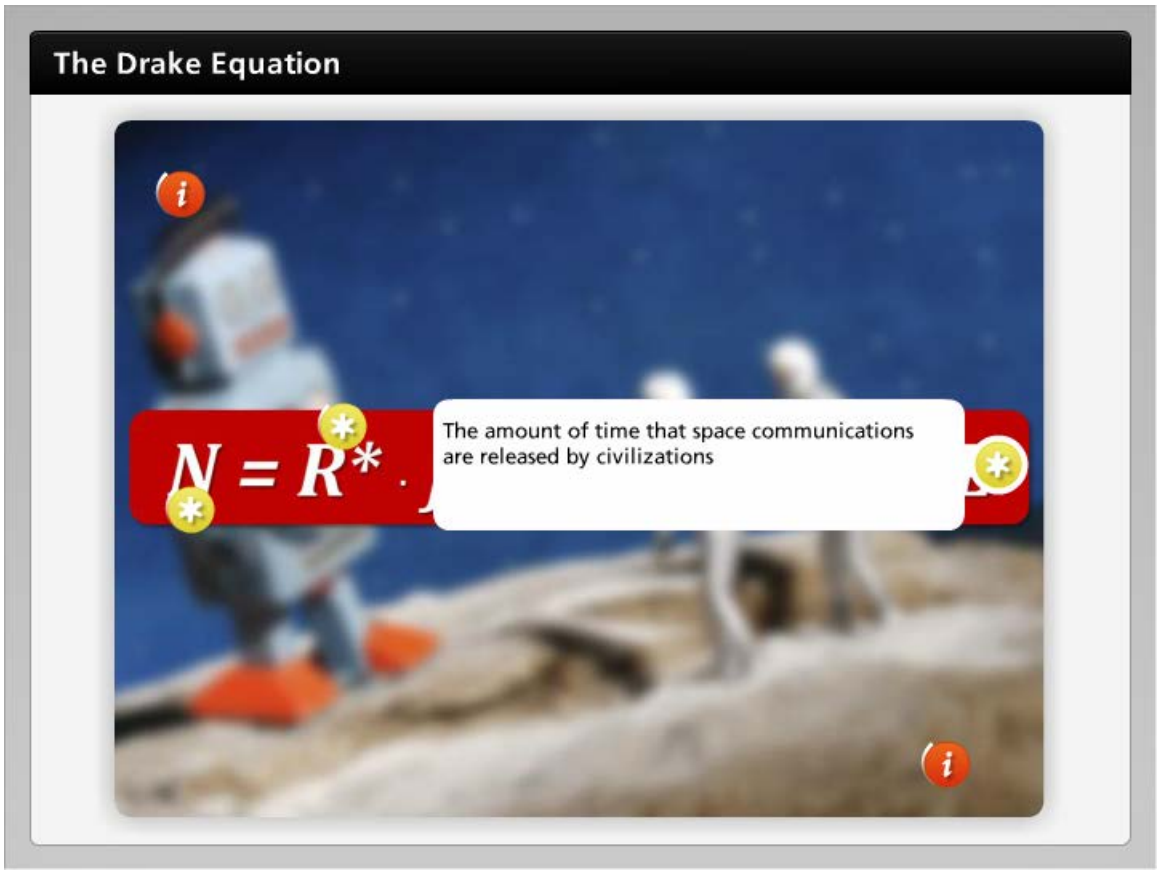
The fraction of planets that could support life that actually develop life



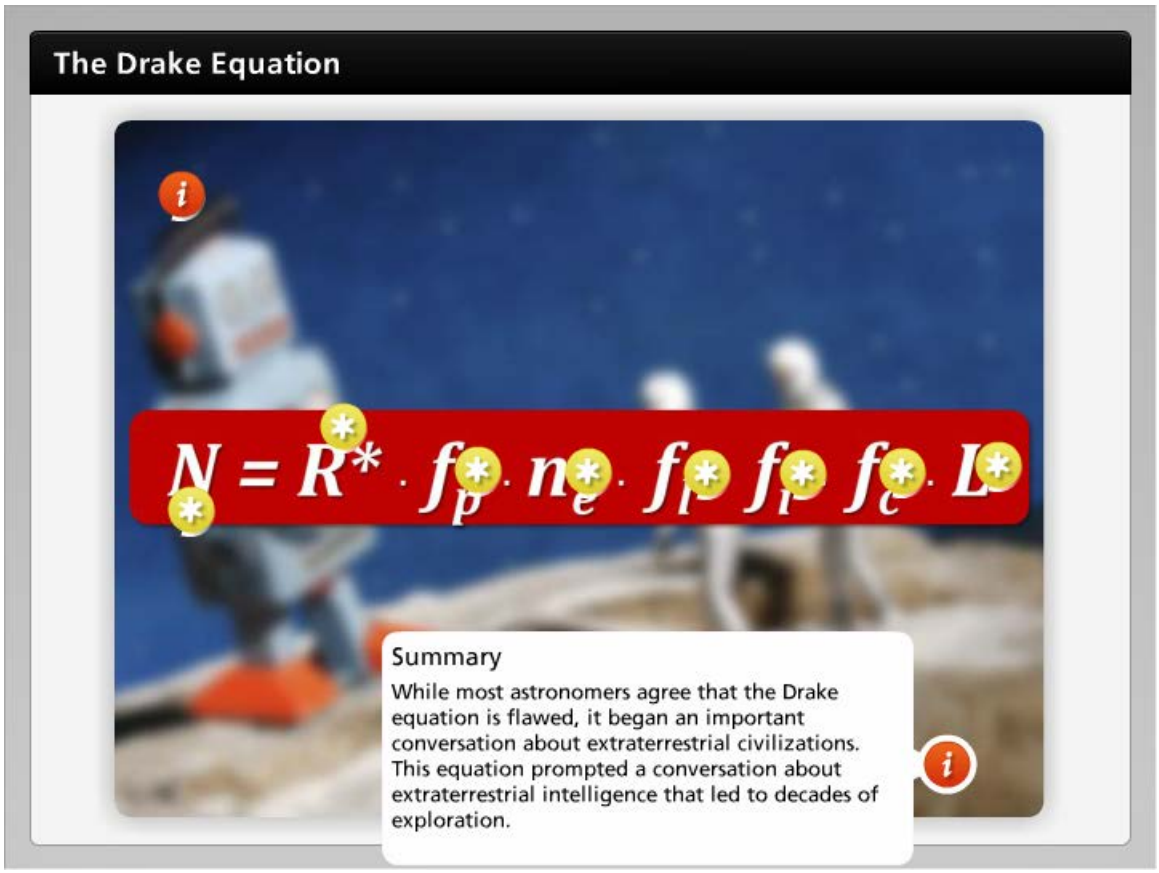
The fraction of planets with life that develop intelligent life (or civilizations)



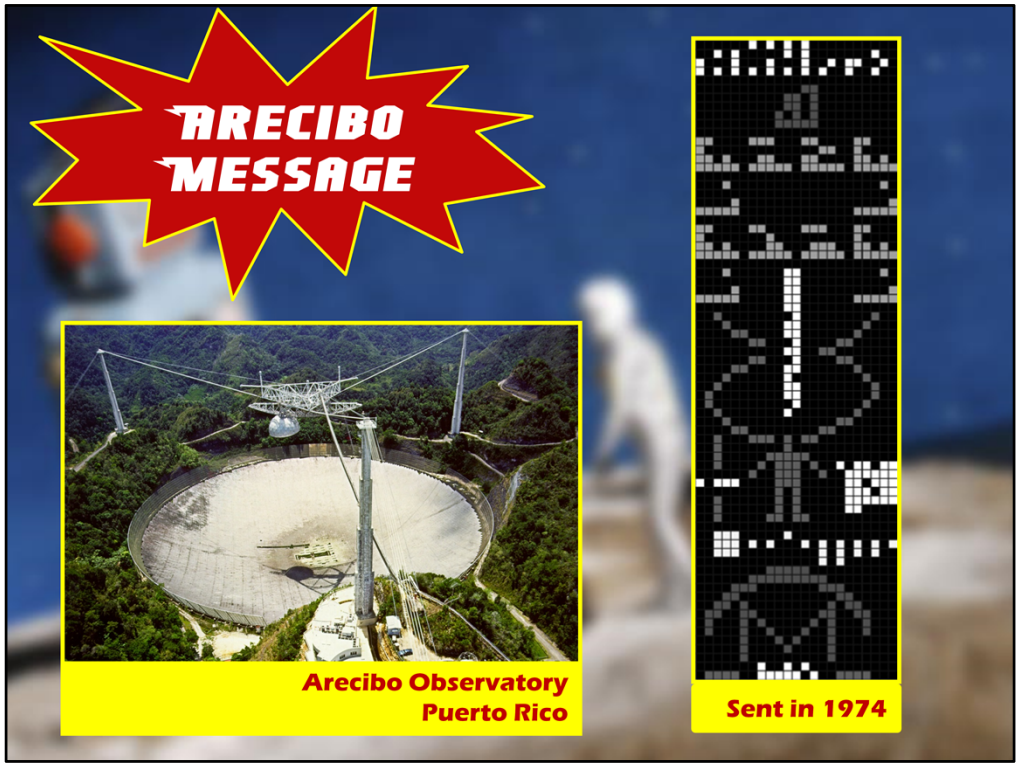
The fraction of civilizations that develop communication technology that extends to space



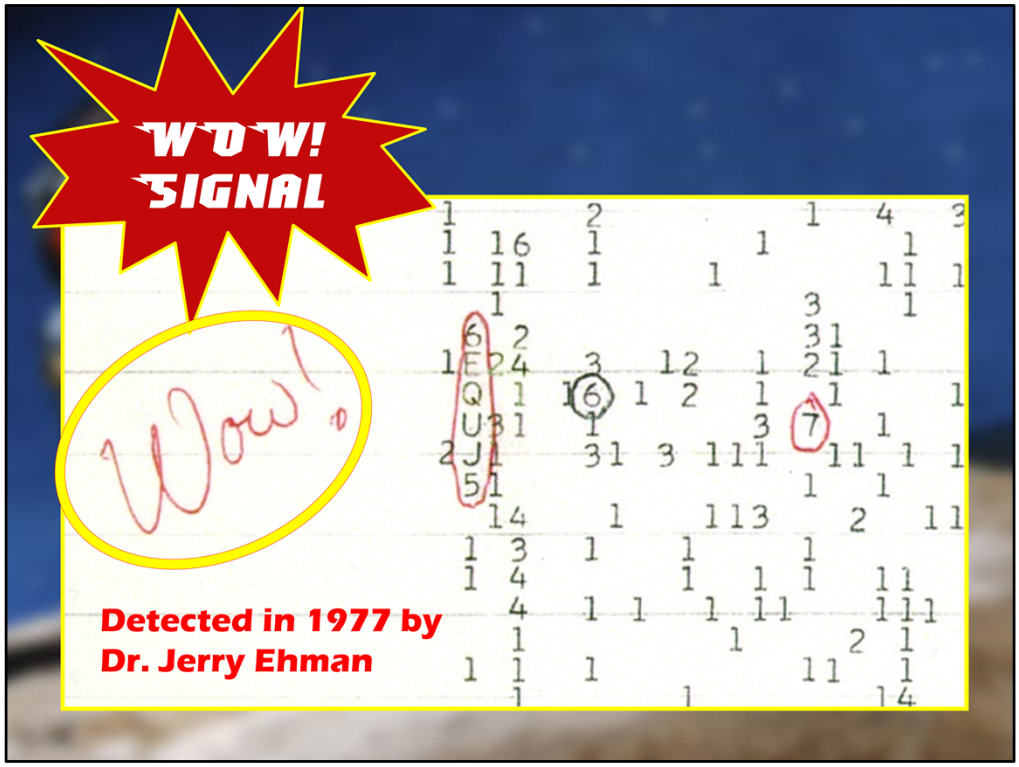
The amount of time that space communications are released by civilizations



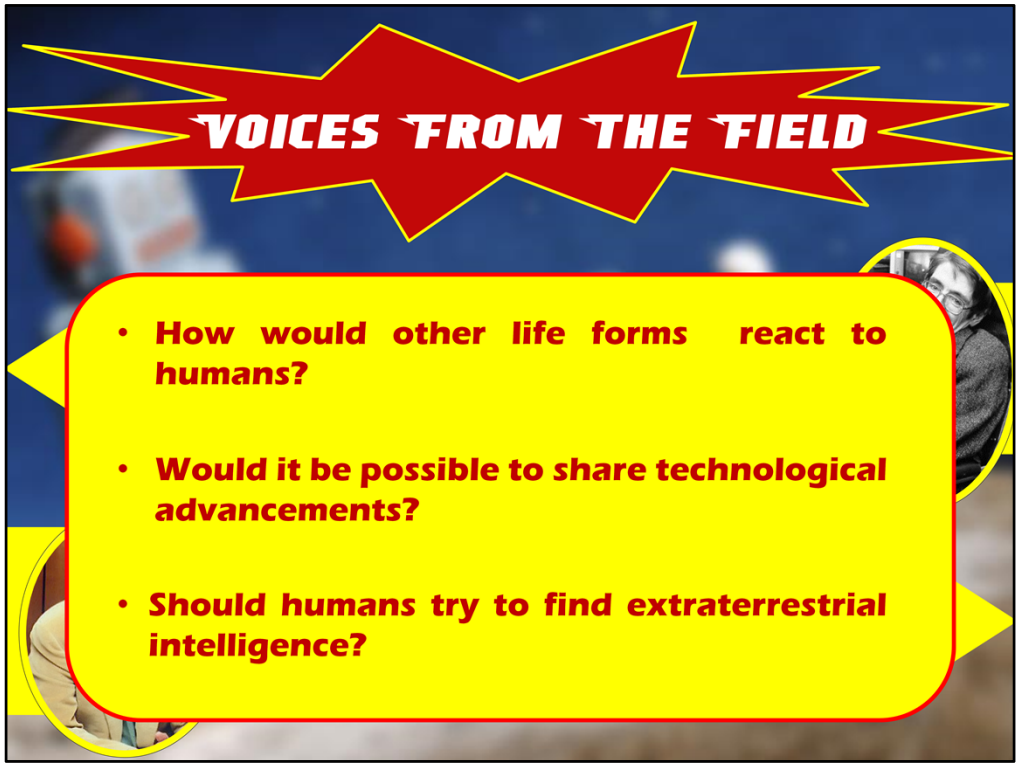
While most astronomers agree that the Drake equation is flawed, it began an important conversation about extraterrestrial civilizations. This equation prompted a conversation about extraterrestrial intelligence that led to decades of exploration.



In 1974, Dr. Drake sent a largely symbolic message to a star cluster 25,000 light years away from Earth in an attempt to reach intelligent life. This message was named the Arecibo message because it was sent from the Arecibo Observatory in Puerto Rico. No response was every recorded.



The Wow! Signal was a strong radio signal detected in 1977 by Dr. Jerry Ehman, who was working on a SETI project at Ohio State University. The signal lasted for seventy two seconds and has never been detected again. It is called the Wow! Signal because Dr. Ehman wrote the word “wow” on the side of the computer printout associated with the signal. The numbers and letters 6EQUJ5 play an important role in the signal, and the signal was a close match to what scientists would expect to receive from other intelligent life.



Since the WOW! Signal, SETI has embarked on many projects; however, most projects are now inactive due to decreased funding or project conclusion. Many astronomers suggest that such a large universe provides endless possibilities for the existence of intelligent life. Scientist Stephen Hawking has this to say about continued exploration: “To confine our attention to terrestrial matters would be to limit the human spirit.” Scientist Carl Sagan asserted that “We find that we live on an insignificant planet of a humdrum star lost in a galaxy tucked away in some forgotten corner of a universe in which there are far more galaxies than people.”

If there is life somewhere in space, humans will need to consider the effects of interacting with other intelligent life. This search for extraterrestrial intelligence prompts the following questions:

•How would other life forms react to humans?
•Would it be possible to share technological advancements? and
•Should humans try to find extraterrestrial intelligence?

What do you think?