

Lotto or Life: What are the Chances ?

Activity 3

Is there a way to estimate the number of technologically advanced civilizations that might exist in our Galaxy? While working at the National Radio Astronomy Observatory in Green Bank, West Virginia, Dr. Frank Drake conceived a means to mathematically estimate the number of worlds that might harbor beings with technology that could communicate across the vastness of interstellar space. The Drake Equation, as it came to be known, was formulated in 1961 and is generally accepted by the scientific community.

$$N = f_s * f_p * n_e * f_{ld} * f_i * f_c * f_l$$

where,

N = The number of communicative civilizations in the Milky Way

f_s = The number of stars in the Milky Way

f_p = The fraction of those stars with planets (Current evidence indicates that planetary systems may be common for stars like the Sun.)

n_e = The number of Earth-like worlds per planetary system

f_{ld} = The fraction of those Earth-like planets where life actually develops

f_i = The fraction of life sites where intelligence develops

f_c = The fraction of communicative planets (those on which electromagnetic communications technology develops)

f_l = The fraction of a planet's lifetime that has a technological civilization

If we substitute,

$$N = f_s * f_p * n_e * f_{ld} * f_i * f_c * f_l$$

$$N = 400 \text{ billion} (1/4) 2 (1/2) (1/10) (1/10) (1/100 \text{ million})$$

$$N \sim 10 \text{ technological civilizations in just the Milky Way Galaxy!}$$

What would we do to determine the number of technological civilizations that exists in the Universe? Multiply this by billions; the number of galaxies in the Universe!