Midterm Exam SCB115.700A Name _____ 100 pts

1. Which of the following is a common energy currency in living cells that powers most living organisms?
A) Sunlight B) Heat C) ATP D) Phosphate

2. How does ATP release energy that can be used by living cells?
A) By being exposed to body heat
B) By breaking a bond within an ATP molecule
C) By being exposed to sunlight
D) By adding more phosphate groups to itself

3. Choose the best explanation as to why both consumers and producers perform cellular respiration.
A) Although they may obtain their sugars in different ways, both consumers and producers rely on cellular respiration to make ATP.
B) Both consumers and producers perform cellular respiration to produce the sugars that will be "burned" to fuel the energy of life.
C) Both consumers and producers perform cellular respiration to produce the oxygen necessary to sustain life.
D) Both consumers and producers perform cellular respiration to produce the heat necessary to sustain life.

4. How do we know green light is not absorbed by chlorophyll?
A) Green light is the wavelength of light that is reflected instead of absorbed by the chloroplasts.
B) Not enough of the green light penetrates the ozone layer and makes it to the plant.
C) Green light has such a small wavelength that most of it goes straight through the leaves without interacting with the chlorophyll.
D) Green light does not have enough energy to excite an electron in the photosystem.

5. During the process of photosynthesis, solar (radiant) energy is converted to
A) chemical energy. B) heat energy. C) thermal energy. D) mechanical energy.

6. What molecule(s) link the light reactions (stage 1 of photosynthesis) to the Calvin cycle (stage 2 of photosynthesis)?
A) The oxygen and carbon dioxide molecules
B) ATP and NADPH
C) The sugars
D) The water

7. The primary function of the Calvin cycle is to produce _____.
A) O_2 B) ATP C) CO_2 D) Sugar

8. Respiration is called aerobic because _____.
A) it happens in the absence of oxygen B) it requires oxygen
C) it requires carbon dioxide D) it happens in mitochondria

9. Identify the stage of cellular respiration when glucose is split into two molecules of pyruvic acid.
A) Citric acid cycle B) Calvin cycle C) Electron transport chain D) Glycolysis

10. During which stage of cellular respiration is the majority of the ATP produced?
A) Glycolysis B) Citric acid cycle C) Fermentation D) Electron transport chain

11. Explain how molecules other than glucose can be used as energy sources.
A) They can't; cellular respiration is limited to glucose.
B) They have their own unique metabolic pathways.
C) They are modified first and then enter the same metabolic pathway as glucose.
D) Fats, proteins, and other carbohydrates are similar enough to glucose that they utilize the same metabolic pathway without any modifications.

12. What is the main purpose of cellular respiration?
A) To produce carbon dioxide
B) To produce sugars
C) To produce ATP
D) To produce oxygen

13. The scientific method includes all of the following EXCEPT:
A) experiment
B) a testable theory
C) an observation.
D) a hypothesis

14. Which of the following statements is a hypothesis rather than a theory?
A) Matter is composed of atoms.
B) Living things are made of cells.
C) Modern organisms descended from preexisting life-forms.
D) Female birds prefer to mate with male birds that have longer tails.

15. Which is the correct sequence of increasing organization?
A) Atom, tissue, cell, organ
B) Organ, molecule, tissue, cell
C) Organ, tissue, cell, molecule
D) Cell, tissue, organ, organ system

16. Which of the following levels of organization is the most inclusive (that is, includes the most life-forms)?
A) Ecosystem
B) Population
C) Biosphere
D) Community

17. If you examined the human body, which of the following combinations of elements would be most common?
A) C, O, P, S
B) C, Na, O, N
C) Cl, Ca, C, H
D) C, H, O, N

18. Carbon has an atomic number of 6, so what is the distribution of its electrons?
A) The first energy level has 6 and the second has none
B) The first energy level has 2, the second has 2, and the third has 2.
C) The first energy level has 2 and the second has 4.
D) The electron arrangement cannot be determined from the atomic number alone.

19. Which of the following best explains why a particular atom may not form compounds readily?
A) The atom has no electrons.
B) The atom has an uneven number of protons.
C) The atom has 7 electrons in its outer shell.
D) The atom's valence shells are completely full.

20. Polar covalent bonds form when
A) electrons are shared unequally between atoms.
B) more than one pair of electrons is shared.
C) an acid and a base are combined.
D) atoms from two molecules are attracted to each other.

21. Polar molecules
A) have an overall negative electric charge.
B) have an equal distribution of electric charge.
C) have an overall positive electric charge.
D) have an unequal distribution of electric charge.

22. How does a scientist get the corrected version of a gene into the cells of a gene therapy patient?
A) It is delivered with a modified virus.
B) It is directly injected with a microscopic hypodermic needle.
C) It is attached to a food molecule, such as glucose and is then ingested by the individual.
D) It is attached to the surface of microscopic beads and is then shot into the individual (i.e., shotgun method).

23. DNA profiling relies on an individual's _____, no two of which are the same between different people, except identical twins.
A) unique set of genes
B) unique mRNA sequences
C) unique set of short tandem repeats (STR) within DNA
D) unique fingerprints

24. What is recombinant DNA?
A) A segment of DNA containing sequences from two different sources
B) DNA that comes from plasmids
C) DNA that can no longer replicate
D) DNA that is circular

25. The small circular molecules of DNA commonly found in bacteria are called _____.
A) chromatids B) plastids C) chromophores D) plasmids

26. Prokaryotes and eukaryotes are different because
A) Prokaryotes have RNA; eukaryotes have DNA.
B) Prokaryotes have DNA; eukaryotes have RNA.
C) Prokaryotes have a true nucleus; eukaryotes have a nucleoid.
D) Prokaryotes have a nucleoid; eukaryotes have a true nucleus.

27. The type of mutation that alters the nucleotide sequence of a gene but does not alter the amino acid sequence of the protein produced from that gene is called _____ mutation.
A) missense B) silent C) nonsense D) frameshift

28. In what way(s) can mRNAs be processed?
A) By adding caps and tails to the ends of the mRNAs
B) By removing the introns (the noncoding regions) of the mRNAs
C) By splicing the exons (the coding regions) of the mRNAs in different ways
D) All of the above

29. What does it mean when we say a gene is "turned off"?
A) The gene is no longer working properly.
B) The gene cannot be transcribed and translated into a protein.
C) The gene has a mutation.
D) The gene is now activated.

30. The typical carbon atom is described in the periodic table by the accompanying box. How many protons are in a typical oxygen atom?

A) 8 B) 12 C) 18 D) Not enough information given

31. The bond in which bonded atoms share electrons is called a(n) _____.
A) ionic bond B) covalent bond C) hydrogen bond D) polar bond

32. Individual water molecules are held to one another by relatively weak _____ bonds.
A) covalent B) hydrogen C) ionic D) nonpolar

33. Why is one side of a single water molecule partially negative while the other side is partially positive?
A) Electron pairs are unevenly shared between the oxygen atom and the two hydrogen atoms.
B) Electron pairs are unevenly shared between the two hydrogen atoms.
C) Oxygen donates its electrons to hydrogen.
D) Hydrogen donates its electrons to oxygen.

34. Water molecules stick to other water molecules because
A) water molecules are neutral, and neutral molecules are attracted to each other.
B) hydrogen bonds form between the hydrogen atoms of one water molecule and the oxygen atoms of other water molecules.
C) the hydrogen atoms of adjacent water molecules are attracted to one another.
D) the oxygen atoms of adjacent water molecules are attracted to one another.

35. To a large extent, a protein's function is dependent upon its shape. What determines a protein's shape?
A) The location of the active site
B) The sequence of amino acids
C) The number of amino acids
D) The number of peptide bonds

36. The building of a large organic molecule from small subunits involves multiple _____.
A) hydrolysis reactions
B) osmotic reactions
C) dehydration synthesis reactions
D) hydrosynthetic reactions

37. Transfer RNA
A) is a nucleic acid that carries the code for the primary structure of a protein.
B) brings amino acids to the ribosome.
C) is a subunit of ribosomes.
D) transfers proteins into the nucleus.

38. Which of the following is a difference between RNA and DNA?
A) RNA is single-stranded and DNA is usually triple-stranded.
B) DNA contains adenine and RNA does not.
C) RNA has ribose sugar and DNA has deoxyribose sugar.
D) RNA is made from nucleotide monomers and DNA is made from amino acid monomers.

39. The genetic code is
A) different in different organisms.
B) read in sets of three bases called codons.
C) used during the translation of DNA to mRNA.
D) a set of two base sequences coding for each amino acid.

40. Which is the correct pathway of a protein through a cell as it is being made?
A) Nucleus, ribosome, Golgi apparatus
B) Golgi apparatus, ribosome, rough endoplasmic reticulum
C) Nucleus, smooth endoplasmic reticulum, Golgi apparatus
D) Golgi apparatus, ribosome, mitochondria

41. What is the monomer of the DNA molecule?
A) Polynucleotide
B) Monosaccharide
C) Nucleotide
D) Peptide

42. How many nucleotides are required to code for 20 amino acids?
A) 20
B) 40
C) 60
D) 120

43. Why does transcription occur in the nucleus and not in the cytoplasm in eukaryotes?
A) RNA cannot exist in the cytoplasm.
B) DNA cannot leave the nucleus.
C) Ribosomes cannot leave the nucleus.
D) Codons are only found in the nucleus

44. Molecules are made up of particles called _____, which retain all properties of their type of matter.
A) atoms
B) protons
C) compounds
D) acids

45. Which of the following represents the strongest acid?
A) pH 2.4 lemon juice
B) pH 7.4 blood
C) pH 13 lye
D) pH 1.0 battery acid

46. Often foods contain trans fats or hydrogenated fats. This ingredient has to be disclosed on the label. If you look closely at the food in your cupboards, you'll be shocked to see how many different items contain this (from seasonings to soup to bread crumbs). Why is there so much "hype" about trans fats?
A) They contain a bond that does not naturally occur.
B) They are unhealthy and are being phased out of many foods.
C) They contain omega–3 fatty acids, which are not good for you to eat.
D) Both A and B

47. A needle can be made to "float" on the surface tension of water. What causes this surface tension to form?
A) The adhesion of water molecules to the needle
B) The cohesion of water molecules to each other
C) The solubility of water
D) The heat capacity of water

48. What is the sum total of all the chemical reactions that take place in your body called?
A) Catabolism B) Anabolism C) Embolism D) Metabolism

49. What kind of bond joins amino acids together to form a protein?
A) Peptide bond B) Hydrogen bond C) Polar bond D) Protein bond

50. What is the opposite of photosynthesis and occurs in the mitochondria?
A) Cellular respiration B) Elongation C) Transcription D) Termination

Extra credit

1. What term describes the fatty acid tail of a phospholipid and indicates that it "hates" water?
A) bilayer B) hydrophilic C) hydrophobic D) cytosol

2. DNA is contained within the _____.
A) nucleus B) vacuole C) chloroplast D) mitochondria

3. Which organelle functions to break down and recycle large molecules?
A) Ribosome B) Golgi apparatus C) Lysosome D) Chloroplast

4. What kinds of molecules pass through a cell membrane most easily?
A) large and hydrophobic B) small and hydrophobic C) large polar D) ionic

5. Diffusion _____.
A) is very rapid over long distances
B) requires an expenditure of energy by the cell
C) is a passive process in which molecules move from a region of higher concentration to a region of lower concentration
D) requires integral proteins in the cell membrane

6. A neutral solution, pH 7
A) has no H^+ B) has no OH^- C) has equal amounts of H^+ and OH^- D) is hydrophobic

7. The following is a characteristic of a cell membrane:
A) It separates the cell contents from its environment. B) It is permeable to certain substances.
C) It is a lipid bilayer with embedded proteins. D) All of the above

8. Where do the light-dependent reactions of photosynthesis occur?
A) in the guard cells of the stomata B) in the chloroplast stroma
C) within the thylakoid membranes of the chloroplast D) in the leaf cell cytoplasm

9. Protein synthesis occurs where?
A) endoplasmic reticulum B) nucleus C) ribosome D) eukaryotic chromosome

10. The polymerase chain reaction (PCR) is useful for
A) analyzing a person's fingerprints
B) cutting DNA into many small pieces
C) creating recombinant plasmids
D) making many copies of a small amount of DNA