# BIO PLACEMENT TEST REVIEW QUESTIONS

**Review 1: Answer Key on page 11**

**Select the correct answer.**

1) Which of the following is FALSE about scientific theories?
   A) They have been thoroughly tested.
   B) They are developed by inductive reasoning.
   C) They are used to support observations using deductive reasoning.
   D) They can be either supported or modified by new observations.
   E) They are firmly established and cannot be refuted.

2) Which of the following issues would be **LEAST** helped by application of the scientific method?
   A) Developing more effective high school curricula
   B) Evaluating the relationship between violence in videogames and criminal behavior in teens
   C) Determining the most effective safety products for automobiles
   D) Formulating public policy on euthanasia
   E) Comparing the effectiveness of two potential antibiotics

3) In controlled experiments:
   A) One variable is manipulated while others are held constant
   B) All variables are dependent on each other
   C) All variables are held constant
   D) All variables are independent of each other
   E) All critical variables are manipulated

4) Which of the following is/are characteristics of living organisms?
   A) Organized structure
   B) Growth and reproduction
   C) Maintenance of homeostasis
   D) A and B
   E) A, B and C

5) What do we call the maintenance of internal conditions of an organism within a certain boundary range?
   A) Evolution
   B) Homeostasis
   C) Adaptation
   D) Metabolism
   E) Photosynthesis

6) Which is the correct sequence of increasing organization?
A) Molecule, cell, organelle, organ
B) Organelle, tissue, cell, organ
C) Atom, molecule, tissue, cell
D) Organ, organism, tissue, cell
E) Cell, tissue, organ, organ system

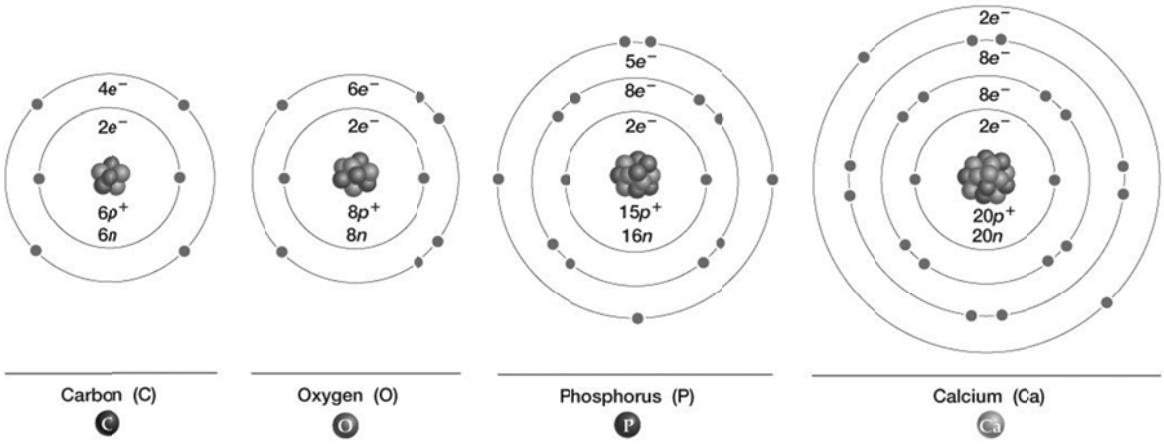
7) Which kingdom possesses unicellular animal-like species and unicellular plant-like species?
A) Fungi
B) Animalia
C) Protist
D) Plant
E) Bacteria

8) The Bacteria and Eukarya domains are distinguished by:
A) All members of Bacteria are single-celled and all members of Eukarya are multicellular.
B) All Bacteria get nutrients via absorption and all Eukarya by photosynthesis.
C) Only Eukarya have the ability to grow and reproduce.
D) In Bacteria there is an absence of membranous organelles, such as a nucleus.
E) Only Eukarya have DNA

9) A basic difference between a prokaryotic cell and a eukaryotic cell is that the prokaryotic cell:
A) Possesses membrane-bound organelles.
B) Lacks a nucleus.
C) Lacks DNA
D) is considerably larger.
E) is structurally more complex.

10) The atomic number of carbon is 6. Its nucleus **must** contain:
A) 6 neutrons and 6 protons
B) 3 protons and 3 neutrons
C) 6 neutrons and 0 electrons
D) 6 protons and 0 electrons
E) 6 protons and 6 electrons

11) Which of these atoms would become inert if it accepted three electrons?




A) Carbon
B) Hydrogen
C) Phosphorus
D) Calcium
E) All of the above

12) A chemical compound that releases $OH^-$ into a solution is called:
A) A proton
B) A base
C) An acid
D) A hydroxide ion
E) A hydrogen ion

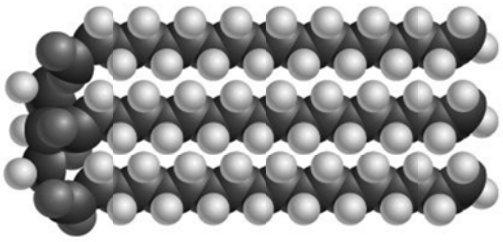
13) What happens when hydrochloric acid is added to water?
A) The HCl molecules separate into H+ and Cl-
B) The water had less free H+
C) The concentration of $OH^-$ increases
D) The pH of the water increases
E) None of the above

14) Which property of water molecules enables water to function as a moderator of temperature for living organisms?
A) High specific heat
B) High heat of vaporization
C) High heat of fusion
D) A and B
E) A, B, and C

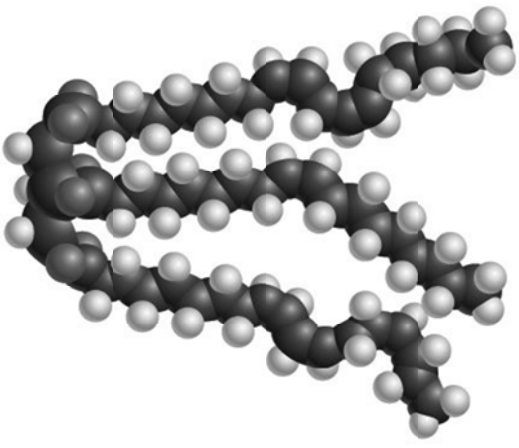
15) The formation of ions involves the:
A) Gain or loss of electrons
B) Gain or loss of protons
C) Sharing of electrons
D) Sharing of protons
E) Gain or loss of neutrons

16) A covalent bond is formed when:
A) Two non-polar molecules associate with each other in a polar environment
B) A positively charged particle is attracted to a negatively charged particle
C) One atom gives up electrons to another atom
D) Two atoms share electrons
E) Two polar molecules are attracted to each other

17) What type of chemical reaction results in the breakdown of organic polymers into their respective subunits?
A) Condensation
B) Hydrolysis
C) Oxidation
D) Ionization
E) Dehydration



(a) A fat



(b) An oil

18) As shown in this figure, the top triglyceride (a) has ____; the bottom triglyceride has ____.
A) Double bonds and is saturated; no double bonds and is unsaturated
B) No double bonds and is saturated; double bonds and is unsaturated
C) No double bonds and is unsaturated; double bonds and is saturated
D) Double bonds and is unsaturated; double bonds and is unsaturated
E) Double bonds and is unsaturated; no double bonds and is saturated

19) Which of the following reactions requires the removal of water to form a covalent bond?
A) Glycogen -> glucose subunits
B) Peptide -> amino acids
C) Cellulose -> glucose
D) Glucose and galactose -> lactose
E) Fat -> fatty acids and glycerol

20) Which of the following refers to the amino acid sequence of proteins?
A) Primary
B) Secondary
C) Tertiary
D) Quaternary
E) None of the above

21) Which is not a feature of a prokaryotic cell?
A) A plasma membrane
B) A nuclear membrane
C) Ribosomes
D) Enzymes
E) DNA

22) After being formed by ribosomes on the endoplasmic reticulum, what is the next organelle to which a protein might be transported?
A) Mitochondria
B) Smooth endoplasmic reticulum
C) Nucleus
D) Golgi apparatus
E) Chloroplast

23) Which type of cell does NOT produce cell walls?
A) Animal cells
B) Plant cells
C) Archaea
D) Bacteria
E) Prokaryotic cells

24) In an experiment, you measure the concentration of a polar molecule inside and outside the cell and find that the concentration of this molecule is gradually increasing inside the cell. You also measure the concentration of ATP inside the cell and find that it is dropping. Which of the following processes are you likely to be observing?
A) Osmosis
B) Facilitated diffusion
C) Active Transport
D) Simple diffusion
E) Passive transport

25) The movement of **water** across a membrane from a solution of lower solute concentration to a solution of higher solute concentration is best described as
A) Osmosis
B) Facilitated diffusion
C) Active Transport
D) Simple diffusion
E) Endocytosis

26) Mitochondria and chloroplasts share all of the following characteristics EXCEPT that they:
A) Are capable of ATP synthesis.
B) Capture the energy of sunlight to meet metabolic demands.
C) Possess their own DNA
D) Are surrounded by a double membrane
E) Were originally independent organisms

27) Which of the following will be least likely to degrade a protein?
A) Temperature greater than 100 degrees centigrade
B) Strong acid
C) Strong base
D) Water
E) Poisons

28) Which of the following energy-generating processes is the only one that occurs in almost all living organisms?
A) Glycolysis
B) Combustion
C) Krebs Cycle
D) Photosynthesis
E) Chemiosmosis

29) At the end of glycolysis, the original carbons of the glucose molecule form:
A) Six molecules of carbon dioxide
B) Two molecules of NADH
C) Two molecules of pyruvate
D) Two molecules of citric acid
E) Two molecules of fructose

30) The oxygen we breathe in is used in
A) Glycolysis
B) Krebs cycle
C) Electron Transport System
D) Preparatory Step
E) Fermentation

31) If a DNA sample contains 13% adenine, what percentage of the sample contains cytosine?
A) 13%
B) 0%
C) 37%
D) 26%
E) 74%

32) For the DNA sequence G-C-C-T-A-T in one polynucleotide chain, the sequence found in the other polynucleotide chain must be:
A) C-G-G-A-T-A.
B) G-C-C-A-T-A.
C) C-G-G-A-U-A.
D) A-T-T-C-G-C.
E) G-C-C-T-A-T.

33) Which of the following are expected to result in genetic variation among offspring?
A) Mutations
B) Crossing over
C) Random assortment of parental chromosomes during meiosis
D) A and B
E) A, B, and C

34) For a mutation to affect the evolution of an animal species, it must occur in
A) Somatic cells
B) Prokaryotic cells
C) Gametes
D) None of the above
E) All of the above

35) If a sperm cell has 6 chromosomes, it comes from an animal whose somatic cells have ___ chromosomes.
A) 6
B) 10
C) 12
D) 18
E) 24

36) The haploid number of chromosomes for humans is
*A) 23
B) 24
C) 26
D) 46
E) 48

37) Which represents the correct sequence of stages in the cell cycle?
A) G1, G2, S, M
B) G1, G2, M, S
C) M, S, G1, G2
D) G1, S, G2, M
E) G1, M, G2, S

38) Which of the following is TRUE regarding the genetic information in the cells of your body?
A) Different kinds of body cells contain different genetic information.
B) Each type of body cell contains only the genetic information it needs to be that type of cell.
C) The genetic information in almost all of your body cells is identical.
D) The genetic information in your body cells changes in a predictable manner as you grow and develop.
E) The genetic information is stored in the sequence of amino acids in proteins

39) What is the importance of crossing over in meiosis?
A) It provides extra genetic material for the daughter cells
B) It produces proteins necessary for cell division
C) It causes the separation of homologous chromosomes
D) It ensures that the daughter cells have different genetic material
E) It initiates meiosis 11

40) At which stage of meiosis is each chromosome composed of a single chromatid?
A) Prophase 1
B) Prophase 11
C) Metaphase 1
D) Metaphase 11
E) Anaphase 11

41) Which of the classes of RNA molecules carries the genetic information as it is needed for the construction of a protein?
A) Ribosomal RNA
B) Transfer RNA
C) Messenger RNA
D) Primary RNA
E) Secondary RNA

42) Which the following occurs in the nucleus in a eukaryotic cell?
A) Transcription only
B) Assembly of amino acids into protein only
C) Replication of genetic material only
D) Both transcription and replication of genetic material
E) Translation only

43) What are alleles?
A) Genes for different traits, such as hair color or eye color
B) Alternative forms of a gene for a single trait, such as blue eyes or brown eyes
C) The location of genes on the chromosome
D) Recessive forms of the gene
E) Dominant forms of the gene

44) An individual who is **a carrier** for a sex-linked trait, such as hemophilia:
A) Is always male
B) Is homozygous for the condition
C) Shows the dominant phenotype
D) Cannot pass the gene to his or her daughters
E) Is never a female

45) An individual with a dominant phenotype is crossed with an individual with a recessive phenotype and 4 of their 9 offspring show the recessive phenotype. What is the genotype of the parent with the dominant phenotype?
A) Aa
B) AA
C) aa
D) AAAa
E) Aaaa

46) Which of the following is NOT true according to Mendel's law of segregation?
A) Each individual contains two factors for each trait
B) One factor must be dominant and one must be recessive
C) Factors separate from each other during the formation of gametes
D) Each gamete contains one copy of each factor
E) Fertilization restores the two copies of each factor

47) Which of the following can evolve?
A) Individuals
B) Populations
C) Genes
D) DNA
E) All of the above

48) Genetic variations in natural populations develop due to:
A) Random mutations of the DNA
B) Changes in the diet
C) Changes in the environment
D) Environmental catastrophes
E) Individual activities

49) An antibiotic is given repeatedly to treat a recurrent ear infection. It worked initially but now is no longer effective. This likely indicates that the *Streptococcus* bacterium:
A) Is very sensitive to the antibiotic.
B) Is being treated with an antibiotic that has experienced a manufacturing error, making it ineffective.
C) Experienced natural selection that has allowed the resistant *Streptococcus* bacteria to survive and multiply.
D) Are infectious only if they are sensitive to the antibiotic.
E) All of the above

50) Natural selection can act on a trait only if the trait is:
A) Heritable
B) Behavioral
C) Favorable
D) New
E) Morphological

KEY for Review 1

| | | | |
|---|---|---|---|
| 1. | E | 26. | B |
| 2. | D | 27. | D |
| 3. | A | 28. | A |
| 4. | E | 29. | C |
| 5. | B | 30. | C |
| 6. | E | 31. | C |
| 7. | C | 32. | A |
| 8. | D | 33. | E |
| 9. | B | 34. | C |
| 10. | D | 35. | C |
| 11. | C | 36. | A |
| 12. | B | 37. | D |
| 13. | A | 38. | C |
| 14. | E | 39. | D |
| 15. | A | 40. | E |
| 16. | D | 41. | C |
| 17. | B | 42. | D |
| 18. | B | 43. | B |
| 19. | D | 44. | C |
| 20. | A | 45. | A |
| 21. | B | 46. | B |
| 22. | D | 47. | B |
| 23. | A | 48. | A |
| 24. | C | 49. | C |
| 25. | A | 50. | A |

**Review 2: Answer Key on page 21**

**Select the correct answer.**

1) A primary source of scientific results is ___
   A) The news media
   B) Anecdotes from others
   C) Articles in peer- reviewed journals
   D) The internet
   E) All of the above

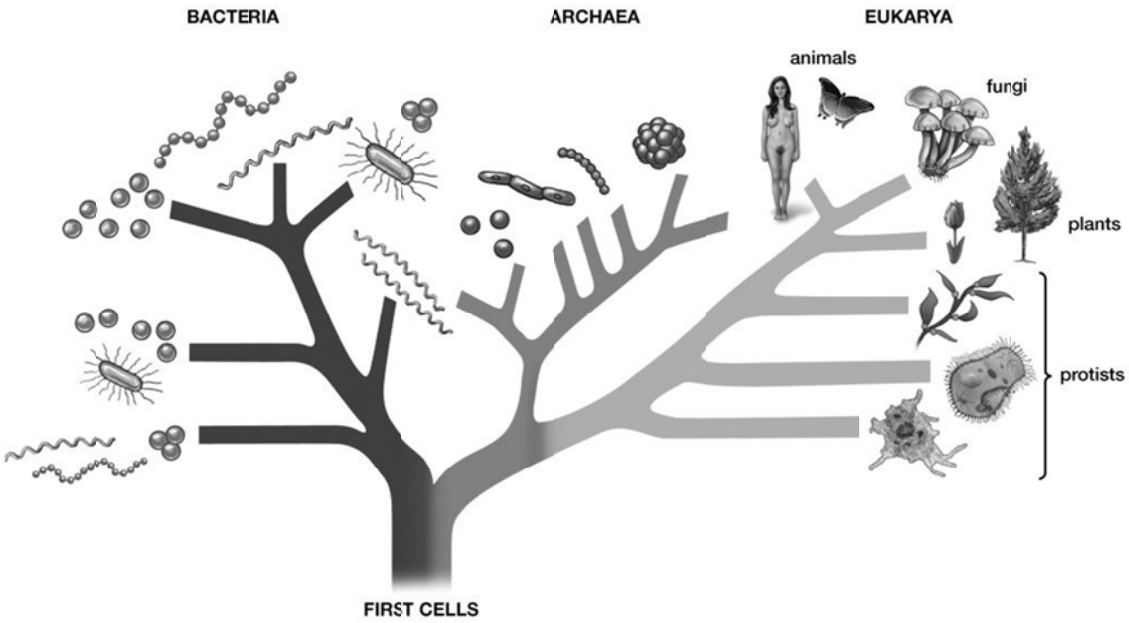
2) A guess in a scientific process is called __; a unifying explanation for a range of observations is termed___?
   A) Theory: Hypothesis
   B) Theory: Experiment
   C) Hypothesis: Control
   D) Hypothesis: Theory
   E) Experiment: Theory

3) To test the effect of vitamin D on growth, two groups of rats were raised under identical conditions and fed the same diet. One of the groups received daily injections of vitamin D. The other group received injections of saline, which did not contain vitamin D. All the rats were weighed weekly for 2 months. In this experiment, the control was the:
   A) Group receiving vitamin D.
   B) Group receiving saline.
   C) Average weight gain of the rats.
   D) 2-month period of time.
   E) The diet the rats ate

4) Which of the following are both universal characteristics of life?
   A) The ability to grow and the ability to reproduce using DNA
   B) The ability to reproduce using DNA and the ability to capture energy from the sun
   C) The ability to move and the ability to sense the environment
   D) The ability to grow and the ability to think
   E) The ability to reproduce and the ability to sleep

5) Which of the following levels of organization is the most inclusive?
   A) Organism
   B) Population
   C) Biosphere
   D) Community
   E) Ecosystem

6) The "first cells" shown at the bottom of this illustration most likely refer to:




A) Prokaryotes.
B) Animals.
C) Plants.
D) Fungi.
E) Protists.

7) The atoms of a single element
A) Have the same number of electrons
B) Can form bonds only with atoms of the same element
C) Can have different numbers of electrons
D) Can have different numbers of protons
E) Always have an overall positive charge

8) The second orbital shell of an atom can hold ___ electrons
A) 2
B) 3
C) 4
D) 6
E) 8

9) A chemical compound that releases $H^+$ into a solution is called:
A) A proton
B) A base
C) an acid
D) A hydroxide ion
E) A hydrogen ion

10) A neutral solution has
A) No H+
B) No OH-
C) equal amounts of H+ and OH-
D) No pH
E) A pH of 0

11) What determines the cohesiveness of water molecules?
A) Hydrogen bonds
B) Ionic bonds
C) Covalent bonds
D) Hydrophobic interactions
E) High heat of vaporization

12) What bond is (are) easily disrupted in aqueous (water) solutions?
A) Covalent
B) Polar covalent
C) Ionic
D) A and B are correct
E) A, B, and C are correct

13) Large biological molecules are synthesized by removal of
A) Carbon
B) Covalent bonds
C) Water
D) Oxygen
E) Peptides

14) Which of the following is NOT one of the four most common elements found in living organisms?
A) Hydrogen
B) Carbon
C) Oxygen
D) Sulfur
E) Nitrogen

15) If a reaction results in one molecule losing an electron and a second molecule gaining that electron, the electron donor is said to be
A) Reduced
B) Oxidized
C) Transformed
D) Activated
E) Inhibited

16) A molecule of glucose has the molecular formula $C_6H_{12}O_6$. Therefore it has __ atoms.
A) 3
B) 12
C) 6
D) 24
E) None of the above

17) A lipid is a polymer made up of which kind of monomers?
A) Glucose or modified glucose molecules
B) Amino Acids
C) Nucleotides
D) Alternating sugar and phosphate groups
E) Fatty acids and glycerol

18) How are amino acids and proteins related?
A) Proteins are made up of chains of amino acids
B) Amino acids are formed by joining together many proteins
C) Proteins are a portion of an amino acid
D) Proteins are chains of carbohydrates; amino acids are a type of lipid
E) Amino acids are similar to fatty acids

19) Fish sperm consists mostly of the male fish's DNA. If tested chemically, there would be relatively high amounts of
A) Nitrogenous bases, sugar and phosphate groups
B) Phospholipids and steroids
C) Triglycerides and ATP
D) Proteins and stored fats
E) Amino acids and unsaturated fats

20) Which of the following statements about prokaryotes is incorrect?
A) Prokaryotes appeared on earth before eukaryotes
B) Prokaryotes have circular pieces of DNA within their nuclei
C) Prokaryotes contain cytoplasm
D) Prokaryotes contain ribosomes
E) Some prokaryotes con photosynthesize

21) In plant cells, chloroplasts
A) Serve the same purpose as mitochondria do in animal cells
B) Are the site of conversion of light energy into chemical energy
C) Play an important role in the breakdown of plant toxins
D) Generate turgor pressure
E) A and B are correct

22) Cell walls
A) Have many small holes
B) Only occur in plant cells
C) Dissolve when a plant dies
D) Are made primarily from phospholipids
E) All of the above

23) The movement of molecules across a membrane from an area of higher concentration (of the molecule)to an area of lower concentration is best described as
A) Osmosis
B) Passive transport
C) Active transport
D) Electron transport
E) Receptor-mediated endocytosis

24) From your knowledge of the function of lysosomes, the pH of lysosomes is likely to be
A) Always changing
B) 5
C) Neutral
D) 9
E) 12

25) In a phospholipid bilayer, the
A) Phosphate groups are hydrophobic
B) Fatty acids tails are ionized
C) Fatty acid tails are hydrophilic
D) Proteins are located only between the two phospholipid bilayers
E) Phosphate heads are oriented toward the exterior of the cell or toward the cytoplasm

26) If enzymes were used during a reaction, which of the following could be added to a system to make the reaction occur faster?
A) Water
B) A decrease in temperature
C) An small increase in heat energy
D) End products
E) All of the above

27) Which of the following does NOT describe a chemical reaction?
A) The products are placed to the left of the arrow
B) The reactants are placed to the left of the arrow
C) The arrow represents the direction in which the reaction proceeds
D) Atoms must be balanced on both sides of the equation
E) All of the above are true

28) Which of these processes occurs in the cytosol?
A) Glycolysis
B) Electron Transport System
C) Krebs Cycle
D) Photosynthesis
E) Chemiosmosis

29) During the Krebs cycle:
A) The products of glycolysis are further broken down, generating additional ATP and NADH molecules
B) High-energy electron carriers pass their energy to molecules of sugar, which store them as potential energy
C) Cellular respiration can continue even in the absence of oxygen
D) Pyruvate molecules are converted to lactate
E) NADH gets oxidized to $NAD^+$

30) The anaerobic breakdown of glucose is called
A) Glycolysis
B) Electron Transport System
C) Krebs Cycle
D) Photosynthesis
E) Fermentation

31) What is the significance of the conversion of pyruvate to lactate during fermentation?
A) Pyruvate becomes available to enter the mitochondrial matrix
B) The citric acid/Krebs cycle is initiated
C) NAD+ is regenerated for use in glycolysis
D) ATP is produced
E) The energy in pyruvate is used up

32) If a species contains 40% guanine in its DNA, what is the percentage of adenine that it would contain?
A) 40%
B) 60%
C) 100%
D) 20%
E) 10%

33) In an analysis of the nucleotide composition of DNA to see which bases are equivalent in amount, which of the following is true?
A) A = C
B) A = G and C = T
C) A + C = G + T
D) A + T = C + G
E) G = T

34) Which of the following statements about DNA replication is NOT correct?
A) The DNA molecule unwinds as the hydrogen bonds are broken
B) Replication occurs as each base is paired with one exactly like it
C) The process is known as semiconservative replication because one old strand is conserved in the new molecule
D) The enzyme that replicates the DNA is DNA polymerase
E) The enzyme that links the Okazaki fragments together is DNA ligase

35) A "mini-gene" has the base sequence TACCCGTGCACG. If the T at the beginning of the sequence is deleted, what will be the consequence?
A) All of the codons after that point will be changed
B) Only the amino acid coded for in that codon will be changed
C) RNA polymerase will skip that codon, but all the others will be read normally.
D) RNA polymerase will correct the deletion, and a normal protein will be produced
E) The first nucleotide is always replaced anyway, so there will be no change.

36) Which point mutation would be most likely to have a catastrophic effect?
A) A base substitution
*B) A base deletion near the start of the coding sequence
C) The deletion of three bases near the start of the coding sequence
D) A base deletion near the end of the coding sequence
E) A base deletion at the very end of the coding sequence

37) The cell formed through fertilization is called a/an
A) Zygote
B) Gamete
C) Sperm cell
D) Ovum
E) Egg cell

38) Which sequence of stages in mitosis is correct?
A) Prophase, anaphase, metaphase, telophase
B) Prophase, metaphase, anaphase, telophase
C) Anaphase, metaphase, telophase, prophase
D) Anaphase, prophase, telophase, metaphase
E) Prophase, telophase, anaphase, metaphase

39) Which does not occur in telophase?
A) Cytokinesis is under way
B) The nuclear membrane is being reconstructed
C) The centromeres split apart
D) Chromosomes de-condense into chromatin
E) The nucleolus reforms

40) During which stage of meiosis does crossing-over occur?
A) Prophase 1
B) Metaphase 1
C) Anaphase 11
D) Prophase 11
E) Metaphase 11

41) Prior to protein synthesis, the DNA
A) Attracts tRNAs with appropriate amino acids
B) Must first undergo replication
C) Contains anticodons that must become codons
D) Serves as a template for the production of mRNA
E) Attaches to ribosomes for protein synthesis

42) Which of the classes of RNA molecules carries the amino acids that are added to the growing polypeptide chain?
A) Ribosomal RNA
B) Transfer RNA
C) Messenger RNA
D) Primary RNA
E) Secondary RNA

43) The process of converting the "message" of mRNA into a sequence of amino acids is called:
A) Translation
B) Transcription
C) Replication
D) Activation
E) Duplication

44) Suppose one strand of a "mini-gene" has the base sequence TACCCGGATTCA. The last codon in the mRNA sequence will be:
A) UGA
B) AGT
C) AGU
D) TCA
E) ACT

45) Traits controlled by sex-linked recessive genes are expressed more often in males because:
A) Males inherit these genes from their fathers
B) Males always carry two copies of these genes
C) All male offspring of a female carrier get the gene
D) The male has only one copy of these genes
E) Males get more copies of recessive genes than females do

46) A human male has ___ chromosomes with ___ sex chromosomes.
A) 46, XY
B) 48, XY
C) 46, XX
D) 48, XX
E) 48, YY

47) Which statement is NOT true about x-linked characteristics?
A) More males than females are affected
B) If a female has the characteristic, all her sons will show it
C) Females can be carriers of the gene without showing it
D) The characteristic often skips a generation, from a woman's father to her son
E) Males can have two copies of the allele for the trait, but females only have one

48) Which organism is **least likely** to survive to reproduce?
A) A flower that produces a scent that attracts bees
B) A shrub that produces a toxin in its flower buds that repels deer
C) An animal with a mutation that causes skin color to be more noticeable
D) A dark-furred rodent that comes out only at night
E) a seahorse that mimics the weeds in which it lives

49) Evolution:
A) Occurs too slowly to be observed
B) Can occur in the wild but not in the laboratory
C) Is responsibility for the increased occurrence of antibiotic-resistant bacteria
D) Is unrelated to mutations in DNA
E) All of the above are correct

50) Which mutation provides a survival advantage?
A) A flower that attracts more bees
B) A tree that grows shorter than the surrounding trees
C) A horse that lacks the ability to digest either grains or grass
D) A brightly colored fish that attracts predators
E) A shrub that loses the ability to make seeds

KEY for Review 2

| | | | |
|---|---|---|---|
| 1. | C | 26. | C |
| 2. | D | 27. | A |
| 3. | B | 28. | A |
| 4. | A | 29. | A |
| 5. | C | 30. | E |
| 6. | A | 31. | C |
| 7. | A | 32. | E |
| 8. | E | 33. | C |
| 9. | C | 34. | B |
| 10. | C | 35. | A |
| 11. | A | 36. | B |
| 12. | C | 37. | A |
| 13. | C | 38. | B |
| 14. | D | 39. | C |
| 15. | B | 40. | A |
| 16. | D | 41. | D |
| 17. | E | 42. | B |
| 18. | A | 43. | A |
| 19. | A | 44. | C |
| 20. | B | 45. | D |
| 21. | B | 46. | A |
| 22. | A | 47. | E |
| 23. | B | 48. | C |
| 24. | B | 49. | C |
| 25. | E | 50. | A |

**Review 3: Answer Key on page 31**

**Select the correct answer.**

1) Science is;
   A) A field of study that requires certain “laws of nature” to be taken on faith
   B) Both a body of knowledge and an intellectual activity encompassing observation, description, experimentation, and explanation of natural phenomena
   C) A process that can be applied only within the scientific disciplines, such as biology, chemistry, and physics
   D) The only way to understand the world
   E) A field of study that determines ethical standards for the human Population

2) What best describes a control group in an experiment?
   A) The condition that is being tested
   B) A sample taken through all experimental steps except the one being tested
   C) A variable that changes throughout the experiment
   D) The dependent variable
   E) A condition that is different in every way from what is being tested

3) Which group is the most abundant in terms of numbers of individuals?
   A) Animals
   B) Fungi
   C) Eukarya
   D) Plants
   E) Prokaryotes

4) Which of the following is a multicellular organism
   A) Heart
   B) Cardiovascular system
   C) Bacterium
   D) Forest ecosystem
   E) Cockroach

5) Which of the following are universal characteristics of life?
   A) The ability to grow and the ability to reproduce using DNA
   B) The ability to reproduce using DNA and the ability to capture energy from the sun
   C) The ability to move and the ability to see and smell
   D) The ability to grow and the ability to photosynthesize
   E) The ability to organize and the ability to become dormant

6) Metabolism refers to an organism's ability to
A) Reproduce
B) Use energy
C) Pass on genetic information
D) Respond to the environment
E) All of the above

7) A cell that lacks membranous organelles is a(n):
A) Member of the Plant kingdom
B) Animal cell
C) Prokaryotic cell
D) A protist
E) Eukaryotic cell

8) An atom has 5 electrons in its outer orbit. To complete its outer orbit it needs __ electrons.
A) 5
B) 3
C) 2
D) 1
E) 8

9) Electrons
A) Located closest to the nucleus have the most energy
B) Along with neutrons, are located in the nucleus
C) Are attracted to the negatively charged nucleus
D) Are negatively charged
E) Have an amu = 1

10) Water can absorb and store a large amount of heat while increasing only a few degrees in temperature. Why?
A) The heat must first be used to break the hydrogen bonds rather than raise the temperature.
B) The heat must first be used to break the ionic bonds rather than raise the temperature
C) The heat must first be used to break the covalent bonds rather than raise the temperature
D) An increase in temperature causes an increase in the adhesion of water
E) An increase in temperature causes an increase in the cohesion of water

11) Milk of magnesia, which had a pH of 10, is often used to treat a stomach upset. Milk of magnesia ___?
A) Is a base
B) Is hydrophobic
C) Is a salt
D) Is an acid
E) Has the same pH as stomach acid

12) A molecule of glucose has the molecular formula $C_6H_{12}O_6$. Therefore it has __ atoms.
A) 3
B) 12
C) 6
D) 24
E) None of the above

13) Which of the following provides some energy **storage** for animals?
A) Glucose
B) Glycogen
C) Cellulose
D) Starch
E) Ribose

14) Triglycerides are:
A) Polymers of amino acids
B) Always composed of carbon rings
C) Lacking carboxyl groups (COOH)
D) Nonpolar and hydrophobic
E) Made from glycerol and nucleic acids

15) Which of the following is NOT an organic molecule?
A) Protein
B) Nucleic acid
C) Monosaccharide
D) Carbon dioxide
E) Lipid

16) Which of the following is NOT one of the four most common elements found in living organisms?
A) Hydrogen
B) Carbon
C) Oxygen
D) Sulfur
E) Nitrogen

17) What type of chemical reaction results in the breakdown of organic polymers into their respective subunits?
A) Condensation
B) Hydrolysis
C) Oxidation
D) Ionization
E) Dehydration

18) All of the following are components of modern cell theory EXCEPT:
A) All living organisms are made up of one or more cells
B) The smallest living organisms are single cells
C) All cells arise from preexisting cells
D) Bacterial cells are eukaryotic
E) Cells are the functional units of all organisms

19) Which of the following organelles would only be found within a cell that was both eukaryotic and autotrophic?
A) Mitochondria
B) Smooth endoplasmic reticulum
C) Nucleus
D) Golgi apparatus
E) Chloroplast

20) Which statement is NOT true about bacteria?
A) Their cell wall is composed of the same material as plant cell walls
B) Some can move because they have flagella
C) Some can photosynthesize
D) They are all prokaryotes
E) Their cell wall contains peptidoglycan

21) Which of the following statements about the plasma membrane is/are true?
A) It is a solid layer of proteins that protects the contents of the cell
B) The plasma membrane of the bacterium has none of the same components as the plasma membrane of a eukaryotic cell
C) It is a rigid and unmoving layer of phospholipids and proteins
D) It allows selected molecules to pass into and out of the cell
E) C and D are correct

22) If a living plant were moved from a freshwater aquarium to a saltwater aquarium, which of the following would occur?
A) Nothing – the plant would do equally well in either aquarium
B) The plant's cells would lose water
C) The plant's cells would lose ions
D) The plant's cells would take up water
E) The plant would gain turgor pressure

23) Which phrase does NOT describe one of the functions of proteins of the plasma/cell membrane?
A) Forming a channel through the membrane
B) Initiating the replication of genetic material
C) Binding to a substance to carry it through the membrane
D) Acting as a receptor for substances outside the cell
E) Maintaining $Na^+/K^+$ balance in cell

24) Which of the following is true about ribosomes?
A) They contain RNA and proteins
B) They synthesize proteins
C) They are formed on the cytoskeleton
D) They are found only in the nucleus
E) A and B

25) The cells that line our respiratory tract, and covering one-celled paramecia both have these hair-like projections..
A) Cilia
B) Flagella
C) Microfilaments
D) Centrioles
E) Pili

26) Which form of energy is NOT correctly associated with an example?
A) Kinetic energy: fat molecules
B) Kinetic energy: movement of molecules
C) Chemical energy: glucose
D) Potential energy: water behind a dam
E) Potential energy: ATP

27) If a reaction results in one molecule losing an electron and a second molecule gaining that electron, the electron donor is said to be
A) Reduced
B) Oxidized
C) Transformed
D) Activated
E) Inhibited

28) Lactose is a disaccharide of glucose and galactose, and its digestion requires the actions of the enzyme lactase to break lactose into monosaccharides. If lactose is eaten as part of the diet but is not digested by lactase, this sugar is then metabolized by bacteria in the intestine, leading to the symptoms of lactose intolerance. Lactose intolerance, therefore, results from a(n):
A) Lack of hydrolysis of lactose
B) Lack of dehydration synthesis of lactose
C) Low blood lactose level
D) Inability of the body to produce lactose
E) Lack of glucose in the diet

29) Which molecule attaches to pyruvate after glycolysis and before Krebs cycle?
A) Lactate
B) Acetyl-CoA
C) Citric acid
D) NADH
E) Oxygen

30) What is the significance of the conversion of pyruvate to lactate during fermentation?
A) Pyruvate becomes available to enter the mitochondrial matrix
B) The citric acid/Krebs cycle is initiated
C) NAD+ is regenerated for use in glycolysis
D) ATP is produced
E) The energy in pyruvate is used up

31) The first process in breaking down glucose is
A) Krebs cycle
B) Fermentation
C) Chemiosmosis
D) Glycolysis
E) Preparatory Step

32) Which of the following molecules can be modified to enter the citric acid/Krebs cycle?
A) Pyruvate
B) Amino Acids
C) Fatty Acids
D) None of the above
E) All of the above

33) Because one strand of the double-stranded helix is found in each daughter cell, the replication process is called
A) Proofreading
B) Polymerizing
C) Semiconservative
D) Redundant
E) Duplication

34) In a DNA molecule, base pairing occurs between:
A) Adenine and thymine
B) Adenine and guanine
C) Guanine and uracil
D) Thymine and cytosine
E) Adenine and uracil

35) During which phase of the eukaryotic cell cycle does DNA and chromosome replication occur?
A) The S phase of interphase
B) The $G_1$ phase of interphase
C) The mitotic phase
D) Cytokinesis
E) The G2 phase of interphase

36) When a cell divides via mitosis:
A) Each daughter cell receives a nearly perfect copy of the parent cell's genetic information
B) Each daughter cell receives exactly half the genetic information in the parent cell
C) Each daughter cell receives the same amount of genetic information that was in the parent cell, but it has been significantly altered
D) The genetic information is randomly parceled out to the daughter cells
E) Each daughter cell contains unique genetic information

37) Meiotic cell division occurs in the ____, and results in the production of ____
A) Body cells; daughter cells
B) Body cells; parent cells
C) Germ-line; gametes
D) Testes and ovaries; diploid cells
E) Somatic cells; haploid cells

38) In the comparison of a DNA molecule to a twisted ladder, the upright sides of the ladder are:
A) Nitrogenous bases linked together.
B) Deoxyribose linked to phosphate.
C) Deoxyribose linked to sulfate.
D) Nitrogenous bases linked to phosphate.
E) Hydrogen bonds between bases.

39) A “mini-gene” has the base sequence TACCCGTGCACG. Which of the following sequences represents a single base substitution?
A) TACCCGTGCACG
B) TACCCGAGCACG
C) TACCCGGCACG
D) TACCCGTGTCACG
E) TACCGTGCTACG

40) All of the following statements about genotypes and phenotypes are true EXCEPT:
A) Individuals with the same phenotype might have different genotypes.
B) Matings between individuals with dominant phenotypes cannot produce offspring with recessive phenotypes.
C) Matings between individuals with recessive phenotypes usually do not produce offspring with dominant phenotypes.
D) Individuals with the same genotype might have different phenotypes
E) None of the above statements are true

41) Which of the following is NOT true about mutations?
A) Damage to DNA can result after exposure to some environmental factors
B) Mutations can often be repaired by enzymes
C) Variations in DNA and mutations are important for evolution to occur
D) All mutations are harmful for the organism
E) Ultraviolet light can cause mutations

42) Choose the correct pathway of information flow in the cell.
A) RNA → DNA → protein
B) DNA → RNA → protein
C) ER → DNA → RNA → protein
D) ER → DNA → Golgi → protein
E) Ribosomal RNA → DNA → protein

43) Which of the classes of RNA molecules is part of the process of transcription?
A) Ribosomal RNA
B) Transfer RNA
C) Messenger RNA
D) Primary RNA
E) Secondary RNA

44) Which of the classes of RNA molecules is/are part of the process of translation?
A) Ribosomal RNA
B) Transfer RNA
C) Messenger RNA
D) A and C
E) A, B and C

45) All of the following are directly involved in translation EXCEPT:
A) Ribosomes
B) tRNA
C) Amino acids
D) DNA
E) mRNA

46) Darwin realized that most species produce many more offspring than is necessary to maintain a constant population yet the size of the population normally doesn't change much. These "extra" individuals that are born:
A) Migrate to another location
B) Die before they can reproduce
C) Evolve to become new species
D) Mutate and are able to adapt to new environments
E) Mate with other species

47) A broad definition of a fossil is:
A) Any preserved trace or remnant of an organism from the past, usually at least 10,000 years old
B) The preserved pieces of hard parts of an organism, such as shell or bone
C) The preserved bones of vertebrates
D) A piece of an organism that has turned into a rock
E) The process of preservation of intact animal bodies

48) The human appendix is an example of a(n):
A) Analogous structure
B) Homologous structure
C) Vestigial structure
D) Adaptation
E) Mutation

49) Of all the possible amino acids, all living organisms make use of only the same 20 amino acids. This supports the idea that:
A) Only a limited number of DNA mutations are possible
B) Bacteria, animals, and plants developed independently
C) Each species uses a unique set of amino acids
D) Plants and animals have a completely different ancestry
E) All living things are derived from a common ancestor

50) Which is NOT an example of evolution?
A) Development of antibiotic-resistant bacteria.
B) Flightless birds on islands without predators.
C) This year's flu is different from last year's flu.
D) A dog learns how to open the cabinet where its food is kept
E) Most commercial pesticides are effective for 2-3 years.

KEY for Review 3

1. B
2. B
3. E
4. E
5. A
6. B
7. C
8. B
9. D
10. A
11. A
12. D
13. B
14. D
15. D
16. D
17. B
18. D
19. E
20. A
21. D
22. B
23. B
24. E
25. A
26. A
27. B
28. A
29. B
30. C
31. D
32. E
33. C
34. A
35. A
36. A
37. C
38. B
39. B
40. B
41. D
42. B
43. C
44. E
45. D
46. B
47. A
48. C
49. E
50. D