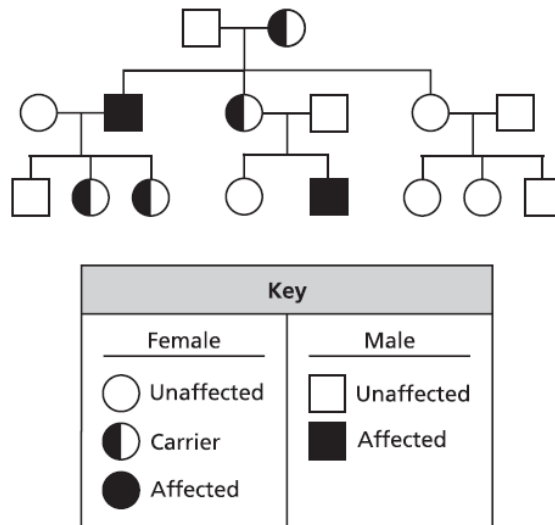


BIOLOGY ITEMS

1. The pedigree chart below shows the transmission of genetic traits over several generations.



How is the trait inherited?

- A Autosomal recessive
- B Autosomal dominant
- C Sex-linked recessive
- D Sex-linked dominant

2. Which of these statements best explains the process of energy conversion that takes place in the mitochondria?

- A Energy is required for carbon dioxide molecules to form six-carbon sugar molecules.
- B Water molecules and radiant energy are necessary for anaerobic respiration to take place.
- C Oxygen molecules release energy in the form of heat during combustion reactions.
- D The energy in the bonds of glucose molecules is transferred to the phosphate bonds in ATP.

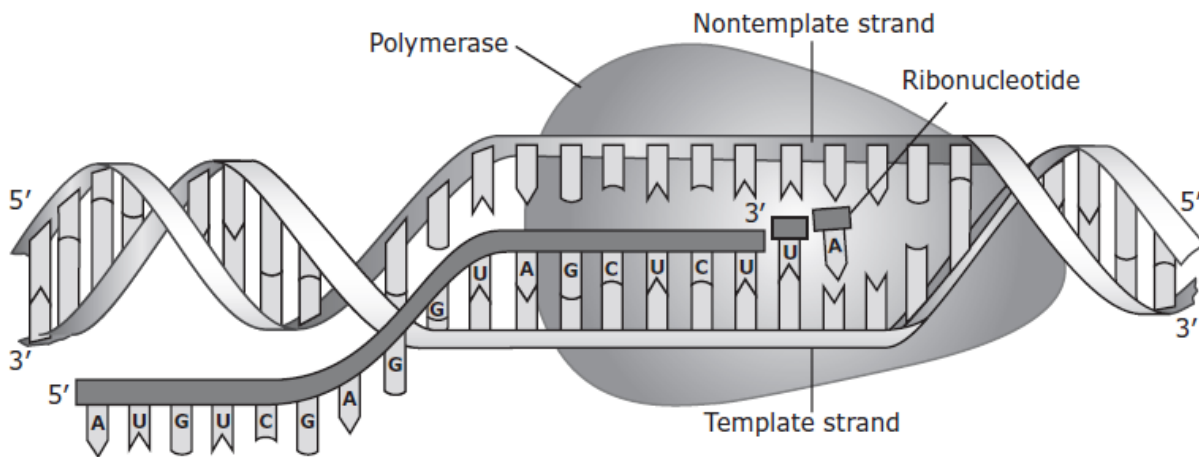
3. Which organism is most likely to use anaerobic respiration?

- A bird
- B moss
- C tree
- D yeast

4. Enzymes are proteins that help increase the rate of chemical reactions inside cells. These proteins are composed of many simpler molecules called amino acids. Which of the following suggests that the shape of an enzyme determines the enzyme's function?

- A** Enzymes are specific to a substrate.
- B** Enzymes can operate in a wide range of conditions.
- C** Enzymes are activated by neighboring molecules.
- D** Enzymes can be found in all life-forms.

5. A section of a nucleic acid is shown below.



The process represented in the diagram produces a molecule that is complementary to the template strand of DNA. What type of molecule is produced?

- A** New DNA
- B** Polypeptide
- C** Messenger RNA
- D** Carbohydrate

6. RNA and DNA are which type of organic compound?

- A** carbohydrate
- B** lipid
- C** nucleic acid
- D** protein

7. Which of the following correctly describes how a diagram of cellular respiration would differ from a diagram of photosynthesis?

- A** The cellular-respiration diagram would show electromagnetic waves as the final product.
- B** The cellular-respiration diagram would show glucose as the main source of energy.
- C** The cellular-respiration diagram would show energy stored in large protein molecules.
- D** The cellular-respiration diagram would show water as the main source of chemical energy.

8. If several pea plants with the genotype T TYy are crossed with pea plants with the genotype Ttyy, what percentage of the offspring will be expected to have the T TYy allele combination?

- A** 25%
- B** 40%
- C** 50%
- D** 75%

9. The concept of gene flow is demonstrated when a cow is driven off from its herd, joins another herd, and reproduces. When the cow contributes to the gene pool of the new herd, which of these most likely increases?

- A** Natural selection
- B** Genetic variation
- C** Environmental fitness
- D** Reproductive mutations

10. Which is an example of osmosis?

- A** potassium ions moving in and out of an animal cell
- B** carbon dioxide moving into the leaf cells of a plant
- C** oxygen moving into the bloodstream from the lungs
- D** water moving into the root cells of a plant

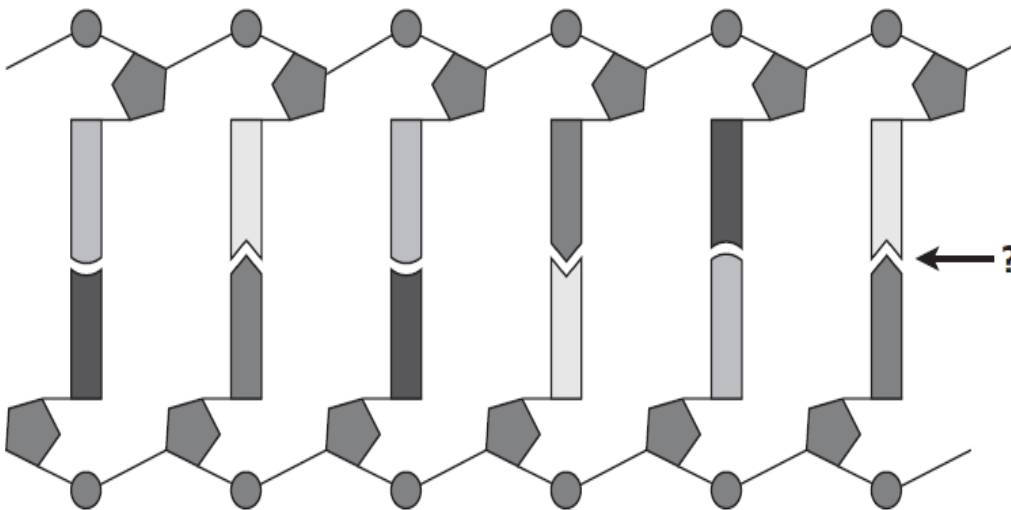
11. Crossing-over between nonsister chromatids during meiosis is significant in heredity. This process most likely leads to an increase in which of the following?

- A** The expression of dominant traits
- B** Number of gametes
- C** The occurrence of polyploidy
- D** Genetic variation

12. Which cellular process takes place in the ribosomes that are bound to the endoplasmic reticulum?

- A** The breakdown of waste material
- B** The conversion of radiant energy to glucose
- C** The synthesis of new proteins
- D** The replication of nucleic acids

13. A model of a DNA molecule is shown below.



The arrow indicates —

- A** the bond between adjacent phosphate and deoxyribose molecules
- B** the junction of introns and exons in the sense strand of DNA
- C** the hydrogen bond between complementary nucleotides
- D** the junction of a codon and a DNA triplet

14. Characteristics such as a widow's peak or attached earlobes are determined by the genetic code.

Which components of DNA are referred to as the genetic code?

- A** Phosphate groups
- B** Nitrogenous bases
- C** Deoxyribose sugars
- D** Hydrogen bonds

15. How does DNA in cells determine an organism's complex traits?

- A** DNA contains codes for proteins, which are necessary for the growth and functioning of an organism.
- B** DNA separates into long single strands that make up each part of an organism.
- C** DNA produces the energy an organism needs in order to grow.
- D** DNA folds into the nucleus of each of the cells of an organism.

16. The acacia ant (*Pseudomyrmex ferruginea*) lives in the bullshorn acacia plant, as shown below.



The acacia ant nests and feeds in the plant's hollow thorns. The ant helps protect the bullshorn acacia by attacking insects and grazing animals that come near the plant. The relationship between the acacia ant and the bullshorn acacia is an example of which of the following?

- A** Commensalism
- B** Mutualism
- C** Neutralism
- D** Parasitism

17. Which of these must occur during S phase of the cell cycle so that two daughter cells can be produced during M phase?

- A The DNA must be replicated.
- B The chromosomes must be joined.
- C The cytoplasm must be separated.
- D The cell membrane must be expanded.

18. Which group of organic compounds contains fatty acids?

- A. carbohydrates
- B. lipids
- C. nucleic acids
- D. proteins

19. A student is studying the ecology of a playa lake, which forms after a rainfall in a dry lake bed. The table lists the organisms that the student observed.

Organisms Observed			
Day 1	Day 2	Day 3	Day 4
Fairy shrimp Clam shrimp Tadpole shrimp	Fairy shrimp Clam shrimp Tadpole shrimp Mayfly larvae	Fairy shrimp	None

Which level of biological organization has the student described in the table?

- A Biosphere
- B Organelle
- C Ecosystem
- D Community

20. A sugar, a phosphate group, and a nitrogen base form the building blocks of which organic compound?

- A carbohydrates
- B lipids
- C nucleic acids
- D proteins

21. In cocker spaniels the allele for a black coat color (B) is dominant over the allele for a brown coat color

(b). If a brown cocker spaniel is crossed with a heterozygous black cocker spaniel, which of the following genotypic ratios can be expected?

A 0 BB: 2 Bb: 2 bb

B 1 BB: 2 Bb: 1 bb

C 2 BB: 0 Bb: 2 bb

D 2 BB: 1 Bb: 0 bb

22. Which of the following statements describes each new molecule of DNA produced when DNA replicates?

A. Each new molecule is half the length of the original molecule.

B. Each new molecule has only the coding portions of the original molecule in its sequence.

C. Each new molecule contains one strand from the original molecule and one newly synthesized strand.

D. Each new molecule retains the A, C, and G bases in the DNA sequence but replaces the T base with U.

23. A mutation that occurs in the gametes of an organism will most likely be transferred to which of the following?

A The siblings of the organism

B The offspring of the organism

C The other organisms living nearby

D The mating partner of the organism

24. Which is a use of genetically engineered bacteria?

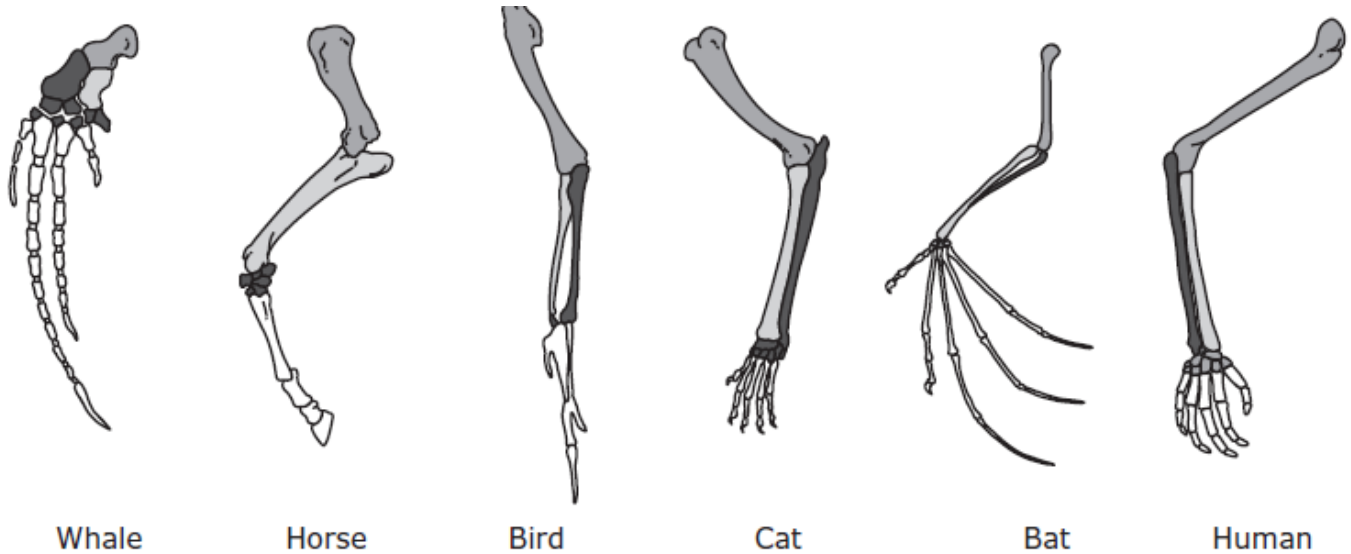
A identifying the remains of an unknown person

B developing a DNA fingerprint for blood left at a crime scene

C making human insulin for diabetics

D producing corn that is resistant to herbicides

25. The limbs of several organisms are shown in the illustrations below. Scientists sometimes compare the limbs of these organisms to look for evidence of common ancestry.



These limbs provide evidence of common ancestry because they —

- A** have the same basic structure
- B** perform the same function
- C** are the same size
- D** are parts of mammals

26. Which is the most likely function of a group of cells that contains a high number of chloroplasts?

- A** respiration
- B** transpiration
- C** fermentation
- D** photosynthesis

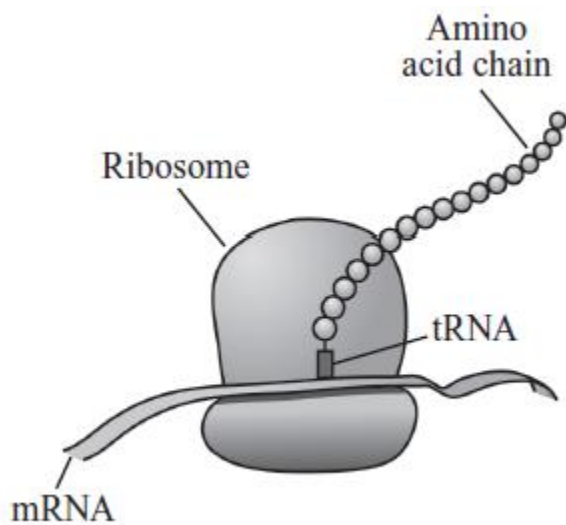
27. A student views cells from several different prokaryotic and eukaryotic organisms under a high-powered microscope. Which of the following statements describes how the prokaryotic cells appear different from the eukaryotic cells?

- A.** The prokaryotic cells are much larger.
- B.** The prokaryotic cells do not have nuclei.
- C.** The prokaryotic cells have mitochondria.
- D.** The prokaryotic cells have a less distinct shape.

28. Cellulose is a complex carbohydrate that makes up the cell walls of plants. Which of the following elements are main components of cellulose?

- A. calcium and chlorine
- B. carbon and hydrogen
- C. potassium and chlorine
- D. sodium and hydrogen

29. The diagram below shows a process that occurs in cells.



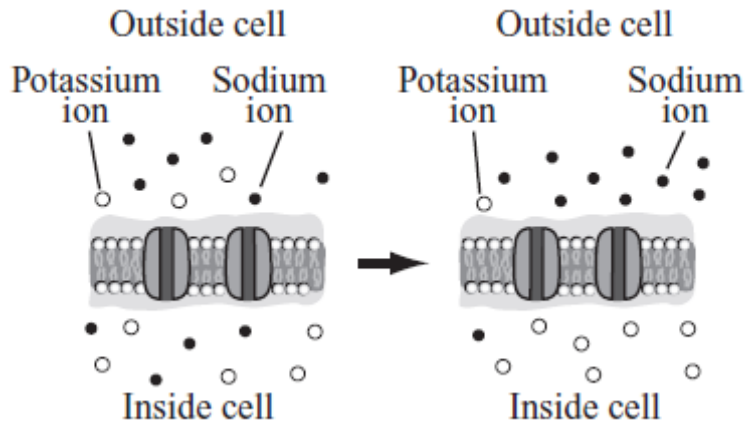
Which process is shown in the diagram?

- A. diffusion
- B. recombination
- C. respiration
- D. translation

30. A person with swollen gums rinses his mouth with warm salt water, and the swelling decreases. Which has occurred?

- A. The swollen gums have absorbed the saltwater solution.
- B. The saltwater solution lowers the temperature of the water in the gums.
- C. The salt in the solution has moved against the concentration gradient.
- D. The water in the gums has moved from a high to a low concentration of water

31. The diagram below shows changes in the concentrations of sodium and potassium ions inside and outside a nerve cell. These changes prepare the nerve cell to conduct an electrical impulse.



32. Which of the following processes is directly responsible for these changes in the concentrations of sodium and potassium ions inside and outside the nerve cell?

- A. active transport
- B. enzyme activity
- C. osmosis
- D. transcription

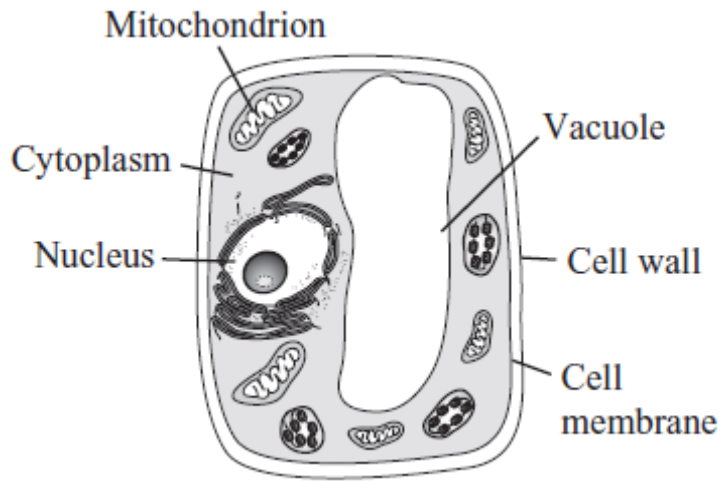
33. The illustration below shows a phase of mitosis.



Which of the following statements describes what is occurring in this phase?

- A. The chromosomes are duplicating their DNA.
- B. The copies of each chromosome are separating.
- C. The chromosomes are moving toward the center of the cell.
- D. The homologous chromosomes are preparing for crossing over.

34. A cell is shown in the diagram below.



Which of the following cell characteristics provides evidence that this cell comes from a plant and not from an animal?

- A. a large vacuole
- B. a single nucleus
- C. a functional mitochondrion
- D. a semipermeable cell membrane

35. In the first step of glycolysis, glucose is converted to glucose-6-phosphate. Which of the following supplies the energy for the reaction?

- A. ATP
- B. RNA
- C. oxygen
- D. hydrogen

36. A hypothesis and a theory are related because

- A. a theory is always used to develop a hypothesis.
- B. they are both developed in the absence of observations.
- C. the data collected when a hypothesis is tested can support a theory.
- D. an experiment is done before the formation of both a hypothesis and a theory.

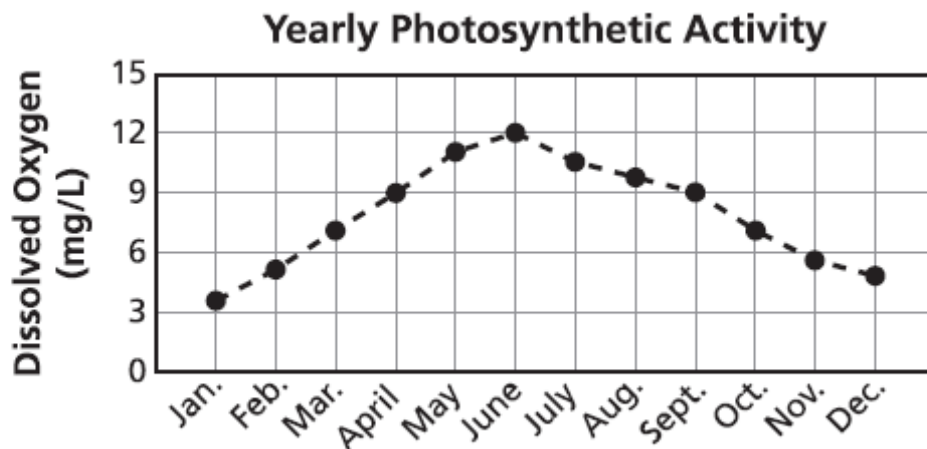
37. Complex molecules are broken down during cellular respiration and converted into smaller molecules containing energy. What are these complex molecules called?

- A. proteins
- B. enzymes
- C. nucleic acids
- D. carbohydrates

38. The first process in the light-dependent reactions of photosynthesis is

- A. light absorption
- B. formation of ATP
- C. oxygen production
- D. Electron transport

39. An ecologist performed a study to determine how the rate of photosynthetic activity in a lake changed from month to month. The results of the study are shown in the graph below.



Which conclusion is best supported by the evidence?

- A. Photosynthetic organisms were dormant during the months of April through August.
- B. The rate of photosynthesis increased from June through December.
- C. The rate of photosynthesis was greatest during the months of May through July.
- D. Photosynthetic organisms experienced die-off during the months of January through June.

40. Which piece of equipment is best in measuring the mass of potato slices after placing them in different concentrations of salt water?

- A.** Beaker
- B.** Metric ruler
- C.** Spring scale
- D.** Triple beam balance