

HW check at bell

QUIZ: Drake Equation and Fermi Paradox 18.2 & 18.3
-open book and notebook (not open computer)

Then we'll build solar filters for our telescopes

CONCEPTUAL SELF-TEST: TRUE OR FALSE?/MULTIPLE CHOICE

1. The definition of life requires only that, to be considered “alive,” you must be able to reproduce. (T/F)
2. Laboratory experiments have created living cells from nonbiological molecules. (T/F)
3. Dinosaurs lived on Earth for more than a thousand times longer than human civilization has existed to date. (T/F)
4. The *Viking* landers on Mars discovered microscopic evidence of life but found no fossil evidence. (T/F)
5. The development of life and intelligence on Earth are extremely unlikely if chance is the only evolutionary factor involved. (T/F)
6. We have no direct evidence for Earth-like planets orbiting other stars. (T/F)
7. Our civilization has already launched probes into interstellar space and broadcast our presence to our neighbors. (T/F)
8. The chemical elements that form the basic molecules needed for life are found (a) in the cores of Sun-like stars; (b) commonly throughout the cosmos; (c) only on planets that have liquid water; (d) only on Earth.
9. Fossil records of early life-forms on Earth suggest that life began about (a) 6000 years ago; (b) 65 million years ago; (c) 3.5 billion years ago; (d) 14 billion years ago.
10. The least well-known factor in the Drake equation is (a) the rate of star formation; (b) the fraction of stars having planetary systems; (c) the average lifetime of a technologically competent civilization; (d) the diameter of the Milky Way Galaxy.
11. We don’t expect life on planets orbiting B-type stars because the star (a) has too much gravity; (b) is too short-lived for life to evolve; (c) is at too low a temperature to sustain life; (d) would have only gas giant planets.
12. NASA’s Space Shuttle orbits Earth at about 17,500 mph. If it traveled to the next Sun-like star at that speed, the trip would take at least (a) 1 week; (b) 1 decade; (c) 1 century; (d) 100 millennia.
13. The strongest radio-wavelength emission in the solar system comes from (a) human-made signals from Earth; (b) the Sun; (c) the Moon; (d) Jupiter.
14. **VIS** From the data shown in **Figure 18.10** (Stellar Habitable Zones), the habitable zone surrounding a main sequence K-type star (a) cannot be determined; (b) extends from roughly 1 to 2 AU from the star; (c) is larger than that of an F-type star; (d) is larger than that of an M-type star.
15. **VIS** If **Figure 18.14** (Earth’s Radio Leakage) were to be redrawn for a planet spinning twice as fast, the new jagged line would be (a) unchanged; (b) taller; (c) stretched out horizontally; (d) compressed horizontally.

True or False?/Multiple Choice 1) F 2) F 3) T 4) F 5) T 6) T 7) T 8) b 9) c 10) c 11) b
12) d 13) a 14) d 15) d

3. ■ Based on the numbers presented in the text, and assuming an average lifetime of 5 billion years for suitable stars, estimate the total number of habitable planets in the Galaxy.
5. ■ Suppose that each of the “fraction” terms in the Drake equation turns out to have a value of 1/10, that stars form at an average rate of 20 per year, and that each star with a planetary system has exactly one habitable planet orbiting it. Estimate the present number of technological civilizations in the Milky Way Galaxy if the average lifetime of a civilization is (a) 100 years, (b) 10,000 years, (c) 1 million years.

Problems 1) 6.3 seconds (for a 20-year-old reader); 18 seconds (in 2003); 72 seconds; 161 seconds; 237 days 2) 0.19–0.47 AU 3) 5 billion 4) 27 AU 5) (a) 0.2, (b) 20, (c) 2000

MAKING A SOLAR FILTER

- FILTER MATERIAL
- CARDSTOCK
- TAPE OR HOT GLUE

