

**TEST #2**  
**Nov 16, 2020**

1. DNA is one of the fundamental building blocks of every single biological organism here on Earth.
  - a) What does DNA stand for?
  - b) What nucleic bases does DNA incorporate, and how do they pair together?
  - c) How are genetic “words” formed into a “sentence”?
  - d) What is the difference between coding and non-coding DNA?
  - e) What are mutations? The mutations of which “letter” in a genetic word are *least* likely to be lethal and why?
2. Our Moon is certainly an oddball among terrestrial worlds. What is our best guess on how the Moon formed? What makes us say that?
3. What can you say about the *past* habitability of Mars?
4. Let’s now focus on potential life on the moons around gas giants.
  - a) Name at least 4 moons that are most likely to be habitable.
  - b) Name at least 4 arguments for the existence of liquid water on these moons.
  - c) What energy sources could life potentially tap into on those moons?
  - d) How would you characterize the habitability of Titan compared to Earth?
5. The habitable zone is one of the prime targets when searching for life on planets orbiting other stars.
  - a) Define the habitable zone.
  - b) What physical considerations determine the inner and the outer boundaries of the habitable zone? At what distance from the Sun are these boundaries? Focus only on extreme boundaries.
  - c) The Sun was 80% as luminous as it is today about 4 billion years ago. Estimate the inner and outer boundaries of the habitable zone then.
  - d) The Sun will be about 130% as luminous as it is today in about 4 billion years. Estimate what the inner and outer boundaries of the habitable zone will be in that case.

- e) Based on those numbers, draw the evolution of the habitable zone through time and estimate when will Earth stop being habitable.

Hint: think about how the amount of light depends on the luminosity of the Sun.

- 6. Why do we say that science is deeply skeptical of UFOs being explained by alien encounters?