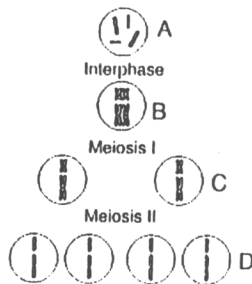


(I). Choose the most appropriate answer for the following questions, 1.5 points each (90 %).

- Which of the following is important in the pharmaceutical industry?
A). enantiomers B). geometric isomers C). structural isomers D). enantiomers & geometric isomers E). structural & geometric isomers
- The bonds that are broken when water vaporizes are
A). ionic bonds B). bonds between water molecules C). bonds between atoms of individual water molecules D). polar covalent bonds E). nonpolar covalent bonds
- A mole of table sugar and a mole of vitamin C are equal in their
A). weight in daltons B). weight in grams C). number of molecules D). number of atoms E). volume
- Which of the following characteristics is not associated with allosteric regulation of an enzyme's activity?
A). A naturally occurring molecule stabilizes a catalytically active conformation
B). Regulatory molecules bind to a site remote from the active site.
C). A molecule mimics the substrate and competes for the active site.
D). Inhibitor and activator molecules may compete with one another.
E). The enzyme usually has a quaternary structure.
- The two ring forms of glucose (α and β)
A). are made from different structural isomers of glucose
B). arise from different linear (nonring) glucose molecules
C). arise when different carbons of the linear structure join to form the rings
D). arise because the hydroxyl group at the point of ring closure can be trapped in either one of two possible positions
E). include an aldose and a ketone
- An enzyme accelerates a metabolic reaction by
A). altering the overall free-energy change for the reaction
B). making an endergonic reaction occur spontaneously
C). pushing the reaction away from equilibrium
D). making the substrate molecule more stable
E). lowering the activation energy
- The structural level of a protein least affected by a disruption in hydrogen bonding is the:
A). primary level B). secondary level C). tertiary level D). quaternary level
E). all structural levels are equally affected

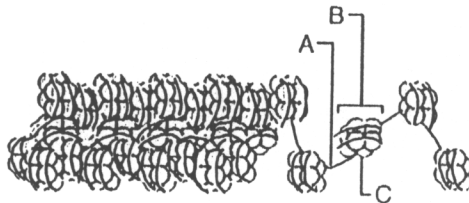
8. Which type of cell would probably provide the best opportunity to study lysosomes?
A). nerve cell B). phagocytic white blood cell C). bacterial cell D). leaf cell of a plant
E). muscle cell
9. Which of the following organelles is least closely associated with the endomembrane system?
A). chloroplast B). Golgi apparatus C). ER D). plasma membrane E). nuclear envelope
10. Which of the following factors would tend to increase membrane fluidity?
A). a high membrane potential. B). a lower temperature. C). a greater proportion of unsaturated phospholipids. D). a greater proportion of relatively large glycolipids compared to lipids having smaller molecular weights. E). a relatively high protein content in the membrane.
11. Which of the following experimental treatments would increase the rate of sucrose transport into the cells?
A). decreasing extracellular pH B). decreasing extracellular sucrose concentration C). decreasing cytoplasmic pH D). adding an inhibitor that blocks the regeneration of ATP
E). adding a substance that makes the membrane more permeable to hydrogen ions
12. The final electron acceptor of the electron transport chain that functions in oxidative phosphorylation is
A). NAD^+ B). ADP C). oxygen D). pyruvate E). water
13. Most CO_2 from catabolism is released during
A). the Krebs cycle B). glycolysis C). lactate fermentation D). electron transport
E). oxidative phosphorylation
14. Cooperation of the two photosystems of the chloroplast is required for
A). reduction of NADP^+ B). ATP synthesis C). cyclic photophosphorylation
D). oxidation of the reaction center of photosystem E). generation of a proton-motive force
15. Which of the following statement is a correct distinction between autotrophs and heterotrophs?
A). Only heterotrophs have mitochondria
B). Autotrophs, but not heterotrophs, can nourish themselves beginning with CO_2 and other nutrients that are entirely inorganic.
C). Only heterotrophs require oxygen.
D). Cellular respiration is unique to heterotrophs.
E). Only heterotrophs require chemical compounds from the environment.

16. Cell biologists use the term of "ligand" to refer to
 A). the target cell of a signal molecule. B). any small molecule that can bind to a larger one.
 C). the bond that forms between a signal molecule and its receptor. D). a molecule that can occupy a receptor site while not activating the receptor.
 E). the change in shape that occurs when a signal molecule binds to its receptor.
17. Chromatids are _____.
 A). found only in aberrant chromosomes. B). held together by the centroles.
 C). identical copies of each other if they are part of the same chromosome.
 D). composed of RNA. E). not present in the Y sex chromosome, but are present in the X sex chromosome.
18. Which of these cells is (are) haploid?



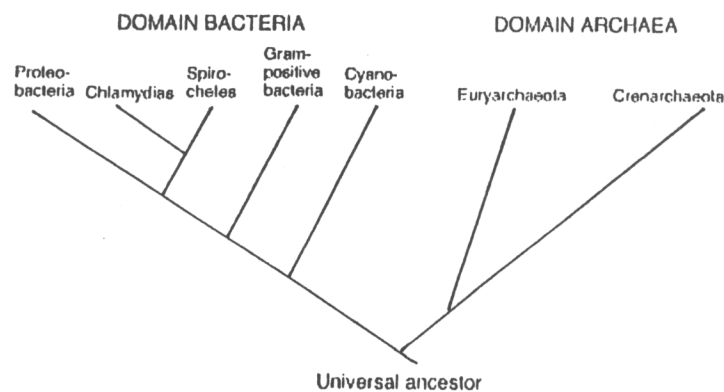
- A). A and D B). B C). B and C D). C and D E). D
19. At the end of _____ and cytokinesis, haploid cells contain chromosomes that each consist of two sister chromatids.
 A). metaphase II B). telophase I C). telophase D). telophase II E). interphase
20. Black eyes are dominant to orange eyes, and green skin is dominant to white skin. Sam, a MendAlien with black eyes and green skin, has a parent with orange eyes and white skin. Carole is a MendAlien with orange eyes and white skin. If Sam and Carole were to mate, the predicted phenotypic ratio of their offspring would be
 A). 1 black eyes, green skin : 1 black eyes, white skin : 1 orange eyes, green skin : 1 orange eyes, white skin.
 B). 3 black eyes, green skin : 3 black eyes, white skin : 9 orange eyes, green skin : 1 orange eyes, white skin.
 C). 1 black eyes, green skin : 3 black eyes, white skin : 3 orange eyes, green skin : 9 orange eyes, white skin.
 D). 9 black eyes, green skin : 3 black eyes, white skin : 3 orange eyes, green skin : 1 orange eyes, white skin
 E). There is insufficient information to determine Sam's genotype.

21. Telomerase _____.
- A). is an enzyme made up of a protein and an RNA sequence that serves as a template for telomeric sequence addition B). prevents the loss of centromeric DNA C). speeds cell aging D). slows the rate of cancer cell growth E). splits telomeres
22. How does RNA polymerase know where to start transcribing a gene into mRNA?
- A). It starts at one end of the chromosome.
B). Transfer RNA acts to translate the message to RNA polymerase.
C). It starts at a certain nucleotide sequence called a promoter.
D). The ribosome directs it to the correct portion of the DNA molecule.
E). It looks for the AUG start codon.
23. When a lysogenic phage infects a bacterial cell, all of the following happen EXCEPT _____.
- A). viral DNA is injected into the bacterium
B). the cell is immediately lysed by the invasion
C). viral DNA becomes inserted into the bacterial chromosome
D). when the bacterial chromosome replicates, viral DNA is also replicated
E). all bacterial descendants will carry the viral genes
24. Where would RNA polymerase attach?



- A). A B). B C). C D). A and B E). B and C
25. What enzyme forms covalent bonds between restriction fragments?
- A). DNA primase B). DNA helicase C). single-stranded binding protein
D). DNA polymerase E). DNA ligase
26. In gel electrophoresis DNA molecules migrate from _____ to _____ ends of the gel.
- A). acidic ... basic B). negative ... positive C). basic ... acidic D). long ... short
E). positive ... negative
27. The *bicoid* gene product is directly responsible for _____ in a developing *Drosophila* embryo.
- A). the establishment of the right-left axis B). vulval development C). flower development
D). the establishment of the anterior-posterior axis E). apoptosis

28. Which of these is a consequence of uniformitarianism?
 A). Earth is round, not flat. B). Populations evolve. C). Populations reproduce faster than their food supply. D). A Creator made Earth. E). Earth is old.
29. Generation to generation change in the allele frequencies in a population is _____.
 A). microevolution B). genetic drift C). natural selection D). mutation
 E). macroevolution
30. How do the skulls of adult chimpanzees and humans differ?
 A). Adult chimpanzees have a less angled skull.
 B). Adult chimpanzees have less massive jaws.
 C). Adult chimpanzees have heavier brow ridges.
 D). Adult chimpanzees have flatter faces.
 E). Adult chimpanzees have more rounded faces
31. Most modern animal phyla evolved during the _____ era.
 A). Paleozoic B). Permian C). Cenozoic D). Mesozoic E). Precambrian
32. In the two-kingdom system, why were fungi classified in the kingdom Plantae?
 A). They are sedentary. B). They are heterotrophs. C). They lack cell walls.
 D). They are unicellular. E). They are autotrophs
33. Which of these pairs of prokaryotic subgroups share the most recent common ancestor?

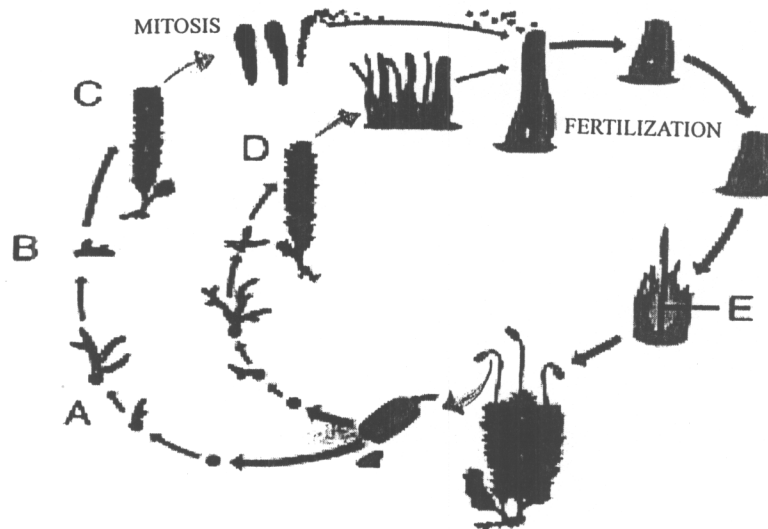


- A). Euryarchaeota ... Cyanobacteria
 B). Proteobacteria ... Crenarchaeota
 C). Proteobacteria ... Cyanobacteria
 D). Euryarchaeota ... Crenarchaeota
 E). Crenarchaeota ... Cyanobacteria

34. Which of these groups consist of parasitic flagellated cells, such as *Trypanosoma*, the organism that causes sleeping sickness?

- A). metazoans B). kinetoplastids C). diatoms D). brown algae E). ciliates

35. Which of these represents the sporophyte generation of the moss life cycle?



- A). A B). B C). C D). D E). E

36. "Pollination" is the transfer of pollen grain to the _____ of a flower on the same plant or another plant of the same species.

- A). style B). anther C). ovulate cone D). stigma E). ovary

37. A nucleus within an ascus undergoes meiosis, producing four haploid spores, which then undergo mitosis, producing eight haploid ascospores. These haploid ascospores contain a maximum of _____ different genetic types.

- A). one B). two C). three D). four E). five

38. As a group, how do poriferans, cnidarians, and platyhelminths differ from other animal phyla?

- A). They are radially symmetrical. B). They do not have a body cavity.
C). They are triploblastic. D). They are diploblastic.
E). They lack true tissues.

39. A land snail, a clam, and an octopus all share

- A). a mantle B). a radula C). gills D). embryonic torsion E). distinct cephalization

40. Which of the following is *not* thought to be ancestral to humans?

- A). a reptile B). a bony fish C). a primate D). an amphibian E). a bird

41. In plants, but not in animals, _____.
A). cell division requires the formation of a cell plate.
B). mitosis involves the separation of chromatids during anaphase.
C). mitosis is accomplished by binary fission.
D). mitosis does not involve microtubules.
E). cells can move about within a developing organ.
42. Sugar moves from leaves into the _____ of _____ by _____.
A). sieve-tube elements ... phloem ... active transport
B). sieve-tube elements ... xylem ... active transport
C). sieve-tube elements ... phloem ... diffusion
D). tracheids ... phloem ... active transport
E). tracheids ... phloem ... diffusion
43. What process is the source of the CO₂ that root hairs release into the soil?
A). photosynthesis B). respiration C). photolysis D). photosynthesis and respiration
E). respiration and photolysis
44. Plant hormones _____.
A). are inorganic compounds B). are not produced by plants C). include one that is a gas
D). usually function in the location at which they are synthesized E). are active only in large amounts
45. What type of epithelial tissue lines kidney tubules?
A). stratified squamous epithelium B). stratified cuboidal epithelium
C). simple squamous epithelium D). simple cuboidal epithelium
E). stratified transitional epithelium
46. Which of the following structures or substances is incorrectly paired with a tissue?
A). osteon – bone B). platelets – blood C). fibroblasts – skeletal muscle
D). chondroitin sulfate – cartilage E). basement membrane – epithelium
47. How does a gastrovascular cavity differ from an alimentary canal? The gastrovascular cavity _____.
A). stores food but does not digest it
B). absorbs food molecules but does not produce hydrolytic enzymes
C). has only a single opening
D). functions in digestion but not absorption
E). is the location for extracellular digestion

48. _____ is secreted by the _____ and acts to emulsify _____ in the _____.
- A). Lipase ... small intestine ... fats ... small intestine
 - B). Trypsin ... pancreas ... fats ... small intestine
 - C). Nucleases ... pancreas ... nucleic acids ... stomach
 - D). Amylase ... salivary glands ... starch ... stomach
 - E). Bile ... liver ... fats ... small intestine
49. Carbon dioxide enters the blood at the _____.
- A). capillaries of the lungs B). capillaries of the abdominal organs
 - C). capillaries of the hind limbs D). capillaries of the head and forelimbs
 - E). capillaries of the head, forelimbs, abdominal organs, and hind limbs
50. Which of the following cells are part of the nonspecific, second line of defense?
- A). cytotoxic T cells B). B cells C). prostaglandins D). macrophages
 - E). thrombocytes
51. Dehydration in animals _____.
- A). such as the tardigrade is lethal
 - B). is a problem because carbohydrates are fragile and break down when they dry out
 - C). has nothing in common with freezing
 - D). is a problem because fluid-mosaic cell membranes fall apart when deprived of water
 - E). may be less damaging in the presence of sugar
52. A hermaphrodite is an animal that _____.
- A). fuses with one of the opposite sex
 - B). contains both male and female reproductive systems in its body
 - C). can create zygotes of either sex
 - D). reproduces only asexually
 - E). does all of the above
53. One difference between the blastula and gastrula stages of development is that _____.
- A). blastula cells are more differentiated than gastrula cells
 - B). there are many more cells in a blastula
 - C). the blastula consists of more cell layers
 - D). the blastula is a solid ball of cells, but the gastrula is hollow
 - E). there is an opening from the cavity inside the gastrula to the outside

54. An action potential is generated when _____.
A). Na^+ ions diffuse into the cytoplasm at the trigger zone
B). K^+ ions diffuse into the cytoplasm along the axon
C). Ca^{++} ions diffuse into the cytoplasm at the dendrites
D). K^+ ions diffuse out of the cytoplasm at the trigger zone
E). During the depolarization phase, sodium ions diffuse into the cell and the interior of the cell becomes more positive, and K^+ ions diffuse out of the cytoplasm.
55. Difficulty in distinguishing red from green is most likely due to a defect in certain _____.
A). rod cells B). cone cells C). lens cells D). cornea cells E). iris
56. Permafrost is characteristic of the _____.
A). tundra B). temperate forest C). taiga D). desert E). tropical forest
57. A behavior that is genetically determined and that cannot be modified is _____.
A). a fixed action pattern B). a conditioned response C). modified by learning
D). one that requires parental guidance E). not species specific
58. Which one of the following is regarded as a density-independent factor in the growth of natural populations?
A). intraspecific competition B). interspecific competition C). emigration
D). flooding E). predation
59. The niche of an animal is _____.
A). the number of individuals of the species the environment will support
B). the same as its habitat
C). the way the animal fits into its environment
D). its den or nest
E). its position in the food chain
60. Consider this segment of a food web: Snails and grasshoppers eat pepper plants; spiders eat grasshoppers; shrews eat snails and spiders; owls eat shrews. The shrew occupies the trophic level(s) of a _____.
A). primary consumer
B). secondary consumer
C). tertiary consumer
D). primary and secondary consumers
E). secondary and tertiary consumers

(II). Describe the action of hormone on cells (10 %).