

1. Life on Earth is carbon-based instead of silicon-based because carbon atoms are:
  - (A) more abundant.
  - (B) easier to connect/disconnect into chains.
  - (C) responsible for the greenhouse effect.
  - (D) more soluble in water.
  - (E) (Unsure/guessing/lost/help!)
  
2. Carbon atoms can form long, complex stable chains because:
  - (A) of how they bond with other atoms.
  - (B) they can store and transmit information.
  - (C) of Earth's electromagnetic fields.
  - (D) of random variations.
  - (E) (Unsure/guessing/lost/help!)
  
3. 

Biological evolution
Chemical evolution
Life

 is a process where:
  - (A) organisms change over generations because of environmental changes.
  - (B) an organism alters its environment to survive and reproduce.
  - (C) organic molecules on Earth came from space.
  - (D) stable, complex molecules arise from simpler molecules.
  - (E) (Unsure/guessing/lost/help!)
  
4. Evidence that 

life began in the sea
organic molecules can form naturally
molecules chemically evolved into life
simple organisms evolved into complex organisms

 on Earth is:
  - (A) fossil stromatolites.
  - (B) Cambrian explosion fossils.
  - (C) the Miller experiment.
  - (D) (No evidence yet exists.)
  - (E) (Unsure/guessing/lost/help!)

5. For life on Earth, DNA molecules store information that encodes:
- (A) possible combinations of carbon molecules.
  - (B) previous forms of life.
  - (C) chemical processes in organisms.
  - (D) metals made by the sun.
  - (E) (Unsure/guessing/lost/help!)
6. Water (or some other type of liquid) should be present on a planet with life, as liquids would be necessary to:
- (A) transport nutrients and wastes.
  - (B) cause erosion.
  - (C) start tectonic plate motion.
  - (D) absorb radioactivity.
  - (E) (Unsure/guessing/lost/help!)
7. The habitable zone around a star is the region where:
- (A) plants use photosynthesis.
  - (B) planets are geologically active.
  - (C) the greenhouse effect can be maintained.
  - (D) terrestrial planets have liquid water.
  - (E) (Unsure/guessing/lost/help!)
8. Which type of star(s)  
| could have a habitable zone, where planets could have liquid water |  
| would have a main - sequence lifetime long enough for life to arise | ?
- I. A massive star.
  - II. A medium-mass star.
  - III. A low-mass star (a.k.a. "red dwarf").
- (A) I only.
  - (B) II only.
  - (C) III only.
  - (D) Both I and II.
  - (E) Both II and III.
  - (F) Both I and III.
  - (G) I, II and III.
  - (H) (Unsure/guessing/lost/help!)

9. Life is not likely to exist on planets that orbit massive main-sequence stars because:
- (A) massive main sequence stars are too luminous.
  - (B) massive main sequence stars have short lifetimes.
  - (C) these planets would be geologically dead.
  - (D) these planets would be metal-poor.
  - (E) (Unsure/guessing/lost/help!)
10. Life is not likely to exist on planets in many binary star systems because these planets would not have:
- (A) regular day and night cycles.
  - (B) enough geological activity.
  - (C) stable orbits.
  - (D) a stable moon.
  - (E) (Unsure/guessing/lost/help!)
11. Stars in the halo of the Milky Way would not be likely places to find life because these stars are:
- (A) too young.
  - (B) metal-poor.
  - (C) not massive enough.
  - (D) rich in dark matter.
  - (E) (Unsure/guessing/lost/help!)
12. The Drake equation estimates the number of technological civilizations in the Milky Way from estimating the numbers of:
- (A) inhabitable planets, and lifetimes of technological civilizations.
  - (B) previous generations of massive main-sequence stars.
  - (C) possible signals receivable by radio telescopes.
  - (D) metal-rich Milky Way spiral arms.
  - (E) (Unsure/guessing/lost/help!)
13. The Drake equation cannot give a precise result for the number of technological civilizations in the Milky Way because:
- (A) no other technological civilizations have been discovered yet.
  - (B) the precise values of many factors are not yet known.
  - (C) it has never been tested.
  - (D) it assumes only carbon-based life is possible.
  - (E) (Unsure/guessing/lost/help!)

- 14.** The most precisely known value in the Drake equation is the:
- (A) number of stars in the Milky Way.
  - (B) fraction of stars with planets.
  - (C) number of planets per star in habitable zones.
  - (D) fraction of planets where life begins.
  - (E) fraction of planets where life evolves with intelligence.
  - (F) fraction of star's life that a technological civilization survives.
  - (G) (Unsure/guessing/lost/help!)

*(Subjective)*

- 15.** Number of technological civilizations in the Milky Way?
- (A) One (only us).
  - (B) A few (tens).
  - (C) Many (hundreds).
  - (D) A lot (thousands).
  - (E) A multitude (millions+).
  - (F) (Unsure/guessing/lost/help!)

- 16.** Communication with other technological civilizations may be "messages in a bottle," rather than two-way conversations because other technological civilizations:
- (A) would take too long to understand messages.
  - (B) may not bother sending replies.
  - (C) are more likely to visit Earth than reply.
  - (D) are likely to be very far away.
  - (E) (Unsure/guessing/lost/help!)

*(Subjective)*

- 17.** Messages should be transmitted from Earth to other technological civilizations.
- (A) Strongly disagree.
  - (B) Disagree.
  - (C) Neutral.
  - (D) Agree.
  - (E) Strongly agree.

*(Subjective)*

- 18.** It is possible that messages will be received from other technological civilizations.
- (A) Strongly disagree.
  - (B) Disagree.
  - (C) Neutral.
  - (D) Agree.
  - (E) Strongly agree.