

普通生物學

- (C)1. The molecular formula for glucose is $C_6H_{12}O_6$. What would be the molecular formula for a polymer made by linking ten glucose molecules together by dehydration reactions?
(A) $C_{60}H_{120}O_{60}$ (B) $C_6H_{12}O_6$ (C) $C_{60}H_{102}O_{51}$ (D) $C_{60}H_{100}O_{50}$ (E) $C_{60}H_{111}O_{51}$
- (B)2. Which of the following statements concerning unsaturated fats is correct?
(A)They are more common in animals than in plants.
(B)They have double bonds in the carbon chains of their fatty acids.
(C)They generally solidify at room temperature.
(D)They contain more hydrogen than saturated fats having the same number of carbon atoms.
(E)They have fewer fatty acid molecules per fat molecule.
- (A)3. 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.
- (A)4. If an enzyme solution is saturated with substrate, the most effective way to obtain an even faster yield of products is to
(A)add more of the enzyme. (B)heat the solution to $90^\circ C$. (C)add more substrate. (D)add an allosteric inhibitor. (E)add a noncompetitive inhibitor.
- (A)5. Which of the following characteristics is not associated with allosteric regulation of an enzyme's activity?
(A)A molecule mimics the substrate and competes for the active site.
(B)A naturally occurring molecule stabilizes a catalytically active conformation.
(C)Regulatory molecules bind to a site remote from the active site.
(D)Inhibitor and activator molecules may compete with one another.
(E)The enzyme usually a quaternary structure.
- (B)6. Which of the following organelles is least closely associated with the endomembrane system?
(A)nuclear envelope (B)chloroplast (C)Golgi apparatus (D)plasma membrane (E)ER
- (D)7. Which of the following organelles is common to plant and animal cells?
(A)chloroplasts (B)wall made of cellulose (C)tonoplast (D)mitochondria (E)centrioles
- (C)8. Which type of cell would probably provide the best opportunity to study lysosomes?
(A)muscle cell (B)nerve cell (C)phagocytic white blood cell (D)leaf cell of a plant (E)bacterial cell
- (B)9. Which of the following statements is a correct distinction between prokaryotic and eukaryotic cells attributable to the absence of a prokaryotic cytoskeleton?
(A)Compartmentalized organelles are found only in eukaryotic cells.
(B)Cytoplasmic streaming is not observed in prokaryotes.
(C)Only eukaryotic cells are capable of movement.
(D)Prokaryotic cells are usually $10\ \mu m$ or less in diameter.
(E)Only the eukaryotic cell concentrates its genetic material in a region separate from the rest of the cell.
- (B)10. In what way do the various membranes of a eukaryotic cell differ?
(A)Phospholipids are found only in certain membranes.
(B)Certain proteins are unique to each membrane.
(C)Only certain membranes of the cell are selectively permeable.

- (D) Only certain membranes are constructed from amphipathic molecules.
(E) Some membranes have hydrophobic surfaces exposed to the cytosol, while others have hydrophilic surfaces facing the cytosol.
- (A) 11. Which of the following factors would tend to increase membrane fluidity?
(A) a greater proportion of unsaturated phospholipids
(B) a lower temperature
(C) a relatively high protein content in the membrane
(D) a greater proportion of relatively large glycolipids compared to lipids having smaller molecular weights
(E) a high membrane potential
- (D) 12. The immediate energy source that drives ATP synthesis during oxidative phosphorylation is
(A) the oxidation of glucose and other organic compounds.
(B) the flow of electrons down the electron transport chain.
(C) the affinity of oxygen for electrons.
(D) a difference of H^+ concentration on opposite sides of the inner mitochondrial membrane.
(E) the transfer of phosphate from Krebs cycle intermediates to ADP.
- (B) 13. Which of the following is a true distinction between fermentation and cellular respiration?
(A) Only respiration oxidizes glucose.
(B) NADH is oxidized by the electron transport chain only in respiration.
(C) Fermentation, but not respiration, is an example of a catabolic pathway.
(D) Substrate-level phosphorylation is unique to fermentation.
(E) NAD^+ functions as an oxidizing agent only in respiration.
- (B) 14. Most CO_2 from catabolism is released during
(A) glycolysis. (B) the Krebs cycle. (C) lactate fermentation. (D) electron transport. (E) oxidative phosphorylation.
- (B) 15. Which of the following sequences correctly represents the flow of electrons during photosynthesis?
(A) NADPH O_2 CO_2
(B) H_2O NADPH Calvin cycle
(C) NADPH chlorophyll Calvin cycle
(D) H_2O photosystem photosystem
(E) NADPH electron transport chain O_2
- (B) 16. Cooperation of the two photosystems of the chloroplast is required for
(A) ATP synthesis.
(B) reduction of $NADP^+$.
(C) cyclic photophosphorylation.
(D) oxidation of the reaction center of photosystem .
(E) generation of a proton-motive force.
- (C) 17. In what respect are the photosynthetic adaptations of C_4 plants and CAM plants similar?
(A) In both cases, the stomata normally close during the day.
(B) Both types of plants make their sugar without the Calvin cycle.
(C) In both cases, an enzyme other than rubisco carries out the first step in carbon fixation.
(D) Both types of plants make most of their sugar in the dark.
(E) Neither C_4 plants nor CAM plants have grana in their chloroplasts.

- (B)18. Which of the following processes could still occur in a chloroplast in the presence of an inhibitor that prevents H^+ from passing through ATP synthase complexes?
(A)sugar synthesis (B)generation of a proton-motive force (C)photophosphorylation (D)the Calvin cycle (E)oxidation of NADPH
- (D)19. Binding of a signal molecule to which type of receptor leads to a change in membrane potential?
(A)tyrosine-kinase receptor
(B)G-protein-linked receptor
(C)phosphorylated tyrosine-kinase dimer
(D)ligand-gated ion channel
(E)intracellular receptor
- (B)20. Lipid-soluble signal molecules, such as testosterone, cross the membranes of all cells but affect only target cells because
(A)only target cells retain the appropriate DNA segments.
(B)intracellular receptors are present only in target cells.
(C)most cells lack the Y chromosome required.
(D)only target cells possess the cytosolic enzymes that transduce the testosterone.
(E)only in target cells in testosterone able to initiate the phosphorylation cascade leading to activated transcription factor.
- (C)21. Signal-transduction pathways benefit cells for all of following reasons except
(A)they help cells respond to signal molecules that are too large or too polar to cross the plasma membrane.
(B)they enable different cells to respond appropriately to the same signal.
(C)they help cells use up phosphate generated by ATP breakdown.
(D)they can amplify a signal.
(E)variations in the signal-transduction pathways can enhance response specificity.
- (A)22. Vinblastine is a standard chemotherapeutic drug used to treat cancer. Since it interferes with the assembly of microtubules, effectiveness must be related to
(A)disruption of mitotic spindle formation.
(B)inhibition of regulatory protein phosphorylation.
(C)suppression of cyclin production.
(D)myosin denaturation and inhibition of cleavage furrow formation.
(E)inhibition of DNA synthesis.
- (C)23. One difference between a cancer cell and a normal cell is that
(A)the cancer cell is unable to synthesize DNA.
(B)the cell cycle of the cancer cell is arrested at the S phase.
(C)cancer cells continue to divide even when they are tightly packed together.
(D)cancer cells cannot function properly because they suffer from density-dependent inhibition.
(E)cancer cells are always in the M phase of the cell cycle.
- (C)24. the decline of MPF at the end of mitosis is caused by
(A)the destruction of the protein kinase (Cdk).
(B)decreased synthesis of cyclin.
(C)the enzymatic destruction of cyclin.
(D)synthesis of DNA.
(E)an increase in the cell's volume-to-genome ratio.
- (B)25. which of the following does not occur during mitosis?
(A)packaging of the chromosomes (B)replication of the DNA (C)separation of sister chromatids (D)spindle formation (E)separation of the centrosomes

- (B)26. A biochemist isolates and purifies various molecules needed for DNA replication. When she adds some DNA, replication occurs, but the DNA molecules formed are defective. Each consists of a normal DNA strand paired with numerous segments of DNA a few hundred nucleotides long. What has she probably left out of the mixture?
(A)DNA polymerase (B)ligase (C)nucleotides (D)Okazaki fragments (E)primers
- (B)27. Of the following, the most reasonable inference from the observation that defects in DNA repair enzymes contribute to some of cancer is that
(A)cancer is generally inherited.
(B)uncorrected changes in DNA can cause cancer.
(C)cancer cannot occur when DNA repair enzymes work proper.
(D)mutations generally lead to cancer.
(E)cancer is caused by environmental factors that damage DNA pair enzymes.
- (B)28. In eukaryotic cells, transcription cannot begin until
(A)the two DNA strands have completely separated and exposed the promoter.
(B)the appropriate transcription factors have bound to the promoter.
(C)the 5' caps are removed from the mRNA.
(D)the DNA introns are removed from the template.
(E)DNA nucleases have isolated the transcription unit from the noncoding DNA.
- (A)29. Which of the following is not true of RNA processing?
(A)Exons are excised and hydrolyzed before mRNA moves out of the nucleus.
(B)The presence of introns may facilitate crossing over between regions of a gene that code for polypeptide domains.
(C)Ribozymes may function in RNA splicing.
(D)RNA splicing may be catalyzed by spliceosomes.
(E)A primary transcript is often much longer than the final RNA molecule that leaves the nucleus.
- (B)30. RNA viruses require their own supply of certain enzymes because
(A)the viruses are rapidly destroyed by host cell defenses.
(B)host cells do not have enzymes available that can replicate viral genome.
(C)the enzymes translate viral mRNA into proteins.
(D)the viruses use these enzymes to penetrate host cell membrane.
(E)these enzymes cannot be made in host cells.
- (E)31. Transposition differs from other mechanisms of genetic recombination because it
(A)occurs only in bacteria.
(B)moves genes between homologous regions of the DNA.
(C)plays little or no role in evolution.
(D)occurs only in eukaryotes.
(E)scatters genes to new loci in the genome.
- (C)32. Which of the following information transfers is catalyzed by reverse transcriptase?
(A)RNA RNA (B)DNA RNA (C)RNA DNA (D)protein DNA (E)RNA protein
- (A)33. The functioning of enhancers is an example of
(A)transcriptional control of gene expression.
(B)a post-transcriptional mechanism for editing mRNA.
(C)the stimulation of translation by initiation factors.
(D)post-translational control that activates certain proteins.
(E)a eukaryotic equivalent of prokaryotic promoter functioning.

- (A)34. Which of the following statements about the DNA in one of your brain cells is true?
(A)Some DNA sequences are present in multiple copies.
(B)Most of the DNA codes for protein.
(C)The majority of genes are likely to be transcribed.
(D)Each gene lies immediately adjacent to an enhancer that helps control transcription.
(E)Many genes are grouped into operon-like clusters.
- (C)35. Which of the following is an example of a possible step in the post-transcriptional control of gene expression?
(A)the addition of methyl groups to cytosine bases of DNA
(B)the binding of transcription factors to a promoter
(C)the removal of introns and splicing together of exons
(D)gene amplification during a stage in development
(E)the folding of DNA to form heterochromatin
- (C)36. Plants are more readily manipulated by genetic engineering than are animals because
(A)plant genes do not contain introns.
(B)more vectors are available for transferring recombinant DNA into plant cells.
(C)a somatic plant cell can often give rise to a complete plant.
(D)genes can be inserted into plant cells by microinjection.
(E)plant cells have larger nuclei.
- (A)37. Expression of a cloned eukaryotic gene in a prokaryotic cell involves many difficulties. The use of mRNA and reverse transcriptase is part of a strategy to solve the problem of
(A)post-transcriptional processing (B)electroporation (C)post-translational processing
(D)nucleic acid hybridization (E)restriction fragment ligation
- (D)38. In recombinant DNA methods, the term vector can refer to
(A)the enzyme that cuts DNA into restriction fragments.
(B)the sticky end of a DNA fragment.
(C)a RFLP marker.
(D)a plasmid used to transfer DNA into a living cell.
(E)a DNA probe used to identify a particular gene.
- (C)39. In its sequencing of the human genome, Celera carried out
(A)linkage mapping of each chromosome.
(B)extensive physical mapping of each chromosome, starting with large chromosomal fragments.
(C)DNA sequencing of small fragments and then assembly of the fragments to determine overall nucleotide sequence.
(D)(A)and(B)
(E)(A),(B),and(C)
- (E)40. The criteria for a good model organism for studying development would probably include all of the following except
(A)observable embryonic development.
(B)short generation time.
(C)a relatively small genome.
(D)preexisting knowledge of the organism's life history.
(E)abundant local populations for specimen collection.
- (D)41. In *Drosophila*, which genes initiate a cascade of gene activation that includes all other genes in the list?
(A)homeotic genes (B)gap genes (C)pair-rule genes (D)egg-polarity genes (E)segment

- polarity genes
- (C)42. Absence of bicoid mRNA from a *Drosophila* egg leads to the absence of anterior larval body parts and mirror-image duplication of posterior parts. This is evidence that the product of the bicoid gene
 (A)is an inducer. (B)contains a homeobox. (C)is a morphogen. (D)is a transcription factor.
 (E)is a caspase.
- (C)43. The smallest biological unit that can evolve over time is
 (A)a cell. (B)an individual organism. (C)a population. (D)a species. (E)an ecosystem.
- (C)44. Which of the following ideas is common to both Darwin's and Lamarck's theories of evolution?
 (A)Adaptation results from differential reproductive success.
 (B)Evolution drives organisms to greater and greater complexity.
 (C)Evolutionary adaptation results from interactions between organisms and their environments.
 (D)Adaptation results from the use and disuse of anatomical structures.
 (E)The fossil record supports the view that species are fixed.
- (D)45. Which of the following pairs of structures is least likely to represent homology?
 (A)the wings of a bat and the forelimbs of a human
 (B)the hemoglobin of a baboon and the hemoglobin of a gorilla
 (C)the mitochondria of a plant and those of an animal
 (D)the bark of a tree and the protective covering of a lobster
 (E)the brain of a frog and the brain of a dog
- (C)46. In a population in Hardy-Weinberg equilibrium, 16% of the individuals show the recessive trait. What is the frequency of the dominant allele in the population?
 (A)0.84 (B)0.36 (C)0.6 (D)0.4 (E)0.48
- (B)47. A founder event favors microevolution in the founding population mainly because
 (A)mutations are more common in a new environment.
 (B)a small founding population is subject to extensive sampling error in the composition of its gene pool.
 (C)the new environment is likely to be patchy, favoring diversifying selection.
 (D)gene flow increases.
 (E)members of a small population tend to migrate.
- (B)48. Most of biological diversity has probably arisen by
 (A)anagenesis. (B)cladogenesis. (C)phyletic evolution. (D)hybridization. (E)sympatric speciation.
- (B)49. The largest unit in which gene flow is possible is a
 (A)population. (B)species. (C)genus. (D)subspecies. (E)phylum.
- (C)50. Which of the following species concepts identifies species based on their shared genetic histories and thus unique genetic markers?
 (A)biological (B)ecological (C)genealogical (D)morphological (E)pluralistic
- (D)51. Plant species A has a diploid number of 12. Plant species B has a diploid number of 16. A new species, C, arises as an allopolyploid from hybridization of A and B. The diploid number of C would probably be
 (A)12 (B)14 (C)16 (D)28 (E)56
- (B)52. The speciation episode described in question 51 is most likely case of
 (A)allopatric speciation. (B)sympatric speciation. (C)speciation based on sexual selection.
 (D)adaptive radiation. (E)anagenic speciation.
- (B)53. If humans and pandas belong to the same class, then they must also belong to the same

- (A)order. (B)phylum. (C)family. (D)genus. (E)species.
- (C)54. If you were using cladistic analysis to build a phylogenetic tree of cats, which of the following would be the best choice for an out-group?
(A)lion (B)domestic cat (C)wolf (D)leopard (E)tiger
- (E)55. Which statement does not support the hypothesis that RNA function as the first genetic material of early protobionts?
(A)Short RNA sequences can self-assemble when combined with nucleotide monomers.
(B)Catalytic activity has been demonstrated for RNA in modern cells.
(C)Variations in base sequences produce molecules with variable stabilities in different environments.
(D)Modern cells use an RNA template when synthesizing protein.
(E)In modern cells, RNA provides the template on which DNA nucleotides are assembled.
- (B)56. Competition among various protobionts may have led to evolutionary improvement only when
(A)they were first able to catalyze chemical reactions.
(B)some kind of heredity mechanism developed.
(C)they were able to grow and split in two.
(D)photosynthesis evolved.
(E)DNA first appeared.
- (C)57. Penicillins function as antibiotics mainly by inhibiting the ability of some bacteria to
(A)from spores. (B)replicate DNA. (C)synthesize normal cell walls. (D)produce functional ribosomes. (E)synthesize ATP.
- (A)58. An example of bioremediation is
(A)the use of prokaryotes to treat sewage or clean up oil spills.
(B)the use of antibiotics produced by cultured prokaryotes.
(C)the genetic engineering of bacteria to produce human protein and useful chemical products.
(D)the introduction of parasitic bacteria to kill other bacteria.
(E)all of the above.
- (B)59. Biologists suspect that endosymbiosis gave rise to mitochondria before plastids because
(A)the products of photosynthesis could not be metabolized without mitochondrial enzymes.
(B)almost all eukaryotes have mitochondria, while only autotrophic eukaryotes have plastids.
(C)mitochondrial DNA is less similar to prokaryotic DNA than is the DNA from plastids.
(D)without mitochondrial CO₂ production, photosynthesis could not occur.
(E)plastids utilize their own ribosomes, while mitochondrial proteins are synthesized in the cytosol.
- (B)60. Which of the following is an incorrect statement about the possible endosymbiotic origins of plastids and mitochondria?
(A)They are the appropriate size to be descendants of bacteria.
(B)They contain their own genome and produce all their own proteins.
(C)They contain circular DNA molecules.
(D)Their membranes have enzymes and transport systems that seem those found in the plasma membranes of prokaryotes.
(E)Their ribosomes are more similar to those of bacteria than to those of eukaryotes.
- (B)61. Which of the following groups probably represents the earliest branch in the evolution of eukaryotes?
(A)archaea (B)diplomonads (C)fungi (D)amoebas (E)diatoms
- (A)62. All bryophytes (mosses, liverworts, and hornworts)share certain characteristics. There are

- (A)reproductive cells in gametangia; embryos
(B)branched sporophytes
(C)vascular tissues, true leaves, and a waxy cuticle
(D)seeds
(E)lignified walls
- (A)63. Which of the following is not common to all phyla of vascular plants?
(A)the development of seeds (B)alternation of generations (C)dominance of the diploid generation (D)xylem and phloem (E)the addition of lignin to cell walls
- (A)64. A land plant that produces flagellated sperm and has a diploid-dominant generation is most likely a
(A)fern. (B)moss. (C)liverwort. (D)charophycean. (E)hornwort.
- (D)65. Where would you find a megasporangium in an angiosperm?
(A)at the base of a sporophyll in an ovulate cone
(B)producing a megaspore within the archegonium of the fem gametophyte
(C)enclosed in the stigma of a flower
(D)within an ovule contained within an ovary of a flower
(E)packed into pollen sacs within the anthers found on a stame
- (B)66. Which angiosperm cell is incorrectly paired with its chromosome count(n or $2n$)?
(A)egg cell- n (B)megaspore- $2n$ (C)microspore- n (D)zygote- $2n$ (E)sperm- n
- (A)67. Plant diversity is greatest in
(A)tropical forests. (B)deserts. (C)salt marshes. (D)temperate forests. (E)farmlands.
- (D)68. Gymnosperms and angiosperms have the following in common texcept
(A)seeds. (B)pollen. (C)vascular tissue. (D)ovaries. (E)ovules.
- (B)69. All fungi share which one of the following characteristics?
(A)symbiotic (B)heterotrophic (C)flagellated (D)pathogenic (E)saprobic
- (C)70. Which of the following cells or structures are associated with asexual reproduction in fungi?
(A)ascospores (B)basidiospores (C)conidia (D)zygosporangia (E)ascogonia
- (A)71. The closest relatives of fungi are probably
(A)animals (B)vascular plants (C)mosses (D)brown algae (E)slime molds
- (E)72. What is the main basis for placing the arthropods and nematodes in the Ecdysozoa?
(A)Animals in both groups are segmented.
(B)Animals in both groups undergo ecdysis.
(C)They both have radial, determinate cleavage, and their embryonic development is similar.
(D)The fossil record has revealed a common ancestor to these two phyla.
(E)Their SSU-rRNA sequences are quite similar, and these sequences differ from those of the lophotrochozoans and deuterostomes.
- (A)73. Among the characteristics unique to animals is
(A)gastrulation. (B)multicellularity. (C)sexual reproduction. (D)flagellated sperm. (E)heterotrophic nutrition.
- (A)74. Water movement through a sponge would follow what path?
(A)porocyte spongocoel osculum
(B)blastopore gastrovascular cavity1 protostome
(C)choanocyte mesohyl spongocoel
(D)porocyte choanocyte mesohyl
(E)colloblast coelom porocyte
- (D)75. Which of the following is not a characteristic of most members of the phylum Annelida?
(A)hydrostatic skeleton (B)segmentation (C)metanephridia (D)pseudocoelom (E)closed

circulatory system

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- (E)76. Which of the following characteristics is probably most responsible for the incredible diversification of insects on land?
(A)segmentation (B)exoskeleton (C)tracheal system (D)metamorphosis (E)flight
- (D)77. Mammals and extant birds share all of the following characteristics except
(A)endothermy. (B)descent from reptiles. (C)a dorsal, hollow nerve cord. (D)teeth specialized for diverse diets. (E)the ability of some species to fly.
- (E)78. 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
- (A)79. The multiregional and replacement hypotheses for the origin of modern humans agree that
(A)*Home erectus* had an African origin.
(B)modern *Home sapiens* originated only in Africa.
(C)Neanderthals are the ancestors of modern humans in Europe.
(D)Australopithecines migrated out of Africa.
(E)north America had the first population of modern humans.
- (D)80. Which structure is incorrectly paired with its tissue system?
(A)root hair—dermal tissue (B)palisade parenchyma—ground tissue (C)guard cell—dermal tissue (D)companion cell—ground tissue (E)tracheid—vascular tissue
- (C)81. Wood consists of
(A)bark. (B)periderm. (C)secondary xylem. (D)secondary phloem. (E)cork.
- (D)82. Which of the following is not part of an older tree's bark?
(A)cork (B)cork cambium (C)lenticels (D)secondary xylem (E)secondary phloem
- (C)83. _____ is to primary xylem as vascular cambium is to _____.
(A)Primary phloem; secondary xylem (B)Tracheid; vessel cell (C)Procambium; secondary xylem (D)Apical meristem; lateral meristem (E)Stele; primary phloem
- (D)84. Which of the following is not part of the transpiration-cohesion-tension mechanism for the ascent of xylem sap?
(A)the loss of water from the mesophyll cells, which initiates a pull of water molecules from neighboring cells
(B)the transfer of transpirational pull from one water molecule to the next owing to the cohesion caused by hydrogen bonds
(C)the hydrophilic walls of the narrow tracheids and xylem vessels that help maintain the column of water against the force of gravity
(D)the active pumping of water into the xylem of roots
(E)the reduction of water potential in the surface film of mesophyll cells due to transpiration
- (B)85. Which structure or compartment is not part of the plant's apoplast?
(A)the lumen of a xylem vessel (B)the lumen of a sieve tube (C)the cell wall of a mesophyll cell (D)the cell wall of a transfer cell (E)the cell wall of a root hair
- (C)86. Which of the following is not an adaptation that enhances the uptake of water and minerals by roots?
(A)mycorrhizae, the symbiotic associations of roots and fungi
(B)root hairs, which increase surface area near root tips
(C)selective uptake of minerals by xylem vessels
(D)selective uptake of minerals by cortical cells
(E)plasmodesmata, which facilitate symplastic transport from the cortex into the stele
- (B)87. Most of the mass of organic material of a plant comes from
(A)water. (B)carbon dioxide. (C)soil minerals. (D)atmospheric oxygen. (E)nitrogen.

- (B)88. Micronutrients are needed in very small amounts because
(A)most of them are mobile in the plant.
(B)most function as cofactors of enzymes.
(C)most are supplied in large enough quantities in seeds.
(D)they play only a minor role in the health of the plant.
(E)only the growing regions of the plants require them.
- (B)89. Carnivorous adaptations of plants mainly compensate for soil that has a relatively low content of
(A)potassium. (B)nitrogen. (C)calcium. (D)water. (E)phosphate.
- (A)90. Mycorrhizae enhance plant nutrition mainly by
(A)absorbing water and minerals through the fungal hyphae.
(B)providing sugar to the root cells, which have no chloroplasts of their own.
(C)converting atmospheric nitrogen to ammonia.
(D)enabling the roots to parasitize neighboring plants.
(E)stimulating the development of root hairs.
- (D)91. Which of the following would definitely be a unisexual flower? A flower that
(A)is also incomplete. (B)lacks sepals. (C)is self-compatible. (D)is staminate. (E)cannot self-pollinate.
- (A)92. Germinated pollen grain is to _____ as _____ is to female gametophyte.
(A)male gametophyte; embryo sac (B)embryo sac; ovule (C)ovule; sporophyte (D)anther; seed (E)petal; sepal
- (C)93. A seed develops from
(A)an ovum. (B)a pollen grain. (C)an ovule. (D)an ovary. (E)an embryo.
- (A)94. A fruit is a (an)
(A)mature ovary. (B)mature ovule. (C)seed plus its integuments. (D)fused carpel.
(E)enlarged embryo sac.
- (B)95. Which of the following plant hormones is incorrectly paired with its function?
(A)auxin—promotes stem growth through cell elongation
(B)cytokinins—initiate programmed cell death
(C)gibberellins—stimulate seed germination
(D)abscisic acid—promotes seed dormancy
(E)ethylene—inhibits cell elongation
- (B)96. Buds and sprouts often form on tree stumps. Which of the following hormones would you expect to stimulate their formation?
(A)auxin (B)cytokinins (C)abscisic acid (D)ethylene (E)gibberellins
- (D)97. Which of the following is not part of the acid-growth hypothesis?
(A)Auxin stimulates proton pumps in cell membranes.
(B)Lowered pH results in the breakage of cross-links between cellulose microfibrils.
(C)The wall fabric becomes looser (more plastic).
(D)Auxin-activated proton pumps stimulate cell division in meristems.
(E)The turgor pressure of the cell exceeds the restraining pressure of the loosened cell wall, and the cell takes up water and elongates.
- (B)98. If long-day plant has a critical night length of 9 hours, which of the following 24-hour cycles would prevent flowering?
(A)16 hours light / 8 hours dark
(B)14 hours light / 10 hours dark
(C)15.5 hours light / 8.5 hours dark
(D)4 hours light / 8 hours dark / 4 hours light / 8 hours dark

- (E)8 hours light / 8 hours dark / light flash/ 8 hours dark
- (C)99. 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
- (C)100. Which of the following statements about bioenergetics is true?
(A)Every animal has a specific metabolic rate that does not change.
(B)A BMR can be determined only at a specific temperature.
(C)Endotherms are warmed by metabolic heat.
(D)An SMR is best measured just after an ectotherm has eaten.
(E)Ectotherms and endotherms use the same basic energy “strategy.”
- (C)101. Which of the following physiological responses is an example of positive feedback?
(A)An increase in the concentration of glucose in the blood stimulates the pancreas to secrete insulin, a hormone that lowers blood glucose concentration.
(B)A high concentration of carbon dioxide in the blood causes deeper, more rapid breathing, which expels carbon dioxide.
(C)Stimulation of a nerve cell causes sodium ions to leak into the cell, and the sodium influx triggers the inward leaking of even more sodium.
(D)The body’s production of red blood cells, which transport oxygen from the lungs to other organs, is stimulated by a low concentration of oxygen.
(E)The pituitary gland secretes a hormone called TSH, which stimulates the thyroid gland to secrete another hormone called thyroxine; a high concentration of thyroxine suppresses the pituitary’s secretion of TSH.
- (C)102. Which of the following respiratory systems is not closely associated with a blood supply?
(A)vertebrate lungs (B)fish gills (C)tracheal systems of insects (D)the outer skin of an earthworm (E)the parapodia of a polychaete worm
- (B)103. A decrease in the pH of human blood caused by exercise would
(A)decrease breathing rate. (B)increase heart rate. (C)decrease the amount of O₂ unloaded from hemoglobin. (D)decrease cardiac output. (E)decrease CO₂ binding to hemoglobin.
- (A)104. Which of the following reactions prevails in red blood cells traveling through pulmonary capillaries? (Hb=hemoglobin)
(A) $\text{Hb} + 4\text{O}_2 \rightarrow \text{Hb}(\text{O}_2)_4$ (B) $\text{Hb}(\text{O}_2)_4 \rightarrow \text{Hb} + 4\text{O}_2$ (C) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$ (D) $\text{H}_2\text{CO}_3 \rightarrow \text{H}^+ + \text{HCO}_3^-$ (E) $\text{Hb} + 4\text{CO}_2 \rightarrow \text{Hb}(\text{CO}_2)_4$
- (E)105. Which of the following is not part of the body’s nonspecific defense system?
(A)natural killer (NK) cells (B)inflammation (C)phagocytosis by neutrophils (D)phagocytosis by macrophages (E)antibodies
- (B)106. HIV targets include all of the following except
(A)macrophages. (B)cytotoxic T cells. (C)helper T cells. (D)cells bearing CD4 and fusin. (E)cells bearing CD4 and CCR5.
- (C)107. Which of the following best describes the difference in the way B cells and cytotoxic T cells respond to invaders?
(A)B cells confer active immunity; cytotoxic T cells confer passive immunity.
(B)B cells kill viruses directly; cytotoxic T cells kill virus-infected cells.
(C)B cells secrete antibodies against a virus; cytotoxic T cells kill virus-infected cells.
(D)B cells accomplish cell-mediated immunity; cytotoxic T cells accomplish humoral immunity.
(E)B cells respond the first time the invader is present; cytotoxic T cells respond subsequent times.

- (C)108. An epitope associates with which part of an antibody?
(A)the antibody-binding site
(B)the heavy-chain constant regions only
(C)the variable regions of a heavy chain and light chain combined
(D)the light-chain constant regions only
(E)the antibody tail
- (C)109. Which of the following is not a mechanism for reducing the rate of heat exchange between an animal and its environment?
(A)feathers or fur (B)vasoconstriction (C)nonshivering thermogenesis (D)countercurrent heat exchanger (E)blubber of fat layer
- (D)110. An animal's inputs of energy and materials would exceed its outputs
(A)if the animal is an endotherm, which must always take in more energy because of its high metabolic rate.
(B)if it is actively foraging for food.
(C)if it is hibernating.
(D)if it is growing and increasing its biomass.
(E)never—homeostasis makes these energy and material budgets always balance.
- (D)111. Which process in the nephron is least selective?
(A)secretion (B)reabsorption (C)active transport (D)filtration (E)salt pumping by the loop of Henle
- (A)112. The vertebrate liver functions in all of the following regulatory processes except
(A)osmoregulation by variable excretion of salts.
(B)maintenance of blood sugar concentration.
(C)detoxification of harmful substances.
(D)production of nitrogenous wastes.
(E)caloric storage in the form of glycogen.
- (D)113. A distinctive feature of the mechanism of action of thyroid hormones and steroid hormones is that
(A)these hormones are regulated by feedback loops.
(B)target cells react more rapidly to these hormones than to local regulators.
(C)these hormones bind with specific receptor proteins on target-cell plasma membranes.
(D)these hormones bind to receptors inside cells.
(E)these hormones affect metabolism.
- (C)114. Which of the following hormones is incorrectly paired with its action?
(A)oxytocin—stimulates uterine contractions during childbirth
(B)thyroxine—stimulates metabolic processes
(C)insulin—stimulates glycogen breakdown in the liver
(D)ACTH—stimulates that release of glucocorticoids by the adrenal cortex
(E)melatonin—affects biological rhythms, seasonal reproduction
- (C)115. A portal vessel carries blood from the hypothalamus directly to the
(A)thyroid. (B)pineal gland. (C)anterior pituitary. (D)posterior pituitary. (E)thymus.
- (C)116. The main target organs for tropic hormones are
(A)muscles. (B)blood vessels. (C)endocrine glands. (D)kidneys. (E)nerves.
- (A)117. Which of the following male and female structures are least alike in function?
(A)semiferous tubules—vagina
(B)Leydig cells of testes—follicle cells of ovaries

- (C) testes—ovaries
(D) spermatogonia—oogonia
(E) vas deferens—oviduct
- (B)118. A difference between estrous and menstrual cycles is that
(A) nonmammalian vertebrates have estrous cycles, whereas mammals have menstrual cycles.
(B) the endometrial lining is shed in menstrual cycles but reabsorbed in estrous cycles.
(C) estrous cycles occur more frequently than menstrual cycles.
(D) estrous cycles are not controlled by hormones.
(E) ovulation occurs before the endometrium thickens in estrous cycles.
- (D)119. Fertilization of human eggs most often takes place in the
(A) vagina. (B) ovary. (C) uterus. (D) oviduct (fallopian tube). (E) vas deferens.
- (C)120. Which of the following occurs when a stimulus depolarizes a neuron's membrane?
(A) Na^+ diffuses out of the cell.
(B) The action potential approaches zero.
(C) The membrane potential changes from the resting potential to a voltage closer to the threshold potential.
(D) The depolarization is all or none.
(E) The inside of the cell becomes more negative in charge relative to the outside of the cell.
- (A)121. Which of the following structures or regions is incorrectly paired with its function?
(A) limbic system—the motor control of speech
(B) medulla oblongata—homeostatic control center
(C) cerebellum—coordination of movement and balance
(D) corpus callosum—band of fibers connecting left and right cerebral hemispheres
(E) hypothalamus—production of hormones and regulation of temperature, hunger, and thirst
- (E)122. Which of the following receptors is incorrectly paired with its category?
(A) hair cell—mechanoreceptor (B) muscle spindle—mechanoreceptor (C) taste receptor—chemoreceptor (D) rod—electromagnetic receptor (E) gustatory receptor—electromagnetic receptor
- (E)123. Clams and lobsters both have exoskeletons, but lobsters have much greater mobility. Why?
(A) Clams only have adductor muscles that hold the shell closed, whereas lobsters have both abductor and adductor muscles.
(B) The paramyosin of clam muscles holds them in a low-energy state of contraction, whereas lobster muscles are very similar to vertebrate striated muscles.
(C) Clams can only grow by adding to the outer edge of the shell, whereas lobsters molt and repeatedly replace their exoskeleton with a larger, more flexible one.
(D) The lobster skeleton can actively contract, while the clam skeleton lacks its own contractile mechanism.
(E) Lobsters have a jointed exoskeleton, allowing for the flexible movement of appendages and body parts at the joints.
- (C)124. Which of the following is a true statement about cardiac muscle cells?
(A) They lack an orderly arrangement of actin and myosin filaments.
(B) They have less extensive sarcoplasmic reticulum and thus contract more slowly than smooth muscle cells.
(C) They are connected by intercalated discs, through which action potentials spread to all cells in the heart.
(D) They have a resting potential more positive than an action potential threshold.
(E) They contract only when stimulated by neurons.

- (A)125. Which of the following is correctly paired with its description?
(A)neritic zone—shallow area over continental shelf
(B)benthic zone—surface water of shallow seas
(C)pelagic zone—seafloor
(D)aphotic zone—zone in which light penetrates
(E)intertidal zone—open water at the edge of the continental shelf
- (B)126. According to the hamilton's rule ($rB > C$),
(A)natural selection could not favor altruism if the altruist loses its life.
(B)natural selection would favor altruistic acts when the benefit to the receiver, reduced by the coefficient of relatedness, exceeds the cost to the altruist.
(C)natural selection is more likely to favor altruistic acts when the beneficiary is an offspring than when it is a sibling.
(D)kin selection is a stronger selection factor than the individual reproductive success favored by natural selection.
(E)Altruism must always be reciprocal.
- (A)127. A "cohort" in a human life table consists of
(A)people who are the same age.
(B)people who live in the same city.
(C)people of the same education level.
(D)people who have the same occupation.
(E)people who have the same number of children.
- (C)128. The term $(K - N) / K$ influences dN / dt such that
(A)the increase in actual population numbers is greatest when N is small.
(B)as N approaches K, r, the intrinsic rate of increase, becomes smaller.
(C)when N equals K, population growth is zero.
(D)when K is small, the population begins growing exponentially.
(E)as N approaches K, the birth rate approaches zero.
- (D)129. A population's carrying capacity is
(A)the number of individuals in that population.
(B)a constant that can be estimated for all populations.
(C)inversely related to r.
(D)the population size that can be supported by available resources for that species within the habitat.
(E)set at 8 billion for the human population.
- (D)130. The current size of the human population is closest to
(A)2 million. (B)3 billion. (C)4 billion. (D)6 billion. (E)10 billion.
- (C)131. The concept of trophic structure of a community emphasizes
(A)prevalent form of vegetation.
(B)keystone predator.
(C)feeding relationships within a community.
(D)effects of coevolution.
(E)species richness of the community.
- (D)132. According to the concept of competitive exclusion,
(A)two species cannot coexist in the same habitat.
(B)extinction or emigration are the only possible results of competitive interactions.
(C)competition within a population results in the success of the best-adapted individuals.
(D)two species cannot share the exact same niche in a community.

- (E)resource partitioning will allow a species to utilize all the resources of its niche.
- (B)133. Predation and parasitism are similar in that both can be characterized as
(A)+ / + interactions. (B)+ / -interactions. (C)+ / 0 interactions. (D)- / - interactions.
(E)symbiotic interactions.
- (E)134. One of the lessons from a pyramid of production is that
(A)only one-half of the energy in one trophic level is passed on to the next level.
(B)most of the energy from one trophic level is incorporated into the biomass of the next level.
(C)the energy lost as heat or lost in cellular respiration is 10% of the available energy of each trophic level.
(D)production efficiency is highest for primary consumers.
(E)eating grain-fed beef is an inefficient means of obtaining the energy trapped by photosynthesis.
- (D)135. The recent increase in atmospheric CO₂ concentration is mainly a result of an increase in
(A)primary production.
(B)the biosphere's biomass.
(C)the absorption of infrared radiation escaping from Earth.
(D)the burning of fossil fuels and wood.
(E)cellular respiration by the exploding human population.
- (B)136. which of these ecosystems has the lowest primary production per square meter?
(A)a salt marsh (B)an open ocean (C)a coral reef (D)a grassland (E)a tropical rain forest
- (D)137. Which of the following conditions is the most likely indicator of a population in an extinction vortex?
(A)The population is divided into smaller populations.
(B)The species is rare.
(C)The effective population size of the species is around 500.
(D)Genetic measurements indicate a continuing loss of genetic variation.
(E)All populations are connected by corridors.
- (D)138. The application of ecological principles to return a degraded ecosystem to its natural state is specifically characteristic of
(A)population viability analysis. (B)landscape ecology. (C)conservation ecology. (D)restoration ecology. (E)resource conservation.
- (E)139. What is the greatest threat to biodiversity?
(A)overexploitation of commercially important species
(B)introduced species that compete with or prey on native species
(C)the high rate of destruction of tropical rain forests
(D)disruption of trophic relationships as more and more prey species become extinct
(E)human alteration, fragmentation, and destruction of terrestrial and aquatic habitats
- (C)140. According to the small-population approach, what would be the best strategy for saving a population that is in an extinction vortex?
(A)determining the minimum viable population size by taking into account the effective population size
(B)establishing a nature reserve to protect its habitat
(C)introducing individuals from other populations to increase genetic variation
(D)determining and remedying the cause of its decline
(E)reducing the population size of its predators and competitors