1. Which is the MOST important property of the element carbon that makes it ideal as a fundamental building block of biological molecules?
A. it is a very common element
B. it readily forms chemical bonds with itself and other elements, allowing a wide variety of complex molecules to form
C. it is the ONLY element that forms complex molecules
D. it is a very stable element

2. What is the MOST important role that proteins play in living organisms on the Earth?
A. information storage
B. short-term energy storage
C. long-term energy storage and cell structure
D. basic functioning of living organisms

3. The secondary (2°) structure of a protein is
A. the sequence of amino acids
B. a sheet or helix
C. the overall shape of the molecule
D. the orientation of molecular groups around an asymmetrical carbon atom

4. Which of the following molecules is NOT asymmetric (i.e. does not contain a central carbon atom surrounded by four different groups)?
A. (CH₂SH) (H)C(NH₂)(COOH)
B. (CH₂=CH) (H)C(CHO)(C₆H₅)
C. (NH₂)(C₂H₅)C(H)(OH)
D. (CH₃)(H)C(COOH)(H)

5. A Chlorine (Cl) atom with seven electrons in its outer shell (out of a full shell of eight) will most likely react with other elements by
A. giving up seven electrons
B. gaining one electron
C. sharing electrons
D. keeping the same number of electrons and being unreactive

6. The basic molecular building blocks of carbohydrates are
A. fatty acids
B. saccharides
C. amino acids
D. nucleic acids

7. Using the following fragment of the genetic code: Leu = ATG, Gly = CAC, Ala = GTC, which of the following simple proteins does the gene GTCATGCACCACATG correspond to?
A. Ala-Leu-Gly-Gly-Leu
B. Leu-Ala-Leu-Gly-Gly
C. Ala-Gly-Leu-Ala-Gly
D. Gly-Gly-Ala-Gly-Leu
8. What is the messenger-RNA sequence corresponding to the gene AGCCTG?
A. UCGGAC  
B. GTCCGA  
C. TCGGUC  
D. TCGGAC

9. Why might we think that silicon would be an obvious alternative to carbon as a building block for biological molecules?
A. it has the same number of outer electrons as carbon and hence should have a similar chemistry  
B. it has a similar abundance on Earth to carbon  
C. it forms complex molecules like carbon  
D. it forms the basis of some life forms on Earth

10. What important role does water play in Life on Earth?
A. it forms complex molecules  
B. it harnesses energy from the Sun  
C. it acts as a reaction medium  
D. it prevents us from becoming thirsty

11. Observers in the nineteenth century reported seeing many straight-line features criss-crossing the surface of Mars, and these were interpreted as canals constructed by intelligent beings. What is the most likely present-day explanation for these observations?
A. stationary linear cloud formations (mountain lee wave clouds) and weather fronts, rotating with the planet  
B. optical illusions caused by vague shadings on the planet surface  
C. rifts at the boundaries of geological tectonic plates  
D. lines of volcanoes similar to those of the Hawaiian Islands on Earth

12. Which of the following characteristics of a human beings is NOT a fundamental characteristic of Life but a product of our environment (i.e. the planet we have formed and evolved on)?
A. our ability to reproduce  
B. our ability to stabilize our body temperatures  
C. our ability to see visible radiation  
D. our ability to move

13. What is the ultimate source of energy for human Life on the surface of the Earth?
A. the Sun  
B. other animals  
C. geothermal heat from the Earth's interior  
D. plant matter

14. A section of DNA that corresponds for a particular protein is known as a
A. genome  
B. gene  
C. chromosome  
D. codon

15. An amoeba is an example of a simple
A. bacteria  
B. archaea  
C. eukaryote  
D. prokaryote
16. A chemohereotroph
A. gets its energy from the Sun and its carbon from other organisms
B. gets its energy chemically and its carbon from the atmosphere
C. gets its energy from the Sun and its carbon from the atmosphere
D. gets its energy chemically and its carbon from other organisms

17. Modern laboratory experiments, which repeated those of Urey and Miller in exploring the possibility of producing organic molecules (the building blocks of life) from mixtures of gases expected to exist in the atmosphere of early Earth, passed electrical discharges through which mixture of gases?
A. ammonia, methane and water vapor
B. hydrogen and helium
C. carbon dioxide, water vapor, and dust
D. nitrogen, water vapor, and carbon dioxide

18. Some scientists have suggested that Life may have started on Mars first and then been transported to the Earth by Martian meteorites. Which of the main theories for the origin of Life on Earth does this correspond to?
A. chemical evolution
B. supernaturalism
C. litho panspermia
D. directed panspermia

19. According the current scientific evidence, what is the likelihood that Life on Earth originated due to the action of some omnipotent being?
A. very likely
B. certain
C. very unlikely but not impossible
D. impossible

20. The strong intermolecular forces between water molecules which give it its characteristic surface tension are due to
A. its strong polarity
B. it being composed of abundant atoms
C. high boiling point
D. wide liquid range

21. The Cretaceous period ended 65 million years ago with the
A. appearance of the first cells
B. disappearance of the dinosaurs
C. appearance of the first hominids
D. appearance of the first mammals

22. Most of the alternative biological solvents to water are liquids at much lower temperatures. Why is this a disadvantage for Life?
A. It is an advantage not a disadvantage since it means that an organism would not overheat as easily
B. biological reactions would proceed much more quickly
C. biological reactions would proceed much more slowly
D. biological reactions could never occur
23. The gas that is the major constituent of the atmospheres of Venus and Mars and a minor constituent of Earth's atmosphere is
A. H₂O.
B. N₂.
C. CO₂.
D. O₂.

24. Water exists on Mars. Where and in what state does it NOT exist on this planet?
A. as liquid, flowing in river valleys
B. in permafrost, below the surface
C. in polar icecaps
D. as water vapor in the atmosphere and as clouds

25. The theory that seems to account most satisfactorily for the origin of the Moon at the present time is that
A. the Moon formed from material spun off from Earth when Earth was molten and spinning rapidly, early in its history.
B. a large object collided with Earth and ejected the material that formed the Moon.
C. the Moon formed by accretion elsewhere in the solar system and was captured later by Earth.
D. the Moon formed from material already in orbit around Earth.

26. If the history of the Earth is scaled to one year then the origin of Life occurred
A. at the very beginning of January 1st
B. just after Valentines Day
C. in the middle of the Summer
D. on New Year's Eve

27. Igneous rocks that form on the bottom of the ocean or the surface of the Earth are said to be
A. intrusive
B. extrusive
C. inclusive
D. exclusive

28. Sandstone is a type of
A. igneous rock
B. sedimentary rock
C. metamorphic rock
D. meteoritic rock

29. A fossil is found in a layer of strata which is above another layer dated at 10 million years and below another layer dated at 5 million years. From this we can deduce the age of the fossil to be
A. between 5 and 10 million years old
B. older than 10 million years
C. younger than 5 million years
D. we can tell nothing about the fossils age from this data

30. In which Eon of Earth's history did the first eukaryotes appear?
A. the Hadean
B. the Achaean
C. the Proterozoic
D. the Phanerozoic
31. The radioactive isotope $^{226}_{88}$Ra decays to the isotope $^{222}_{86}$Rn. What type of radioactive decay is this?
A. alpha decay  
B. beta decay  
C. electron capture  
D. electron ionization

32. What do we mean by the half-life of a radioactive isotope?
A. it is the time for half the number of radioactive nuclei to decay  
B. it is the amount of time of half of the nuclei to become radioactive  
C. it is the amount of time a person can be exposed to radiation without getting sick  
D. it is the time for half the number of radioactive nuclei to become stable nuclei

33. A rock sample contains equal amounts of the radioactive isotope U-235 and its daughter isotope Pb-207. If the half-life of this decay is 700 million years, how old is this rock?
A. 700 million years  
B. 1400 million years  
C. 350 million years  
D. 2100 million years

34. The oldest rocks date back to approximately
A. 4.0 bya  
B. 3.5 bya  
C. 3.85 bya  
D. 4.5 bya

35. The amount of geological activity on a Terrestrial planet is directly related to
A. its size  
B. its chemical composition  
C. the thickness of its atmosphere  
D. its density

36. Mild, short-term cooling periods during the Earth's history are known as
A. ice ages  
B. snowball Earth  
C. nuclear winters  
D. ice storms

37. As Life on Earth evolved, its DNA
A. became gradually more complex  
B. became gradually less complex  
C. stayed exactly the same  
D. changed gradually into RNA

38. Why do we think that DNA was probably NOT the first self-replicating molecule?
A. it is able to catalyze its own replication  
B. it is far too complex to have been the first self-replicating molecule  
C. it is able to replicate using carbohydrates rather than proteins  
D. it is able to replicate at high temperatures found near deep ocean vents
39. What is one reason that early Life formed cells?
A. it helps to protect the fragile biological molecules from the outside environment
B. biological reactions can only occur within cells
C. only cells can replicate
D. cell walls prevent heat from escaping

40. In the chemical evolution model what came after protocells?
A. chemical reactions on clays and other minerals
B. prokaryotes
C. eukaryotes
D. dinosaurs

41. Mass Extinctions
A. can slow down or speed up evolution
B. always speed up evolution
C. always slow down evolution
D. have absolutely no effect on evolution

42. Due to its elliptical orbit, Mars is closer to the Sun on average during Summer in the Southern Hemisphere. This means Southern Summer on Mars will be
A. short and hot
B. short and mild
C. long and hot
D. long and mild

43. The seasonal polar caps on Mars are made of
A. water ice
B. carbon dioxide ice
C. a uniform mixture of water and carbon dioxide ices
D. methane ice

44. What was seen on the ground at the Viking 1 Landing site during Winter that indicated low temperatures?
A. carbon dioxide frost
B. water ice frost
C. snow
D. sand dunes

45. What method has been used to determine the most recent time the Tharsis volcanoes on Mars have erupted?
A. counting the craters on their slopes
B. measuring the thickness of lava flows on their sides
C. measuring the changes in sulfur compound concentrations in the planet's atmosphere
D. measuring the intensity of infrared radiation emitted by them

46. Most of the larger water erosion features on Mars were carved out during the
A. Noachian Era
B. Amazonian Era
C. Hesperian Era
D. Hadean Era
47. If Life still exists on Mars today it is probably in the form of
A. simple single-celled bacteria
B. advanced Alien beings
C. simple plants
D. small mammals that live beneath the surface

48. Which of the following statements best describes the idea behind the Labeled Release Experiment on board the Viking Landers?
A. living organisms in the soil should incorporate carbon from atmospheric gases
B. living organisms in the soil should give off gases when they metabolize nutrients
C. radioactive gases should be produced when radioactive nutrients are added to a soil sample
D. soil with living organisms in it should contain organic molecules

49. How do we know that Europa has an icy surface?
A. the spectrum of reflected sunlight from its surface matches very closely the spectrum of light reflected from ice in the laboratory
B. its surface is very bright and reflective
C. only ices could have condensed at its distance from the Sun
D. all Jovian moons have icy surfaces

50. The atmosphere of Mercury
A. is nonexistent.
B. is only sulfur dioxide and hydrogen sulfide from volcanoes.
C. consists mostly of nitrogen (80%) and oxygen (20%).
D. is made up of carbon dioxide with small quantities of nitrogen and argon.