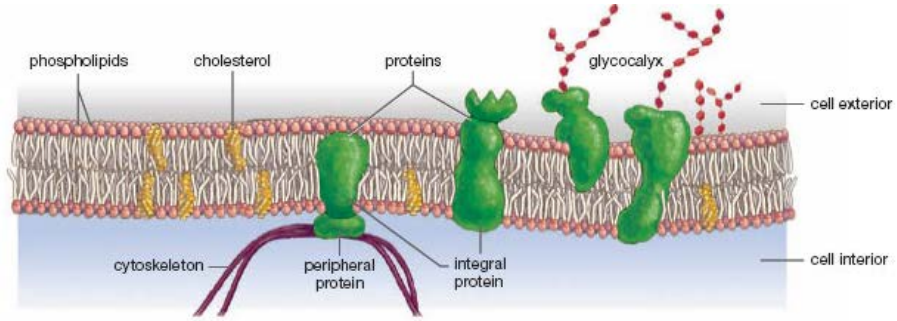
Biology 1 Science League Biology January 15, 2015 Exam <u>BLUE TEST</u>

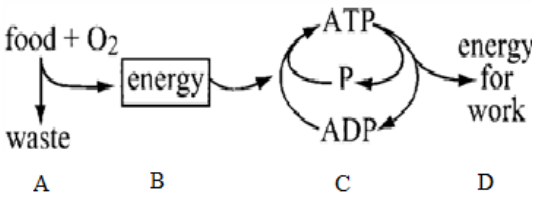
Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer, be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scan-tron.

1. In this diagram which molecule may function in facilitated diffusion?
a. Peripheral Protein
b. Cholesterol
c. Glycoprotein with Integral Protein
d. Phospholipid



2. A group of scientist is studying the effects of spraying salicylic acid (aspirin) and jasmonic acid to prevent caterpillars from eating tomato plants. One group of plants was sprayed with salicylic acid and the other jasmonic acid. The starting mass of the caterpillars placed on the tomato plants was between 50-55 grams. The average mass of the caterpillars after one month on the tomato plant for salicylic acid was 150 mg and for jasmonic acid 55 mg. To increase the validity of this experiment the following should be considered.
a. Use the same acid in the study
b. Use more than one caterpillar
c. Use more than one type of worm
d. Determine the average mass of the tomato plant along with the caterpillars

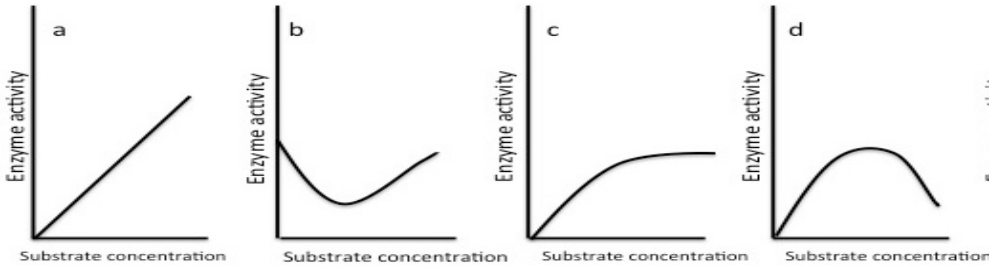
3. Determine which reaction (A, B, C, or D) in the right diagram transfers energy for most metabolic activities.
a. A b. B c. C d. D



4. In determining the presence of a monosaccharide in an aqueous solution which of the following laboratory equipment would be appropriate.
a. an apron, a balance, ruler, erlemeyer flask
b. an apron, a graduate cylinder, a centrifuge
c. a 100 ml beaker of water, an indicator, a hotplate
d. a compound microscope, a slide and cover slip, a pipette

5. An *Elodea* plant is placed in a test tube of water. Illuminating the test tube with a 100-watt light causes bubbles to emit from the plant. Moving the light away from the test tube reduces the quantity of bubbles emitted. The experimental variable in this experiment is:
a. the elodea plant
b. the amount of water in the test tube
c. the bubbles emitted from the elodea into the water
d. the distance of the plant from the light

6. Which graph **best** represents the relationship between enzyme and substrate concentration?



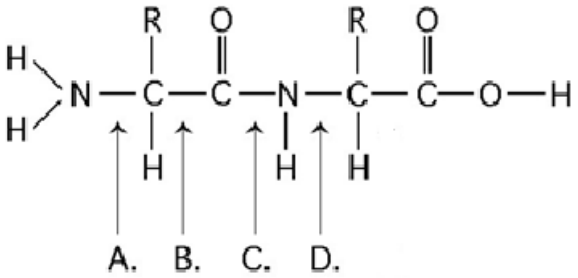
7. The table below is the set up for four experiments in osmosis. Predict which of the four experiments (A-D) would yield the most net water ***gain*** to the environment.

Experiment	Concentration of Water in Cell Model (dialysis tubing)	Concentration of Water in Environment
A	85%	65%
B	85%	100%
C	85%	75%
D	75%	80%

a. Experiment A b. Experiment B c. Experiment C d. Experiment D.

8. Refer to the molecule at the right. Determine at which point hydrolysis of this polypeptide would achieve its amino acid component.

a. A b. B c. C d. D



9. During a lab experiment a student prepares a slide of a red onion epithelium cells and places the slide under a compound microscope. The student views the cells under total magnification of 100x. Of the following which would definitely not be seen?

a. Nucleus b. Nucleolus c. Lysosomes d. Vacuole

10. The enzyme maltase breaks down maltose into two glucose molecules. Under which of the following conditions would this reaction be slowed down?

a. increasing maltase concentration
b. increasing maltose concentration
c. increasing the amount of water
d. reducing the glucose concentration

11. Cooked albumin, the white part of an egg, is opaque. The opaqueness is due to:

a. the denaturing of the lipids
b. the denaturing of the protein
c. the denaturing of the carbohydrates
d. the naturing of the protein

12. Two Petri dishes, labeled Plate 1 and Plate 2, each containing cornstarch agar. One sterile swab was dipped into a test tube containing fresh human saliva. This swab was immediately used to draw a circle on the agar of Plate 1. The second sterile swab was dipped into sterile water and a circle was drawn on the agar of Plate 2. After an hour a small amount of iodine was applied to each plate. The resulting reaction seen on the agar for Plate 1 was a clear ring circle and for Plate 2 the entire agar was blue-black. The clear ring represents

a. the iodine digested the cornstarch
b. the water digested the cornstarch
c. a lipid in the saliva digested the cornstarch
d. an enzyme in the saliva digested the cornstarch

13. When human blood pressure is elevated, the brain senses the change and causes the heart to slow until pressure returns to a normal level. This negative feedback response is an example of
    a. reconcentration
    b. homeostasis
    c. exocytosis
    d. digestion

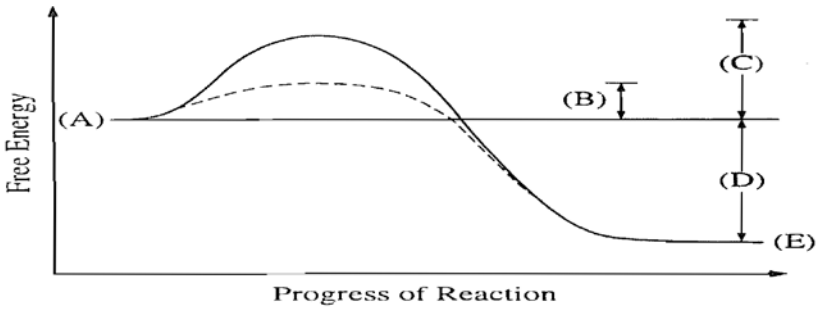
14. In which organic macromolecule is the ratio of carbon-to-hydrogen atoms closest to 1:2 ?

Macromolecule	Characteristic
A	Glycerol is a component
B	Contains an amine group
C	Subunit is a nitrogenous base
D	Includes glucose and amylose

15. A team of scientist discovered a new organism in Faery Hole Cave in Warren County, New Jersey. The organism has the following characteristics: motile, lacks cell walls, multicellular, and heterotrophic. In which kingdom would this new organism be placed?

    a. Eubacteria b. Fungi c. Animalia d. Plantae

16. Which interpretation of the reaction shown in the graph is correct?
    a. The reaction is endergonic
    b. The reaction is exergonic
    c. "C" represents the catalyzed energy of activation
    d. The reaction could represent photosynthesis

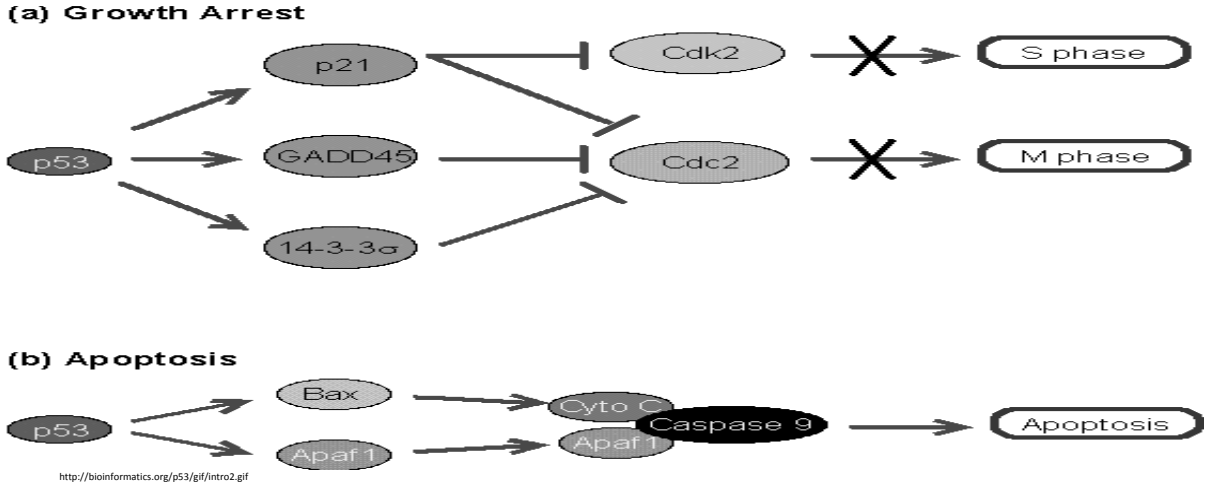


17. Which process does the following reaction represent? **A + B + free energy → AB**
    a. Hydrolysis b. Exergonic c. Catabolism d. Endergonic

18. Glycine, alanine, and leucine are amino acids that have hydrophobic side chains. In a normal cellular protein where would these amino acids be found?
    a. in an aqueous environment
    b. in the transmembrane portion interacting with lipid fatty acids chains
    c. in the exterior surface of the folded protein, reacting with water
    d. in the hydrophilic core of the folded protein

19 . In a noncyclic photophosphorylation reaction the highly excited and ultimate energy acceptor is:
    a. ADP b. Oxygen c. Water d. NADP+

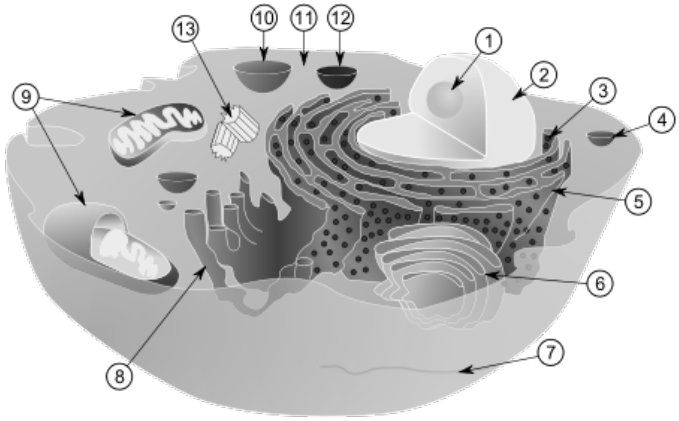
Use the diagram below for question # 20.



20. Tumor suppressor genes play a role in regulating cells that are found to have a defective p53 gene (see diagram above). These defective cells will most likely:

a. stop dividing
b. not react to growth regulators
c. continue to divide and produce cells without a defective p53 gene
d. make hormones to arrest cancer cells

21. Many "diet beverages" carry a warning, "Contains Phenylalanine!" This warning is aimed at individuals who exhibit
a. Down Syndrome b. HIV c. PKU d. Cystic Fibrosis



22. Referring to the adjacent diagram determine which of the following statements is true.
a. Structure 2 is the site of nucleotides and transmits genetic information
b. Structure 10 is the site of cellular respiration
c. Structure 9 utilizes carbon dioxide in the process of photosynthesis
d. Structure 5 is the site of aerobic respiration

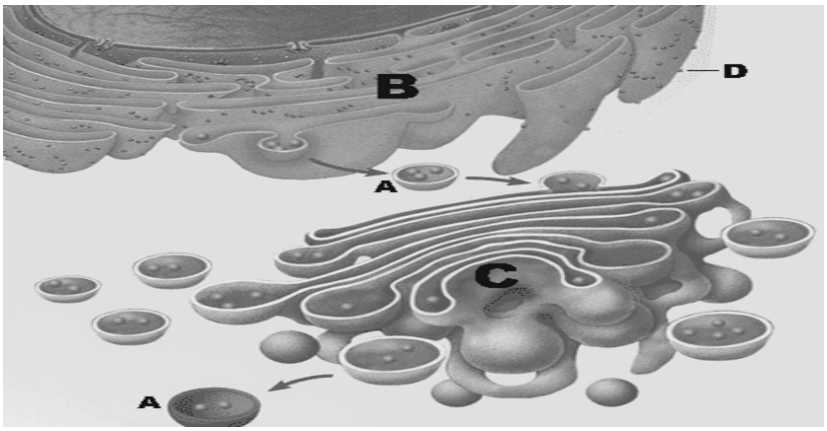
23. Which of the following statements is true with regard to human digestion of carbohydrates?
a. digestion begins and ends in the large intestine
b. digestion begins in the oral cavity and ends in the small intestine
c. digestion begins in the stomach and ends in the large intestine
d. digestion begins in the oral cavity and ends in the large intestine

24. If a cell has a mitochondrial matrix of pH 8 and the cell's cytoplasm is pH 7 then the
a. mitochondrial matrix is more acidic than the cytoplasm.
b. cytoplasm's concentration of hydrogen ions is tenfold higher than mitochondrial matrix.
c. mitochondrial matrix's concentration of hydrogen ions is tenfold higher than the cytoplasm.
d. cytoplasm is less acidic than the mitochondrial matrix

25. What carbon compound is linked to cardiac disease, but is necessary for cell membrane formation?
a. Monosaccharides
b. Carbon Monoxide
c. Unsaturated fats
d. Saturated fats

26. Structure "A" is most likely a _____ that may be destined for_____

a. a lipid; endocytosis
b. a transport vesicle; exocytosis
c. a micelle; endocytosis
d. a ribosome; exocytosis



27. The mitotic sequence of events G1 to S to G2 to M is followed by

a. Kinetochore formation
b. Cytokinesis
c. RNA transcription
d. Migration of chromatids

28. Cyanide ions stop cellular respiration by inhibiting an enzyme called cytochrome C oxidase, therefore, the organelle mainly affected by cyanide ions is

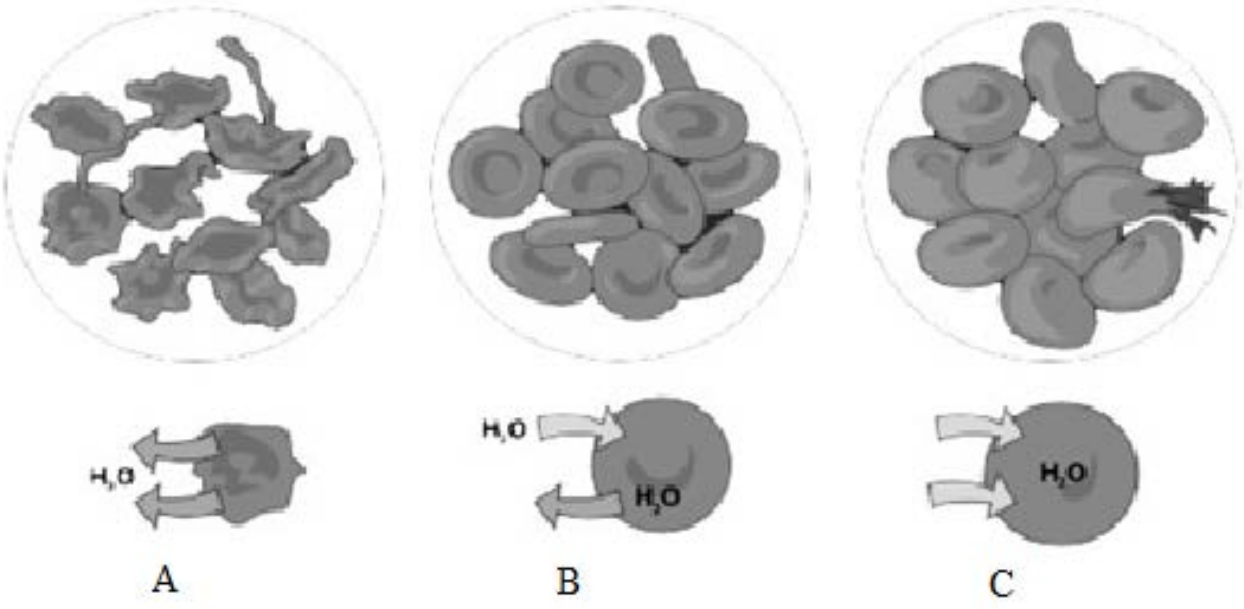
a. Golgi b. Endoplasmic reticulum c. Mitochondria d. Ribosomes

29. The fluid bilayer of the plasma membrane can solidify and freeze at very low temperatures. What component of the plasma membrane protects an organism from freezing by lowering the temperature that the membrane solidifies and decreases fluidity at high temperatures.

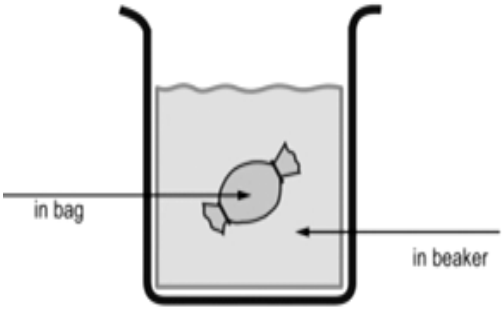
a. Fatty acids portion of the plasma membrane b. Cholesterol
c. Peripheral proteins d. Glycoproteins

30. Red blood cells were suspended in a test tube containing 5ml of 0.85% Saline solution (normal salinity for vertebrates). Five milliliters (5 ml) of aqueous 1.75% NaCl solution was added slowly to the test tube. A slide was then prepared. Which diagram below demonstrates the appearance of the red blood cells and the process responsible for the appearance of the red blood cells shown:

a. A, Isotonic b. B, Hypotonic c. C, Hypertonic d. A, Hypertonic

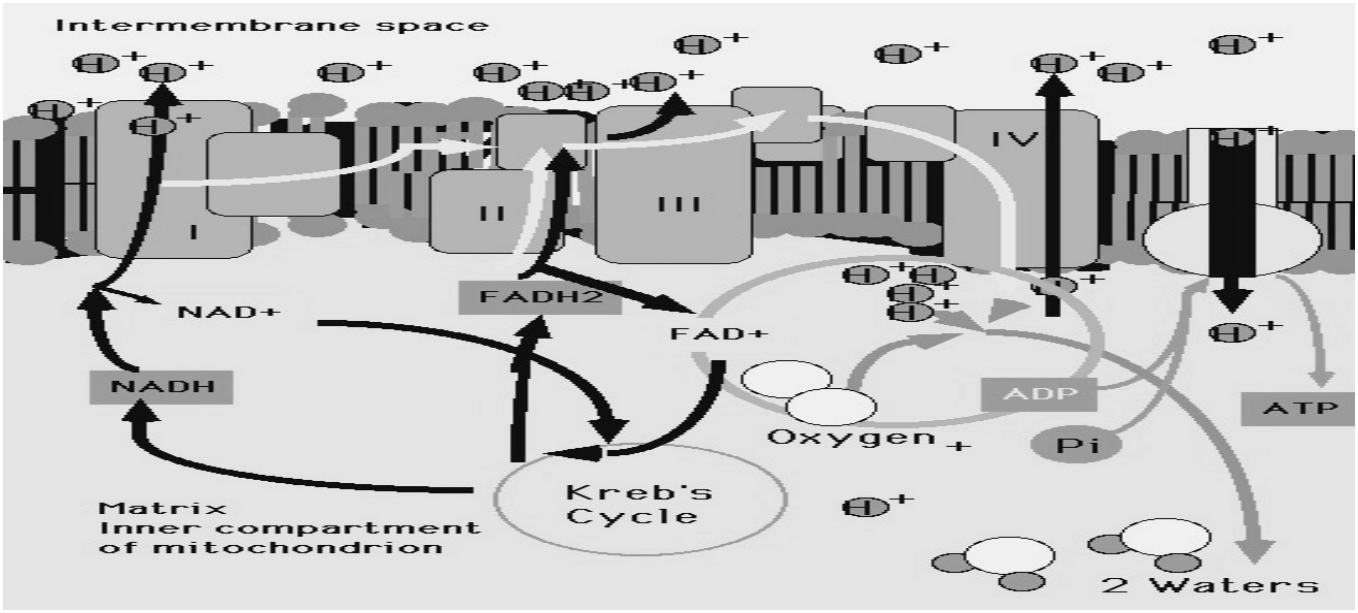


Use the drawing of the beaker and information for question # 31.
Bag contents 5% Starch and 95% water
Beaker contents 20% Starch and 80% water



31. The bag is composed of a semi-permeable membrane. Water tends to move _____ of the bag, thereby establishing a(n) _____ solution in the bag as compared to the solution in the beaker.

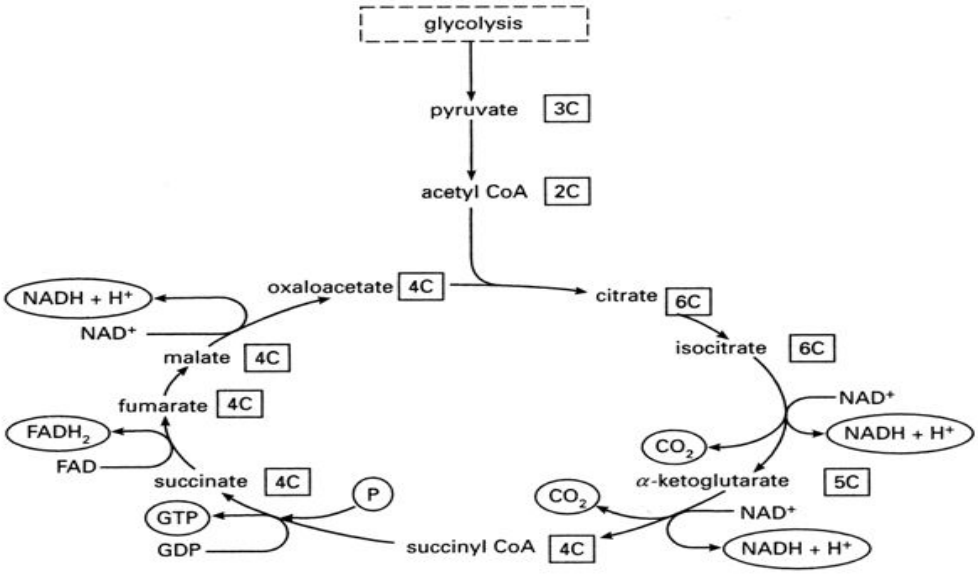
a. out, isotonic
b. into, hypertonic
c. out, hypotonic
d. out, hypertonic



32. Which statement below most accurately describes an event depicted in the diagram above?
a. The donating of electrons by NAD+ to protein I.
b. The establishing of an electrochemical proton gradient.
c. The donating of electrons by oxygen to hydrogen.
d. The transfer of protons from water to protein IV.

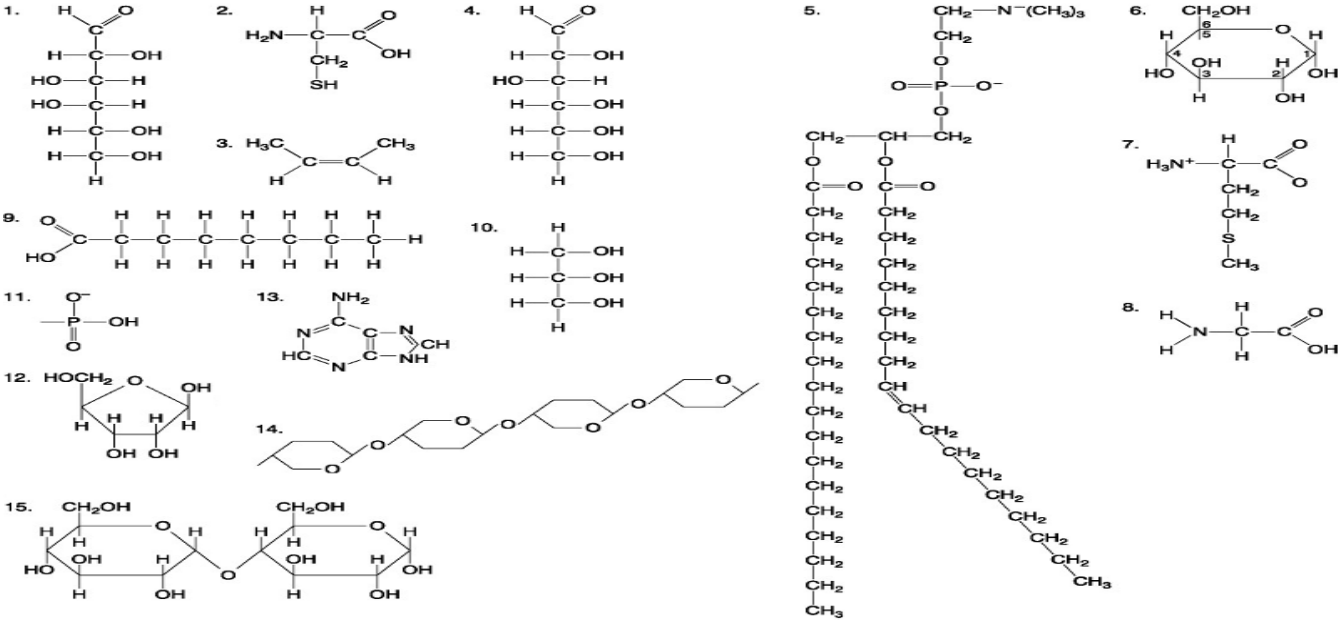
33. The Krebs cycle (Citric acid cycle) begins with the transfer of a two-carbon acetyl group from acetyl-CoA to a four-carbon acceptor compound. The four carbon compound starts the Krebs Cycle, and is regenerated at the end of the Krebs Cycle. What is the compound that begins and ends the Krebs Cycle?

a. Acetyl CoA
b. Citrate
c. Pyruvic Acid
d. Oxaloacetate



34. Which statement is false about the element carbon?

a. Carbon can form compounds with hydrogen and oxygen
b. Carbon can bond together and form other structures
c. Elemental carbon can dissolve in aqueous solutions and form other compounds
d. Carbon atoms have four electrons that can form bonds with other compounds



35. Select the appropriate numbers of the molecules in the image above that would form a nucleotide.

a. 2, 11,12
b. 2, 12, 13
c. 11, 12, 13
d. 4, 11, 13

36. Select the appropriate numbers that would result in the formation of a triglyceride by dehydration.

a. one molecule of 9 and three molecules of 5
b. three molecules of 5 and one molecule of 10
c. one molecule of 5 and three molecules of 4
d. three molecules of 9 and one molecule of 10

37. The following are components of the digestive system.

I. Mouth II. Gullet III. Stomach IV. Small Intestine V. Colon VI. Anus

Select from the list above the correct order of letters that corresponds with the following statements.

1. Initial source of amylase 2. Water is primarily removed 3. Oligopeptides broken down to peptides

a. II, IV, IV b. I, V, III c. IV, III, V d. I, V, IV.

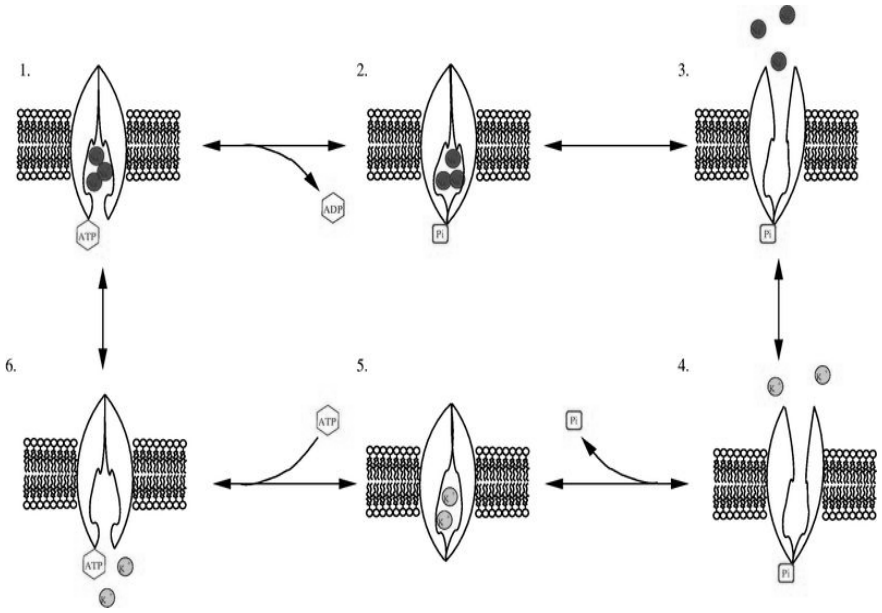
38. Which test tubes from the data supports the hypothesis, that yeast uses an enzyme to convert the disaccharide maltose to glucose?

a. test tube 2, 4, 5
b. test tube 1, 2, 3, 5
c. test tube 2, 3
d. test tube 1,2,3

Test tube	Addition of Water	Addition of Yeast	Addition of Maltose	Temperature	Presence of glucose after 10 minutes
1	yes	no	No	68-70 F	none present
2	yes	yes	No	68-70 F	none present
3	yes	no	Yes	68-70 F	none present
4	yes	yes	Yes	test tube placed in a beaker of water on a heated hot plate after yeast added	no glucose present
5	yes	yes	Yes	test tube placed in an ice bucket after yeast added	a small amount of glucose is present

Use the diagram for questions # 39 and 40.

39. The diagram to the right illustrates
   a. An aquaporin
   b. Osmosis
   c. Carbohydrate exchange
   d. Active transport



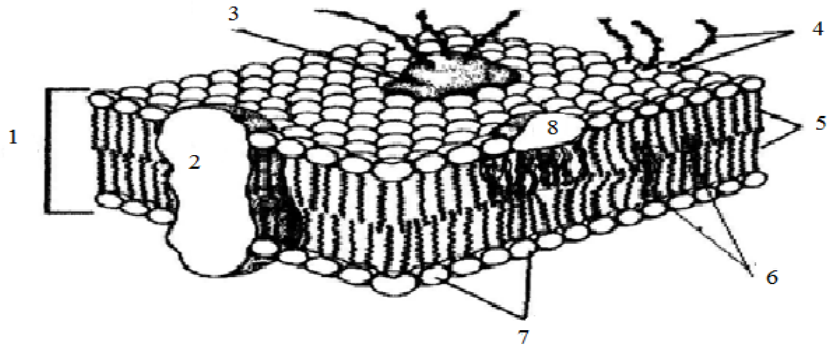
40. Which of the following statements most accurately describes an event shown in this diagram?
   a. The protein in 2 is identical to the protein in 1.
   b. The addition of phosphate changes the shape of the protein.
   c. The protein pumps ATP against a gradient.
   d. The protein moves particles only from outside to inside the membrane.

41. The structure of living organisms including those of entire populations and ecosystems is organized in a hierarchical fashion. Place the following biological levels of organization of living things from the most complex to the least complex:

1. A Neuron 2. DNA 3. Brain 4. All species in an ecosystem 5. Rain Forest 6. Nervous System 7. Organism 8. All Individuals of a single species in a given area 9. A single individual of a species

   a. 5, 4, 9, 8, 7, 6, 3, 1, 2
   b. 4, 5, 9, 8, 7, 6, 3, 1, 2
   c. 4, 5, 8 ,9, 7, 6, 3, 1, 2
   d. 5, 4, 8 ,9, 7, 6, 3, 1, 2

Use the adjacent figure to answer questions 42-43.

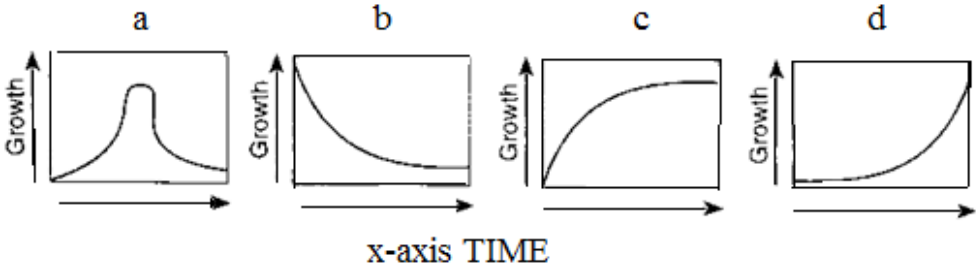


42. Which number specifically represents the fatty acid region?
   a. 1 b. 7 c. 5 d. 4

43. Which number represents a carbohydrate ID marker?
   a. 4 b. 2
   c. 3 d. 5

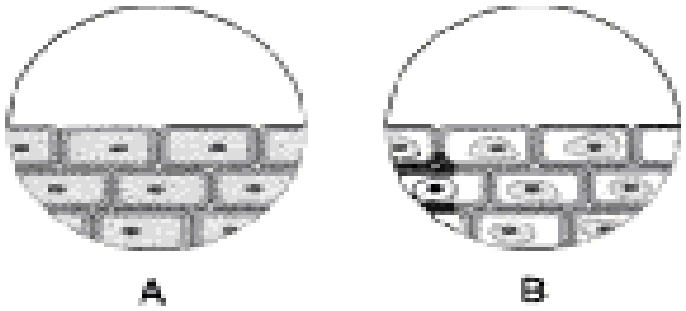
44. The data below represents a ***Euglena gracilis*** cell that was placed in a broth for 24 hours. The growth was recorded in hours and graphed. Which graph best represents the data collected?

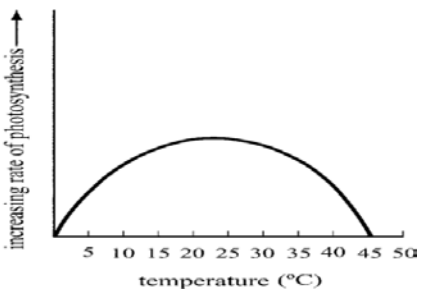
Population Age in Hours	*Euglena* Population number
0	2
5	4
10	8
15	16
20	32
25	64
30	128
35	256
40	512

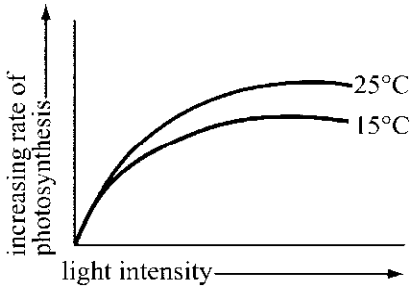


45. Paclitaxel (Taxol),a mitotic inhibitor, is used in breast cancer therapy. Taxol interrupts microtubule formation which stops mitosis. Therefore, Taxol must affect
a. DNA synthesis b. Mitotic spindle formation c. chromatin condensation d. Prophase

46. A student placed a piece of epithelium on a slide and observed it under low power (A). The student then obtained a pipette and placed a small amount of a liquid on the edge of the slide. Image B shows the cells AFTER the liquid has been added. Which choice below describes the liquid?
a. Iso-osmotic to onion cells
b. Distilled water
c. Saline
d. Tap water



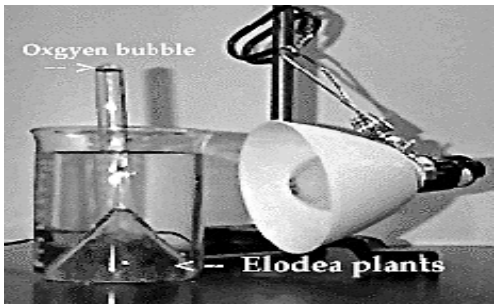




47. With regard to rate of photosynthesis, the above graphs demonstrate that
a. as the temperature increases for photosynthesis the light intensity increases
b. photosynthesis is negatively affected at 15 degrees Celsius
c. photosynthesis is not affected by temperatures and light intensity above 25 degrees Celsius
d. according to these graphs the amount of oxygen produced during photosynthesis is greatest at approximately 22°C

48. Specialized protein can aide in the movement of amino acids, sugars, and ions across a cell membrane. What is the term for this type of cell transport?
a. facilitated diffusion b. osmosis c. endocytosis d. exocytosis

49. In the adjacent picture when the light is shinning on the Elodea plant bubbles appear in the water. What color of filter needs to be placed between the Elodea plant and the light bulb in order to slow the production of bubbles?
a. violet b. red
c. blue d. yellow



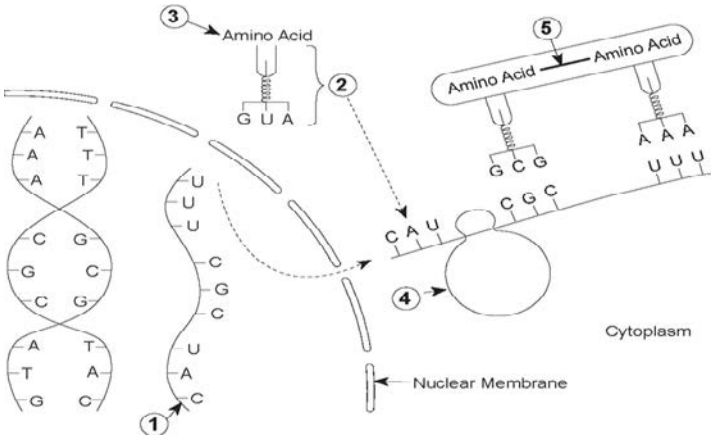
50. A factor that can stop normal human cells from growing is
a. cyclin in mitosis
b. contact with another cell
c. human growth hormones
d. mineral Co factor digestion

51. As a human cell breaks down nutrients to obtain energy, which pair of systems removes CO_2?
a. respiratory, excretory b. circulatory, respiratory c. endocrine, respiratory d. reproductive, excretory

52. Which structure best functions in the removal of waste products from a cell?
a. microvilli b. lysosome c. ribosome d. mitochondrion

53. Considering the movement of molecules what is the difference between in dialysis and osmosis:
a. In osmosis the solute moves from an area of high concentration to an area of lower concentration
b. In dialysis the solute moves from an area of high concentration to an area of lower concentration
c. In osmosis the solute moves through a selective permeable membrane
d. In dialysis the solvent moves from an area of low concentration to an area of higher concentration

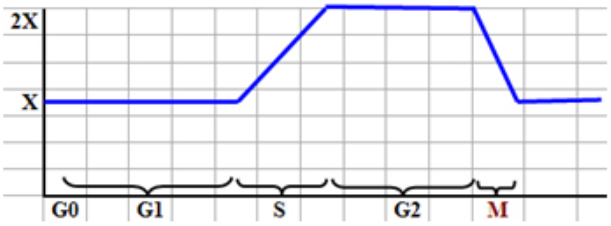
54. The bond (labeled 5) is a _____ bond and a possible resulting molecule produced is _____
a. disulfide, glucose
b. hydrogen, amylase
c. carbon, maltose
d. peptide, amylase



55. The nasal cavity and the trachea are lined with cilia.
What role do these cilia play?
a. to cool air that is entering the respiratory system
b. to help move trapped particles out of the respiratory system
c. to help produce sound as air moves out of the respiratory system
d. to increase the surface area for gas exchange in the respiratory system

56. The organelle responsible for the transporting of proteins synthesized on the surface of the rough Endoplasmic reticulum is the:
a. Mitochondrion b. Golgi
c. Nuclear Membrane d. Ribosome

Cell Cycle Graph



57. Using the graph to the right in which phase of the cell cycle is DNA replicated?
a. M b. G2 c. G1 d. S

58. In the cell cycle which point on this graph represents most microtubule synthesis?
a. G0 b. G1 c. S d. G2

59. In the process of conducting a field study of the organisms pictured above a student uses a collecting bottle to take a sample of freshwater Oscillatoria. The student wants to see the reaction of transferring the specimen collected to a salt water environment. What would be the expected reaction of Oscillatoria to this new environment?
a. Lose turgor c. The cell bursts
b the cell expands d. No difference

60. Some bacteria contain a substance that catalyzes atmospheric nitrogen (N_2) into ammonia (NH_3). This substance is most likely:
a. a lipid b. a nucleic acid c. a carbohydrate d. an enzyme

New Jersey Science League

Biology I Answer Key Blue Test

Date: Jan 15, 2014

Record onto the area record the # correct (Corrections)

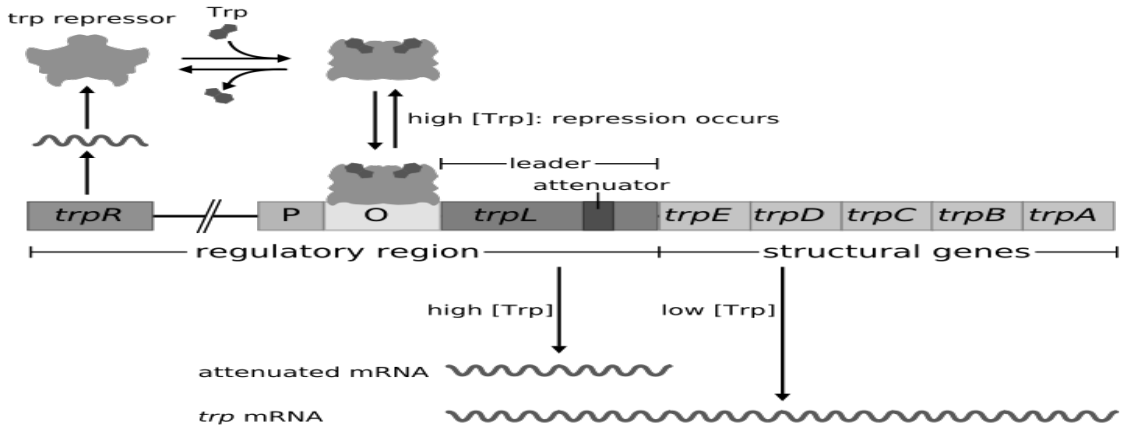
1	C	16	B	31	A	46	C
2	D	17	D	32	B	47	D
3	C	18	B	33	D	48	A
4	C	19	D	34	C	49	D
5	D	20	B	35	C	50	B
6	C	21	C	36	D	51	B
7	A	22	A	37	B(all full credit)	52	B
8	C	23	B	38	A	53	B
9	C	24	B	39	D	54	D
10	B(C)	25	D	40	B	55	B
11	B	26	B	41	D	56	B
12	D	27	B	42	C	57	D
13	B	28	C	43	C(all full credit)	58	D
14	D	29	B	44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

New Jersey Science League
Biology 1 BLUE EXAM
February 12, 2015 Incorrect in yellow

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. Select the letter that represents the strand of DNA from which the mRNA strand AUGCGUCAUACG was transcribed?
   a. GATTGCCTGTCT
   b. TACGCAGTATGC
   c. TACTGCGAGTGC
   d. CATTGGCTCTCT

2. Genes can be cloned and inserted into bacteria. The bacteria recognize human genes and reproduce them because:
   a. human and bacteria contain all the same organelles
   b. the basic nucleotides are the same for human and bacteria
   c. human and bacteria chromosomes are the same
   d. the process of DNA replication is the same in both human and bacteria



Refer to the diagram above for questions 3 and 4

3. With regard to the *trp operon*, when tryptophan is present where does the repressor bind?
   a. *trpR*
   b. Structural genes
   c. Operator
   d. Promoter

4. With regard to the *trp operon*, when tryptophan is absent this molecule facilitates the transcribing of the tryptophan genes to *trp* mRNA
   a. *trpR*
   b. Operator
   c. Structural genes
   d. RNA polymerase

5. In 1940's blood group evidence was not admissible in California courts. During this time a famous movie star was involved in a legal battle over the paternity of a child born to a prominent young female actor. The baby's blood was type B, the mother's blood was type A, and the movie star had type O. Could the movie star have been the father of this child?
   a. Yes, he could have fathered the child.
   b. In this case, more evidence must be given.
   c. blood tests are inconclusive.
   d. No, he could not possibly have fathered the child.

6. In cattle, a red bull crossed with a white cow yields offspring that are all roan, a shade between red and white. A cross between roans should yield offspring in the ratio of
   a. 3 red: 1 white
   b. 3 roan: 1 red
   c. 3 white: 1 red
   d. 1 red: 2 roan: 1 white

7. The data table below gives the percentages of nitrogenous bases in a DNA sample. What would be the expected % of Guanine in the sample?

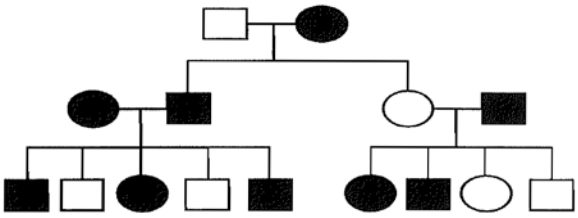
a. 24
b. 50
c. 52
d. 26

Nitrogenous Bases	Adenine	Guanine	Thymine	Cytosine
Per cent of Total DNA	24	____	_____	26

8. A cat with long hair (*ll*) mates with a female shorthaired cat (*LL*). Short hair is dominant to long hair. One of the offspring mates with a cat that is homozygous recessive for the trait. What is the probability that this mating produces a longhaired offspring?
a. 50% b. 25% c. 75% d. 100%

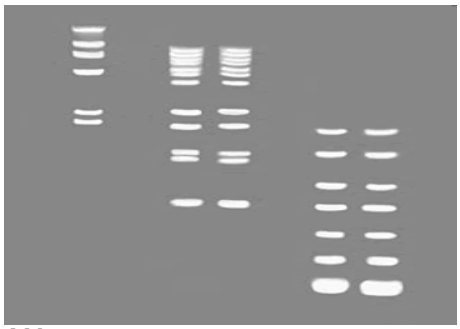
9. In the pedigree below the squares represent males and the circles females. For an individual who expresses the trait, the symbol is solid black. Which pattern of inheritance explains the transmission of this trait?

a. sex-linked dominant
b. autosomal dominant
c. sex-linked recessive
d. incomplete dominance



10. Please refer to the photograph of a DNA gel to the side. The migration of the samples is mainly due to:

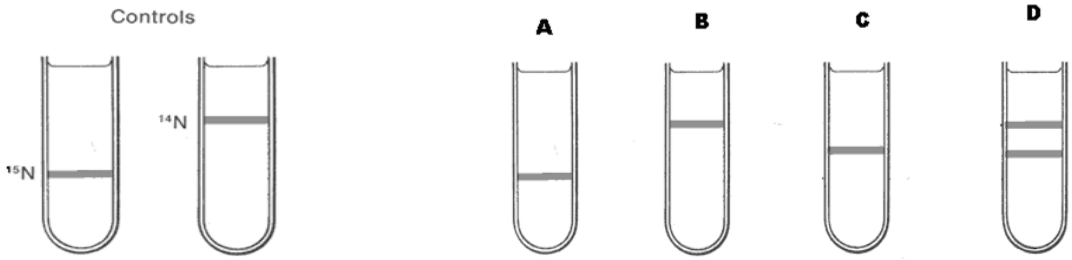
a. the quantity of radioactive DNA in the sample
b. size of each fragment of DNA
c. the number of points in the DNA fragments.
d. the overall negative charge of the DNA fragments



11. A small fragment of DNA is 3' TAAGCGGCT 5', its complementary strand would be:

a. 3' ATTCGCCGA 5'.
b. 5' AATTGCCGT 5'.
c. 3' AATTGCCGC5'.
d. 5' ATTCGCCGA3'.

12. The figure below represents the density-gradient centrifugation control groups for the experiment in which Meselson & Stahl proved that DNA replicates semi-conservatively. In the experimental group, Meselson & Stahl grew E. coli cells first in medium containing only heavy nitrogen (^{15}N). These cells were then transferred to medium containing only regular (light) nitrogen (^{14}N). After two rounds of replication in the latter medium, DNA from the cells was separated by density-gradient centrifugation. Which of the lettered tubes below most closely resembles the result that supported semi-conservative DNA replication?



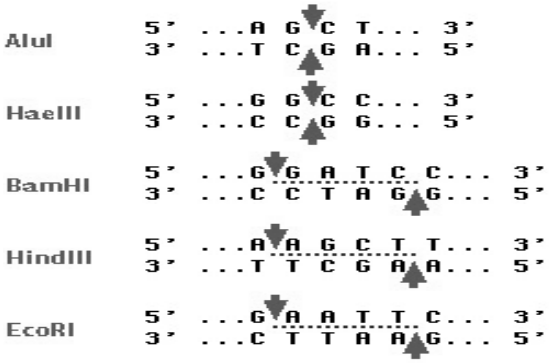
13. What is the maximum number of codons contained in the DNA sequence shown below?

a. 18
b. 9
c. 6
d. 1

5'...ATAGCGGTATTAGCCTAT...3'
3'...TATCGCCATAATCGGATA...5'

14. The picture to the right shows how 5 different restriction enzymes cut DNA. What do they all have in common?

a. They create "sticky ends"
b. They recognize short palindromic DNA sequences
c. They are derived from the same species
d. The ability to cut hydrogen bonds



15. Scientists have isolated some DNA fragments from the bone marrow of a frozen Mastodon that was found when a glacier retreated. The largest fragment has been cloned and sequenced. How can the scientists best determine if the sequence in question consists of a functional gene?

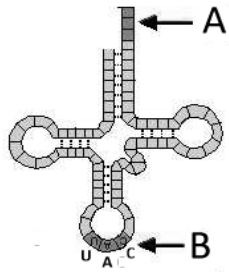
a. identify the gene to a chromosome region
b. run a BLAST search
c. search the human genome
d. search the intron/exon data base

16. Suppose a plasmid isolated and purified from E.coli contains only one HindIII site. Assume this plasmid DNA is successfully digested with HindIII and the resulting digest is run on an agarose gel using electrophoresis. How many bands should ideally appear in the gel once the DNA is stained and visualized?

a. 0 b. 3 c. 2 d. 1

17. In what cell organelle is the structure to the right found?

a. mitchondrion
b. smooth endoplasmic reticulum
c. ribosome
d. nucleus

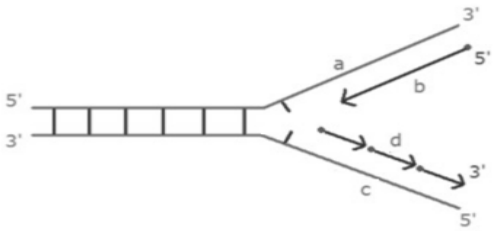


18. Referring to the diagram in question 17, letter B points to a 3-letter segment (UAC). What role does this segment play?

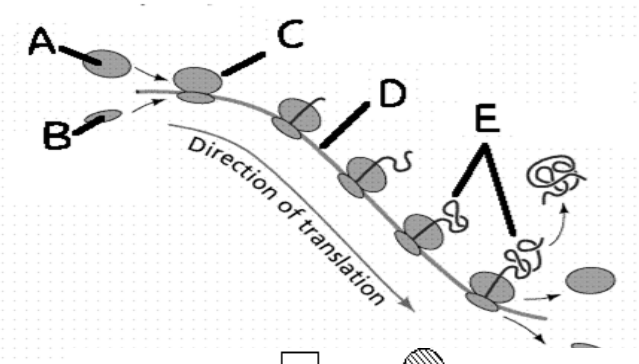
a. In translation it attaches to an amino acid
b. In transcription it attaches to an amino acid
c. In translation, it binds to a codon
d. In transcription, it binds to a codon

19. The right diagram is a portion of a DNA molecule undergoing replication. Which letter identifies the **lagging strand**?

a. A
b. B
c. C
d. D

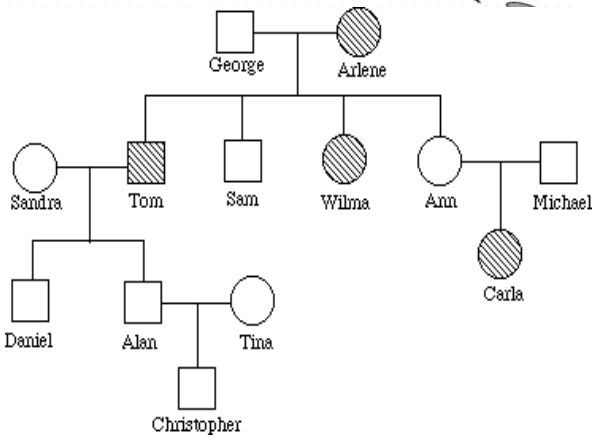


20. Using the diagram to the right *match the letters to the following sequence?*
mRNA, small subunit, polypeptide, ribosome.
a. A, D, E, C
b. D, B, A, C
c. D, B, E, C
d. A, B, E, C



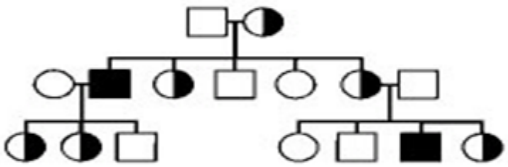
21. The pedigree below right is of a family that carries an autosomal recessive trait. Individuals that express the trait phenotypically have symbols that are shaded in. Which answer is a correct interpretation of the pedigree?

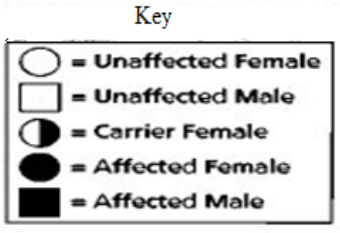
a. Sandra is most likely heterozygous
b. Ann is most likely heterozygous
c. George is most likely homozygous
d. Michael is most likely homozygous

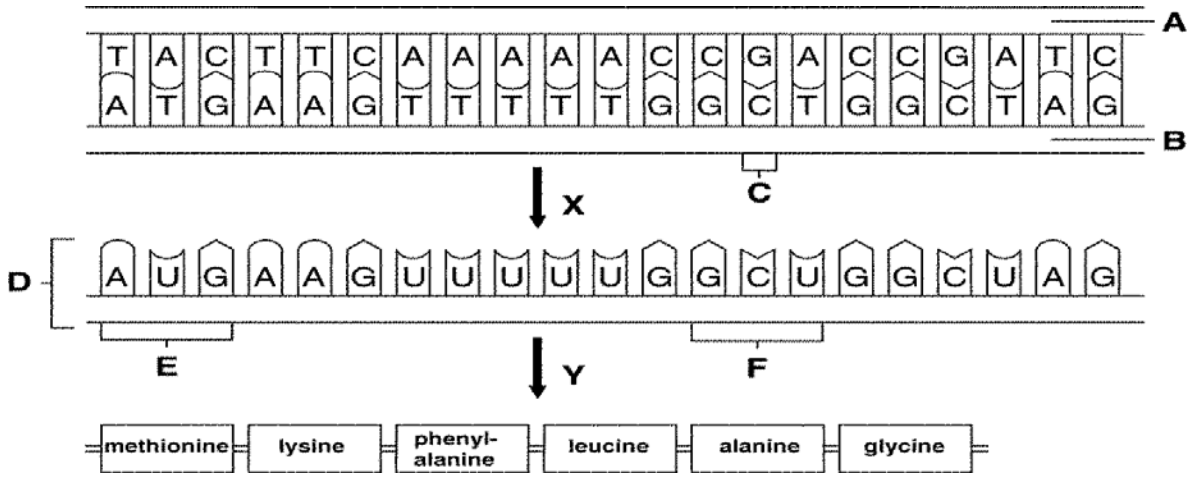


22. The statements below are valid pertaining to the similarities between the behavior of autosomal chromosomes and the behavior of genes except for letter:
a. Two chromosomes in each homologous pair, and an individual has two alleles of each gene
b. Sister chromatids determine the individual's karyotype, and dominant alleles determine the individual's phenotype.
c. Offspring receive one chromosome from each homologous pair in the sperm and egg, and offspring receive one allele of each gene from each parent.
d. Homologous chromosomes separate in Meiosis I, and Alleles segregate in haploid formation.

23. DMD (Duchene muscular dystrophy) is a fatal neuromuscular disorder and is usually incurable. The pedigree below right is of a family that has 2 individuals with DMD. How does this trait seem to be inherited?
a. As an autosomal dominant
b. As a sex-linked dominant
c. As a sex-linked recessive
d. As an autosomal recessive



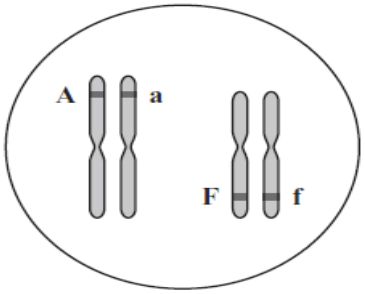




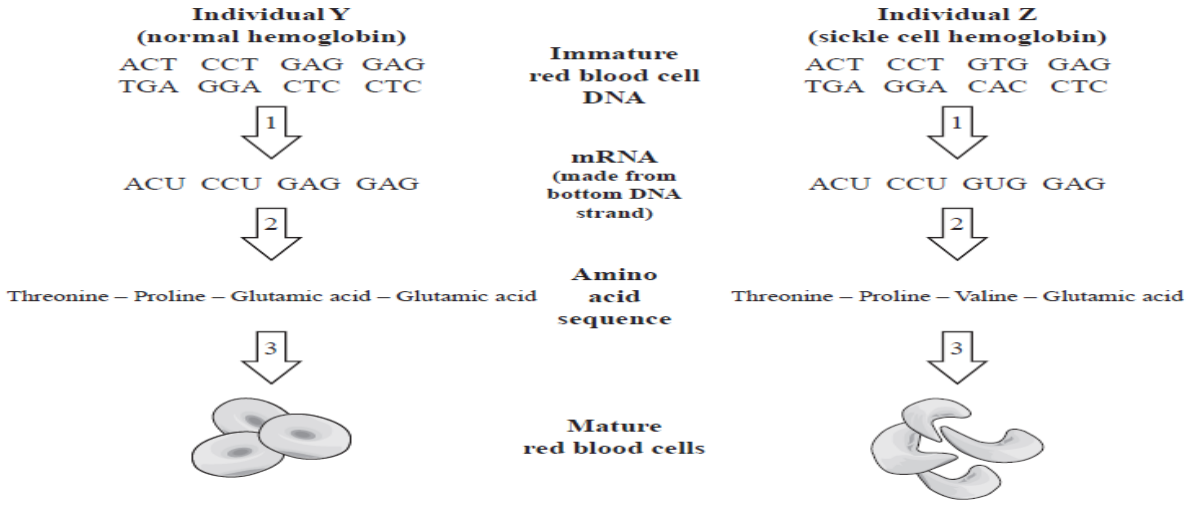
24. In the diagram above, what process does "Y" represent?
    a. transcription b. translation c. mutagenesis d. replication

25. The diploid organism to the right demonstrates these two chromosomes. Assuming meiosis and fertilization occur normally, which of the following pairs of alleles can an offspring receive from this parent?

    a. A and f c. F and f
    b. A and A d. A and a



26. A mold that grows on grain produces a toxin that binds to the DNA of the animals that eat the grain, thereby preventing transcription. Which explanation best describes how this toxin might work?
    a. The toxin prevents RNA polymerase from binding.
    b. The toxin competes competitively for DNA polymerase binding sites.
    c. The toxin prevents DNA from condensing into chromatin.
    d. The toxin interferes with the binding of ribosomes.



27. Use the diagram above for this question. Which statement below is the best interpretation of the mutation that results in cycle cell hemoglobin?
   a. The change builds a double strand of mRNA for each DNA molecule.
   b. The change modifies the amino acid sequence of the protein.
   c. The change inhibits mRNA from being synthesized
   d. The change allows the blood cells to divide indiscriminately

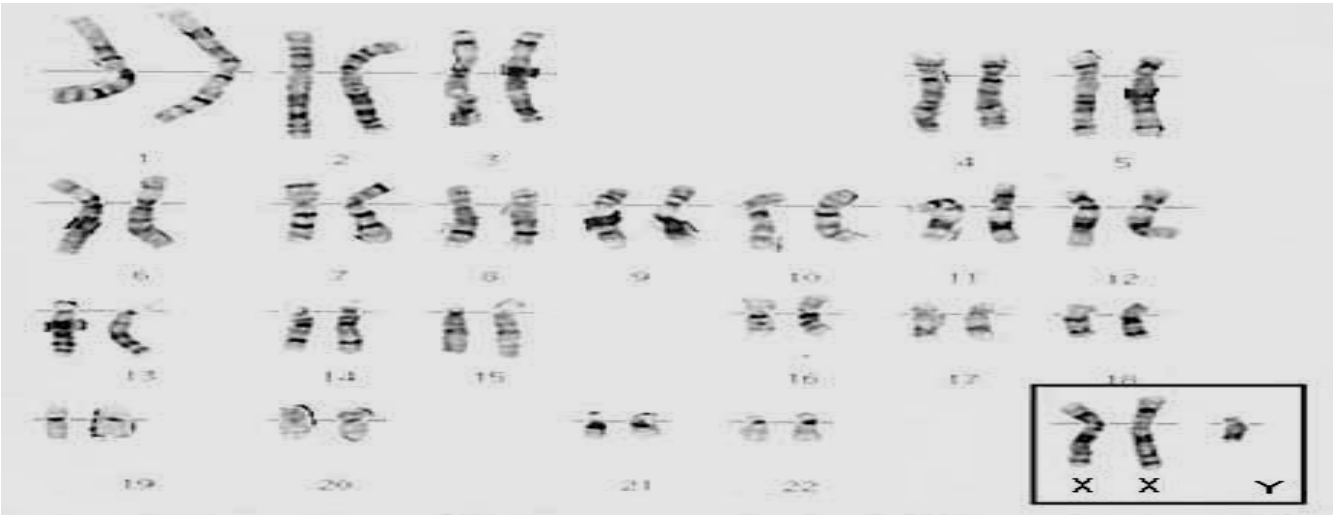
28. The somatic cells of a certain plant each contain 46 chromosomes. They have the same number of chromosomes as humans but are clearly different from humans. What may account for these differences?
   a. Genes on a plant chromosome, such as the X, must be on a different human chromosome, such as number 18.
   b. These plant cells must be metabolically more like animals than other plants.
   c. Plant cells cannot reproduce sexually.
   d. Genes of these plant chromosomes are significantly different than those in humans.

29. How do cells at the completion of meiosis compare with cells that have replicated their DNA and are just about to begin meiosis?
   a. They have half the number of chromosomes and one-fourth the amount of DNA.
   b. They have half the amount of cytoplasm and twice the amount of DNA.
   c. They have the same number of chromosomes and half the amount of DNA.
   d. They have twice the amount of cytoplasm and half the amount of DNA.

30. A eukaryotic gene was inserted into the DNA of a bacterium. The bacterium then transcribed this gene into mRNA and translated the mRNA into protein. The protein produced was useless; it contained many more amino acids than the protein made by the eukaryotic cell. Why?
   a. Eukaryotes and prokaryotes use different genetic codes.
   b. The mRNA was not spliced as it is in eukaryotes.
   c. Repressor proteins interfered with transcription and translation.
   d. Bacterial ribosomes can't recognize mRNA transcribed from eukaryotic DNA.

31. Suppose we discover extraterrestrial life that is biochemically much like our own, Earth-based life. However, these life forms use 48 amino acids in their proteins. Therefore, what would be the minimum number of nucleotides required in a single codon?
   a. 4 b. 3 c. 2 d. 1

32. Some disorders of cell metabolism are attributed to a defective mitochondrial gene. What best explains how such disorders are passed from one generation to the next?
    a. The trait is transmitted by the tail of the father's sperm
    b. Each parent contributes equally to the disorder
    c. The trait is passed from the egg's cytoplasm to the zygote.
    d. The sperm nucleus contributes the gene for the trait to the zygote.



33. The above karyotype is a result of _____, and is characteristic of _____ (disorder)
    a. nondisjunction, Down syndrome
    b. nondisjunction, Fragile X syndrome
    c. aneuploidy, Down's syndrome
    d. nondisjunction, Klinefelter's syndrome

34. Four students evaluated the DNA gel shown in the picture above. Which interpretation is INCORRECT?
    a. "The sample taken from the crime scene contains DNA from both the victim and a suspect."
    b. "The victim's sample contains some DNA fragments that are the same size as DNA fragments from the suspects."
    c. "The victim is probably related to the suspects because the victim's sample matches up with fragments from each of the suspects."
    d. "There are fragments from the crime scene that matchup only with Suspect 1. Therefore, Suspect 1 was at the crime scene."

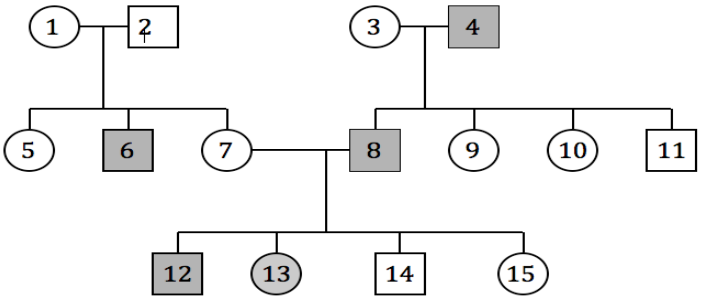
35. During prophase of mitosis strands of DNA appear as:
    a. homologous pairs b. chromosomes c. chromatin d. tetrads

36. If at G1 phase of the cell cycle the diploid cell's DNA content is K, then the DNA content in metaphase at meiosis II would be:
    a. ½ K b. 4K c. 2K d. K

37. In terminally differentiated cells most of the DNA is
a. absent b. inactive c. destroyed d. functioning

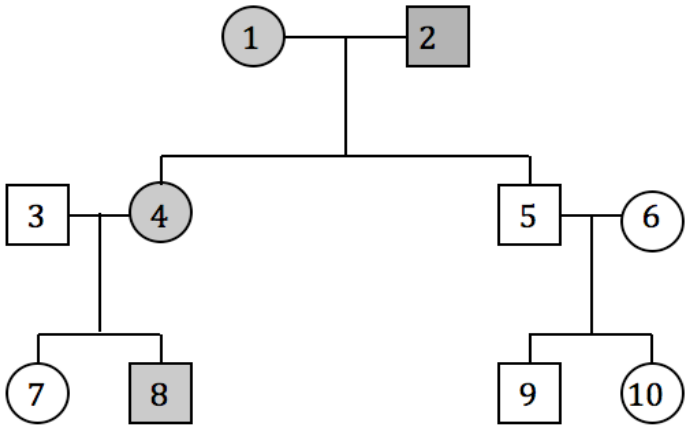
38. In domestic cats a gene for coat color resides on the X–chromosome. This gene has two codominant alleles, black and yellow. When both alleles are present the cat has a "tortoise–shell " coat (also known as "calico "). A black male and a yellow female are mated. What are the phenotypes that can be produced among the kittens?
a. All female kittens will be yellow, all male kittens will be black.
b. All female kittens will be calico, all male kittens will be yellow.
c. All female kittens will be black, all male kittens will be yellow.
d. All female kittens will be calico, all male kittens will be black.

39. In the drawing to the right males are squares, circles are females, darkened circles and squares are colorblind individuals. If number thirteen marries a colorblind male, what is the probability that any son they have will be colorblind?
a. 50%
b. 25%
c. 100%
d. 0%

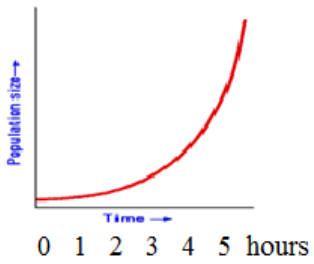


40. The pedigree below right is not a sex-linked trait. What is the probability that individual 1 and individual 2 are, respectively, heterozygous? Note: Shaded area in the pedigree represents individuals with the dominant trait.

a. 50%,50%
b. 100%,100%
c. 100%,50%
d. 50%,100%



Refer to the graph below for questions 41-42. A culture of *Clostridium botulinum* (an anaerobic organism that causes botulism food poisoning) is placed in a sealed flask containing a broth that will allow it to grow. The graph represents the organism's growth. Population size is in colonies/ml. At 4 hours the population size of *Clostridium botulism* is 500,000 colonies/ml. At 5 hours the population size of *Clostridium botulism* is 1,000,000 colonies/ml.



41. The population size of the growth of bacteria demonstrated between 3 to 5 hours can best be described as
a. stabilizing b. exponential c. Lag phase d. Stationary phase

42. If the number of colonies of *Clostridium botulism* reached 1,500,000 in 6 hours and then dropped dramatically. The reason for the rapid drop was probably caused by:
a. Lack of limiting factors
b. Increase in resources
c. Decrease in oxygen
d. Decrease in carbon dioxide

43. Strains of the bread mold *Neurospora crases* can grow on "minimal medium" usually made up of salts, sugar, and the vitamin biotin. Wildtype *Neurospora* was subjected to X rays and mutagenized to produce mutants with a defective gene that only grows if a certain molecule is added to the medium. This method is useful to geneticist because the molecule added to the "minimal medium" permitting the wild type Neurospora to grow is always:

a. the product of the enzymatic reaction of the defective gene
b. the final product of the biochemical pathway of the defective gene
c. utilized by the intermediates in the biochemical pathway to identify the defective gene
d. the same code as the defective gene

44. The following mouse-human hybrid cell lines have the human chromosomes as shown in the first table and the human enzymes as shown in the second table.

Human chromosome

Clone	**1**	**5**	**7**	**9**	**11**	**15**	**17**
GRMDGA1	–	–	–	+	+	+	+
GRMDGA2	+	+	–	+	–	+	–
GRMDGA3	–	+	+	–	–	+	+

Clone	**GRAMDGA1**	**GRAMDGA2**	**GRAMDGA3**
Amylase	+	+	–
Alpha-galactosidase	+	–	–
Lactase	–	+	+

Which chromosome is the carrier of amylase?

a. 3 b. 5 c. 9 d. 17

45. A red flowered plant was crossed with a white flowered plant. Out of 135 offspring, 69 had red flowers, the rest had white flowers. What was the genotype of the red flowered parent plant?

a. Rr b. RR c. rr d. RR or Rr

46. Of the statements below which is considered valid for the enzyme telomerase?

a. it is active on the lagging strand during DNA synthesis
b. it is most active in transformed E. coli cells
c. it requires a RNA template
d. it adds a DNA repetitive sequence at the end of the chromosome

47. From the choices below which groups form the backbone of DNA?

a. pentose sugar and amine group
b. nitrogenous base and pentose sugar
c. nitrogenous base and amine group
d. pentose sugar and phosphate

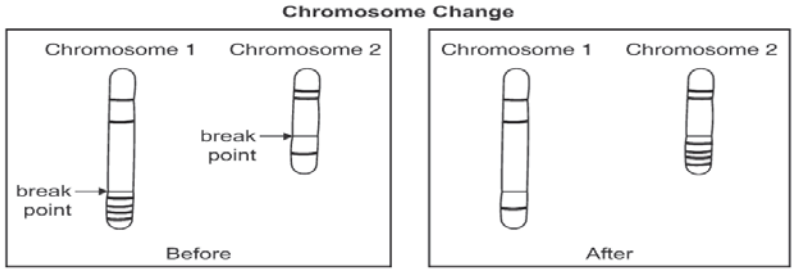
48. In cell division where is genetic variation introduced in eukaryotes?

a. cytokinesis in mitosis
b. crossing over in mitosis
c. anaphase I of meiosis
d. Prophase II of meiosis

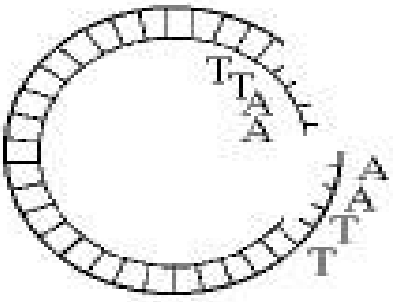
49. Regarding the sequence alignment Blast results below the most significant E value for *Mus musculus(mouse)* is:
a. 8e-79 b. 1e-17 c. 2e-05 d. 5e-18

Sequences producing significant alignments:	Score (bits)	E Value
gi|112189|pir||S11563 probable MASH-2 protein - rat >gi|227...	291	8e-79
gi|440957|gb|AAB28830.1| Achaete-Scute homolog Mash-1 gene ...	283	3e-76
gi|2134688|pir||A48279 achaete scute protein - human >gi|30...	283	3e-76
gi|20455478|sp|P50553|ASH1_HUMAN Achaete-scute homolog 1 (H...	283	3e-76
gi|6678806|ref|NP_032579.1| achaete-scute complex homolog-l...	278	7e-75
gi|2642465|gb|AAB86993.1| Achaete-Scute homologue 2 [Homo s...	105	2e-22
gi|112188|pir||S11562 probable MASH-1 protein - rat >gi|566...	92	2e-18
gi|17432908|sp|O35885|ASH2_MOUSE Achaete-scute homolog 2 (M...	90	5e-18
gi|8574075|emb|CAB94773.1| Mash2 protein [Mus musculus] >gi...	89	1e-17
gi|1754729|gb|AAB39362.1| ASCL2 [Homo sapiens]	65	3e-10
gi|17456298|ref|XP_062690.1| similar to putative bHLH trans...	55	2e-07
gi|20863265|ref|XP_137216.1| similar to transcription facto...	53	1e-06
gi|27717809|ref|XP_235013.1| similar to Achaete-scute homol...	52	1e-06
gi|27679426|ref|XP_215039.1| similar to putative bHLH trans...	52	2e-06
gi|18249653|dbj|BAB83912.1| putative bHLH transcription fac...	51	3e-06
gi|28273166|tpg|DAA00301.1| TPA: class II basic helix-loop-...	51	3e-06
gi|20910395|ref|XP_136181.1| similar to putative bHLH trans...	50	4e-06
gi|13928056|emb|CAC37689.1| MASH5 protein [Mus musculus] >g...	50	7e-06
gi|18249655|dbj|BAB83913.1| putative bHLH transcription fac...	49	2e-05
gi|10190680|ref|NP_065697.1| ASCL3 [Homo sapiens] >gi|80522...	49	2e-05
gi|20454833|sp|Q9NQ33|ASH3_HUMAN Achaete-scute homolog 3 (b...	49	2e-05
gi|8648972|emb|CAB94840.1| dHAND basic helix-loop-helix tra...	48	2e-05
gi|12054812|emb|CAC20671.1| dHand protein [Mus musculus]	48	2e-05

50. The mutational chromosomal change shown to the right is:
a. a deletion
b. a translocation
c. an insertion
d. a duplication

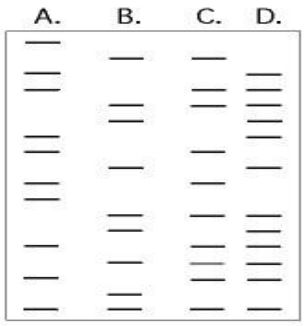


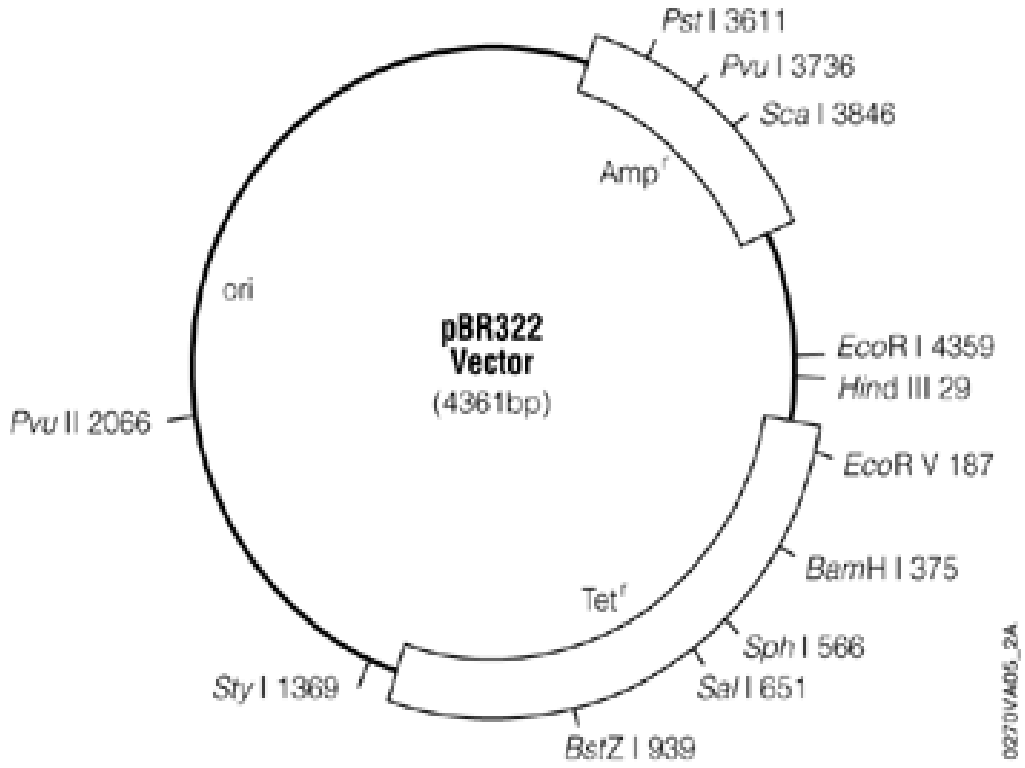
51. Achondroplastic dwarfism is caused by a lethal dominant gene. A person who has inherited one copy of the gene develops the dwarf phenotype, whereas a homozygous dominant fetus usually dies *in utero*. A husband and wife, both dwarfs, are expecting a child. What are the chances the child will have "normal" stature (i.e. no dwarfism)?
a. 50% b. 25% c. 75% d. 0%



52. Which of the enzymes listed below was used to produce the molecule to the right?
a. DNA polymerase
b. Pyrimidine dimer
c. RNA polymerase
d. restriction enzyme

53. The diagram to the right shows a "DNA fingerprinting" gel for four people. Which interpretation is supported by the evidence?
a. A and C are the parents of D
b. A and B are the parents of D
c. C and D are the parents of A
d. A and C are the parents of B





54. The picture above shows a simplified map of a bacterial plasmid called pBR322. In this map *Amp* is the gene for ampicillin resistance and *Tet* is the gene for tetracycline resistance. Ampicillin and tetracycline are antibiotics that kill bacteria. Suppose a foreign piece of DNA is cloned into the *PstI* site. Competent E. coli cells are allowed to take up the recombinant plasmids and are grown on nutrient agar plates as follows:
(Plate 1) with ampicillin and tetracycline
(Plate 2) without antibiotics
(Plate 3) with ampicillin
(Plate 4) with tetracycline

On which plates would we expect to see successful bacterial growth?
a. Plate 1 only
b. Plate 2 only
c. Plates 2 and 4
d. Plates 1 and 3

55. Referring to the conditions stipulated in question 54 above, which of the plates would most likely harbor cells that contained the recombinant plasmids?
a. 1 b. 2 c. 3 d. 4

56. A cross between two snapdragon plants with pink flowers produced plants that had either red, pink, or white flowers respectively. Determine the probable inheritance pattern for these results.
a. Sex linked recessive
b. Codominance
c. Incomplete dominance
d. Simple dominance

57. In some dog breeds, deafness is genetically inherited. In the U.S., e.g., 8% of all Dalmatians are bilaterally deaf and 22% are unilaterally deaf. What is the probability that the offspring of a normal heterozygous (Dd) dog and a deaf dog (dd) would have normal hearing?
a. 0%
b. 50%
c. 25%
d. 75%

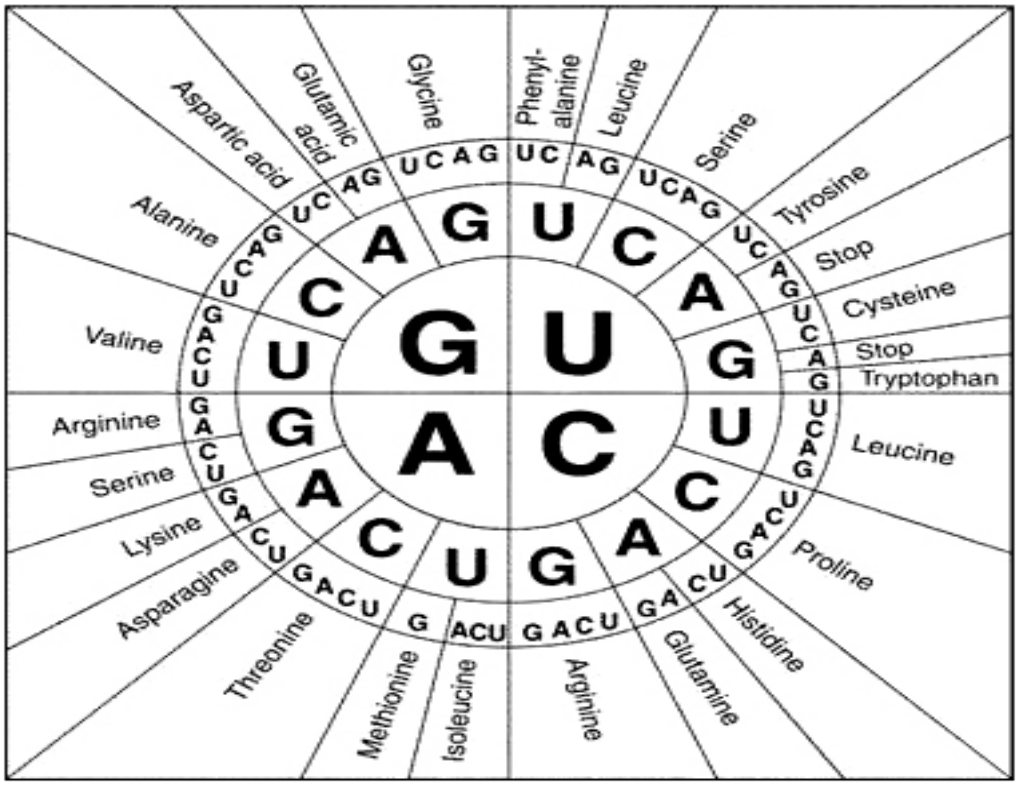
58. Using PCR technology molecular biologists can
a. determine the sequence of DNA bases in a gene.
b. make many copies of a piece of DNA.
c. fuse two DNA sequences from different species.
d. transform bacterial cells.

59. Use the chart with Gene and trait to the right. From a cross of a *BBSS* female with a *bbss* male which of the following statements is true?
a. all the offspring have white fur and short hair fur
b. all the offspring have black fur and long hair fur
c. all of the offspring have black fur and short hair fur
d. all of the offspring have white fur and long hair fur

Gene	Trait
B	black fur
b	white fur
S	short hair fur
s	long hair fur

60. You have discovered a piece of RNA sequence that codes for isoleucine, tyrosine, proline, cysteine, and aspartic acid. Of the choices below which could be a DNA sequence that codes for these amino acids
a. TACAUGGGTACACAA
b. TAGATGGGTACACTA
c. TAGATGGCTACTCTA
d. TAGATGGCTACACTA

mRNA CODON WHEEL



New Jersey Science League

Biology I Answer Key Blue Test

Date: February 12, 2015

Record onto the area record the # correct

(corrected answer)

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

Biology 1 Science League Biology March 12, 2015 Exam BLUE TEST (Correction)

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.

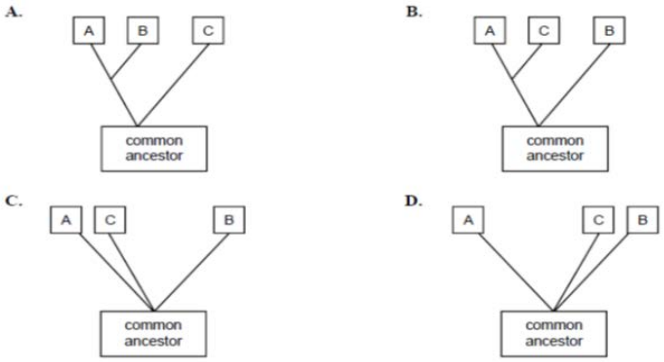
1. Why is polymorphism considered important in evolution?
   a. polymorphic genes mutate
   b. polymorphism follows the Hardy Weinberg principle
   c. individual variations is seen as a factor for natural selection
   d. populations are made of heterozygous individuals

2. One of the most famous horses, Man o' War, won three stakes races in 17 days, and became a national hero in 1919. He held 5 records for distance. His speed is a good example of the fact that selection:
   a. does not work in horses
   b. works in conjunction with genetic variability present in a population
   c. genetic drift works in a small population
   d. is attributed to practice runs

3. When *Drosophila mauritiana* mates with *Drosophila simulans* no viable males are produced. A single gene mutation, which encodes a component of the nuclear pore complex, is responsible. This is an example of
   a. Sympathic speciation
   b. Geographic isolation
   c. Prezygotic isolating mechanism
   d. Postzygotic isolating mechanism

4. Based on the number of amino acid differences in the protein sequence of cytochrome c of species A, B, and C shown in the table below which phylogenetic tree A, B, C, or D below best represents the data?

	Species B	Species C
Species A	21	13
Species B		20



5. Which statement is **not correct** with regard to Darwin's theory of natural selection?
   a. Populations have inheritable traits
   b. Certain populations have adaptive traits
   c. Reproduction population numbers are generally small
   d. There can be competition among members of a population

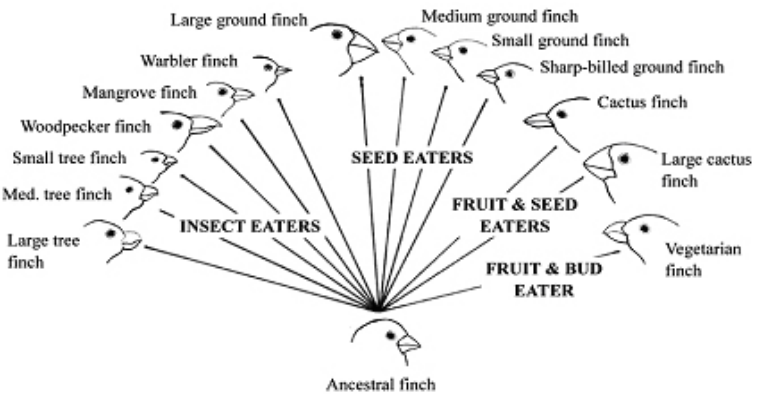
6. Which item does not contribute to phenotypic variability from a recessive allele within a population?
   a. Homozygosity b. Sexual Reproduction c. Heterozygosity d. Diploidy

7. In parts of New York City there are parrots that have been able to survive the winter. These parrots are related to a flock that was inadvertently released at Kennedy Airport in 1967. The reason that these parrot survived is:
   a. asexual reproduction of a mutant gene
   b. ancestral genetic diversity that allows parrots to withstand a variable temperate climate
   c. continual overpopulation of the species
   d. extinction of all other species of parrots in New York City, therefore no competition

8. Choose the statement that demonstrates the best representation of natural selection.
   a. The average bone density of teenagers increased as a result of increased student participation in sports.
   b. The average toxin level in populations of poisonous *Rana* species increased due to higher levels of predation.
   c. The length of the necks of giraffes increased in order to allow giraffes to browse on leaves of trees.
   d. Since World War II, the average height of Americans has decreased.

9. What is the explanation for the large diversity of finches that has arisen from a small ancestral population as seen in the diagram below.

   a. Recessive traits were eliminated over time
   b. Populations of ancestral finches adapted to local environmental conditions
   c. Some recessive traits were terminal due to harmful attributes
   d. Ancestral finches were not affected by environmental pressures



10. Two populations geographically or genetically diverge from each other. If the process continues long enough they may become two different:
    a. Hybrids b. Species c. Polyploids d. Allopatric

11. A mutation in a population that has no selective advantage in the environment of that population is said to be a _____ mutation
    a. Natural b. Variable c. Neutral d. Disruptive

12. Two species are able to copulate and produce a fertilized egg. However the embryo does not survive. The isolating mechanism is:
    a. Mechanical Isolation c. Pre- zygotic isolation
    b. Temporal Isolation d. Post -zygotic isolation

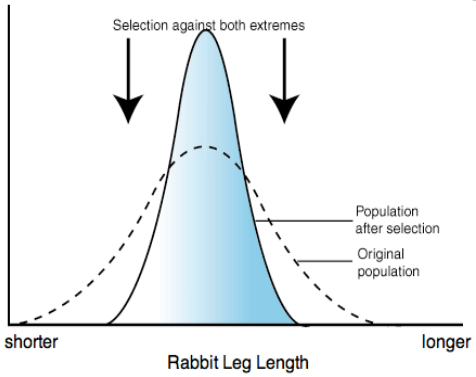
13. The Earth's atmosphere was first oxygenated by photosynthetic activity of which organism below:
    a. Cyanobacteria c. Proteinoids
    b. Water splitting heterotrophs d. Sulfur bacteria

14. Which of the following correctly pairs the group of archaebacteria with the environment in which the group lives?
    a. Thermophiles: marshes c. Thermophiles: ruminant stomachs of cows
    b. Methanogens: the Dead Sea d. Halophiles: the Great Salt Lake

15. Keeping evolution in mind, why would the use of antibiotics to treat viral infections be considered ill advised?
   a. you may become dependent on the antibiotic
   b. overuse of drugs are not advisable
   c. viruses may become resistant to the antibiotics
   d. viruses are not affected by antibiotics but the antibiotics may select for resistant bacteria

16. A Christmas present by Thomas Austin is credited for the releasing 24 *Oryctolagus cuniculus* wild rabbits at his Barwon Park property near Geelong in Victoria, Australia, in 1859 for the purpose of hunting. This small population rapidly grew and by 1900, the rabbits had reached the Northern Territory and Western Australia. In 1950, the myxoma virus was introduced to control the rabbit population. This initially wiped out between 95 and 100% of rabbits. However, the rabbit population recovered. Sustained use of the virus resulted in a population that was by-and-large resistant. What best explains the evolution of resistant rabbits?
   a. Myxoma virus life span is too short to have a lasting effect on rabbits
   b. Natural selection did not favor myxoma resistance in rabbits
   c. Genes for resistance were already present in the initial rabbit population.
   d. The application of myxoma virus caused a mutation to develop among rabbits. This mutation conferred resistance.

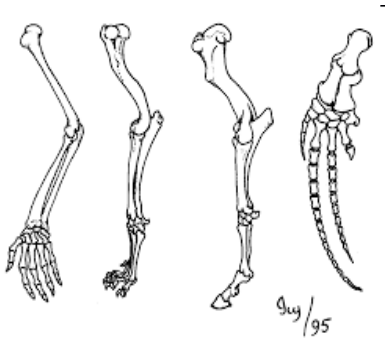
17. Which of the items below are illustrated by the adjacent graph.
1. Adaptation
2. Disruptive selection
3. Genetic Drift
4. Stabilizing Selection
5. Punctuated Equilibrium



   a. 2 and 5 b. 1, 2, 4 c. 3 and 4 d. 1 and 4

18. Assume the frequency of the recessive allele for sickle ß hemoglobin in a given population is 0.20. What is the expected proportion of heterozygous individuals?
   a. 0.16 b. 0.32 c. 0.80 d. 0.10

19. What best explains the homologies demonstrated in the forelimb bones of the different species shown in the diagram?
   a. The species can interbreed.
   b. The species are adapted to the same environment.
   c. The forelimbs of each species fulfill a similar function.
   d. The species share common ancestor.



20. Punctuated equilibrium best explains:
   a. the appearance of new species in relatively short periods of geologic time.
   b. the presence of vestigial structures.
   c. the lack of diversity among small isolated populations.
   d. the observation that some layers of sedimentary rock are devoid of fossils.

21.

Organism	Derived Characteristics		
	Backbone	**Legs**	**Hair**
Earthworm	Absent	Absent	Absent
Trout	Present	Absent	Absent
Lizard	Present	Present	Absent
Human	Present	Present	Present

From the table of derived characteristic above which organism is an outlier of the group?

a. Lizard
b. Trout
c. Earthworm
d. Human

22. What best explains the spread of *MRSA (*methicillin-resistant *Staphylococcus aureus)* in hospital environments?

a. Bacteria evolved resistance in order to combat methicillin.
b. Use of methicillin stimulated bacteria to mutate.
c. Farmers overuse methicillin-resistant bacteria
d. Overuse of methicillin favored already resistant bacteria.

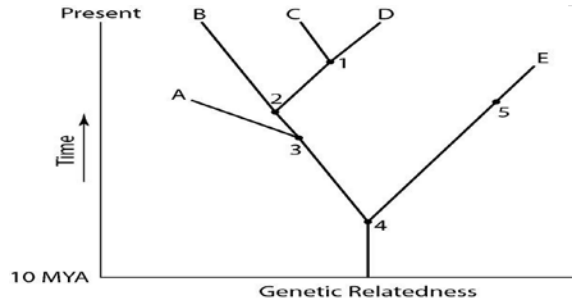
23. Place the following statements in the correct order that is most consistent with the principles of natural selection.

1. Those individuals who are better suited to an environment will be successful to survive and propagate.
2. There are variations within a population; in some cases the changes may be genetic
3. With time there is an increase in certain characteristics in a population.
4. Some individuals of a population may be more suited to a particular environment

a. 2, 4, 1, 3 b. 3, 4, 2, 1 c. 4, 3, 1, 2 d. 4, 2, 3, 1

24. According to the adjacent cladogram what is the most recent common ancestor of species A, B, C and D?

a. 1
b. 2
c. 3
d. 4

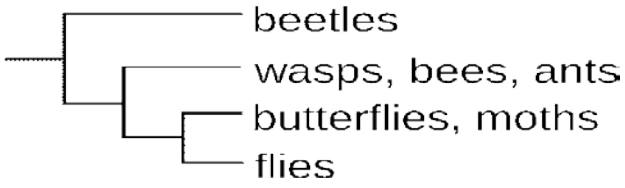


25. Members of *Psittirostrini*, known as "Hawaiian finches" are a group of birds with similar body shape and size but vary in color and beak shape. Each species occupies its own niche and are adapted to the foods available in its niche. This is an example of:

a. Convergent evolution
b. Divergent evolution
c. Disruptive evolution
d. Coevolution

26. Which statement is not correct about the adjacent cladogram?

a. Beetles are related to butterflies, moths and flies
b. Beetles are more closely related to wasps, bees and ants than they are to flies
c. Flies share a more recent common ancestor with wasps than with beetles
d. Beetles evolved into wasp



27. Some large snakes such as pythons have small internal leg bones. These bones are examples of:
a. fossil organs b. vestigial structures c. naturally adapted structures d. birth defects

28. On the island of Madagascar (located in the Indian Ocean off of the east coast of Africa) one can find many species of small, monkey-like animals called LEMURS. Each species is specially adapted to fulfill a specific niche, yet all of them are thought to have evolved from one or a few ancestral species when Madagascar first separated from the African continent many millions of years ago. This example best illustrates which evolutionary pattern?
a. convergent evolution b. adaptive radiation c. genetic drift d. bottleneck effect

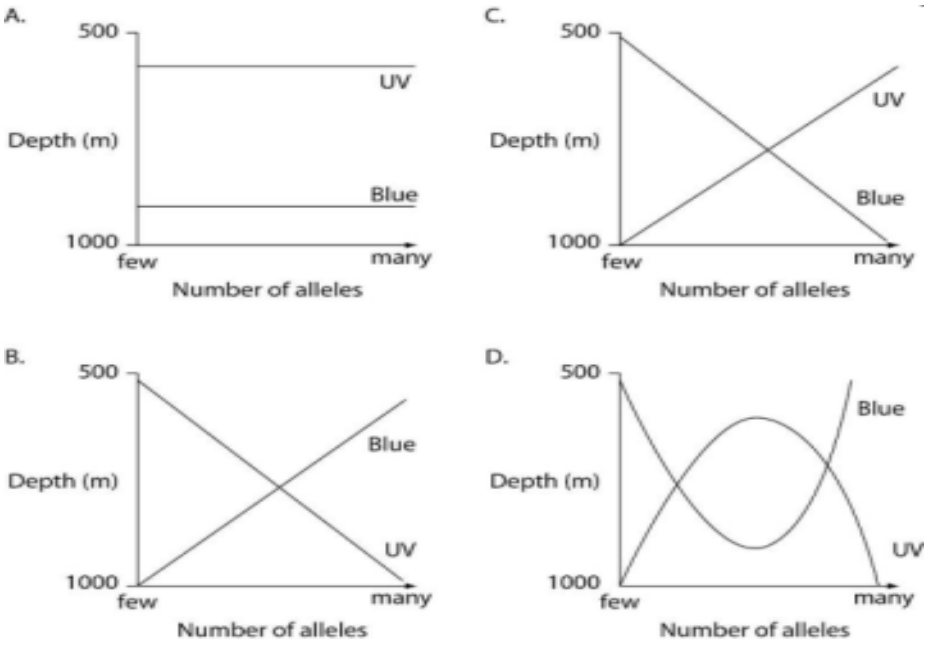
29. Of the statements below which is **correct** regarding the pairwise comparison of mitochondrial DNA sequences of the different species listed below?

Human	ACACCATA
Chimpanzee	ACACCATA
Bonobo	ACACCATA
Gorilla	CCACCACA
Orangutan	CCACCACA
Gibbon	CCACCATA

a. The bonobo is more closely related to the gibbon than to the chimpanzee
b. Bonobos, gorillas, and gibbons are the most closely related group
c. Humans are more closely related to gibbons than to bonobos
d. Gibbons are least closely related to humans

30. The evolution of bilateral symmetry and forward movement led to:
a. highly developed digestive system c. cephalization
b. segmentation d. acquired characteristics

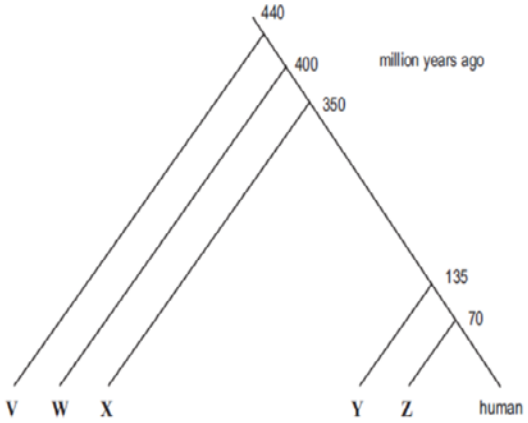
31. In certain fish that inhabit depths from 500 to 1,000 meters there is a gene that exists in 2 alleles. One allele produces a photopigment sensitive to UV light. Another allele produces a photopigment that is sensitive to blue light. Which graph below A, B, C, or D depicts the predicted allele distribution so that the fish that express them can be well seen? Note UV light penetrates deeper into bodies of water than blue light.



32. Assum that an evolutionary relationship of these vertebrates has been established. What is the correct placement of each organism on the figure below? That is what organism would be placed at position V, W, X, Y, and Z?

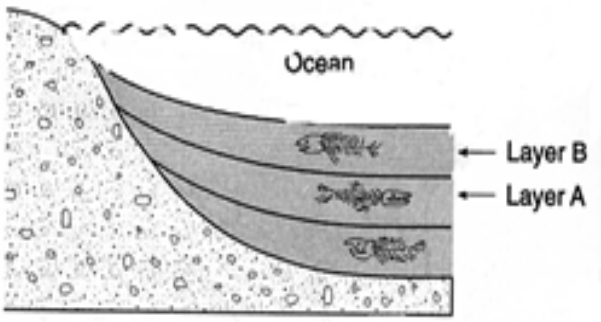
Organism	Tiger Shark	Koala	Newt	Cow	Salamander
Amino Acid differences in polypeptide compared to humans	85	35	70	15	73

	V	W	X	Y	Z
a.	Cow	Koala	Newt	Salamander	Tiger shark
b.	Tiger shark	Salamander	Newt	Koala	Cow
c.	Koala	Salamander	Newt	Tiger shark	Cow
d.	Salamander	Tiger shark	Koala	Newt	Cow



33. Fossils of *Glosspteris*, a fernlike plant that lived 250 million years ago, have been found in rocks in Africa, South America, Australia, India, and Antarctica. What is the best explanation for the presence of *Glosspteris* on these continents?
a. Human migration spread the Glosspteris seeds
b. The continents were initially connected
c. *Glosspteris* evolved independently on the continents
d. Birds carried the Glosspteris seeds to the islands

34. The diagram below shows undisturbed sedimentary strata at the bottom of the ocean. The fossils found in layer B resemble the fossils found in layer A. This similarity suggests that:
a. The fossils in Layer A are ancestral to the fossils in Layer B
b. All of the fossils in all of the layers were deposited at the same time in one worldwide flood
c. The fossils in Layer B are ancestral to the fossils in Layer A
d. The fossils in Layer A must be more developed than those in Layer B



35. Which statement below best explains the evolution of large beak size in a species of bird?
a. The birds needed to evolve larger beaks in order to eat the larger seeds, and they adapted over time to meet that need.
b. Some members of the ancestral population had larger beaks. Since larger beaks were adaptive the birds with larger beaks increased in frequency.
c. The birds discovered that by stretching their beaks, the beaks would get larger. This mutation was passed to the next generation
d. Large beak size occurred as a result of a random selection in each member of the population.

36. What is the relationship between the wing of a bird and the wing of a bat?
a. They are derived characteristics
b. They are homologous because they represent modified forms of a trait, namely forelimbs, present in a common ancestor.
c. They are analogous because the flight trait is the result of convergence
d. B and C

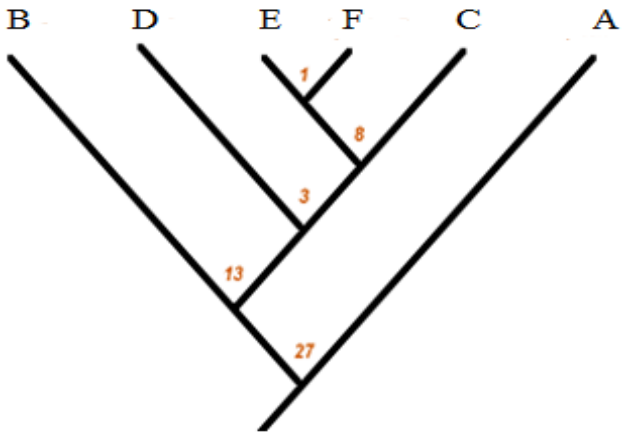
37. Presently at Piedras Blancas, California, elephant seals, once almost extinct, have increased in numbers but the species have few genetic variations between individuals. The elephant seals have experienced:
    a. A founder effect
    b. Natural Selection
    c. Genetic Bottleneck
    d. A mutational change

38. Regarding the Endosymbiont Hypothesis, which of the selections below is not consistent with the hypothesis?
    a. Chloroplasts evolved from cyanobacteria
    b. Chloroplasts and mitochondria reproduced by simple fission
    c. Ribosomes in eukaryotic cells evolved from prokaryotic ribosomes
    d. Mitochondria evolved from aerobic bacteria

39. What best accounts for the genetic diversity seen in individuals of a population?
    a. Inbreeding
    b. Somatic mutations
    c. Stabilizing selection
    d. Meiotic recombination of existing alleles

40. South American maras are rodents that look and behave very much like rabbits do in Europe, even though they are not closely related. What evolutionary principle best accounts for this observation?
    a. Convergent evolution b. Divergent evolution c. Adaptive radiation d. Geographic isolation

41. The number of differences in the amino acid sequences of *Cytochrome-b* between Species (A-F) are shown in the cladogram below. Which species shares the most recent common ancestor with species letter E?



    a. Species D
    b. Species F
    c. Species C
    d. Species B

42. Mammals have evolved a developmental pattern of small intestinal gene expression that promotes high-level lactase production early in development and reduction of gene expression after weaning. 90% of adult Europeans have a lactase-producing allele that remains active into adulthood. Evidence from DNA analysis of bone samples of a number of Europeans (dating from 5840 BC and 5000 BC) concluded that none of them had the adult lactase allele. A plausible explanation for this data is:
    a. Modern Europeans did not descend from the test group of Neolithic Europeans
    b. All ancestors of modern humans have adult lactase-producing alleles throughout their lifetime
    c. The adult lactase production mutation must have occurred more recently than 5000 BC
    d. Adult lactase production created no evolutionary advantage

43. A layer of ancient flood debris was uncovered at an excavation site. The layer consisted of fossilized plants and animal remains embedded in sandstone that was radioactively dated to be approximately 10 million years old. The debris had been deposited under a boulder-strewn river valley. What can we infer from this information?
    a. The fossils are more than10 million years old.
    b. The fossilized animals ate the fossilized plants
    c. The fossilized plant and animal remains are older than the sandy sediment
    d. The boulders of the river valley are younger than the fossils

44.The spiny anteater (*Echidna)* and the nine-banded armadillo (*Dasypus novemcinctus)* are not related but both share characteristics such as long snouts, sticky tongues, and very sharp claws for digging ants. The most plausible explanation for these similarities is:

a. convergent evolution b. coevolution c. adaptive radiation d. mechanical isolation

45. What is the correct order in which each of the following appeared in the history of life on earth?

a. Photosynthetic prokaryotes, eukaryotes, primordial soup, non-photosynthetic prokaryotes
b. Primordial soup, non-photosynthetic prokaryotes, photosynthetic prokaryotes, eukaryotes
c. Non-photosynthetic prokaryotes, photosynthetic prokaryotes, primordial soup, eukaryotes
d. Primordial soup, eukaryotes, photosynthetic prokaryotes, non-photosynthetic prokaryotes

46. Which of the statements below is supported by data from the chart?

a. There are more amino acid differences between Human and Chimpanzee than Horses and Humans
b. Horses and Humans have fewer amino acid differences than Gorillas and Humans
c. Gorillas are closest to Humans according to amino acid differences
d. There are more amino acid differences between Humans and Horses than Horses and Zebras

Species	Sequence of Amino Acids in the Same Part of the Hemoglobin Molecules
Human	Lys–Glu–His–Iso
Horse	Arg–Lys–His–Lys
Gorilla	Lys–Glu–His–Lys
Chimpanzee	Lys–Glu–His–Iso
Zebra	Arg–Lys–His–Arg

47. Natural selection is to adaptation as genetic drift is to_____

a. evolution b. chance c. diversity d. reproduction

48. Negative frequency dependent selection will decrease the frequency of which of the following phenotypes in a population?

a. The most common phenotype
b. The mean phenotype
c. The extreme phenotype
d. The least common phenotype

49. The Cambrian explosion was:

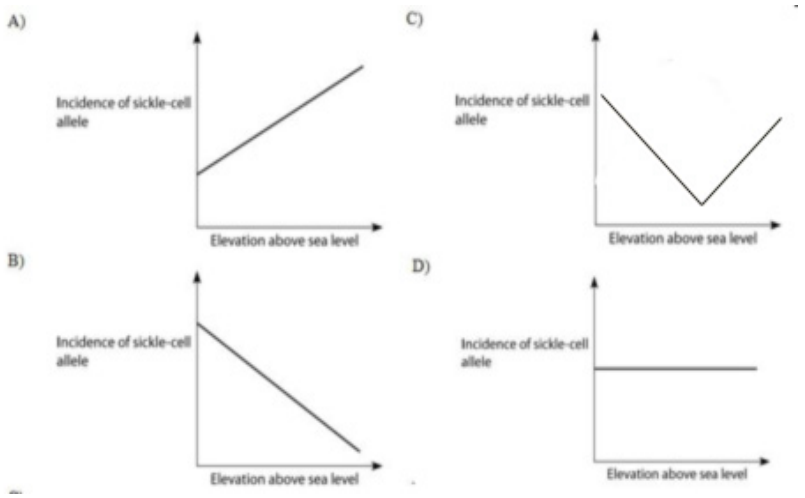
a. The origin of prokaryote from a eukaryote ancestor
b. The exothermic reaction that precipitated the oxygen in the ocean
c. The appearance in the fossil record of most major animal body plans about 543 million years ago
d. The impact that has been thought to give rise to the moon

50. In the Australian sheep blowfly, *Lucilia cuprina*, wing-length is a polygenic trait. This indicates that:

a. There are a small number of clearly defined phenotypes
b. wing length is controlled by one gene with many alleles.
c. the wing length phenotype shows little variation.
d. the phenotype is influenced by more than one gene.

51. Anopheles mosquitoes carry malaria and cannot live above elevations of 5,900 feet. In addition, oxygen availability decreases with higher elevation. Some Tanzanian tribes are adapted to living at higher elevations such as Mt. Kilimanjaro whose base is about 2,600 feet above sea level and whose peak is 19,341 feet above sea level. Plotting the incidence of the sickle cell allele(y-axis) in this human population versus elevation(x-axis), which distribution is most likely?

a. A
b. B
c. C
d. D

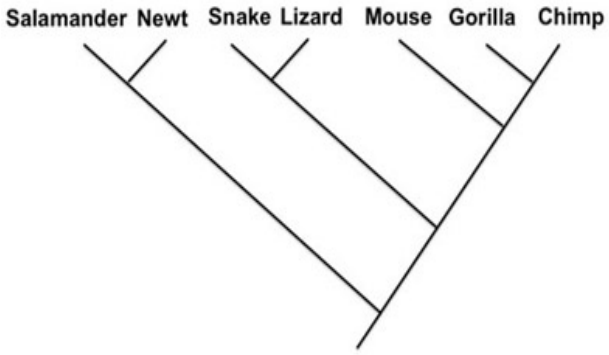


52. Assume that producing daughter cells that are genetically different from mother cells is favored in natural selection. Which of the following would be selected for?
1. Polynucleotide polymerase with low mismatch error
2. Polynucleotide polymerases without proofreading ability
3. Efficient polynucleotide repair enzymes
4. Polynucleotide polymerases with proofreading ability
5. Polynucleotide polymerases with high mismatch error

a. 1 and 5
b. 2 and 5
c. 2 and 4
d. 2, 3, 4

53. A population of Madagascar hissing cockroaches, *Gromphadorhina portentosam* suffers from heavy predation by lizards. Due to small heads, the lizards are unable to eat the larger adult cockroaches and therefore prey upon small to medium sized adults. What specific type of selection do the lizards pose on the roaches?

a. Directional b. Disruptive c. Stabilizing d. Unnatural

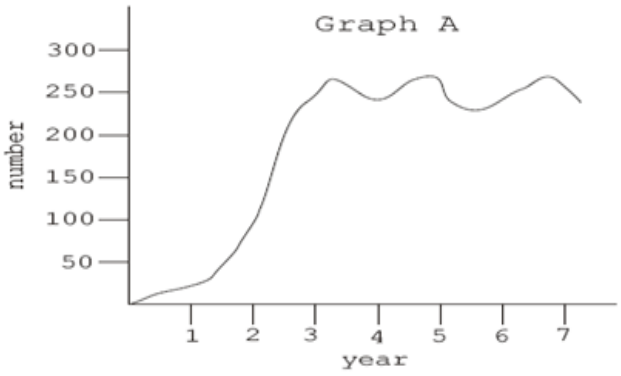


54. Choose the statement that best represents the evolutionary relationships above.

a. A Mouse is more closely related to a newt than to a gorilla
b. A Lizard is more closely related to Mouse than to a Newt
c. A Snake is more closely related to a Salamander than to a Chimp
d. A Gorilla is more closely related to a lizard than to a chimp

Use the graph below to answer questions 55 and 56.

The graph represents the carrying capacity for a population of grass-eating animals in a large valley.



55. The carrying capacity of this population was reached during which year?
    a. 3
    b. 4
    c. 6
    d. 7

56. What may have caused the fluctuations in the population between year 3 and year 7 may be attributed to
    a. Drought
    b. Increased competition
    c. Increased predation
    d. Any of the factors already identified above

57. Artificial selection was responsible for
    a. extinction of the dinosaurs
    b. the evolution of sharks
    c. differences between human societies
    d. the greyhound

58. A ten-year study of the genetics of brown-headed cowbirds (*Molothrus alter)* concluded that the frequency of a harmful allele decreased about 10% in the population. A possible explanation for this decrease is:
    a. The allele is a lethal dominant
    b. The allele is a lethal recessive
    c. The allele is sex-linked recessive
    d. Disruptive selection

59. The Northern flying squirrel (*Glaucomys sabrinus*), a placental mammal, closely resembles the flying phalanger of Australia, a marsupial. They are similar in size, have long bushy tails and skin folds that allow them to glide through the air. These two species are genetically and geographically separated by great distances. Their evolution can be explained by _____.
    a. Disruptive evolution b. Divergent evolution c. Convergent evolution d. Speciation

60. Pandas developed an **extended wrist** bone, which acts a bit like a thumb, allowing them to hold onto bamboo while they are chewing. This is an example of:
    a. Comparative anatomy
    b. Fitness
    c. Adaptation
    d. Neutral selection

New Jersey Science League

Biology I Answer Key Blue Test

Date: March 12, 2015 (Corrected)

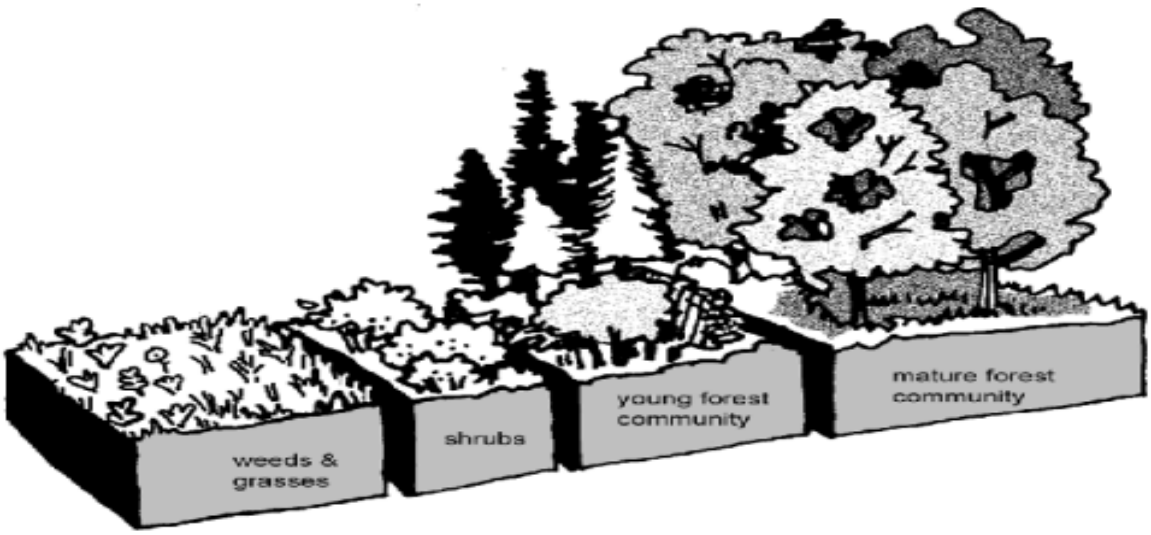
Record onto the area record the # correct

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

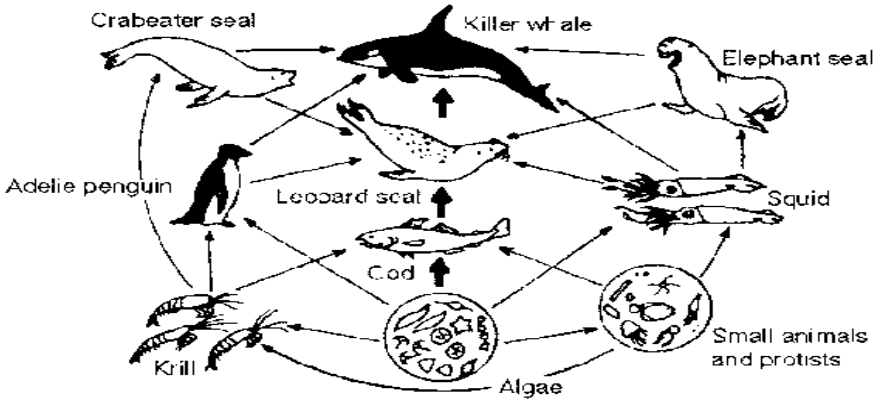
Biology 1 Science League Biology April 9, 2015 Exam **BLUE TEST**

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. The process demonstrated in the image below is:
   a. competitive exclusion b. succession c. symbiosis d. dynamic equilibrium



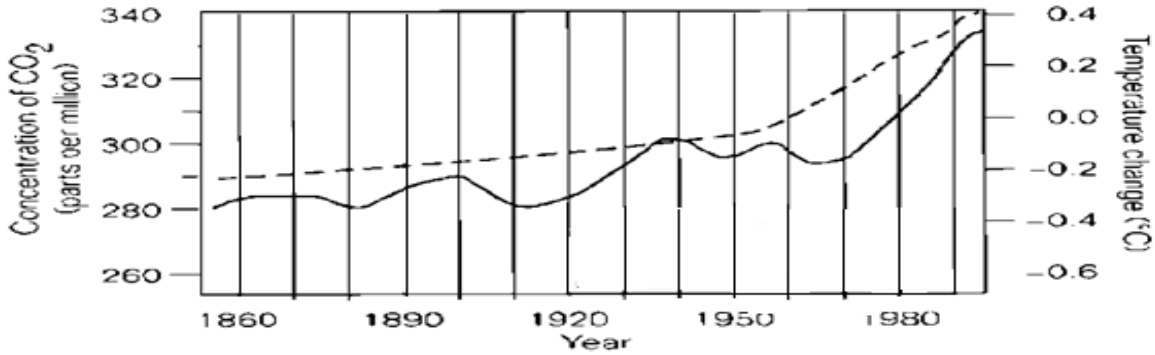
2. Killer whales feed at the
   a. First and second trophic levels.
   b. Second trophic level only.
   c. Second and third trophic levels.
   d. Third and fourth trophic levels.



3. Denitrification: nitrogen gas in the atmosphere::
   a. more rain : transformation of rain forests
   b. more transpiration : arid weather
   c. burning fossil fuels : carbon in the atmosphere
   d. combustion : ground water

Use the graph below for questions #4 and 5. The concentration of CO_2 (left side of graph) and temperature (right side of graph) are plotted against the year

4. Which statement below depicts the information portrayed in the graph below?
   a. From 1870 to 1940 the concentration of CO_2 constantly increased.
   b. The concentration of CO_2 in the atmosphere has increased at the same steady rate for the past 10 years.
   c. The concentration of CO_2 and the temperature were the same in 1890.
   d. The concentration of CO_2 and the temperature showed no movement



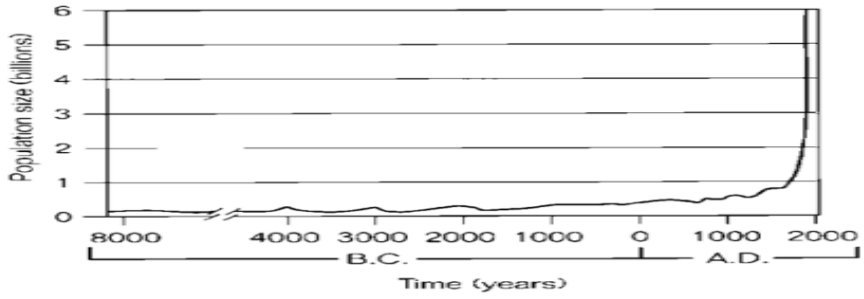
Temp bottom solid line. CO_2 top dotted line

5. Based on the graph above what conclusion could be reached?
   a. the rise in temperature is causing the rise in carbon dioxide
   b. the rise in carbon dioxide is causing the rise in temperature
   c. both carbon dioxide and temperature have risen since 1860
   d. the rise in carbon dioxide is causing global warming

6. If a large chemical spill occurred in a river, the species diversity would most probably
   a. enhance
   b. recover, but it would takes years
   c. recovers quickly.
   d. the species diversity would be unaffected.

7. The Human Population Growth graph below depicts:
   a. humans were not present on the Earth around 4000 B.C.
   b. the human population has shown a decrease in population size from 1000 to 2000 AD
   c. an increase in the food supply was responsible for the increase in the population size.
   d. that the human population is currently rising

Human Population Growth



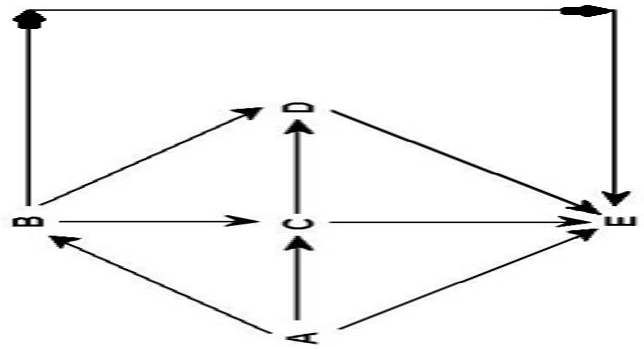
8. The Human Population according to the graph above:
   a. remained essentially unchanged for 10,000 years
   b. doubled in size from 2000 B.C.to 1000 B.C.
   c. reached 1 billion at around 1800 A.D.
   d. will stop growing in the year 2000

9. Which biome has the correct description of its climate?
   a. tundra–long summers, mild winters
   b. tropical forests–nearly constant day length and temperature
   c. savanna–low temperature, precipitation uniform during the year
   d. temperate broadleaf forest–relatively short growing season, mild winters

10. If that the number of bird species is determined mainly by the number of vertical strata found in its environment which of the following biomes would you find the greatest number of bird species?
   a. savanna b. desert c. tropical rain forest d. temperate grassland

11. Which species (letters A-E) in the food web below of a terrestrial ecosystem is most likely a decomposer? The arrows represent energy flow.

   a. A
   b. E
   c. C
   d. D

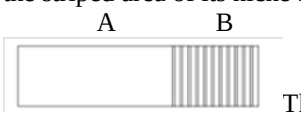


12. Regarding the food web in question 11 species C is toxic to predators. Which species is most likely to benefit from being a mimic of C?
   a. A b. B c. C d. D

13. Select the best statement below that ultimately describes what happens to the chemical energy that is not converted to new biomass in the process of energy transfer between trophic levels in an ecosystem?
   a. It is eliminated as feces or is dissipated into heat in accordance with the second law of thermodynamics.
   b. It is recycled by decomposers to a form that is usable by primary producers
   c. It is undigested and winds up in the feces and is not passed to the next trophic levels
   d. Heat produced by cellular respiration is used by heterotrophs to thermo regulate.

14. Which of the following statements about energy flow is incorrect?
   a. Secondary productivity declines with each trophic level.
   b. Approximately 90% of the energy at one trophic level does not appear at the next.
   c. Only net primary productivity is available to consumers
   d. Consuming meat is the most expedient way of acquiring photosynthetic productivity

15. The entire box shown below represents the niche of species A. Species A is biologically constrained from the striped area of its niche by species B.



This is an example of...

   a. competitive exclusion b. secondary succession c. stability d. commensalism

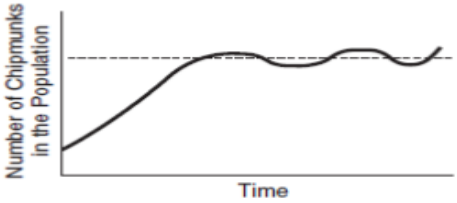
16. In order for the larvae of a particular species of mosquito to survive to the adult stage, the eggs need to be laid in the trapped pool of water of the northern pitcher plant. The mosquito larvae provide no apparent harm or benefit to the pitcher plant. This type of interaction is an example of
   a. parasitism b. predation c. mutualism d. commensalism

17. Which gas is **not** a green house gas?
a. nitrogen gas. b. methane c. carbon dioxide d. water vapor

18. In a pond, the primary producer is the cyanophyte alga, *Oscillatoria*, the primary consumer is the crustacean, *Snail*; the secondary consumer is a small fish, the *Sunfish*; and the tertiary consumer is a larger fish, the *Largemouth Bass*. What changes can be expected in the pond if the *Snails* are killed with pesticides?
a. The *Oscillatoria* population will probably decrease.
b. The *Largemouth Bass* population will decrease.
c. The *Sunfish* population will probably increase.
d. The *Snail* population will eat something else.

19. In the nitrogen cycle, the transformation of gaseous nitrogen into nitrogen-containing compounds is performed primarily by
a. green plants
b. carnivores
c. herbivores
d. bacteria

20. The drawing to the right illustrates the changes in a chipmunk population over time. Identify the statement below that best explains why the chipmunk population has stabilized.

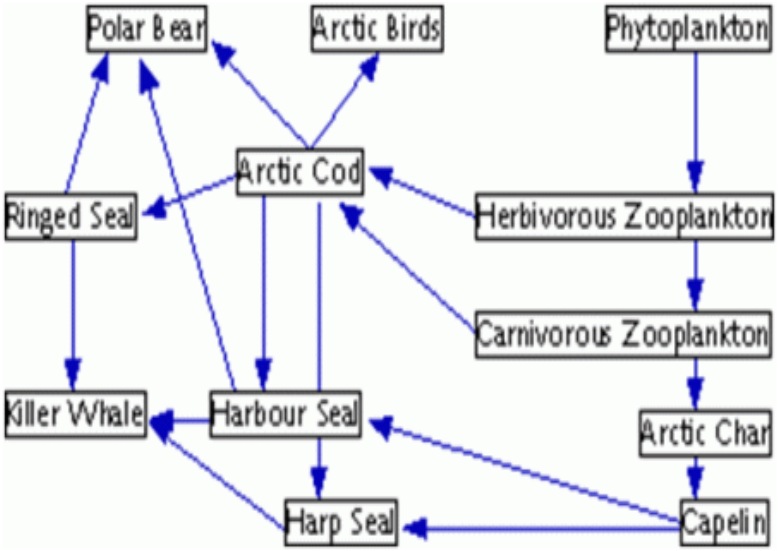


a. A predator entered the chipmunk's niche.
b. Limitation of resources, such as food.
c. An increase of interbreeding resulting in a higher mutation rate.
d. An increase of interbreeding resulting in a higher mutation rate.

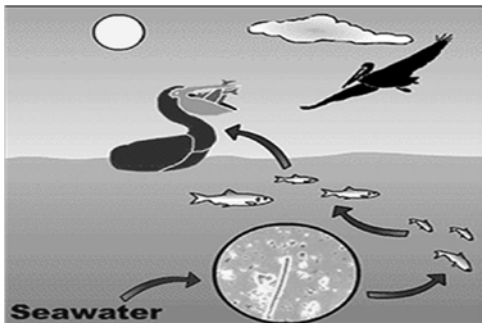
21. In a typical grassland community, which population would have the smallest biomass?
a. snake
b. hawk
c. grass
d. grasshopper

22. In the nitrogen cycle, the bacteria that replenishes the atmosphere with N_2 are
a. denitrifying bacteria
b. nitro fixing bacteria
c. nitrifying bacteria
d. methanogen protozoans

23. The most efficient transfer of energy **to** the artic cod occurs when it preys upon
a. harbour seals
b. carnivorous zooplankton
c. harp seals
d. herbivorous zooplankton



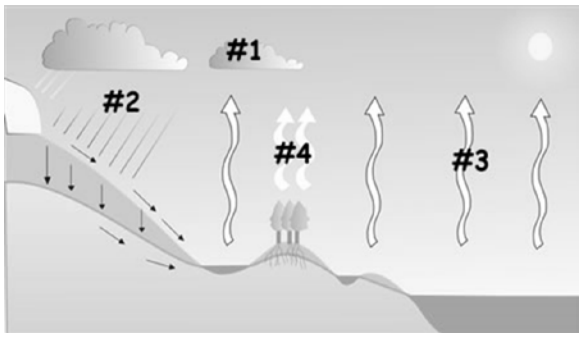
24. When this ecosystem was contaminated with the pesticide DDT, the highest *concentration* of DDT was found in the
    a. seawater
    b. microscopic plankton
    c. pelicans
    d. small fish



25. Ants are known to protect aphids from predators and in return receive some nutrients from the aphids. This relationship is an example of
    a. commensalism
    b. predation
    c. sexual selection
    d. mutualism

The diagram below shows different parts (#1, 2, 3, 4) of the water cycle. Use the diagram with questions # 26 and 27.

26. What is taking place in #2?
    a. condensation
    b. evaporation
    c. precipitation
    d. transpiration



27. What is occurring in #3?
    a. decomposition
    b. evaporation
    c. deamination
    d. respiration

28. Surtsey, a volcanic island approximately 32 km off the south coast of Iceland, is a fairly new island formed by volcanic eruptions that took place from 1963 to 1967. What process is responsible for the development of a biotic community on this barren rock?
    a. climax event b. secondary succession c. primary succession d. progression

29. What factor has contributed to the earth's greenhouse effect?
    a. Decomposers essential to recycling matter have been destroyed
    b. Plants are giving off too much oxygen
    c. Increased levels of carbon dioxide
    d. The Earth's tilt towards the sun

30. Which of the following would undergo secondary succession?
    a. Volcanic lava that has cooled
    b. A newly formed barrier island
    c. A bare rock outcrop
    d. An abandoned farm field

31. Eliminating this component from an ecosystem may cause its collapse.
    a. mushroom
    b. keystone species
    c. tertiary consumer
    d. dominant predator

32. With regard to nutrient cycling, why does timber harvesting in a temperate forest cause less ecological devastation than timber harvesting in tropical rain forests?

a. There are far fewer decomposers in tropical rain forests than in temperate forest ecosystems
b. Typical harvests remove up to 75% of the nutrients in the woody trunks of tropical rain forest trees causing nutrient-depleted soils.
c. Trees are generally less numerous in temperate forests causing fewer nutrients to be removed from the temperate forest ecosystem during a harvest.
d. The higher air temperatures in the tropics influences rain forest species to assimilate nutrients slower than in temperate forests.

33.Which statement best describes what ultimately happens to the chemical energy that is not converted to new biomass in the process of energy transfer between trophic levels in an ecosystem?

a. It is recycled by decomposers to a form that is once again usable by primary producers
b. It is eliminated as fecal matter.
c. It is used by organisms to maintain their life processes through the reactions of cellular respiration.
d. It is released back into the atmosphere as visible light

34. The female yucca moth, (*Tegeticula yuccasella)*, deposits her eggs and pollinates the yucca flower simultaneously. The moth larvae hatch and feed on the yucca seeds developing within the flower. This symbiotic relationship between the yucca flower and the yucca moth that pollinates it is best described as

a. commensalism
b. obligate mutualism
c. saprophytic
d. camouflage

35. The solar energy available to producers is 1,690,000 kcal/m^2/yr. The respiratory rate is the difference between the gross productivity and the net productivity. Looking at the data below the amount of available energy to animals that eat herbivores is?

Energy Flow in a River in a Forest (kcal/m^2/yr.)

Trophic Level	Energy consumed	Waste Energy	Gross Productivity	Net Productivity
Producer	None	1,678,999	12,578	6,478
Primary consumer	3890	2,879	678	545
Secondary Consumer	345	109	87	38
Decomposer	87	77	38	Slight amount

a. 109 kcal/m^2/yr. b. 38 kcal/m^2/yr. c. 77 kcal/m^2/yr. d. 545 kcal/m^2/yr.

36. What is the original source of energy for a food chain made up of green plants, insects, birds, and mammals?

a. autotrophs
b. sunlight
c. glucose and oxygen
d. water and carbon dioxide

37. Lichens, moss, and mold are growing on a log's surfaces found in a forest. On further laboratory investigation it was determined that the decaying log contained small insects, a small amount of land crustaceans and bacteria. Which of the organisms found in the log sample contributed to the most rapid and effective decay of the wood?

a. lichens and insects b. mold and bacteria c. mosses and lichens d. mosses and insects

38. Mongooses were brought by ship to Hawaii islands to kill snakes. However, the mongoose preying on snakes on the island caused the chickens on the island to prosper. Chickens thus turned out to be a worse pest than the snakes. This occurrence was due to:

a. Snakes are a limiting factor in the food chain.
b. Most organisms without predators are able to reproduce at a rate higher than their death rate.
c. Chickens served a useful purpose in maintaining the balance of nature.
d. Chickens and snakes produce the same number of viable eggs.

39. In an animal population, crowding and stress
    a. prevent parasitism
    b. prevent predation
    c. are density-independent factors
    d. are density-dependent factors.

40. Toxic substances are passed up the trophic levels at higher and higher concentration through the process of:
    a. Sustainability
    b. Biological magnification
    c. Waste removal
    d. Conservation

41. Which of the two factors listed below are most important in a biome distribution?
    a. the soil consistency and average air temperature
    b. the latitude and average air temperature
    c. the rainfall and latitude
    d. the rainfall and average air temperature

42. In the nitrogen cycle microorganisms produce activities that include all of the following **except:**
    a. removal of nitrogen from nitrate
    b. fixation of molecular nitrogen
    c. oxidation of ammonia to nitrates
    d. production of ammonia from urea, uric acid, and proteins

43. Which of the following include only greenhouse gases?
    a. methane, carbon dioxide, sulfur dioxide
    b. chlorofluorocarbons, nitrous oxide, hydrogen sulfide
    c. oxygen, methane, carbon dioxide
    d. carbon dioxide, nitrous oxide, methane

44. In aquatic ecosystem, which of the following is associated with an exponential growth of aerobic bacteria?
    a. loss of energy in higher trophic levels
    b. eutrophication
    c. replenishing populations of fishes
    d. bio magnification of pollutants

45. Pitcher plants are insectivorous and as such are well adapted to the bogs of New Jersey's Pinelands. Which statement best describes why pitcher plants are well adapted to this environment?
    a. Moths that are found only in the Pinelands, pollinate pitcher plants.
    b. The Pinelands get more rain than the rest of the state.
    c. Pinelands mosquitoes are bigger than mosquitoes in the rest of the state.
    d. Bog soil is relatively acidic.

46. Which characteristic of a geographical region would have the greatest impact on the type of ecosystem that forms in that region?
    a. ratio of autotrophs to heterotrophs
    b. number of food chains
    c. amount of atmospheric oxygen
    d. climate

47. Which statement below best explains why biomass decreases from one level to the next in diagram #1 below?

a. When organisms die at higher levels, their remains sink to lower levels, thereby increasing the mass at lower levels

b. More organisms die at higher levels than at lower levels, resulting in less mass at higher levels

c. Organisms decay at each level, therefore less mass is supported at higher levels

d. Energy is lost to the environment at each level, so less mass is supported at subsequent levels

Diagram #1

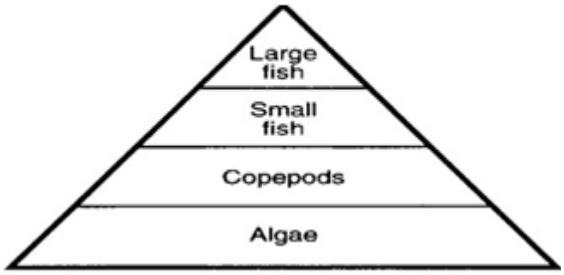
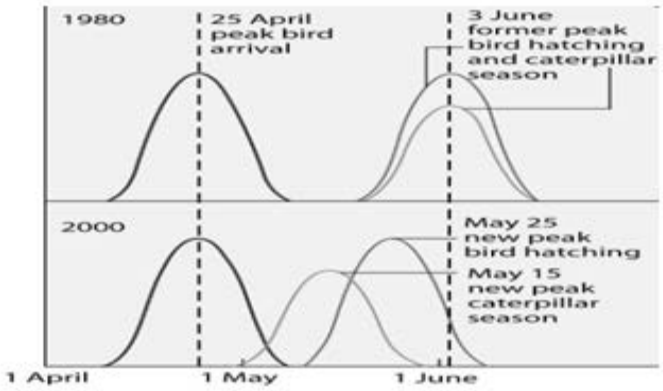


Diagram #2



48. Flycatcher birds that migrate from Africa to Europe feed their nestlings a diet that is nearly exclusively moth caterpillars. Diagram #2 above shows the mean dates of arrival, bird hatching, and peak caterpillar season for the years 1980 and 2000. Which factor is most likely responsible for the shift in caterpillar hatching time?

a. global warming

b. late migration returns of flycatchers

c. pesticides

d. acid rain precipitation

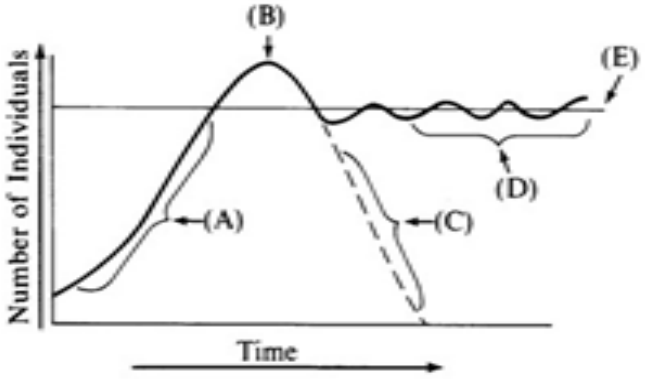
49. The graph demonstrates the change in a population over time. Which lettered section shows exponential growth?

a. A

b. B

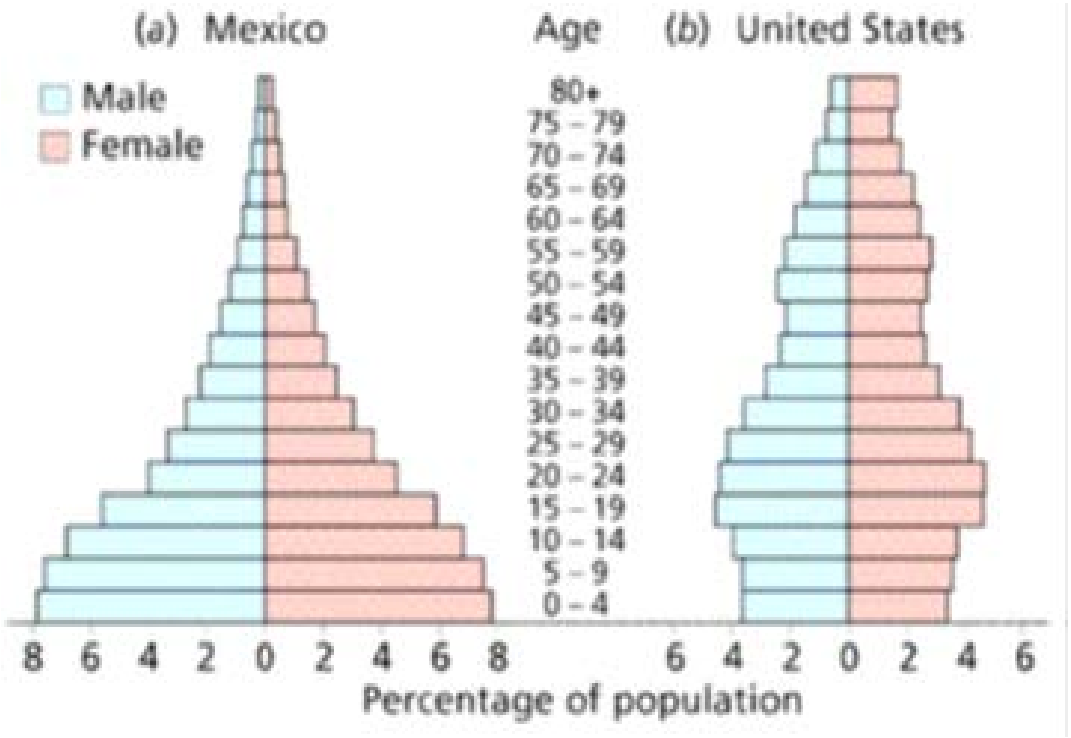
c. C

d. D



50. Population pyramids below are for Mexico and the United States. What is the *ratio of the percentage of the combined male and female populations between ages 0 to 4 years* for the Mexico and the United States? Each ratio is Mexico to the United States.

a. 8:4 b. 7:16 c. 16:4 d. 16:7



51. Of the following ecosystems which has the highest net primary productivity per square meter?

a. Savanna
b. Desert
c. Tropical Rain Forest
d. Temperate Forest

52. Regarding the food chain: grass → grasshopper→ mouse →snake→ hawk.
How much of the chemical energy fixed by photosynthesis of the grass (100%) is available to the hawk?

a. 100% b. 10% c. 1% d. 0.01%

53. Of the following which statement is an example of an ecosystem?

a. Interactions between all of the organisms and their physical environment in a tropical rain forest.
b. The plants, animals, and decomposers that inhabit an alpine meadow.
c. The interactions of various plant and animal species on a savanna during a drought.
d. A pond and all of the plant and animal species that live in it

54. Which trophic level is most vulnerable to extinction?

a. Producer b. Decomposer c. Secondary Consumer d. Tertiary Consumer

55. The predominant reason for the increase in the amount of CO_2 in Earth's atmosphere over the past 150 years is

a. the burning of fossil fuels.
b. an increase in the amount of infrared radiation absorbed by the atmosphere.
c. the increase in respiration rate by the rapidly growing human population.
d. increased worldwide primary production

56. Which of the following is an example of Müllerian mimicry?
    a. two unpalatable butterflies with similar color patterns.
    b. a butterfly that resembles a leaf
    c. a bee that resembles a scorpion
    d. a fish with spots that looks eyes

57. What is a crucial step in managing an ecosystem to maintain biodiversity?
    a. determining which species is most important for conserving biodiversity as a whole
    b. determining the species most favorable for public support
    c. assessing the economic costs and the gains for society
    d. replanting suitable habitat for fauna

58. Which one of the following provides the <u>best</u> evidence of a biodiversity crisis?

    a. decrease of productivity levels
    b. the continued incursion of non-native species
    c. increased rate of pollution levels
    d. high rate of extinction.

59. Species introduced by humans to new geographic locations
    a. are usually successful in colonizing the area.
    b. can outcompete and displace native species for biotic and abiotic resources.
    c. increase the diversity and therefore the stability of the ecosystem.
    d. always spread because they encounter none of their natural predators.

60. Which of the following biotic communities tends to display the greatest number of trophic levels?
    a. Coral reef
    b. Agricultural field
    c. Peat bog
    d. Coniferous forest

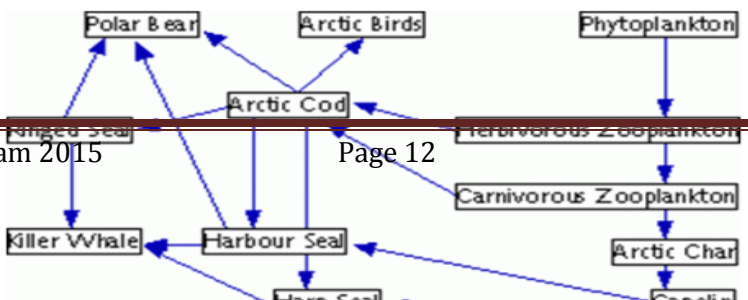
New Jersey Science League

Biology I Answer Key Blue Test

Date: April 9, 2015

Record onto the area record the # correct (corrected)

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


Polar Bear
Arctic Birds
Phytoplankton
Arctic Cod
Killer Whale
Harbour Seal
Carnivorous Zooplankton
Arctic Char