New Jersey Science League
Biology 1 **Blue Exam**
January 12, 2017 **Corrections:**

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer, be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scan-tron.

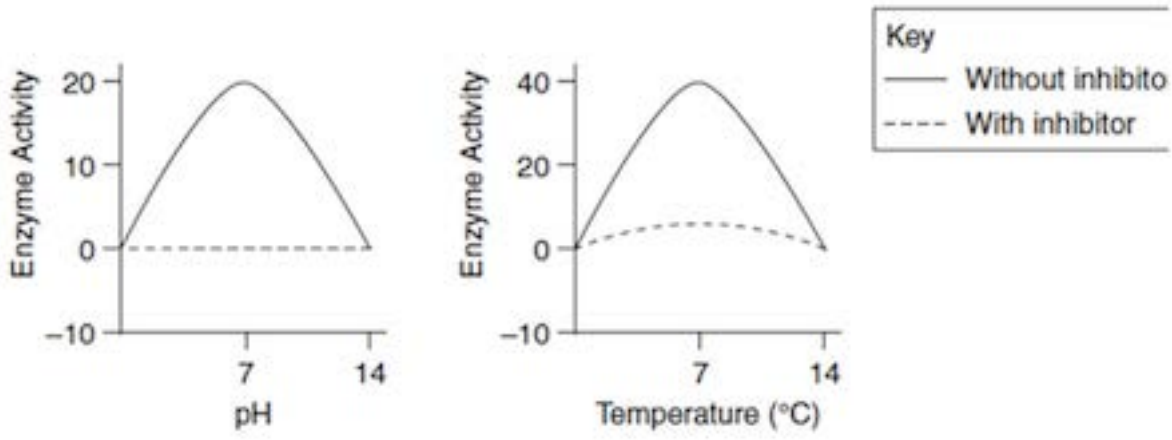
1. A student cut a 2 cm^3 block out of a potato and massed the block. The student then placed the block in distilled water and waited one hour. When the student re-massed the block, which of the following could be expected?
   A. The mass would increase due to plasmolysis.
   B. The mass would increase because the potato is hypertonic to the water.
   C. The mass would decrease because the potato will lose its water.
   D. The mass would remain the same because there are no living components in this system.

2. Which of the following statements about mitochondria is (are) true? A,C and E.
   A. Mitochondria exist in all eukaryotes.
   B. Mitochondria exist in bacteria and plants.
   C. Mitochondria exist in plants, animals, and fungi.
   D. Both (B) and (C) are true.
   E. Both (A) and (C) are true.

3. The flowing cytoplasm of an active amoeba is
   A. propelled by microfilaments for lipid synthesis.
   B. an adaptation for extracellular digestion
   C. required for nerve transmission
   D. dependent on microfilaments for intracellular circulation

4. The nucleus of a nitrogen atom contains 7 neutrons and 7 protons. Which of the following is a correct statement concerning nitrogen?
   A. The nitrogen atom has a mass number of approximately 7 and an atomic number of 14.
   B. The nitrogen atom has a mass number of approximately 14 and an atomic number of 7.
   C. The nitrogen atom has a mass number of approximately 14 and an atomic number of 14.
   D. The nitrogen atom has a mass number of approximately 7 and an atomic number of 21.

Experiments were carried out to show the effects of pH and temperature on enzyme activity. The experiments also tested the effects of a chemical called an inhibitor. The results are shown in the graphs below.



5. The best conclusion that can be drawn from these results is that the inhibitor affects
   A. pH
   B. temperature
   C. enzyme activity
   D. enzyme concentration

6. One of the buffers that contribute to pH stability in human blood is carbonic acid (H_2CO_3). Carbonic acid is a weak acid that, when placed in an aqueous solution, dissociates into a bicarbonate ion (HCO_3^-) and a hydrogen ion (H^+). Thus,

$$H_2CO_3 \leftrightarrow HCO_3^- + H^+$$

If the pH of the blood increases, one would expect

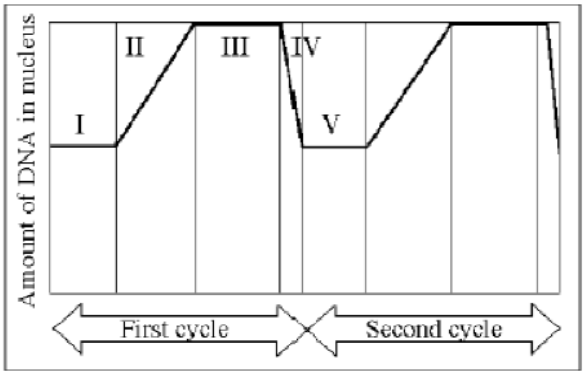
A. a decrease in the concentration of H_2CO_3 and an increase in the concentration of HCO_3^-.
B. an increase in the concentration of H_2CO_3 and a decrease in the concentration of HCO_3^-.
C. a decrease in the concentration of HCO_3^- and an increase in the concentration of H^+.
D. an increase in the concentration of HCO_3^- and a decrease in the concentration of OH^-.

7. What is the most likely pathway taken by a newly synthesized protein that will be secreted by a cell?

A. ER → Golgi → nucleus
B. Golgi → ER →lysosome
C. nucleus → ER →Golgi
D. ER → Golgi → vesicles that fuse with plasma membrane

8. In the figure below mitosis is represented by which numbered part of the cycle?

A. I
B. II
C. III
D. IV



9. Substances transported by facilitated diffusion

A. are limited to solvents
B. may flow from a region of higher concentration by the expenditure of energy
C. must have movements coupled to those of other substances
D. move passively through specific channels from an area of greater concentration to one of lower concentration

10. Glycolysis and oxidative respiration are different in that

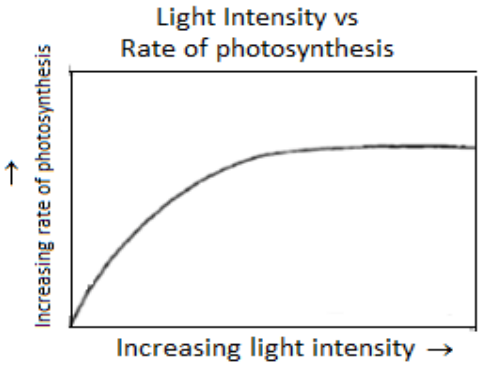
A. glycolysis occurs on the cell membrane, while aerobic respiration occurs in mitochondria.
B. glycolysis occurs only in photosynthesis, while aerobic respiration is part of cellular respiration.
C. glycolysis occurs in the absence of oxygen, while aerobic respiration requires oxygen.
D. Both of these terms are different names for the same process.

11. Cyanobacteria are photosynthetic prokaryotes. Which organelles do cyanobacteria cells contain?

I. Chloroplasts **II. Nucleus** **III. Ribosomes**

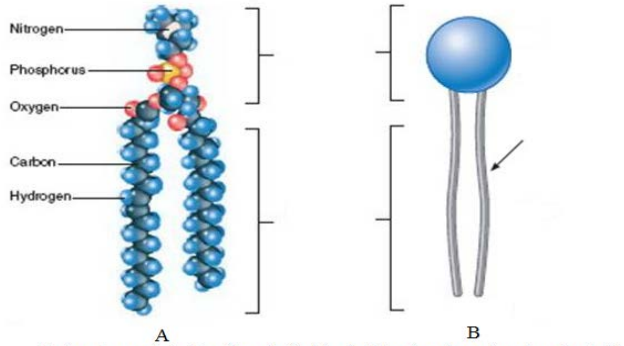
A. I only
B. II only
C. III only
D. I and III only

12. Refer to the illustration below. The graph demonstrates that the rate of photosynthesis
A. decreases in response to increasing light intensity.
B. increases indefinitely in response to increasing light intensity.
C. increases in response to increasing light intensity, but only to a certain point.
D. is unaffected by changes in light intensity.



13. Which of these BEST describes the part of the molecule shown?

A. It is hydrophilic.
B. It forms the outer layer of the plasma membrane.
C. It is composed of phosphate atoms.
D. It contains nonpolar covalent bonds.



Molecular model of a phospholipid Artists drawing of a phospholipid

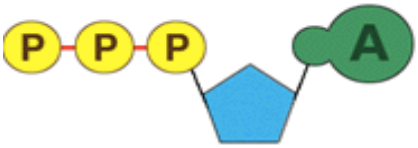
14. What is the correct sequence of these events in the cell cycle?

I. Nuclear membrane dissolves. II. Cell size increases. III. Two daughter cells form. IV. DNA replicates.

A. I, IV, II, III
B. I, IV, III, II
C. II, I, IV, III
D. II, IV, I, III

15. A cell contains multiple nuclei with identical genetic information. This cell most likely formed by going through
A. multiple rounds of mitosis, but no cytokinesis
B. multiple rounds of the M phase, but no rounds of the S phase
C. multiple rounds of cytokinesis, but no rounds of mitosis
D. multiple rounds of the cell cycle, but no rounds of mitosis

16. The adjacent molecule is found in
A. animal cells only
B. plant cells only
C. bacteria, fungi, plant, and animal cells
D. viruses



17. A metabolic disorder involving a missing or inactive enzyme would be found in the _____ which are produced by the _____. All full credit. No answer is correct.
A. Golgi apparatus, endoplasmic reticulum
B. ribosomes, nucleolus
C. rough endoplasmic reticulum, nuclear envelope
D. mitochondria, plasma membrane

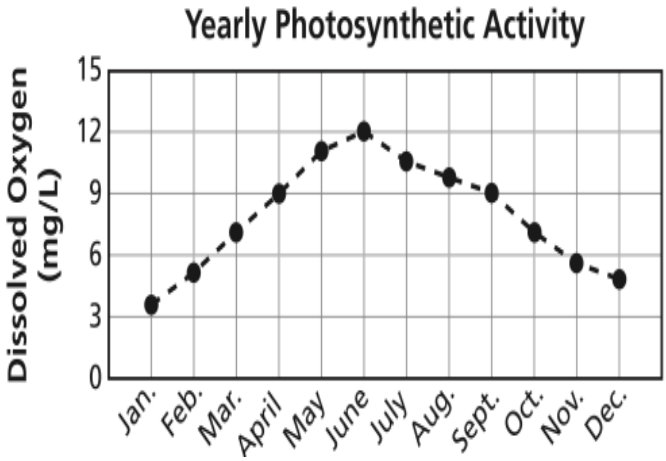
18. Where in a plant cell does the reaction below take place?

$6CO_2(gas) + 6\ H_20(liq) + sunlight \rightarrow C_6H_{12}O_6 + 6\ O_2(gas)$

A. mitochondria
B. lysosome
C. chloroplast
D. nucleus

19. An ecologist performed a study to determine how the rate of photosynthetic activity in a lake is changed from month to month. The results of the study are depicted in the graph below. What 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 a die-off during the months of January through June.



20. Which describes how enzymes function in the body?
A. Enzymes are converted into products by the reactions they catalyze.
B. Enzymes lower the activation energy of reactions.
C. One enzyme can catalyze many different reactions.
D. An enzyme is used once and then destroyed.

21. An ion must cross the cell membrane through active transport instead of passive transport when the ion is
A. negatively charges
B. carried by a protein
C. going against the concentration gradient
D. too small to move independently

A student tests an unknown colorless solution for the presence of sugars, starches, lipids and proteins. The results are shown in the table below.

Unknown Solution Results

Testing Indicator	Observation
Iodine	Unknown solution turned from colorless to brownish-orange
Benedict's Solution	Unknown solution turned from colorless to orange
Biuret Solution	Unknown solution turned from colorless to purple
Brown Paper Bag	No mark left; unknown solution dried completely

22. Based on the information in the data table above, which molecules are present in the unknown solution? Students need the control. All full credit
A. starches and lipids
B. proteins and starches
C. sugars and proteins
D. lipids and proteins

23. How does the amount of energy resulting from fermentation compare with that of aerobic respiration? Correct answer is B
A. Aerobic respiration results in less energy
B. Aerobic respiration results in more energy
C. Each process results in equal amounts of energy
D. Each process results in variable amounts of energy

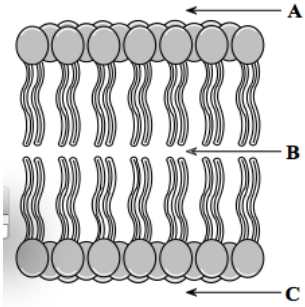
24. What is the result when a single cell reproduces by mitosis? All full credit. Typo in letter B.
A. two cells with half the genetic material of the parent cell
B. Two cells with genetic cells identical to the parent cell
C. Four cells with half the genetic information of the parent cell
D. Four cells with genetic material identical to the parent cell

25. The adjacent cell represents a cell in mitosis. What is the diploid(2n) number for this cell?

A. 2 C. 8
B. 4 D. 12

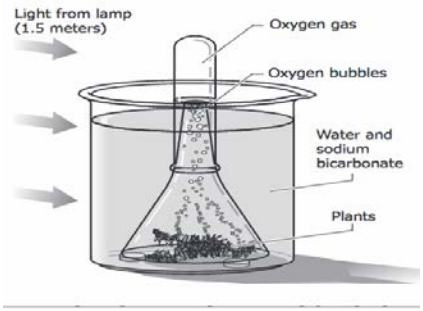
26. Which characteristic is present in offspring produced by sexual reproduction but missing in offspring produced by asexual reproduction? Off topic, this is on meosis.
A. an identical copy of parent chromosomes
B. twice the number of parent chromosomes
C. only half the number of parent chromosomes
D. an independent assortment of parent chromosomes

27. As illustrated below, the molecules of many membranes are arranged with their polar heads to the outside and their nonpolar tails to the inside. With this arrangement, where would you **MOST** likely find water molecules?



A. A only
B. B only
C. C only
D. A and C

28. The picture below shows a student's experiment with *Elodea*, a common aquatic plant. Which change in this experiment is ***most*** likely to increase the volume of oxygen gas that accumulates in the top of the tube?
A. Use fewer plants
B. Replace the beaker with a larger container
C. Move the light source closer to the beaker
D. Reduce the amount of water

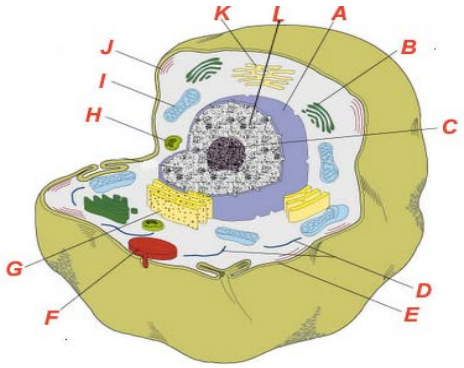


29. Some fish travel from saltwater to fresh water or from freshwater to salt water but still maintain the concentration of salt in their cells. This is an example of
A. mutation
B. positive feedback
C. homeostasis
D. cellular injury

30. Viruses are made up of either DNA or RNA surrounded by a coating of protein. When the two main substances that make up a virus are broken down into smaller molecules, these molecules are
A. fatty acids and amino acids
B. amino acids and sugars
C. amino acids and nucleotides
D. fatty acids and glycerol

31. Many invertebrates have body surfaces that are permeable to water but not to salt. Osmosis can change the pressure of their body fluids. The ocean is very stable in its salt content. What would happen to a jellyfish, if it were placed in a very low salt environment such as an estuary?
A. It would gain water from the environment
B. It would gain nutrients from the water in the environment
C. It would lose proteins into the water
D. It would lose salt into the water

32. Use the adjacent cell diagram for questions 32 and 33. The structure that immediately identifies this as a eukaryotic cell is labeled All full credit. Cannot read the diagram.



A. Structure C
B. Structure G
C. Structure D
D. Structure E

33. Tiny hummingbirds make a 2000 mile flight in their migration pattern. The muscle cells in their wings must contain many of which structure in the diagram? All full credit. Cannot read the diagram.

A. Structure A
B. Structure B
C. Structure H
D. Structure I

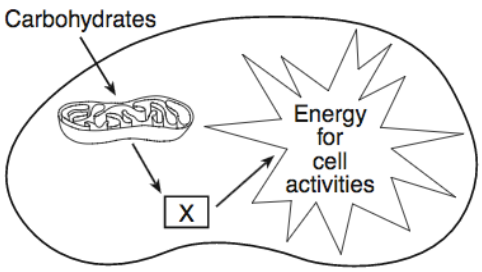
34. An experiment was carried out to answer the question "Does the pH of water affect the growth of radish plants? Two groups of ten radish plants were set up. One group was watered with water having a pH of 3.0, and the other group was watered with water having a pH of 7.0. Both groups of plants received the same amount and intensity of light, the same amount of water, and they were grown in the same type of soil. The heights of the radish plants were measured every 2 days for a period of 2 weeks.
What was the **dependent variable** in this experiment?
A. height of the plants
B. pH of the water
C. temperature of the water
D. type of soil

35. The sequence below represents an incomplete sequence of levels of organization.

Organelles→tissues→organs→organ systems→organism

This sequence can be completed correctly by inserting
A. "cells" between organelles and tissues
B. "proteins" between tissues and organs
C. "populations" between organs and organ systems
D. molecules" between organ systems and organisms

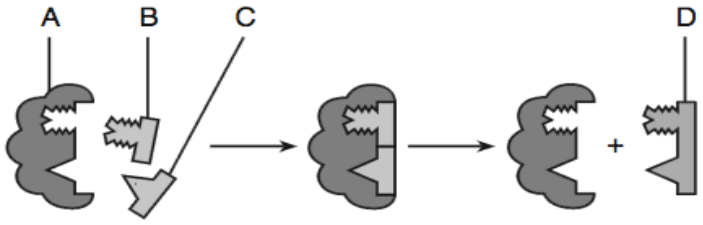
36. The diagram below represents a series of events that occur in living cells Which molecule is indicated by the letter "X"?



A. glucose
B. ATP
C. Carbon dioxide
D. Protein

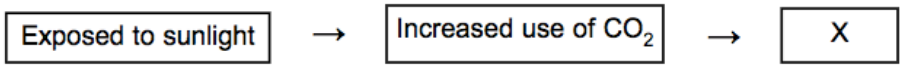
37. The diagram below represents a model of a biological process that occurs in humans at normal body temperature (36.5 to 37.5 ^{o}C)

Increasing the temperature to 40^{0} C would interfere most directly with the rate of function of structure
A. A
B. B
C. C
D. D



38. Which set of functions is directly controlled by the cell membrane?
A. protein synthesis, respiration, digestion of food molecules
B. active transport, recognition of chemical messages, protection
C. enzyme production, elimination of large molecules, duplication of DNA
D. release of ATP molecules, regulation of cell reproduction, food reproduction

39. Which phrase, when placed in BOX with the X, would correctly complete the flow chart below?



A. increased use of starch in root cells
B. increased concentration of glucose in leaf cells
C. decreased ATP in root cells
D. decreased concentration of oxygen in leaf cells

40. Which of the following is a means by which heterotrophs can obtain energy? C and D are correct.
A. using water, carbon dioxide, and energy from the sun to produce sugars
B. using water and carbon dioxide to produce energy-rich compounds
C. consuming autotrophs
D. consuming simple compounds from the environment and using them to assemble complex chemicals and structures needed by the organism

41. When muscle cells are exercised extensively in the absence of sufficient oxygen,
A. a large amount of ATP is formed
B. NADH molecules split
C. lactic acid is produced
D. oxidative phosphorylation ceases

42. While energy absorbed by one type of chlorophyll molecule is used to form molecules of ATP, electrons from a second type of chlorophyll are used
A. to migrate to another proton pump
B. in forming molecules of NADPH
C. in a second thylakoid
D. as a fuel for forming another chlorophyll molecule

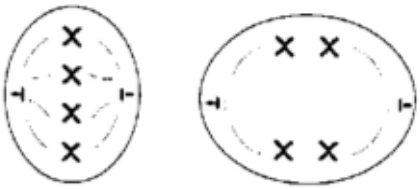
43. Chromatids are
A. dark patches within the nucleus
B. bacterial chromosomes
C. joined strand of duplicated genetic material
D. prokaryotic nuclei

44. Which of the following is the best explanation for the presence of both chloroplasts and mitochondria in plant cells
A. In light, plants are photosynthetic autotrophs. In the dark, they are heterotrophs
B. If plants cannot produce enough ATP in the process of photosynthesis to meet their energy needs, they can produce it in aerobic respiration
C. Sugars are produced in chloroplasts. These sugars can be stored in the plant for later use, converted to other chemicals, or broken down in aerobic respiration to yield ATP for the plant to use to meet its energy needs.
D. The leaves and sometimes the stems of plants contain chloroplasts which produce ATP to meet the energy needs of these plant parts. The root contain mitochondria which produce ATP to meet the energy needs of these plant parts.

Diagrams A and B show cells from an organism with a diploid chromosome number of 4.

45. In the adjacent diagram , which of the cells will be a diploid cell at the completion of division? Off topic, Meosis.

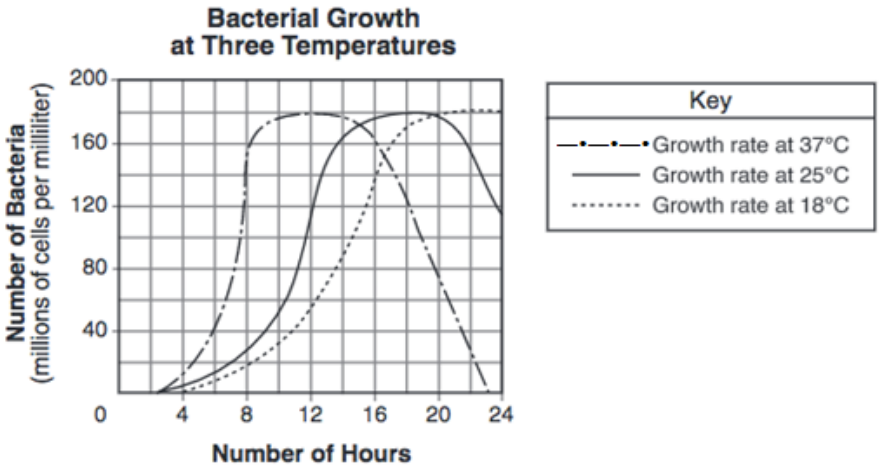
A. "A"
B. "B"
C. both of them
D. neither will form a diploid cell



A B

46. In plant cells, cytokinesis occurs when
A. the chromosomes make exact copies of themselves
B. spindle fibers are formed
C. a new cell wall forms
D. Osmotic pressure is too low

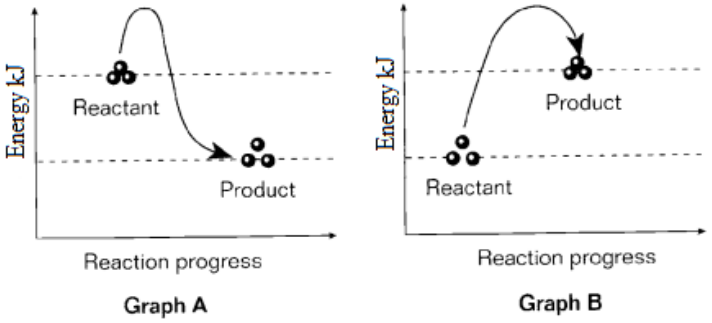
47. Which statement concerning the rate of cell division in the bacterial culture is correct? A is correct, not B.



A. Cell division is most rapid at 37^0C between 6 and 8 hours after it began.
B. Cell division is most rapid at 25^0 C between 20 and 24 hours after it began.
C. Cell division is most rapid at 18^0 C between 4 and 8 hours after it began
D. Cell division occurs at the same rate no matter what the temperature.

48. Use the graph below for questions 48 and 49.

Which graph illustrates what happens during an exothermic reaction?
A. Graph "A"
B. Graph "B"
C. Both graphs, since each graph shows a different stage of an exothermic reaction
D. Neither graph shows an exothermic reaction



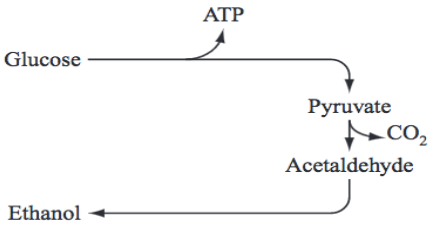
49. Which graph above would be used to illustrate the balance chemical reaction below?

$6CO_2(gas) + 6\ H_20(liq) + sunlight \rightarrow C_6H_{12}O_6 + 6\ O_2(gas)$

A Graph "A"
B. Graph "B"
C. Neither of these graphs.
D. Not enough information is given

50. The chemical reaction in #49 makes glucose, $C_6H_{12}O_6$. What is the source of the vast majority of water, H_2O for this reaction come?

A. the ground around the plant.
B. the air around the plant
C. nearby lakes and rivers
D. none of these choices.



51. The adjacent reaction occurs in what type of cells?

A. viruses
B. yeast cells
C. animal cells
D. plant cells

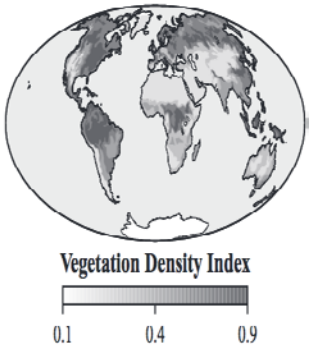
52. Some diseases decrease the activity of certain enzymes in the mitochondria of cells. Which of the following is the **most direct** result of this decrease in enzyme activity?

A. The cells are not able to divide by mitosis
B. The cells are not able to move water by diffusion.
C. The cells produce less ATP by cellular respiration
D. The cells produce fewer sugars by photosynthesis

53. Skin cells and liver cells contain different sets of enzymes. Which of the following conclusions can be made based on this information?

A. Skin cells and liver cells have different numbers of mitochondria
B. Skin cells and liver cells can perform different chemical reactions.
C. skin cells and liver cells have different cell membrane compositions.
D. Skin cells and liver cells can contain different numbers of chromosome

Scientists can use satellite data such as the one below to produce an image showing the density of plants across the different land masses on Earth. Scientists use this information to determine how plant density changes during a year. The satellite data is also used to predict the carbon dioxide levels in the atmosphere at different locations and at different times of the year.

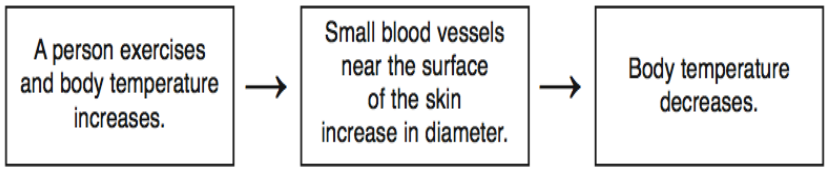


54. Which of the following best explains why scientists can predict carbon dioxide concentrations from plant density data?

A. Plants add Carbon dioxide to the air during germination.
B. Plants add carbon dioxide to the atmosphere during transpiration
C. Plants remove carbon dioxide from the air during photosynthesis
D. Plants remove carbon dioxide from the atmosphere during cellular respiration.

55. The diagram below represents an activity that occurs in the human body. This diagram best illustrates:

A. active transport
B. maintenance of homeostasis
C. synthesis of nutrients
D. differentiation



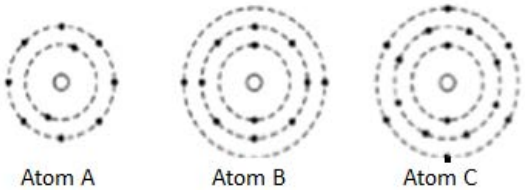
56. If the ribosomes of a cell were destroyed, what effect would this most likely have on the cell?

A. It would stimulate cell division.
B. Development of abnormal heredity features would occur in the cell
C. Increased protein absorption would occur through the cell membrane
D. The cells would be unable to synthesize proteins

57. The maintenance of homeostasis in the body is most directly related to
A. cellular communication
B. cycling of energy
C. aging of organisms
D. recombination of chromosomes

58. The diagram below contains three neutral atoms. The first is a stable rare gas. Atom B is a metal which reacts with non-metals, while C is a non-metal found in the periodic table just under oxygen. Atom "B" interacts with atom "C" to form an ionic bond. In terms of electrons gained or lost, what happens to the electrons of atom B?

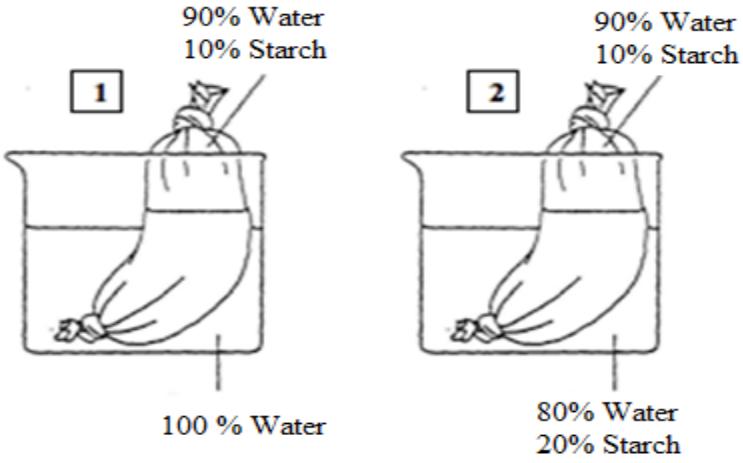
A. gain 6 electrons
B. lose 10 electrons
C. lose 2 electrons
D. gain 2 electrons



Abreviated Periodic Table

1 1A							18 8A
1 H 1.008	2 2A	13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.003
3 Li 6.941	4 Be 9.012	5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95

Study the diagrams below noting the concentration of various substances in the beakers and in the cellulose bags. Water can pass through the cellulose, but starch cannot pass through.



59. What will eventually happen to the concentrations in beaker 2?
A. The water will remain the same but the starch concentration will increase in the bag.
B. The starch concentration will remain the same, but water will increase in the bag.
C. The starch concentration will remain the same but the water will decrease in the bag
D. The water will remain the same as at the start.

60. The final hydrogen acceptor in aerobic respiration is
A. ATP
B. NAD
C. Oxygen
D. Carbon dioxide

New Jersey Science League

Biology I Answer Key Blue Test

Date: January 12, 2017

Record onto the area record the # correct Corrections:

1	B	16	C	31	~~D~~ (A)	46	C
2	E A, C	17	~~C~~ All full credit	32	A(all full credit)	47	~~B~~(A)
3	D	18	C	33	D (All full credit)	48	A
4	B	19	C	34	A	49	B
5	C	20	B	35	A	50	A
6	B	21	C	36	B	51	B
7	D	22	~~C~~(all full credit)	37	A	52	C
8	C	23	~~A~~ (B)	38	B	53	B
9	D	24	B (all full credit)	39	B	54	C
10	C	25	B	40	C & D	55	B
11	C	26	D(all full credit)	41	C	56	D
12	C	27	D	42	B	57	A
13	D	28	C	43	C	58	C
14	D	29	C	44	C	59	C
15	A	30	C	45	A(all full credit)	60	C

BIOLOGY I: **No AP or second year students in this category**. 60 multiple choice questions per exam.

JANUARY EXAM - Carbon Compounds and basic chemistry including the chemistry of water and pH, Chemical Reactions, Enzymes, Cell structure and function, Levels of Cellular Organization, organelles, Prokaryotic and Eukaryotic, Cellular and Intracellular transport, Homeostasis, Cellular Energy Flow, Photosynthesis and Respiration, Cellular Division- Mitosis, Cell Regulation.

FEBRUARY EXAM - Structure and function of nucleic acids; roles of DNA, protein synthesis, Meiosis, chromosomal analysis (pedigree, karyotyping), Mendelian genetics, one and two factor crosses, mutations, Genetic engineering, Gene regulation and expression, Mutation and causes, human genetic diseases including chromosomal analysis, beyond Mendel, Variation of Traits, Plus review of the Jan exam or topics

MARCH EXAM - Evidence for evolution: historical thought/experimental theories of evolution…..Biogenesis/Abiogenesis, Coacervate formation, Miller/Urey experiment. Molecular evidence (nucleotide sequence analysis, amino acid sequence analysis), Comparative anatomy and comparative embryology, Fossil record; Hardy Weinberg; Taxonomy: Cladograms and Phylogenetic Trees, Natural Selection, Genetic change in a population, Patterns and causes of Evolution, Carrying capacity of a population, Exponential Growth, Evidence of diversity, Adaptation of organism to the environment. Plus review of the Jan and Feb exams or topics.

APRIL EXAM - Interactions of autotrophs and heterotrophs; Flow of energy through an ecosystem; Limiting factors in Biomes; Cycles of Matter; Symbiosis; Ecosystem models of energy flow; Ecological experimentation and analysis; Factors affecting biodiversity in a population; Human Influence on ecosystems. Plus review of Jan, Feb, and March exams or topics.

Dates for 2017 Season

Thursday January 12, 2017 Thursday February 9, 2017

Thursday March 9, 2017 Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

New Jersey Science League

PO Box 65 Stewartsville, NJ 08886-0065

phone # 908-213-8923 fax # 908-213-9391 email: newjsl@ptd.net

Web address: http://entnet.com/~personal/njscil/html/

What is to be mailed back to our office?

PLEASE RETURN THE AREA RECORD AND ALL TEAM MEMBER SCANTRONS (ALL STUDENTS PLACING 1ST, 2ND, 3RD, AND 4TH).

If you return scantrons of alternates, then label them as ALTERNATES.

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Thursday March 8, 2018 Thursday April 12, 2018

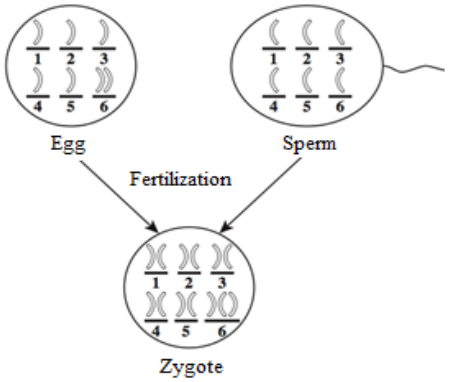
New Jersey Science League
Biology 1
February 9, 2017 **BLUE TEST** **Corrections:**

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer, be sure to completely erase your first choice. Please PRINT your name, school area, and which test you are taking on the scan-tron. The last 5 questions are a review of questions or topics from the Jan 2017 exam.

1. Which statement describes the overall process of meiosis?
   A. A haploid cell produces 2 haploid cells
   B. A diploid cell produces 2 diploid cells.
   C. A haploid cell produces 4 diploid cells.
   D. A diploid cell produces 4 haploid cells

2. The common housefly contains 12 chromosomes. An egg cell, a sperm cell, and the resulting zygote from a cross between two houseflies are shown in the diagram below.

The chromosomal mutation in the zygote can be traced to which of the following?
   A. Chromosome 3 in the egg cell
   B. Chromosome 6 in the egg cell
   C. Chromosome 3 in the sperm cell
   D. Chromosome 6 in the sperm cell.



3. Which phase of meiosis is responsible for nondisjunction?
   A. Prophase 1 of Meiosis 11
   B. Metaphase 1 of Meiosis 11
   C. Anaphase 1 of Meiosis 11
   D. Telophase 1 of Meiosis 11

4. Which step in meiosis increases genetic variation in multicellular organisms?
   A. Formation of tetrads
   B. Crossing over of non-sister chromatids
   C. Disappearance of the nuclear membrane
   D. Moving of centrioles to the opposite ends of the poles.

5. Which statement **best** describes the relationship that exists among proteins, DNA, and cells?
   A. Proteins combine to produce cells, which produce DNA.
   B. Proteins are made up of DNA, which determines where in the cells proteins are produced.
   C. DNA is made is made up of proteins which tell a cell how to function.
   D. Cells contain DNA, which controls the production of proteins.

6. All of the following are true about the structure of DNA ***except***
   A. DNA is one long continuous strand that breaks up into chromosomes when it condenses
   B. every DNA nucleotide contains a sugar, a phosphate group, and a base.
   C. DNA consists of two strands of nucleotides joined by hydrogen bonds
   D. the long strands of DNA are twisted into a double helix

7. Which diagram below correctly models the process of protein synthesis?

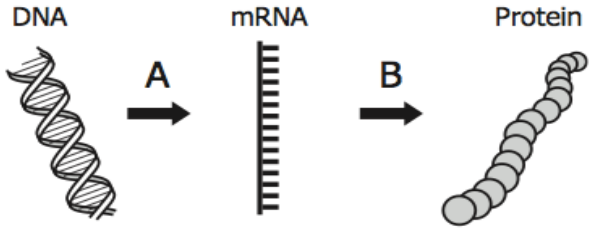
A. DNA —Replication→ RNA —Transcription→ Protein

C. DNA —Translation→ RNA —Transcription→ Protein

B. DNA —Transcription→ RNA —Translation→ Protein

D. DNA —Transcription→ RNA —Replication→ Protein

8. Use the diagram below for questions #8 and 9. In eukaryotic cells, the process indicated by Letter A occurs in the
   A. cytoplasm
   B. ribosome
   C. nucleus
   D. cell membrane



9. In eukaryotic cells, the process indicated by letter B occurs in the
A and B are correct. Key has B.
   A. cytoplasm
   B. ribosome
   C. nucleus
   D. cell membrane

10. Use the diagram below for questions #10, 11, 12. A strand of mRNA containing the repeating sequence of AAGAAGAAGAAG could code for which of the following amino acid sequences?
   A. lys-arg-glu-lys
   B. ser-ser-glu-glu
   C. phe–phe-phe-phe
   D. lys-lys-lys-lys

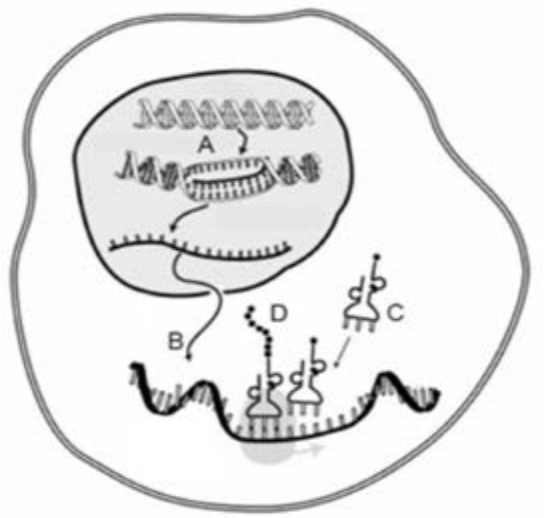
11. The sequence of the DNA that was used as the coding strand to form the RNA sequence above would be:
   A. UUC UUC UUC UUC
   B. TTC TTC TTC TTC
   C. CCG CCG CCG CCG
   D. AAG AAG AAG AAG

12. The tRNA anticodons sequence for the mRNA strand in question 10 would be:
   A. UUC UUC UUC UUC
   B. TTC TTC TTC TTC
   C. CCG CCG CCG CCG
   D. AAG AAG AAG AAA

Codons Found in Messenger RNA

First Base	Second Base U	Second Base C	Second Base A	Second Base G	Third Base
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

Use the diagram below to answer questions 13, 14, 15, and 16.



13. The process that is occurring at "Letter A" is:
    A. replication
    B. transcription
    C. translation
    D. duplication

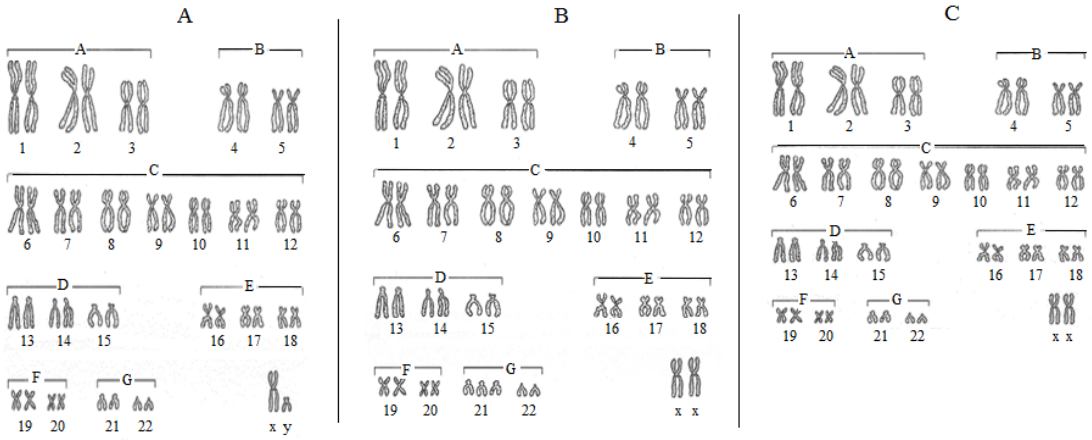
14. Arrow labeled B is pointing to which molecule below?
    A. DNA
    B. rRNA
    C. tRNA
    D. mRNA

15. Letter C represents which molecule below?
    A. DNA
    B. rRNA
    C. tRNA
    D. mRNA

16. The substance that is forming at "Letter D" is"
    A. a polypeptide
    B. a ribosome
    C. a copy of DNA
    D. mRNA

17. Which of the following **best** describes how DNA and RNA are similar?
    A. They both contain the nitrogen bases thymine and adenine
    B. They both have a double helix structure
    C. They are both composed of five different nucleotides
    D. They both contain the nitrogen bases cytosine and guanine.

Use the diagram below for questions # 18, 19, 20, and 21.



18. What do diagrams A, B, and C represent?
    A. karyotypes
    B. DNA replication
    C. half the chromosomes of an individual
    D. DNA fragments

19. Which diagram (s) would represent a female?
    A. diagram A only
    B. diagram B only
    C. diagrams A and C
    D. diagrams B and C

20. Which diagram(s) represent a chromosomal disorder?
    A. A
    B. B
    C. C
    D. Diagrams B and C

21. Which choice below is the correct way to write the chromosomal array for Diagram C? A is correct, not B
    A. 46, XX
    B. 47, XX, +21
    C. 46, XY
    D. 47, XY, +21

22. Which of the following statements **is true** about Mendel?
    A. His discoveries concerning genetic inheritance were generally accepted by the scientific community when he published them.
    B. He believed that genetic traits of parents would usually blend in their children
    C. His ideas about genetics apply equally to plants and animals
    D. He knew about mutations.

23. Mendel believed that the characteristics of pea plant are determined by
    A. Inheritance of unit factors from both parents
    B. Inheritance of unit factors from one parent
    C. Relative health of the parent plants at the time of pollination
    D. The environment in which the plant lives

24. The idea that for any particular trait, the pair of alleles of each parent separate and only one allele from each parent passes to an offspring is Mendel's principle of:
    A. independent assortment
    B. dominance
    C. hybridization
    D. segregation

25. A gene exists in dogs, which affects the length of hair. The allele for short hair (S) is dominant to the allele for long hair (s). A cross of two shorthaired dogs produces six shorthaired and two longhaired offspring. Which of the following best explains how the longhair phenotype can appear in the offspring of two shorthaired parents?
    A. Only recessive alleles are inherited from homozygous parent.
    B. Dominant alleles grow weaker as they are passed from generation to generation.
    C. Only the parent with a dominant allele can pass that allele to offspring in sexual reproduction

D. A heterozygous parent has an equal chance of passing either the dominant or recessive allele to offspring.

26. In guinea pigs, rough coat (R) is dominant to smooth coat (r). What is the expected percentage of smooth-coated guinea pigs when a heterozygous rough-coated guinea pig is crossed with a smooth-coated guinea pig?

A. 0%
B. 25%
C. 50%
D. 75%

27. Fur color in cats is controlled by an autosomal gene that can occur in the dominant form (B) of the recessive form, (b). The length of the cat's fur is controlled by another autosomal gene that occurs in the dominant form, (S), or the recessive form. (s). The table below shows the traits for these allele codes.

Gene	Trait
B	black fur
b	white fur
S	short-haired fur
s	long-haired fur

The following genotypes were found in a male cat and a female cat.

BbSs (male) **bbSS(female)**

Which of the following is true of the phenotype of offspring from these parents?

A. *All* offspring will have black fur.
B. *All* offspring will have white fur
C. *All* offspring will have long-haired fur.
D. *All* offspring will have shorthaired fur.

28. The following genotypes were found in another set of cats and determined to be

BBSs (male) **Bbss(female)**

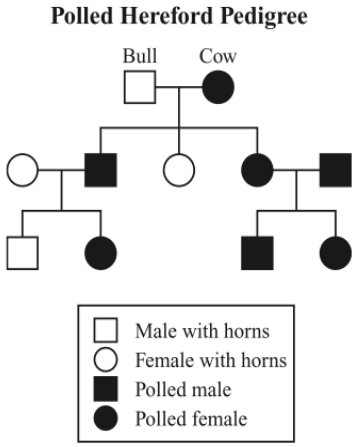
If these cats mated and produced a litter of eight kittens, how many would have black fur and long hair?

A. 100%
B. 75%
C. 50%
D. 25%

29. In cattle, the polled allele is dominant over the horned allele. Cattle with the polled allele do not have horns. The pedigree below shows the inheritance of the polled trait in Hereford cattle. The letter "N" designates cattle with no horns; the letter "n" designates cattle with horn

What are the genotypes of the generation I bull and cow?

A. The bull is nn and the cow is Nn.
B. The bull is nn and the cow is NN
C. The bull is Nn and the cow is Nn
D. The bull is NN and the cow is NN



30. The type of inheritance demonstrated by the above pedigree is:

A. autosomal recessive
B. autosomal dominant
C. sex-linked recessive
D. sex-linked dominant

31. In betta fish, alleles for color are incompletely dominant. Green fish have genotype **GG,** dark blue fish have genotype **BB**, and royal blue fish have genotype **GB.** Two royal blue betta fish are crossed. What percentage of the offspring would be expected to be green?

A. 0%
B. 25%
C. 50%
D. 75%

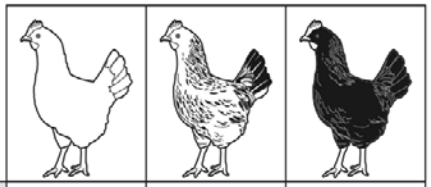
32. If two royal blue fish were crossed, the ratio of the genotype and phenotype would be:

A. 3:1
B. 1:2:1
C. 9:3:3:1
D. 4:0

33. The phenotypes and genotypes for feather color in a certain chicken species are shown below. What are the possible phenotypes of offspring produced when a rooster with black feathers is crossed with a hen that has speckled feathers?

A. only black
B. only speckled
C. black and speckled
D. black, white, and speckled

Feather Color
Phenotypes and Genotypes



Phenotype	White Feathers	Speckled Feathers	Black Feathers
Genotype	WW	BW	BB

34. When cows with black hair are crossed with bulls with white hair, the offspring are known as blue roans because of their dark gray color. A close examination of the blue roan's coat shows a mixture of white hair and black hairs. This is an example of

A. polygenic traits
B. incomplete dominance
C. dominance
D. codominance

35. Muscular dystrophy is an X-linked recessive disorder that occurs in approximately one in 3500 individuals. A woman who is a carrier of muscular dystrophy marries a man who does not have muscular dystrophy. Which of the following is an expected outcome regarding the inheritance of muscular dystrophy in their children?

A. Twenty-five present of the sons would be carriers.
B. One hundred percent of the daughters would be carriers.
C. Fifty percent of the sons would have muscular dystrophy.
D. Seventy-five percent of the daughters would have muscular dystrophy.

36. The gene for red/green colorblindness in humans is recessive and primarily affects males. It must be located on

A. the X chromosome only
B. the Y chromosome only
C. both the X and Y chromosomes
D. either the X or Y chromosome

37. A woman who has blood Type O marries and has a child who also has blood Type O. Her husband and the father of the child could be of what blood type(s)?

A. Type A or Type B
B. Type AB only
C. Only Type O
D. Type A, B, or O

38. The genotypes of a husband and wife are I^AI^B x I^Ai. How many different genotypes and phenotypes would be expected among the blood types of their children?

A. 4 genotypes; 3 phenotypes
B. 4 genotypes; 4 phenotypes
C. 3 genotypes; 3 phenotypes
D. 3 genotypes; 4 phenotypes

39. A genetic disorder due to a recessive allele (a) is lethal in homozygous individuals (aa). Heterozygous individuals (Aa) have no symptoms. Based on this information, which of the following is likely to result?

A. The disorder will quickly be eliminated since no recessive homozygotes will survive to reproduce.
B. The disorder will be maintained in the population through reproduction between heterozygotes.
C. Only homozygous dominant (AA) individuals will survive.
D. The prevalence of the disorder will increase over time.

40. The adjacent chart shows alleles that can be found at the same locus that affect rabbits' fur color. Each allele is dominant to the ones below it. Rabbits with an albino or Himalayan coat are more susceptible to predators. Which of the following genotypes will produce a rabbit that is LEAST likely to survive?

A. $c^{ch}c$
B. Cc
C. c^hc
D. C c^h

Rabbit coat color

Allele	Phenotype
C	Rabbit with fully colored coat
c^{ch}	Rabbit with light gray coat
c^h	Himalayan rabbit: white with dark ear tips, nose, paws, and tail
c	Albino rabbit

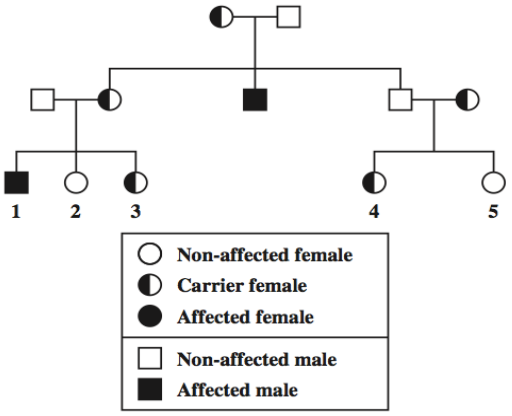
Order of dominance C → c^{ch} → c^h → c

41. The chart in # 40 is an example of

A. X-linked trait
B. single factor trait
C. dihybrid trait
D. multiple alleles

42. Use the pedigree below with questions # 42, 43, 44, and 45. This pedigree illustrates a human genetic disease. What is the most likely mode of inheritance of this disease?

A. autosomal dominant
B. autosomal recessive
C. X-linked dominant
D. X-linked recessive



43. Which statement describes the offspring that would result if Individual #1 has children with a. woman that does carry the allele for this disorder? No answer is correct all full credit. Key has D

A. None of the daughters will inherit the allele for the disorder
B. All of the sons will inherit the allele for the disorder.
C. All of the daughters will be affected by the disorder.
D. None of the sons will be affected b y the disorder.

44. If individual #4 marries a male who is normal, what is the probability that they could have a son with the disorder? A is correct not B.

A. 25%
B. 50%
C. 75%
D. 100%

45. If the above disease represents hemophilia type A, which of the following is directly related to the disorder?

A. a mutation in one gene
B. A chromosome that is duplicated
C. A gene that was incorrectly copied
D. A trait that was acquired from the environment

46. Which of these would most likely cause a mutation?

A. the placement of ribosomes on the endoplasmic reticulum
B. the insertion of a nucleotide into DNA'
C. the movement of transfer RNA out of the nucleus
D. the release of messenger RNA from DNA

47. Review the table below. What is most likely result of this mutation during the translation process?

The table shows a mutation in a DNA sequence.

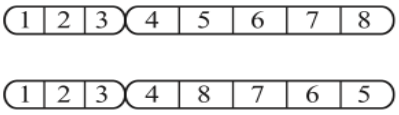
Original Sequence	GCA TAT GCT ATA GCG ACT
Mutated Sequence	GCA TTG CTA TAG CGA CT

A. The translation process will fail to begin
B. The mRNA will be translated at a faster rate than normal.
C. Everything after the mutation will be translated incorrectly.

D. Some of the proteins formed during translation will be unstable.

48. The diagram below shows a mutation that has occurred on chromosome 15. The top diagram is the original chromosome. The second diagram is the chromosome after the mutation has occurred. Which of the following is the type of chromosomal mutation that has occurred?

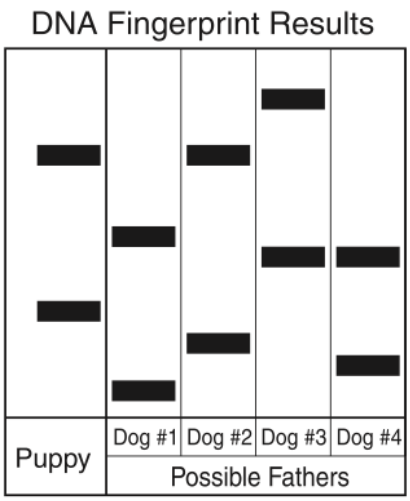
A. Deletion
B. Duplication
C. Inversion
D. Translocation



49. The DNA fingerprint results from four dogs and a puppy are shown below

If the puppy is to be registered, the father must be known. Which of the following dogs would be the father of the puppy?

A. Dog #1
B. Dog #2
C. Dog #3
D. Dog #4



50. Two processes that were used to generate the above diagram are

A. restriction enzymes and DNA sequencing
B. restriction enzymes and electrophoresis
C. restriction enzymes and DNA recombination
D. restriction enzymes and RNA processing

51. Gene expression is

A. the genotypes involved in a genetic cross
B. the processing of RNA
C. the process by which the DNA is converted into a functional product
D. the replication of DNA

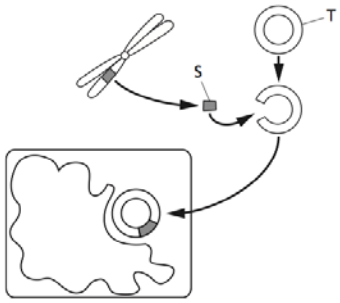
52. Which choice below correctly identifies the type of cells in which genes may be clustered into a linear arrangement all under control of the same regulatory sequence? As an example: an operon

A. prokaryotic cells
B. eukaryotic cells
C. both prokaryotic and eukaryotic cell
D. viruses

53. All of the following contribute to genetic variation **except**

A. crossing over
B. independent assortment
C. mutation
D. mitosis

The adjacent diagram shows the production of a substance, such as insulin, by genetic engineering.



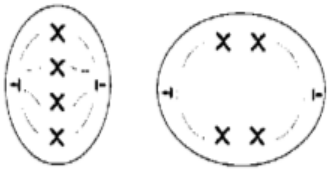
54. Which correctly identified the letters labeled 'S" and "T" in the diagram?

A. "S" is the gene; "T" is the plasmid
B "S" is the gene; "T" is the bacterium
C. "S" is the chromosome; "T" is the plasmid
D. "S" is the chromosome; "T" is the bacterium

55. Structure "S" in the above diagram was isolated using

A. DNA sequencing
B. isolation of mRNA
C. gel electrophoresis
D. restriction enzymes

56. Which of the cells in the diagram below will be a diploid cell at the completion of division? **Review question from the Jan 12, 2017 exam.**



A. "A"
B. "B"
C. both of them
D. neither will form a diploid cell

57. The cell below represents a cell in mitosis. What is the diploid (2n) number for this cell? **Review question from the Jan 12, 2017 exam**

A. 2
B. 4
C. 8
D. 12

58. What is the result when a single cell reproduces by mitosis? Review question from the Jan 12, 2017 exam

A. Two cells with half the genetic material of the parent cell
B. Two cells with genetic cells identical to the parent cell.
C. Four cells with half the genetic information of the parent cell
D. Four cells with genetic material identical to the parent cell

59. In which organelle does the following reaction take place? Review question from the Jan 12, 2017 exam

Energy + 6 CO_2 + 6 H_2O $\rightarrow$ $C_6H_{12}O_6$ + 6 O_2(gas)

A. mitochondria
B. lysosome
C. chloroplast
D. nucleus

60. Which of the following is a means by which heterotrophs can obtain energy? **Review question from the Jan 12, 2017 exam**

A. using water, carbon dioxide, and energy from the sun to produce sugars
B. using water and carbon dioxide to produce energy-rich compounds
C. consuming autotrophs
D. consuming simple compounds from the environment and using them to assemble complex chemicals and structures needed by the organism

New Jersey Science League

Biology I Answer Key Blue Test

Date: February 9, 2017

Record onto the area record the # correct Corrections:

1	D	16	A	31	B	46	B
2	B	17	D	32	B	47	C
3	C	18	A	33	C	48	C
4	B	19	D	34	D	49	B
5	D	20	B	35	C	50	B
6	A	21	~~B~~ (A)	36	A	51	C
7	B	22	C	37	D	52	A
8	C	23	A	38	A	53	D
9	B & A	24	D	39	B	54	A
10	D	25	D	40	C	55	D
11	B	26	C	41	D	56	A
12	A	27	D	42	D	57	B
13	B	28	C	43	D(all full credit)	58	B
14	D	29	A	44	~~B~~ (A)	59	C
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Biology 1
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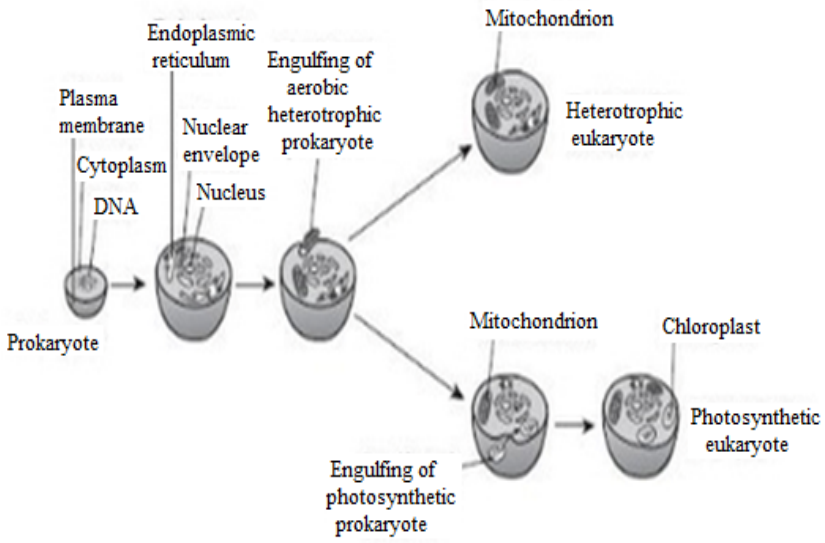
Choose the answer that best completes the questions or statements below and fill in the appropriate response on the form. If you change an answer, be sure to completely erase your first choice. Please PRINT you name, school, area, and which test you are taking on the scan-tron.

1. Which of the following is **not** found in a lipid coacervate droplet or a protenoid microsphere?
   A. the ability to grow and reproduce
   B. a nucleus
   C. a two layer boundary
   D. division by pinching in two

2. The early earth was a harsh environment and the only present day organisms that could possibly have survived that type of environment are
   A. eukaryotic organisms
   B. archaebacteria
   C. early plants called blue-green algae
   D. eubacteria

3. The diagram below represents the evolution of the first eukaryotic cell. The theory that proposes this is called:

A. the heterotroph hypothesis
B. the origin of life
C. the endosymbiotic theory
D. abiogenesis



4. After observing the diagram in #3, a conclusion that can be drawn is that the cells that contained mitochondria-like organelles had an evolutionary advantage because:
   A. They were able to photosynthesize
   B. They had more DNA
   C. They were able to make more use of available energy
   D. They were immune to bacterial invasion.

5. Proponents of spontaneous generation believed which of the following?
   A. Living things arose only from others of the **same** kind
   B. The theory of biogenesis
   C. Maggots were the offspring of flies
   D. The theory of abiogenesis

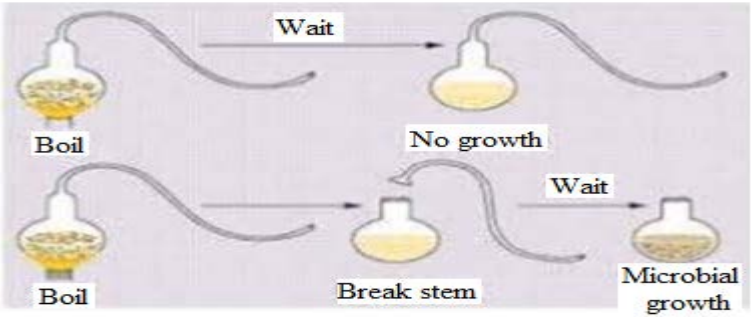
6. The experiment below was designed by Redi and used to disprove the theory of spontaneous generation. What was the independent variable he used in the experiment?

   A. how each jar is covered
   B. the amount of maggots in the jars
   C. the jar left open to the air
   D. the sealed jar

7. The idea that turtles arose from the mud on the banks of the Nile River illustrated the theory of:
   A. abiogenesis
   B. biogenesis
   C. evolution
   D. heredity

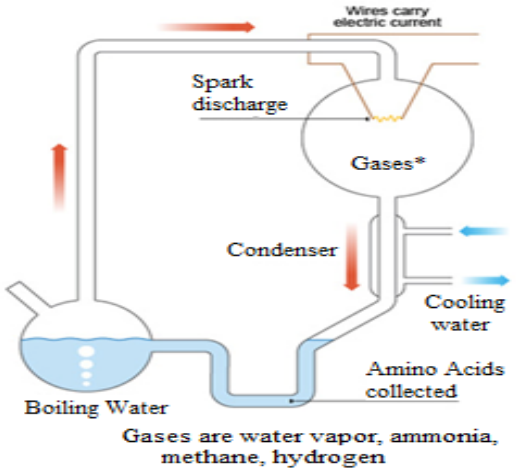
8. The experiment below was done by Pasteur which fully discounted the theory of abiogenesis by

   A. boiling the broth
   B. demonstrating that microorganisms can only enter the flask as airborne particles
   C. comparing two different variables
   D. both B and C are correct



9. The diagram below represents the Miller/Urey experiment. The boiling water represents:

   A. the early earth's atmosphere
   B. the ancient ocean
   C. a freshwater lake
   D. an estuary



10. In the experiment for #9 , what molecule was the source for nitrogen in the experiment?
    A. Water vapor
    B. ammonia
    C. methane
    D. oxygen

11. The experiment in Miller/Urey experiment demonstrated
    A. how RNA could have been the first organic molecule
    B. that simple molecules could not have evolved spontaneously
    C. the kinds of molecules that could have been produced on the early earth
    D. that oxygen was required for the formation of molecules on early earth

12. Thousands of years ago, the jaws and teeth of jaguars were more varied in size than they are today. During a period of climate change about 11,000 years ago, jaguars faced a shortage of food. There were fewer mammals to eat, so the jaguars had to eat shelled reptiles. The jaguars with the largest jaws and teeth could most easily eat the shelled reptiles. How would LaMarck explain this phenomenon?
    A. Jaguars with the smallest teeth died out completely.
    B. Jaguars with the smallest jaws and teeth were not ever able to mate.
    C. Jaguars with the largest jaws and teeth survived and reproduced more successfully than other jaguars.
    D. Jaguars with the largest jaws strengthened them by using them more frequently than other jaguars.

13. A population of herbivores is confined in a 500 acre area by a high fence. A spring provides water to the herbivore population. According to the principles of Thomas Malthus, what will happen to the herbivore population over time?
    A. The population will reproduce more slowly to conserve limited resources.
    B. The population will become extinct.
    C. The population will grow and competition for resources will increase.
    D. The population will slowly decline to zero.

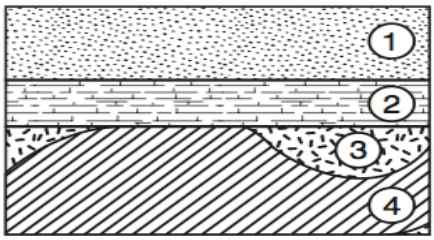
14. A common ancestor gave rise to fourteen species of Darwin's finches, which live on the Galapagos Islands. The finches that colonized different habitats on the islands diverged into different species. Which of the following explains the process that led to the divergence of finches?
    A. Through gene isolation, the finches were unable to adapt due to a limited gene pool.
    B. Through natural selection, the finches adapted to different food sources in their habitats.
    C. Through natural fragmentation, the finches were unable to interbreed in different habitats.
    D. Through gene recombination the finches began to develop different physical characteristics.

15. An biological theory stated that a change in a population can occur when organisms with favorable variations for a particular environment survive and pass these variations on to the next generation. This is best known as the Theory of

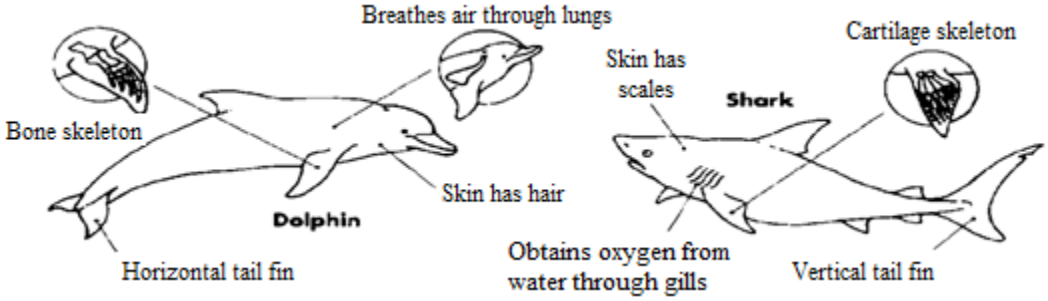
A. Natural selection
B. Punctuated selection
C. Variation and Adaptation
D. Acquired characteristics

16. Which rock layer *most* likely contains fossils of the most recently evolved organisms assuming the layers of rock have not been overturned.

A. 1
B. 2
C. 3
D. 4



17. The diagram below is a comparison between a dolphin and shark. While the shark and the dolphin are similar in appearance, they evolved independently of each other. This is an example of



A. cladistics
B. phonetics
C. convergent evolution
D. divergent evolution

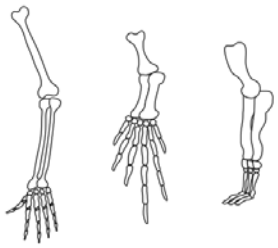
18. Evidence of evolution includes all of the following **except**

A. acquired characteristic
B. similarities and differences in protein and DNA sequences between organisms
C. the fossil record
D. homologous structures

19. Animal fossils may form when

A. an animal is buried by sediment
B. an animal is buried on the ocean floor, in swamps, or in tar pits
C. an animal's tissue is replaced by harder minerals
D. all of these choices.

20. The diagram below represents the bone arrangements of the front limbs of three different species of mammals. The similarities and differences in these limbs suggest that all three species developed from the same ancestor, but



A. produced different numbers of offspring
B. lived in different time periods
C. adapted to different habitats
D. migrated to very similar habitats

21. The diagram in #20 illustrates an example of

A. vestigial structures
B. homologous structures
C. analogous structures
D. none of these choices

22. The beak of a bird and the beak of a giant squid evolved independently and serve the same function. The beaks are

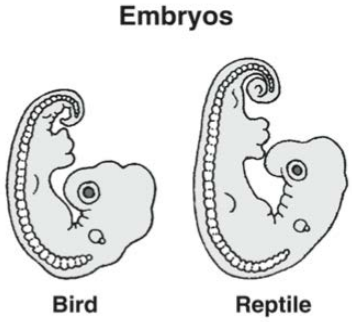
A. divergent structures
B. homologous structures
C. hybrid structures
D. analogous structures

23. Digestive enzymes and hormones are found to be very similar in many mammals. These findings are examples of

A. similar analogous structures
B. biochemical similarities
C. similar homologous structures
D. embryological structures

24. The diagram below illustrates an embryonic stage of two organisms. Which of the following can be inferred by observing the embryos shown in the diagram?

A. The organisms share a common ancestry.
B. The organisms belong to the same genus
C. The organisms are native to the same geographic area.
D. The organisms will grow into anatomically similar adults



25. The protein XIAP is involved in the immune response of many organisms. The table below includes the amino acid sequences of one section of XIAP in humans and four other organisms. Each letter in the sequences represents a particular amino acid. For example, G represents glycine and D represents aspartic acid. Based on the sequences in the table, which <u>two</u> organisms have an XIAP gene sequence **<u>most</u>** similar to that of humans?

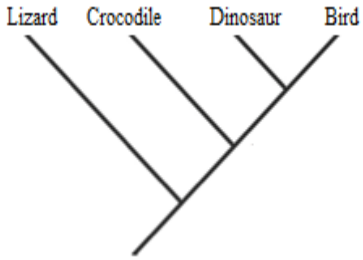
A. organisms 1 and 2
B. organisms 1 and 4
C. organisms 2 and 3
D. organisms 3 and 4

Organism	Amino Acid Sequence
human	G D Q V Q C F C C G G K L K N W E
organism 1	D D Q V Q A F C C G G K L K N W E
organism 2	G D Q V Q C F C C G G K L K N W E
organism 3	D D Q V Q C F C C G G K L K N W E
organism 4	D D N V Q C F C C G G G L S G W E

26. A diagram describing evolutionary history by showing how ancestors are related to their descendants and how much those species have changed over time is a(n)
A. family tree
B. time line
C. amino acid comparison chart
D. phylogenic tree

27. In reference to the diagram below, which of the following is an accurate statement of relationships?

A. A crocodile is more closely related to a lizard than to a bird.
B. A crocodile is more closely related to a bird than to a lizard.
C. A crocodile is equally related to a lizard and a bird.
D. A crocodile is related to a lizard, but is not related to a bird.



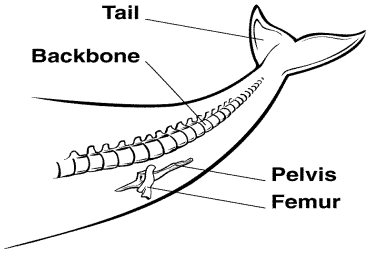
28. All of the following are requirement of the Hardy-Weinberg Law ***except***:
A. No migration of new alleles into or out of the population
B. No mutations can occur
C. No natural selection can occur
D. A small population must be in place

Use the following information to answer #29 and 30.
A stable population exists in Hardy-Weinberg equilibrium with two alleles, T and t. TT and Tt have the ability to curl their tongues, while tt individuals cannot curl their tongues. The frequency of T is 0.6

29. What is the percentage of heterozygotes in the population?
A. 16%
B. 36%
C. 48%
D. 84%

30. What is the percentage of individuals that can curl their tongues?
A. 16%
B. 36%
C. 48%
D. 84%

31. The pelvis and femur of the whale in the below diagram



A. allow the whale to walk
B. are vestigial structures
C. are acquired traits
D. are not inherited

32. How is natural selection in the evolution of long necks in giraffes **best** explained?

A. Shorter-necked giraffes were killed by long-necked giraffes.
B. Giraffe necks grew longer because of the bone structure of the animal.
C. Giraffes with longer necks survived because they were better suited to the environment.
D. Long-necked giraffes mated only with other long-necked giraffes.

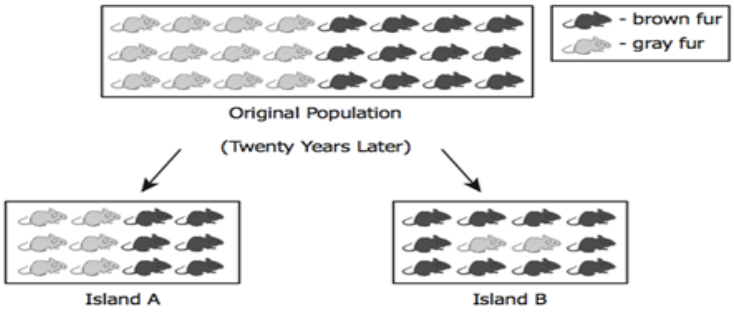
33. Which of the following explains why natural selection acts on the phenotype of an organism instead of its genotype?

A. Phenotypes directly influence the interaction of an organism with its environment.
B. Genotypes do not change except by the process of transcription.
C. Genotypes change in direct response to habitat changes.
D. Phenotypes can be inherited by offspring.

34. A population of termites initially contains darkly colored and brightly colored members. After several generations, the termite population consists almost entirely of darkly colored members because brightly colored termites are easier for a predatory species of insectivores to locate. This situation is an example of

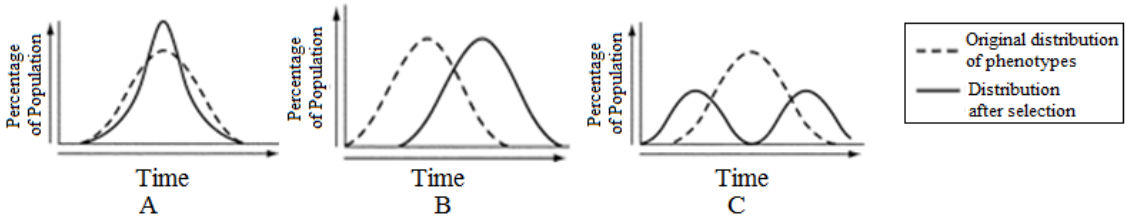
A. stabilizing selection
B. directional selection
C. disruptive selection
D. sexual selection

35. Refer to the below diagram to answer the next question. A population of mice is evenly divided by phenotype into two groups. Each group is placed on an isolated island with no existing mouse population. Which best explains the difference in the mouse population on Island B at the end of 20 years? All full credit Key has C



A. On Island A, the allele for gray fur was dominant, while on island B, the allele for brown fur was dominant.
B. More brown mice were in the half of the original population that was sent to Island B than in the group sent to island A.
C. Conditions on Island B favored the brown-furred individual while both fur colors were evenly advantaged on Island B.
D. The recapturing of mice on Island A and Island B was done differently

Use the three graphs below for questions #36, 37, and 38. The graphs represent the population of wooly beasts vs Time on an island.



36. In a population of wooly beasts, individuals with long snouts tend to survive better on a island that has burrowing termites. Over time, the wooly beast population consists of individuals with extremely long snouts. Which of the graphs above represents this selection?

A. Graph A
B. Graph B
C. Graph C
D. Both Graphs A and B

37. One hundred years have passed on the island with the wooly beasts. The termite population remains stable as well as other insects that roam on the sand. Wooly beast with both long snouts and short snouts exist together. Which of the above graphs represents this selection?

A. Graph A
B. Graph B
C. Graph C
D. Graphs A and C

38. Which graph would represent a population of wooly beasts with medium sized snouts?

A. Graph A
B. Graph B
C. Graph C
D. Graphs A and C

39. In Amish populations, the incidence of a certain type of dwarfism is much higher than in those of other populations. Which principle explains this?

A. gene flow
B. founder effect
C. both A and B
D. multiple alleles

40. Which of the following explains why small, isolated populations are more likely to under speciation if geographic isolation occurs?

A. Individuals in small populations produce fewer offspring than individuals in large populations.
B. Genetic diversity increases as the population decreases, giving small populations a large gene pool.
C. Small populations express significant changes due to the effects of natural selection on a small gene pool.
D. Small populations are less vulnerable to natural selection producing more species than large populations.

41. How does camouflage help an organism survive?

A. helps it to thermo regulate
B. ensures that it blend in with its environment
C. makes sure that predator or prey can find the organism
D. helps it to cool down

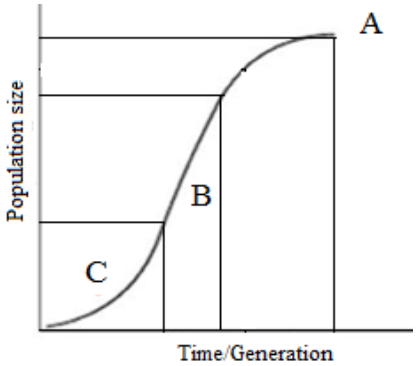
42. Which statement supports the relationship between natural selection and adaptation?

A. Organisms change when the survival rate of offspring begins to decrease.
B. Mutations occur in species that are not suited for the environment.
C. Evolution is the result of mass extinctions of species in different ecosystems due to a lack of genetic diversity.
D. Characteristics of populations can change over time in response to environmental changes

43. Many types of mammals appeared after the mass extinction of the dinosaurs as the result of

A. adaptive radiation
B. inheritance of acquired characteristics
C. convergent evolution
D. divergent evolution

44. The graph shown below represents logistic growth of a population. Which statement describes region Letter C?



A. Population growth decreases because the carrying capacity has been reached
B. Resources are limited so there is slow population growth
C. The population is just starting to build so few individuals produce offspring
D. There is no growth because the population has reached its carrying capacity

45. The maximum number of individuals that can be supported in this population due to a limited supply of resources is at Letter A It is:

A. biotic potential
B. carrying capacity
C. logistic growth
D. natality

46. Which letter in the above graph represents the population doubling at a constant rate due to the availability of many resources.

A. Letter A only
B. Letter B only
C. Letters C and B
D. Letters C and A

47. This dichotomous key below can be used to identify white wildflowers.

Key to White Wildflowers

1a. Five petals	Go to 2
1b. Seven petals	Starflower (*Trientalis borealis*)
2a. Petals single pieces	Go to 3
2b. Petals deeply divided	Chickweed (*Stellaria media*)
3a. Wide round petals	Common strawberry (*Fragaria virginiana*)
3b. Narrow elongated petals	Bowman's root (*Gillenia trifoliata*)

According to this key, what type of flower is shown?

A. Trientalis borealis
B. Stellaris media
C. Fragaria virgiana
D. Gillenia trifoliate

48. The brush mouse and the northwestern deer mouse are both classified in the genus *Peromyscus*. Which of the following conclusions can be made from this information?

A. The two mice live in the same habitat
B. The two types of mice have the same fur color.
C. The two types of mice are closely related to each other.
D. The two types of mice can successfully interbreed with each other.

49. The classification of four birds is shown below. Based on this classification, which two birds are **<u>most</u>** closely related?

A. Western Kingbird and Ovenbird
B. Eastern Bluebird and Robin
C. Western Kingbird and Eastern Bluebird
D. Robin and Ovenbird

	 Eastern Bluebird	 Western Kingbird	 Ovenbird	 Robin
Class	Aves	Aves	Aves	Aves
Order	Passeriformes	Passeriformes	Passeriformes	Passeriformes
Family	Turdidae	Tyranidae	Parulidae	Turdidae
Genus	*Sialia*	*Tyrannus*	*Seiurus*	*Turdus*
Species	*sialis*	*verticalis*	*aurocapillus*	*migratorius*

50. Of the six kingdoms now recognized,

A. two are plants and four are animals
B. four are eukaryotes and two are prokaryotes
C. four are macroscopic and two are microscopic
D. two are eukaryotes and four are prokaryotes

51. In betta fish, alleles for color are incompletely dominant. Green fish have genotype **GG,** dark blue fish have genotype **BB**, and royal blue fish have genotype **GB.** Two royal blue betta fish are crossed. What percentage of the offspring would be expected to be green?

A. 0%
B. 25%
C. 50%
D. 75%

52. A woman who has blood Type O marries and has a child who also has blood Type O. Her husband and the father of the child could be of what blood type(s)?

A. Type A or Type B
B. Type AB only
C. Only Type O
D. Type A, B, or O

53. The genotypes of a husband and wife are I^AI^B x I^Ai. How many different genotypes and phenotypes would be expected among the blood types of their children?

A. 4 genotypes; 3 phenotypes
B. 4 genotypes; 4 phenotypes
C. 3 genotypes; 3 phenotypes
D. 3 genotypes; 4 phenotypes

54. When cows with black hair are crossed with bulls with white hair, the offspring are known as blue roans because of their dark gray color. A close examination of the blue roan's coat shows a mixture of white hair and black hairs. This is an example of

A. polygenic traits
B. incomplete dominance
C. dominance
D. codominance

55. Muscular dystrophy is an X-linked recessive disorder that occurs in approximately one in 3500 individuals. A woman who is a carrier of muscular dystrophy marries a man who does not have muscular dystrophy. Which of the following is an expected outcome regarding the inheritance of muscular dystrophy in their children?

A. Twenty-five present of the sons would be carriers.
B. One hundred percent of the daughters would be carriers.
C. Fifty percent of the sons would have muscular dystrophy.
D. Seventy-five percent of the daughters would have muscular dystrophy

56. What is the most likely pathway taken by a newly synthesized protein that will be secreted by a cell?→

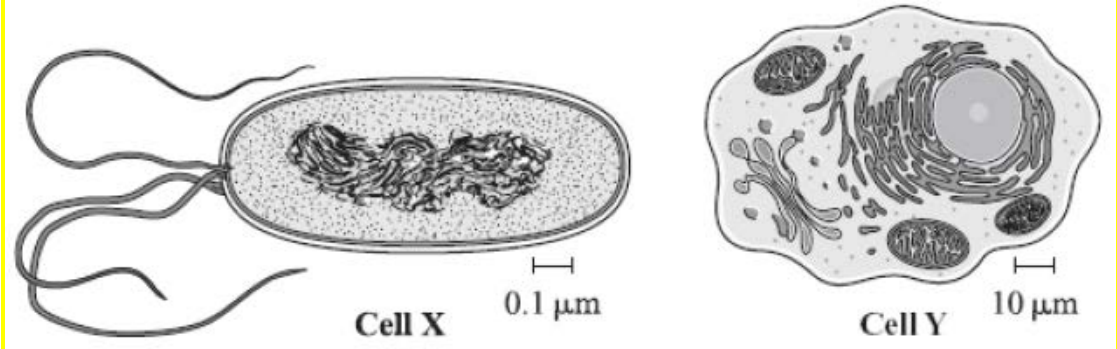
A. ER→Golgi→nucleus
B. Golgi→ER→lysosome
C. lysosome→ER→Golgi
D. ER→Golgi→vesicles that fuse with the plasma membrane

57. Cyanobacteria are photosynthetic prokaryotes. Which organelles do cyanobacteria cells contain?

I. Chloroplasts II. Nucleus III. Ribosomes

A. I only
B. II only
C. III only
D. I and III only

58. The illustrations below represent two different cells. Which one of the following statements best identifies these two cells? No correct answer. All full credit. Key has A.



A. Cell X is eukaryotic cell and cell Y is a prokaryotic cell
B. Cell X is an animal cell while cell Y is a plant cell.
C. Cell X is muscle cell while cell Y is a red blood cell.
D. Both X and Y are prokaryotic cells.

59. Tiny hummingbirds make a 2, 000 mile flight in their migration pattern. They often travel with speeds up to 60 miles per hour. What structure in their wing cells would allow for the use of such a large amount of energy? The muscle cells in their wings contain many of

A. Mitochondria
B. Ribosome
C. Centriole
D. Nuclear Membrane

60. If the ribosomes of a cell were destroyed, what effect would this most likely have on the cell?

A. It would stimulate cell division
B. development of abnormal heredity features would occur.
C. Increased protein absorption would occur through the cell membrane
D. The cells would be unable to synthesize proteins

New Jersey Science League

Biology I Answer Key **Blue Test**

Date: March 9, 2017

Record onto the area record the # correct Corrections:

1	B	16	A	31	B	46	B
2	B	17	C	32	C	47	A
3	C	18	A	33	A	48	C
4	C	19	D	34	B	49	B
5	D	20	C	35	C (all full credit)	50	B
6	A	21	B	36	B	51	B
7	A	22	D	37	C	52	D
8	B	23	B	38	A	53	A
9	B	24	A	39	B	54	D
10	B	25	C	40	C	55	C
11	C	26	D	41	B	56	D
12	D	27	B	42	D	57	C
13	C	28	D	43	A	58	A (All full credit)
14	B	29	C	44	C	59	A
15	A	30	D	45	B	60	D

BIOLOGY I : No AP or second year students in this category. 60 multiple choice questions per exam.

BIOLOGY I : No AP or second year students in this category. 60 multiple choice questions per exam.

JANUARY EXAM - Carbon Compounds and basic chemistry including the chemistry of water and pH, Chemical Reactions, Enzymes, Cell structure and function, Levels of Cellular Organization, organelles, Prokaryotic and Eukaryotic, Cellular and Intracellular transport, Homeostasis, Cellular Energy Flow, Photosynthesis and Respiration, Cellular Division- Mitosis, Cell Regulation.

FEBRUARY EXAM - Structure and function of nucleic acids; roles of DNA, protein synthesis, Meiosis, chromosomal analysis (pedigree, karyotyping), Mendelian genetics, one and two factor crosses, mutations, Genetic engineering, Gene regulation and expression, Mutation and causes, human genetic diseases including chromosomal analysis, beyond Mendel, Variation of Traits, Plus review of the Jan exam or topics

MARCH EXAM - Evidence for evolution: historical thought/experimental theories of evolution…..Biogenesis/Abiogenesis, Coacervate formation, Miller/Urey experiment. Molecular evidence (nucleotide sequence analysis, amino acid sequence analysis), Comparative anatomy and comparative embryology, Fossil record; Hardy Weinberg; Taxonomy: Cladograms and Phylogenetic Trees, Natural Selection, Genetic change in a population, Patterns and causes of Evolution, Carrying capacity of a population, Exponential Growth, Evidence of diversity, Adaptation of organism to the environment. Plus review of the Jan and Feb exams or topics.

APRIL EXAM - Interactions of autotrophs and heterotrophs; Flow of energy through an ecosystem; Limiting factors in Biomes; Cycles of Matter; Symbiosis; Ecosystem models of energy flow; Ecological experimentation and analysis; Factors affecting biodiversity in a population; Human Influence on ecosystems. Plus review of Jan, Feb, and March exams or topics.

Dates for 2017 Season

Thursday March 9, 2017 Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

New Jersey Science League

PO Box 65 Stewartsville, NJ 08886-0065

phone # 908-213-8923 fax # 908-213-9391 email: newjsl@ptd.net

Web address: http://entnet.com/~personal/njscil/html/

What is to be mailed back to our office?

PLEASE RETURN THE AREA RECORD AND ALL TEAM MEMBER SCANTRONS (ALL STUDENTS PLACING 1ST, 2ND, 3RD, AND 4TH).

If you return scantrons of alternates, then label them as ALTERNATES.

Dates 2018 Season

Thursday January 11, 2018 Thursday February 8, 2018
Thursday March 8, 2018 Thursday April 12, 2018

New Jersey Science League Corrections
Biology 1
April 13, 2017 **Blue Test**

Choose the answer that best completes the questions or statements below and fill in the appropriate response on the form. If you change an answer, be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking on the scan-tron.

A diagram of a food chain is depicted below.

Grasses → Crickets → Field Mice → Hawks

1. For the food chain shown, which of the following changes would have the **most** severe consequences?
   A. a drastic decrease in rainfall, causing drought
   B. the poaching of predatory hawks by game hunters
   C. the introduction of a second predator that eats field mice
   D. a parasitic infection that reduces the cricket population

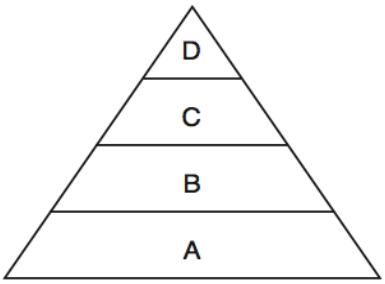
2. A scorpion stalks, kills, and then eats a spider. Based on its behavior, which ecological terms describe the scorpion?
   A. producer, herbivore, decomposer
   B. predator, autotroph, herbivore
   C. producer, carnivore, heterotroph
   D. predator, carnivore, consumer

3. In an ecosystem, which is the **most likely** reason for an increase in the producer population if there is an increase in the carnivore population?
   A. fewer herbivores
   B. higher temperatures
   C. less food
   D. more oxygen

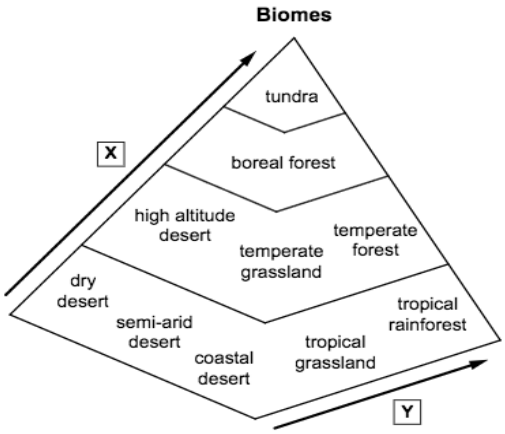
4. Which of the following terms includes all of the others?
   A. herbivores
   B. carnivores
   C. primary consumer
   D. secondary consumers

5. Food chains are relatively short because
   A. Top-level feeders tend to be more numerous than lower-feeding species
   B. Top-level feeders tend to be small but can conserve more energy.
   C. Longer chains do not provide enough energy to top predators.
   D. There are only so many organisms that are adapted to feed on other types of organism.

6. The adjacent diagram represents interactions between organisms in a stable environment. Which statement correctly describes organisms in this ecosystem?
   A. Organisms in level B obtain their energy directly from the sun.
   B. Organisms in level C obtain their nutrients directly from organisms in level D
   C. Organisms in level A are herbivores
   D. Organisms in level D are heterotrophic



Use the model below to answer the next question.



7. Which characteristics do **X** and **Y most likely** represent in this model?
   A. X represents increasing temperature, and Y represents increasing moisture.
   B. X represents increasing temperature and Y represents decreasing moisture
   C. X represents decreasing temperature, and Y represents increasing moisture
   D. X represents decreasing temperature, and Y represents decreasing moisture

8. Which of the following is **NOT** considered as a density-dependent factor affecting population size?
   A. parasitism
   B. selective breeding
   C. disease epidemic
   D. competition

9. Biotic factors in an ecosystem may include:
   A. bacteria, soil, and water
   B. plants, animals, and bacteria
   C. temperature, water, and soil
   D. animals, fungi, and temperature

10. Which of the following would ***least likely*** be affected by a density-dependent limiting factor?
    A. a small, scattered population
    B. a population with a high birth rate
    C. a large, dense population
    D. a population with a high immigration rate

11. A food web is more realistic than a food chain for showing the feeding relationships in an ecosystem because
    A. it compares the number of consumers to the number of micro-organisms in an ecosystem
    B. food chains use only a small sampling of organisms
    C. a food web explains why there are more producers than consumers
    D. producers are usually eaten by many different consumers and most consumers are eaten by more than one predator

12. Which statement **most** accurately describes how matter and energy are used in ecosystems?
    A. Matter is cycled through ecosystems; energy is not.
    B. Energy is cycled through ecosystems; matter is not.
    C. Energy can be converted into matter; matter cannot be converted into energy.
    D. Matter can be converted into energy; energy cannot be converted into matter.

13. The carbon cycle is the process in which carbon …..
    A. is continually created from the sun's energy by living organisms
    B. changes from inorganic forms to organic forms and back
    C. is changed into other elements, including oxygen and hydrogen
    D. is consumed and regenerated from other elements such as oxygen and hydrogen

14. One of the roles of decomposers in an ecosystem is to
    A. convert protein and waste into ammonia and nitrates
    B. produce animal and plant proteins from nitrates
    C. convert nitrogen from the air into ammonia and nitrates
    D. release nitrogen into the air from nitrates

15. How is atmospheric nitrogen made available to plants and animals?
    A. Nitrogen is transformed into nitrates by soil bacteria
    B. Nitrogen is converted into nitrates as groundwater is filtered
    C. Nitrogen is breathed in along with oxygen and discarded as nitrate waste
    D. Nitrogen is released rapidly by the weathering of rocks and absorbed by vegetation

16. What would most likely result in an area if the nitrogen-fixing bacteria were destroyed?
    A. Vegetation in the area would grow at a faster rate.
    B. Vegetation in the area would grow at a slower rate.
    C. Vegetation in the area would not be affected
    D. Vegetation in the area would find another nutrient source.

17. The oxygen and the carbon cycle are connected by two important life processes. One of these, photosynthesis, releases molecular oxygen (O_2) into the oxygen cycle. Which of the following life processes has an important role in releasing carbon dioxide (CO_2) into the carbon cycle?
    A. Fertilization
    B. Transpiration
    C. Respiration
    D. Reproduction

18. To recycle nutrients, an ecosystem must have, **<u>at a minimum</u>**,
    A. producers
    B. producers and decomposers
    C. producers, primary consumers, and decomposers
    D. producers, primary consumers, secondary consumers, and decomposers

19. The global hydrologic cycle supports a net flow of atmospheric water vapor from
    A. land to oceans
    B. the oceans to land
    C. polar to tropical regions
    D. tropical to polar regions

20. Bacteria that convert nitrates (NO_3^-) back to nitrogen gas (N_2) thereby replenishing nitrogen in the atmosphere use the process of
    A. nitrification
    B. denitrification
    C. deamination
    D. nitrogen fixation

21. Components of the hydrologic cycle include precipitation, condensation, surface runoff, and
    A. solar insulation
    B. sublimation
    C. irrigation water
    D. transpiration

22. Which of the following is **not likely** to happen as a result of the rising levels of CO_2 in our atmosphere?
    A. increased incidence of skin cancer
    B. rise in sea levels
    C. changes in climatic patterns
    D. shifts in the locations of deserts and fertile regions in the world

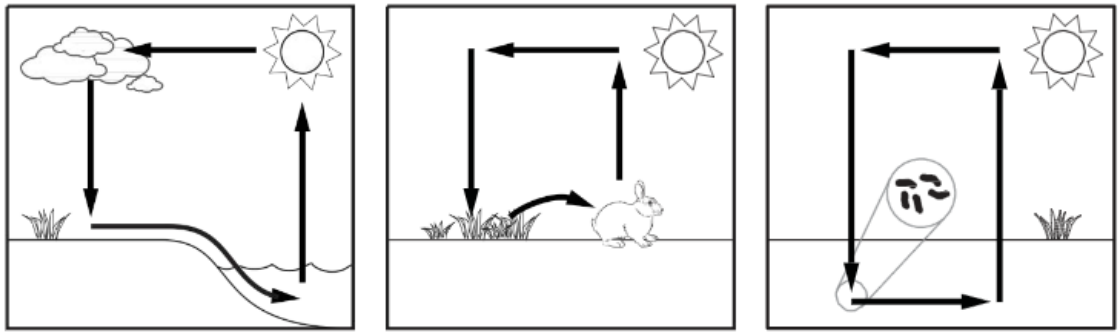


diagram 1 diagram 2 diagram 3

23. Observe the diagrams above which depict nutrient cycles in nature. Which of the charts below correctly identifies the diagram numbers with the correct cycle?

Nutrient Cycle Diagrams

A

Diagram	Cycle
1	water
2	nitrogen
3	carbon

Nutrient Cycle Diagrams

B

Diagram	Cycle
1	water
2	carbon
3	nitrogen

Nutrient Cycle Diagrams

C

Diagram	Cycle
1	carbon
2	water
3	nitrogen

Nutrient Cycle Diagrams

D

Diagram	Cycle
1	carbon
2	nitrogen
3	water

24. Honey guides are African birds that excitedly lead the way to a bee's nest, and ratels are the honey and bee eating mammals that open up and scatter the contents of the bee's nests. This allows both the ratels and honey guides to feed on the contents. The relationship between the honey guides and the ratels is:
    A. Predation
    B. Competition
    C. Commensalism
    D. Mutualism

25. The symbiotic relationship between a flower and the insect that feeds on its nectar is an example of:
    A. mutualism because the flower provides the insect with food, and the insect pollinates the flower.
    B. Parasitism because the insect lives off the nectar from the flower
    C. Commensalism because the insect doesn't harm the flower and the flower doesn't benefit from the relationship
    D. Predation because the insect feeds on the flower

26. Lamprey eels attach to the skin of certain trout and absorb nutrients from the body of the trout. Which symbiotic relationship best represents this relationship? + means the species benefits from the relationship, - means the species does not benefit form the relationship.
    A. Lamprey +/trout +
    B. lamprey+/ trout 0
    C. lamprey +/ trout -
    D. lamprey -/ trout +

27. All of the following are examples of negative symbiosis except: A and C. Key has C
    A. mutualism
    B. predation
    C. commensalism
    D. parasitism

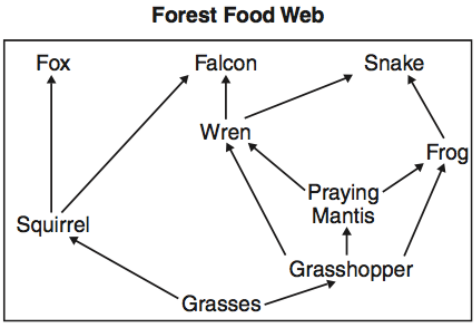
28. All of the following examples are examples of mutualistic relationships except:
    A. protozoan-termite interaction
    B. algal-fungal interactions in lichens
    C. clown fish and sea anemones in coral reefs
    D. legionella bacteria living in a lung

29. Oxpeckers are a type of bird that feed on pests like the ticks and flies found on animals like zebras and giraffes. The oxpeckers also help keep wounds on animals clean reducing the chance of infection. This interaction is an example of what type of relationship?
    A. predation
    B. parasitism
    C. mutualism
    D. commensalism

30. Which of the following lists contains one each of a ***true predator, a grazer, and a parasite*** in this order? The order is true predator, a grazer, and a parasite.
    A. zooplankton, tiger, tapeworm
    B. killer whale, buffalo, tapeworm
    C. spider, killer whale, aphid
    D. carnivorous plant, caterpillar, tuberculosis bacterium

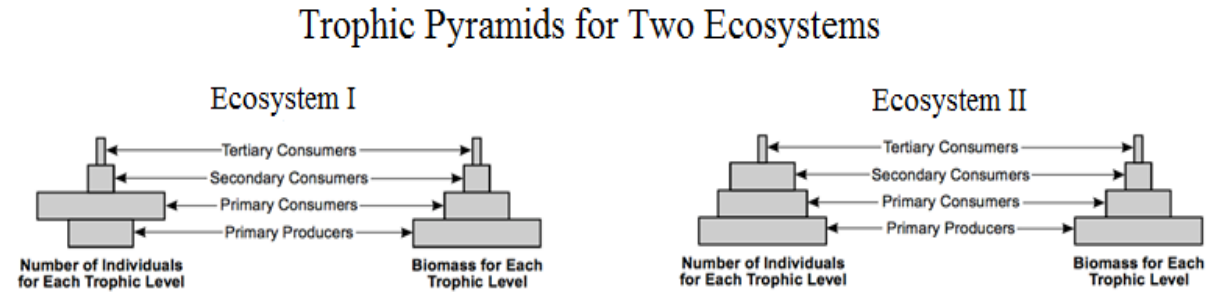
31. Which of the following statements about prey choice in a predator-prey relationship **is not** correct?
    A. Predators may concentrate their attacks on old prey because they have lower stamina
    B. Predators may concentrate their attacks on young prey because these fail to recognize the predator
    C. Predators may concentrate on sick prey because the sick prey are less effective on outmaneuvering the predator.
    D. Predators ignore prey in their prime because this maintains a high reproductive rate in the prey population

32. A forest ecosystem food web is shown below. If additional wrens are introduced into this ecosystem, there will most likely be an immediate decrease in the
    A. frog population
    B. snake population
    C. falcon population
    D. grasshopper population



33. In this same forest, there is an exceptionally cold winter. Many squirrels did not survive to reproduce. This would most immediately effect the
    A. falcon population
    B. snake population
    C. wren population
    D. fox population

Use the diagrams below to answer the next question



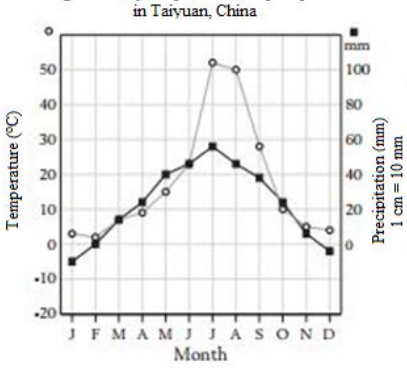
34. The diagrams above show two types of trophic pyramids for two different ecosystems. One type of pyramid shows the number of individual organisms that make up each trophic level, while the other shows the total biomass of all organisms at each trophic level. Which of the following is the most likely explanation for the differences in the number of individuals at each trophic level between the two ecosystems?
    A. The individual producers in Ecosytem I are larger than the number of individual producers in Ecosystem 2.
    B. The productivity of ecosystem I is greater than the productivity of Ecosystem 2.
    C. The individual producers in Ecosystem I are smaller than the individual producers in Ecosystem 2.
    D. The productivity of Ecosystem 1 is less than the productivity of Ec

Grass→ grasshopper → mouse → snake →hawk

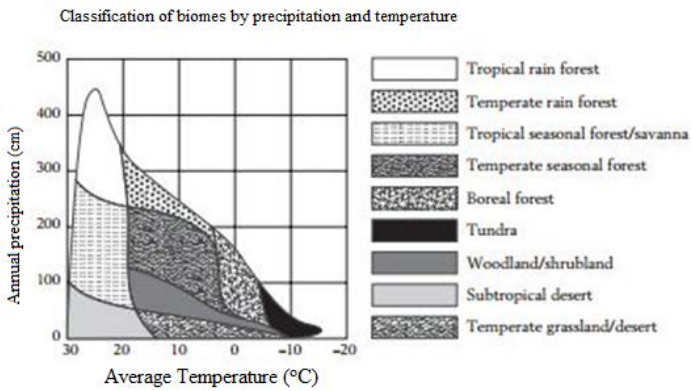
35. Consider the food chain above. How much of the chemical energy fixed by photosynthesis of the grass (100%) is available to the hawk?
    A. 0.01%
    B. 0.1%
    C. 1%
    D. 10%

The graph #I below shows the average monthly temperature and precipitation in Taiyuan, China. Taiyuan's average temperature is 10.3^0 C, and its average precipitation is 381mm, or 38.1 cm. Graph #II depicts the classification of biomes according to precipitation and temperature.

I



II



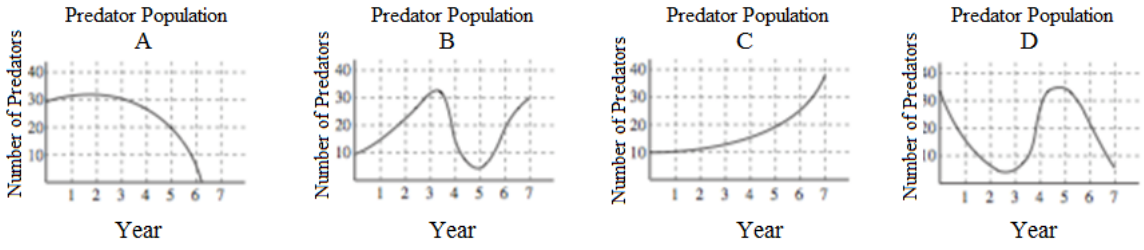
36. According to graph #1 in which month does Taiyuan experience the **LEAST** precipitation?All full credit. Key has D. Negative precipitation is a problem. All full credit.

A. April
B. December
C. February
D. January

37. According to graph #2, in which type of biome is Taiyuan, China located?

A. Tropical rainforest
B. Temperate grassland
C. Temperate rainforest
D. Temperate seasonal forest

38. Researches conducted a seven year study of a rabbit population and its predators in an ecosystem. During the first two-and-a-half years of the study, the rabbit population rose steadily then declined to the lowest level in the fourth year. The rabbit population rose again during the last three years of the study. Which of the graphs below shows how the population of rabbit **predators** would be expected to change during the same period in the ecosystem?

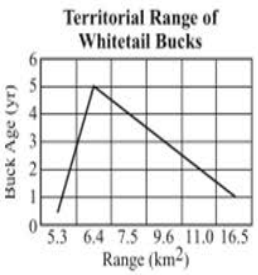


39. Environmentalists conducted a field study to determine if there is a correlation between the age of a whitetail buck and the range of its territory. The table below shows their findings.

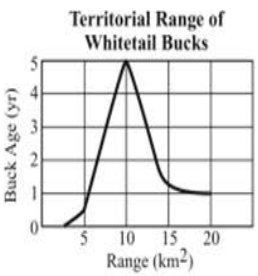
Age (years)	Range (km^2)
0.5	5.3
1	16.5
2	11.0
3	9.6
4	7.5
5	6.4

Which graph correctly shows the data collected during this field study?

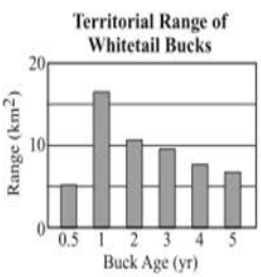
A



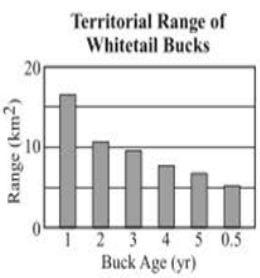
B



C



D



40. During the last century, human impacts on our planet have led to an increasing loss of biodiversity in rainforest ecosystems. This loss of biodiversity also means loss of genetic diversity and loss of ecosystems. What could be done to minimize this loss of biodiversity?
    A. Introduce new species to rainforest ecosystem
    B. Write and pass new environmental protection laws specific to rainforest ecosystems
    C. Build barriers around rainforest ecosystems to keep animals and plants contained.
    D. Move all rainforest animals to new ecosystems where they will be safe.

41. A serious threat to biodiversity is
    A. habitat destruction
    B. maintenance of food chains
    C. competition within a species
    D. a stable population size

42. Humans have had a tremendous impact on the environment. What has caused an increase in the amount of acid rain?
    A. use of chloroflourocarbons
    B. use of pesticides
    C. coal burning power plants
    D. nuclear power plant

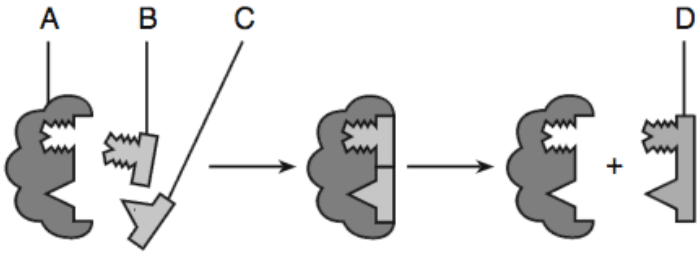
43. One way that humans could have a positive impact on local environments is to
    A. generate waste products as a result of technological advances
    B. use resources that are renewable
    C. increase planting areas of one crop
    D. increase the use of pesticides

44. Which of the following is LEAST likely to be an effect of climate change?
    A. Loss of fertile delta regions for agriculture
    B. Change in global patterns of precipitation
    C. Extinction of some species that have narrow temperature requirements
    D. Decreased rate of photosynthesis in vegetation

45. There is a current controversy involving whether the United States government should drill for oil on a national wildlife refuge in Alaska. The opposing sides of this controversy can be described as
    A. fossil fuel versus nuclear power
    B. economic versus ecological benefit
    C. renewable resource versus nonrenewable resource use
    D. cheap, but weak, energy versus expensive, but powerful, energy source.

46. Which describes how enzymes function in the body?
    A. Enzymes are converted into products by the reactions they catalyze.
    B. Enzymes lower the activation energy of reactions
    C. One enzyme can catalyze many different reactions
    D. An enzyme is used once and then destroyed.

47. The diagram below represents a model of a biological process that occurs in humans at normal body temperature.



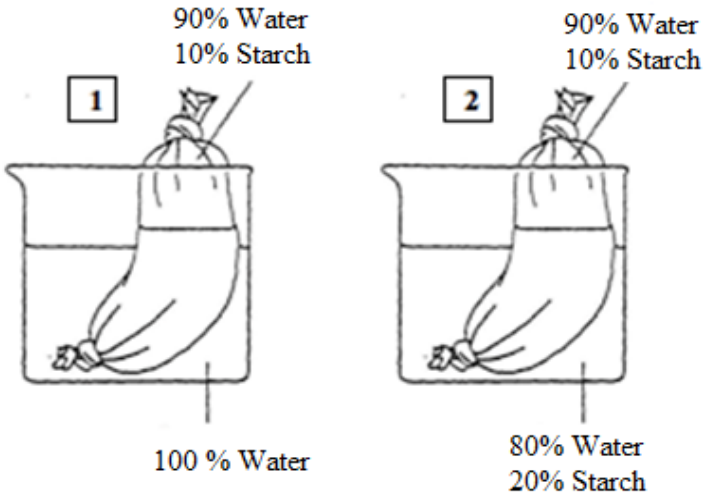
Increasing the temperature to 40^0 C would interfere most directly with the rate of function of structure

    A. A
    B. B
    C. C
    D. D

48. Substances transported by facilitated diffusion
    A. are limited to solvents
    B. may flow from a region of higher concentration by the expenditure of energy
    C. must have movements coupled to those of other substances
    D. move passively through specific channels from an area of greater concentration to one of lower concentration

49. An ion must cross the cell membrane through active transport instead of passive transport when the ion is
    A. negatively charged
    B. carries by a protein
    C. going against the concentration gradient
    D. too small to move independently

50. Study the below diagrams noting the concentration of various substances in the beakers and in the cellulose bags. Water can pass through the cellulose but starch cannot pass through. What will eventually happen to the concentration(s) in Beaker 2? All full credit. No answer is correct.



A. the water will remain the same, but the starch concentration will increase in the bag
B. The starch concentration will remain the same, but water will increase in the bag
C. The starch concentration will remain the same, but the water will decrease in the bag.
D. Both water and starch will reach equilibrium.

51. Which process describes the overall process of meiosis?
A. A haploid cell produces haploid cells
B. A diploid cell produces 2 diploid cells
C. A haploid cell produces 4 diploid cells
D. A diploid cell produces 4 haploid cells

52. Which step in meiosis increases genetic variation in multicellular organisms?
A. formation of tetrads
B. crossing over of non-sister chromatids
C. disappearance of the nuclear membrane
D. moving of centrioles to the opposite ends of the poles

53. Which statement **best** describes the relationship that exists among proteins, DNA, and cells?
A. Proteins combine to produce cells, which produce DNA.
B. Proteins are made up of DNA, which determines where in the cell proteins are produced.
C. DNA is made up of proteins which tell a cell how to function.
D. Cells contain DNA, which controls the production of proteins.

54. All of the following are true about the structure of DNA **except**
    A. DNA is one long continuous strand that breaks up into chromosomes when it condenses
    B. Every DNA nucleotide contains a sugar, a phosphate group, and a base
    C. DNA consists of two strands of nucleotides joined by hydrogen bonds.
    D. The long strands of DNA are twisted into a double helix

55. Which of the following **best** describes how DNA and RNA are similar?
    A. They both contain the nitrogen bases thymine and adenine
    B. They both have a double helix structure
    C. They both are composed of five different nucleotides
    D. They both contain the nitrogen bases cytosine and guanine

56. Thousands of years ago, the jaws and teeth of jaguars were more varied in size than they are today. During a period of climate change about 11,000 years ago, jaguars faced a shortage of food. There were fewer mammals to eat, so the jaguars had to eat shelled reptiles. The jaguars with the largest jaws and teeth could most easily eat the shelled reptiles. How would LaMarck explain this phenomenon?
    A. Jaguars with the smallest teeth died out completely.
    B. Jaguars with the smallest jaws and teeth were not ever able to mate.
    C. Jaguars with the largest jaws and teeth survived and reproduced more successfully than other jaguars.
    D. Jaguars with the largest jaws strengthened them by using them more frequently than other jaguars.

57. A common ancestor gave rise to fourteen species of Darwin's finches, which live on the Galapagos Islands. The finches that colonized different habitats on the islands diverged into different species. Which of the following explains the process that led to the divergence of finches?
    A. Through gene isolation, the finches were unable to adapt due to a limited gene pool.
    B. Through natural selection, the finches adapted to different food sources in their habitats.
    C. Through natural fragmentation, the finches were unable to interbreed in different habitats.
    D. Through gene recombination the finches began to develop different physical characteristics.

Organism	Amino Acid Sequence
human	G D Q V Q C F C C G G K L K N W E
organism 1	D D Q V Q A F C C G G K L K N W E
organism 2	G D Q V Q C F C C G G K L K N W E
organism 3	D D Q V Q C F C C G G K L K N W E
organism 4	D D N V Q C F C C G G G L S G W E

58. The protein XIAP is involved in the immune response of many organisms. The table above includes the amino acid sequences of one section of XIAP in humans and four other organisms. Each letter in the sequences represents a particular amino acid. For example, G represents glycine and D represents aspartic acid. Based on the sequences in the table, which <u>two</u> organisms have an XIAP gene sequence **<u>most</u>** similar to that of humans?

A. organisms 1 and 2
B. organisms 1 and 4
C. organisms 2 and 3
D. organisms 3 and 4

Use the following information to answer the next two questions.
A stable population exists in Hardy-Weinberg equilibrium with two alleles, T and t. TT and Tt have the ability to curl their tongues, while tt individuals cannot curl their tongues. The frequency of T is 0.6 H/W formula: $p^2 + 2pq + q^2 = 1$

59. What is the percentage of heterozygotes in the population?

A. 16%
B. 36%
C. 48%
D. 84%

60. What percentage of individuals that can curl their tongues?

A. 16%
B. 36%
C. 48%
D. 84%

New Jersey Science League

Biology I Answer Key Blue Test Corrections

Date: April 13, 2017

Record onto the area record the # correct

1	A	16	B	31	D	46	B
2	D	17	C	32	D	47	A
3	A	18	B	33	D	48	D
4	D	19	B	34	A	49	C
5	C	20	B	35	A	50	C(all full credit)
6	D	21	D	36	D(all full credit)	51	D
7	C	22	A	37	B	52	B
8	B	23	B	38	B	53	D
9	B	24	D	39	C	54	A
10	A	25	A	40	B	55	D
11	D	26	C	41	A	56	D
12	A	27	C & (A)	42	C	57	B
13	B	28	D	43	B	58	C
14	A	29	C	44	D	59	C
15	A	30	B	45	B	60	D

BIOLOGY I: **No AP or second year students in this category**. 60 multiple choice questions per exam.

JANUARY EXAM - Carbon Compounds and basic chemistry including the chemistry of water and pH, Chemical Reactions, Enzymes, Cell structure and function, Levels of Cellular Organization, organelles, Prokaryotic and Eukaryotic, Cellular and Intracellular transport, Homeostasis, Cellular Energy Flow, Photosynthesis and Respiration, Cellular Division- Mitosis, Cell Regulation.

FEBRUARY EXAM - Structure and function of nucleic acids; roles of DNA, protein synthesis, Meiosis, chromosomal analysis (pedigree, karyotyping), Mendelian genetics, one and two factor crosses, mutations, Genetic engineering, Gene regulation and expression, Mutation and causes, human genetic diseases including chromosomal analysis, beyond Mendel, Variation of Traits, Plus review of the Jan exam or topics

MARCH EXAM - Evidence for evolution: historical thought/experimental theories of evolution…..Biogenesis/Abiogenesis, Coacervate formation, Miller/Urey experiment. Molecular evidence (nucleotide sequence analysis, amino acid sequence analysis), Comparative anatomy and comparative embryology, Fossil record; Hardy Weinberg; Taxonomy: Cladograms and Phylogenetic Trees, Natural Selection, Genetic change in a population, Patterns and causes of Evolution, Carrying capacity of a population, Exponential Growth, Evidence of diversity, Adaptation of organism to the environment. Plus review of the Jan and Feb exams or topics.

APRIL EXAM - Interactions of autotrophs and heterotrophs; Flow of energy through an ecosystem; Limiting factors in Biomes; Cycles of Matter; Symbiosis; Ecosystem models of energy flow; Ecological experimentation and analysis; Factors affecting biodiversity in a population; Human Influence on ecosystems. Plus review of Jan, Feb, and March exams or topics.

Dates for 2017 Season

Thursday April 13, 2017

All areas and schools must complete the April exam and mail in the results by April 28th, 2017

New Jersey Science League

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Web address: http://entnet.com/~personal/njscil/html/

What is to be mailed back to our office?

PLEASE RETURN THE AREA RECORD AND ALL TEAM MEMBER SCANTRONS (ALL STUDENTS PLACING 1ST, 2ND, 3RD, AND 4TH).

If you return scantrons of alternates, then label them as ALTERNATES.

Dates 2018 Season

Thursday January 11, 2018 Thursday February 8, 2018
Thursday March 8, 2018 Thursday April 12, 2018