PLEASE FILL OUT THIS FORM; PLEASE PRINT LEGIBLY.

DATE: _____ **Full Name**: _____

Sam ID: _____ **What year did you begin SHSU**: _____

Did you transfer from another University? NO YES

If yes, from what institution did you transfer? _____

Fill out the following table to the best of your memory:

	Institution	Year	Semester	Grade
General Zoology (BIOL1313):				
General Botany (BIOL1311):				
Intro. Cell Biology (BIOL2420):				
General Micro (BIOL3470):				
Intro. Genetics (BIOL3450):				
General Ecology (BIOL3409):				
Intro. Evol. Biol. (BIOL4361):				

ZOOLOGY

1. Which of the following is an example of an empirical statement or fact?
    A. My mom's chocolate cake is the best in the city.
    B. The human body is made of cells.
    C. My chi energy is the most balanced when I'm meditating.
    D. The life force in your body flows through invisible nodes called chakras.
    E. All of the above are empirical statements/facts.

2. Which of the following is an acceptable definition of biological evolution?
    A. Genetic change in a population of organisms over time
    B. Genetic change in an individual organism during its lifetime
    C. Change in allelic frequencies in populations across generations
    D. All of the above are acceptable definitions of biological evolution
    E. A & C are acceptable definitions, but B is not

3. Mammals are the only vertebrate animals to have three small bones connecting the eardrum to the inner ear. If you are trying to elucidate phylogenetic relationships between different kinds of mammals, for example duck billed platypus, marsupials and placental mammals, the presence of ear bones would be considered which type of character?
    A. plesiomorphic
    B. synapomorphic
    C. polyphyletic
    D. paraphyletic

4. The concept that better adapted organisms are more likely to survive and be the parents of the next generation is called
    A. artificial selection
    B. inheritance of acquired characteristics
    C. heritable variation
    D. natural selection

5. Which of the following animal phyla are triploblastic?
    A. Porifera
    B. Platyhelminthes
    C. Cnidaria
    D. all of these phyla are triploblastic

6. Which of the following animal phyla possess a true coelom?
    A. Cnidaria
    B. Nematoda
    C. Mollusca
    D. Porifera

7. Which of the following animal phyla are deuterostomes?
    A. Mollusca
    B. Annelida
    C. Arthropoda
    D. Echinodermata

8. Which of the following animal phyla are bilaterally symmetrical?
    A. Nematoda
    B. Platyhelminthes
    C. Chordata
    D. All of these

9. Which of the following animal phyla is radially symmetrical?
    A. Arthropoda
    B. Mollusca
    C.Cnidaria
    D. Annelida

10. Darwin's primary contribution to biology was the idea that
    A. the primary mechanism of evolutionary change is natural selection
    B. evolution is the change in allele frequencies over time
    C. characteristics acquired during an individual's lifetime can be passed to its offspring
    D. genes are the primary units of inheritance

11. Which of the following is not a principal chordate feature:
    A. pharyngeal gill slits
    B. dorsal tubular nerve cord
    C. vertebral column
    D. notochord

12. Cave dwelling salamanders live in complete darkness. They are functionally blind with reduced eyes. This is an example of a/an_____ trait:
    A. abnormal B. vestigial C. homologous D. artificial

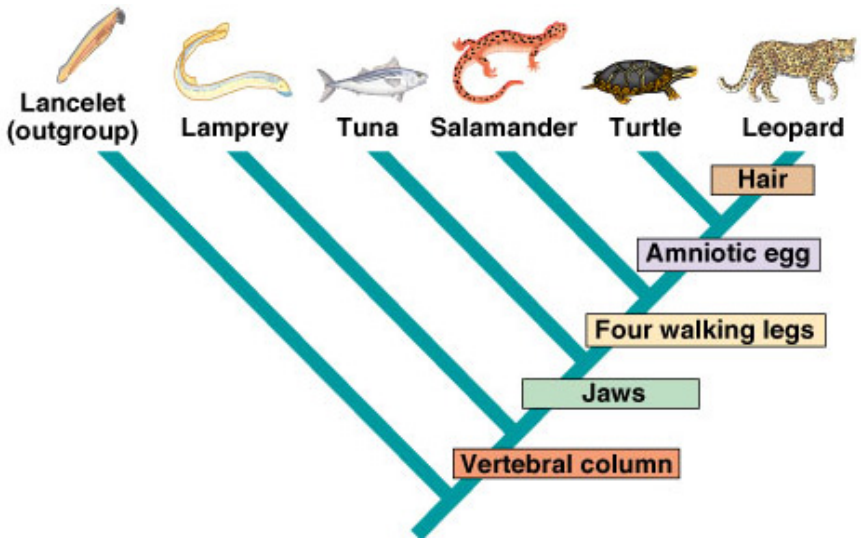
13. An animal with jointed appendages, segmentation and an open circulatory system would be classified in the phylum:
    A. Chordata B. Arthropoda C. Mollusca D. Annelida

14. In an experiment testing the effects of testosterone on territory defense in lizards, 10 lizards were surgically implanted with a small tube containing testosterone and their territorial behaviors were quantified. What would be the best control for this experiment ?

A. implant 10 lizards with another hormone like estrogen and quantify territorial behavior
B. implant 10 lizards with empty tubes (no hormone) and quantify territorial behavior
C. do nothing at all to 10 lizards and quantify territorial behavior
D. a control group is not needed in this kind of experiment

15. Individuals in a population of fruit flies at Hardy-Weinberg equilibrium have either red or white eyes. Red eyes are the dominant phenotype whereas white eyes are a recessive trait. If 36 out of 100 individuals in a population of fruit flies exhibit white eyes what is the expected frequency of heterozygotes in the population?

A. 0.48 B. 0.84 C. 0.36 D. 0.14



16. In reference to the cladogram above which of the following statements is false:

A. lampreys and leopards share a common ancestor
B. turtles are more closely related to leopards than to salamanders
C. leopards are more closely related to salamanders than they are to turtles
D. the amniotic egg is an apomorphic (derived) trait found in turtles and leopards

BOTANY

17. Phenotypic variation arises from which of the following processes?
    A. Mutation
    B. Meiotic Recombination
    C. Sexual Recombination
    D. Environmental interactions
    E. All of these are sources of phenotypic variation

18. A(n) _____ always subtends a(n) _____.
    A. Axillary bud, leaf
    B. Leaf, flower
    C. Petiole, leaf
    D. Leaf, axillary bud

19. Which tissue of the root has Casparian strips in the cell walls, which forces molecules to cross the plasma membrane instead of moving through intercellular spaces?
    A. Xylem
    B. Phloem
    C. Pericycle
    D. Endodermis
    E. Apoplast

20. If purple flowers are a dominant trait and white flowers are a recessive trait, is it possible for a white flowered and purple flowered individual to produce white flowered offspring?
    A. Yes, because white flowered plants always give rise to white flowering offspring regardless of the genotype of the other parent.
    B. Yes, because a heterozygous plant would have purple flowers, but could still donate a recessive allele to an offspring.
    C. No, because purple flowered plants only give rise to purple flowered offspring, regardless of the genotype of the other parent.
    D. No, because a purple flowering plant can only donate a dominant allele to an offspring.

21. When the phenotypic ratios of a controlled cross involving two traits do not assort independently, the explanation is
    A. The genes encoding the traits of interest lie close together on the same chromosome
    B. The two traits are maternally inherited.
    C. The genes do not recombine freely during meiosis
    D. All of these are good explanations.

22. Which of the following is/are <u>not</u> a component(s) of Darwin's theory of Natural Selection?
    A. Eventually, species become perfectly suited to their habitats.
    B. Organisms produce more offspring than can be sustained by the environment.
    C. Populations do not expand continuously.
    D. Variation exists within populations.
    E. Much of this variation that exists in populations is heritable.

23. Which of the following represent examples of reproductive isolating mechanisms?

A. Adaptations to different microhabitat by maples occurring in overlapping geographical distributions.

B. The separation of the mesic forest populations of eastern North America and eastern Asia due to changes in climate and sea-level.

C. Local adaptation of a few populations of *Agrostis tenuis* to high copper soils

D. Differences in flowering time exhibited by *Silene virginica* and *Silene rotundifolia*

E. These are all examples of reproductive isolating mechanisms.

24. Which of the following traits is not a synapomorphy for Magnoliophyta (the flowering plants)?

A. Flowers

B. Ovules enclosed in carpels

C. Seeds

D. Fruits

E. Double fertilization

25. Perennial plants of prairie ecosystems often have root systems that are much deeper than the aboveground height of the plant. This is because

A. Prairies are seasonally dry ecosystems and deep roots are needed to reach water.

B. It prevents plants from being blown away in tornados.

C. Soil of the prairie ecosystem is especially rich.

D. Herds of bison may damage shallow roots with their hooves.

26. Which of the following would tend to decrease the concentration of carbon dioxide in the atmsophere?

A. Burning of fossil fuels

B. Deforestation

C. Aerobic respiration

D. Production of concrete from lime deposits

E. An decrease in oceanic temperature

27. If I attach one end of a hammock to the trunk of an oak tree growing at a rate of 200 cm per year, and the other end to the trunk of a maple growing at 100 cm per year, how much higher will the oak-end of the hammock be than the maple-end after ten years have elapsed.

A. 0 cm

B. 50 cm

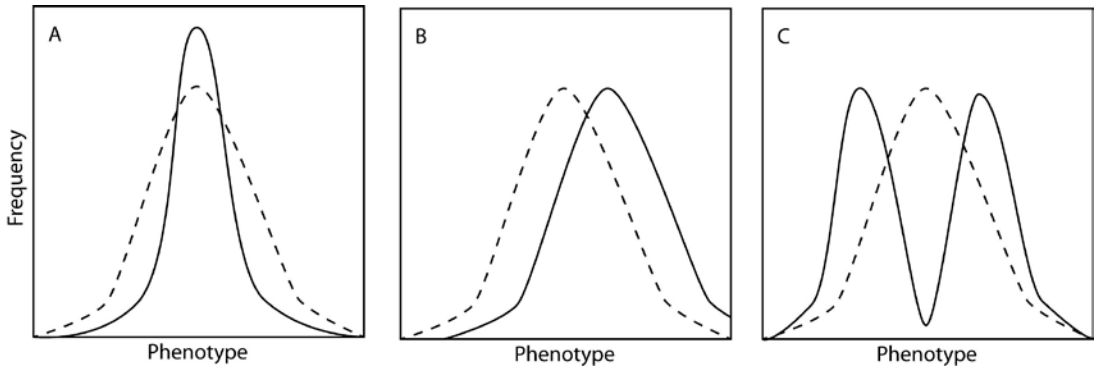
C. 100 cm

D. 1 m

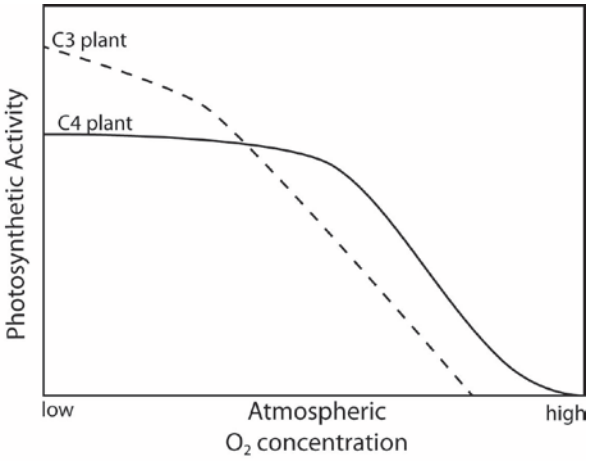
28. After repeating his monohybrid cross experiment thousands of times, Mendel came to the conclusion that traits are inherited in the form of genes, and that each pea plant had two copies of each gene, which we now call alleles. Which of the following statements about Mendel's conclusion is consistent with the modern philosophy of science?

A. Given the number of experimental replicates, Mendel should have held absolute certainty that his hypothesis was true.
B. Because a hypothesis is a general statement and can never be proven true, even such carefully formulated conclusions could be overturned by additional evidence.
C. This conclusion is absolutely true, but only in regard to pea plants and the traits studied.
D. Mendel's conclusion is false because he only worked with pea plants.

29. Under purifying selection, phenotypic extremes are selected against. If the frequency distribution before selection is represented as a dotted line, and the frequency distribution after selection is represented as a solid line, which of these three graphs indicates purifying selection most accurately.



30. Given the following graph, which statement(s) are true?



A. Increasing amounts of atmospheric O_2 negatively affect photosynthetic activity of both C3 and C4 plants.
B. Light concentration is equally important as atmospheric O_2 concentration in determining photosynthetic activity.
C. The decrease in photosynthetic activity with increasing concentration of atmospheric O_2 is more pronounced in C4 than in C3 plants.
D. At all concentrations of atmospheric O_2, C4 plants exhibit greater photosynthetic activity than C3 plants.

31. In pea plants, the gene "P" determines flower color, with the dominant allele P specifying purple flowers and the recessive allele p specifying white flowers. Similarly another gene "X" determines plant height, with the dominant allele X specifying tall stems and the recessive allele x specifying short stems. How many of 192 offspring can most reasonably be expected to have purple flowers and short stems if the parents both have the genotype PpXx?

A. 3
B. 12
C. 36
D. 108

CELL BIOLOGY

32. The Fluid Mosaic Model for membrane structure was proposed in 1972. This model for membrane structure differed from the Sandwich Model of 1935 in which of the following ways?

A. Hydrophilic heads of phospholipids are in the center of the membrane instead of the outside
B. Membranes are a phospholipid monolayer instead of a bilayer
C. Proteins are inserted into the membrane instead of on both sides
D. Membranes are composed of steroids instead of phospholipids

33. In photosynthesis, Oxygen is a product. This oxygen comes from:

A. Glucose
B. water
C. Carbon dioxide
D. ATP

34. The final electron acceptor in the electron transport chain of cellular respiration is:

A. NAD+
B. Carbon dioxide
C. Water
D. oxygen

35. Plant cells and animal cells have many of the same organelles. Which of the following organelles is found in animal cells but not found in plant cells.

A. ER
B. Golgi bodies
C. Lysosomes
D. Mitochondria
E. Ribosomes

36. Suppose one were provided with an actively dividing culture of a single-celled eukaryotic organism to which radioactive thymine nucleotides (T) had been added. What would happen if a cell replicated once with the formation of two daughter cells, in the presence of this radioactive base?

A. one of the daughter cells, but not the other, would have radioactive DNA
B. neither of the two daughter cells would have radioactive DNA
C. all four bases of the DNA would be radioactive in one daughter cell
D. radioactive thymine would pair with nonradioactive guanine
E. DNA in both daughter cells would be radioactive

37. What type of bond or interaction is responsible for holding the two strands together in DNA?

A. ionic bonds
B. hydrophobic bonds
C. hydrogen bonds
D. glycosidic bonds
E. covalent bonds

38. Which of the statements regarding enzymes is false?
    A. enzymes are proteins that function as catalysts
    B. enzymes display specificity (selectivity) for certain molecules to which they attach
    C. enzymes provide activation energy for the reactions they catalyze, increasing their transition state
    D. enzymes have an active site
    E. an enzyme may be used many times over for a specific reaction

39. The chemical reaction: ATP → ADP + phosphate is:
    A. exergonic
    B. endergonic
    C. apogonic
    D. transgonic
    E. none of the above

40. This bond or interaction best explains attraction of water molecules to each other.
    A. nonpolar covalent bond
    B. ionic bond
    C. hydrogen bond
    D. polar covalent bond
    E. hydrophobic interaction

41. Polymers are made by condensation synthesis. Which of the following molecules is given off as a product during this reaction:
    A. ATP
    B. oxygen
    C. water
    D. carbon dioxide
    E. ADP

42. In plant cells, genetic information (DNA) is found in the:
    A. nucleus only
    B. nucleus and mitochondria only
    C. nucleus and plastids (including chloroplasts) only
    D. nucleus, plastids (including chloroplasts) and mitochondria
    E. nucleus, plastids (including chloroplasts) , mitochondria and Golgi only

43. Glucose is $C_6H_{12}O_6$. How should one make 1 liter of a 0.5 molar solution of glucose?
    A. mix 12 gram of glucose with enough water to yield 1 liter of solution
    B. mix 24 grams of glucose with enough water to yield 1 liter of solution
    C. mix 80 grams of glucose with enough water to yield 1 liter of solution
    D. mix 90 grams of glucose with enough water to yield 1 liter of solution
    E. mix 180 grams of glucose with enough water to yield 1 liter of solution

44. Which of the following is not true of osmosis?

A. it is an energy-demanding or active process
B. water moves from a hypotonic solution to a hypertonic solution
C. it is a special case of diffusion
D. it occurs whenever two solutions are separated by a semi-permeable membrane
E. it occurs in living cells

45. The primary structure of a protein is ultimately determined by an individual:

A. carbohydrate
B. steroids
C. glucose
D. RNA
E. DNA

46. An enzyme has a total of four active sites. When you study its structure, you find that each active site occurs on a different polypeptide. Which of the following statements does this observation support?

A. the protein has quaternary structure
B. the enzyme is subject to competitive inhibitors
C. the protein's structure is affected by temperature and pH
D. the protein's structure is not affected by temperature and pH
E. the enzyme requires ATP

47. You have just determined the amino acid sequence of a new protein found in corn and discovered that it contains a long run of hydrophobic monomers. What is the significance of this finding?

A. These monomers are likely to form alpha helices and beta-pleated sheet, and thus contribute to primary structure.
B. These monomers are likely to occupy a regulatory site.
C. These monomers are likely to move toward the outside of the protein and contribute to primary structure.
D. These monomers are likely to occupy the active site.
E. These monomers are likely to move toward the interior of the protein and contribute to tertiary structure

48. Viruses are intracellular parasites. Viruses in their simplest form are composed of:

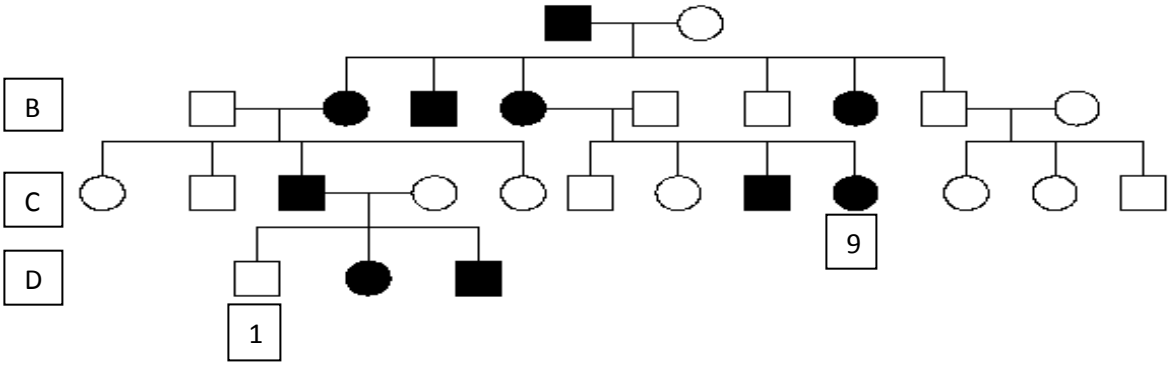
A. nucleic acid and protein
B. protein and carbohydrate
C. carbohydrate and lipid
D. lipid and nucleic acid
E. nucleic acid and carbohydrate

49. Noncoding regions must be removed from mRNA transcripts in eukaryotes. These noncoding regions are:

A. exons
B. introns
C. protons
D. neutrons
E. electrons

50. Some cells can have several nuclei per cell. How does this happen?
    A. many mitosis followed by many cytokinesis
    B. multiple S phases before the entry of a cell into mitosis and a single cytokinesis
    C. repeated cytokinesis with no interphase and no mitosis
    D. repeated interphase with mitosis but without cytokinesis
    E. this phenomenon cannot be explained

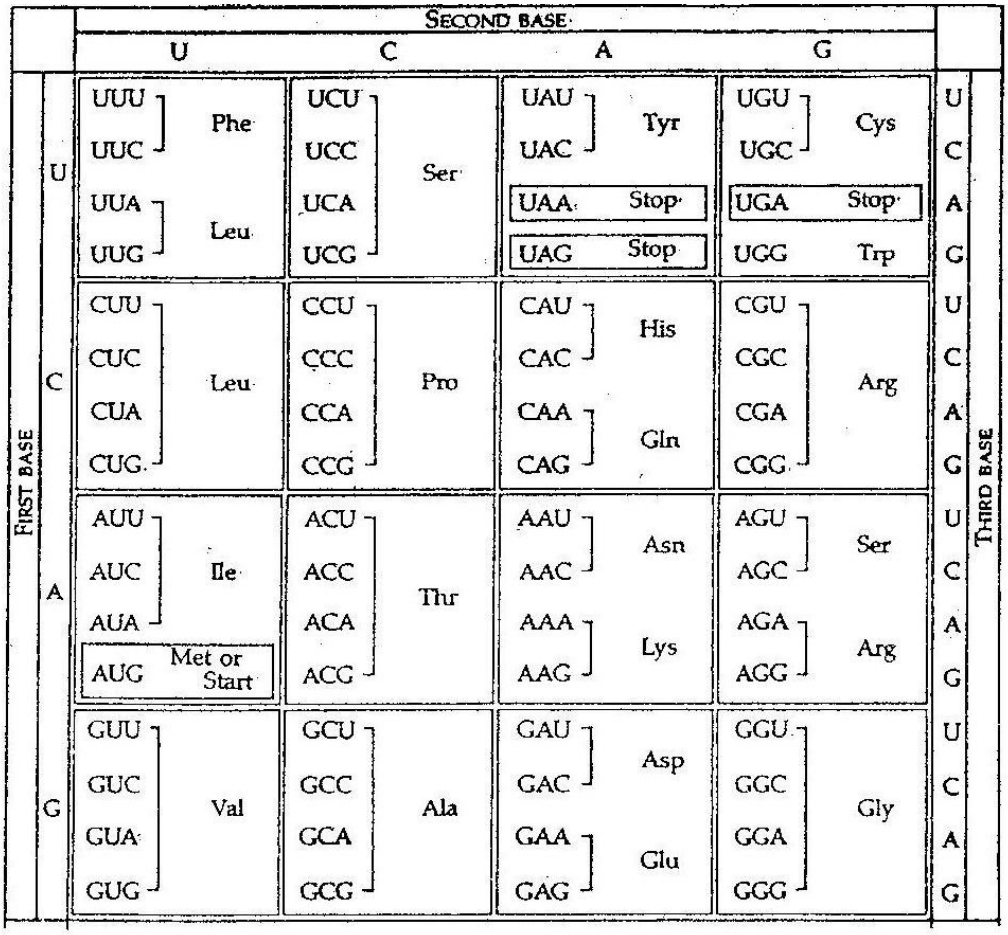
For the next TWO questions, refer to the pedigree chart below for a family with Marfan syndrome. Examine the pedigree below and answer the questions. Individuals with Marfan syndrome are black, males are squares and females are circles. Dominant allele M is for Marfan syndrome.



51. What is the genotype of individual C-9?
    A. MM only
    B. Mm only
    C. mm only
    D. MY
    E. mY

52. What is the genotype of individual D-1?
    A. MM only
    B. Mm only
    C. mm only
    D. MY
    E. mY

Using the Genetic code below, answer the next question.



First base	Second base: U	Second base: C	Second base: A	Second base: G	Third base
U	UUU, UUC: Phe	UCU, UCC, UCA, UCG: Ser	UAU, UAC: Tyr	UGU, UGC: Cys	U
	UUA, UUG: Leu		UAA: Stop; UAG: Stop	UGA: Stop; UGG: Trp	C, A, G
C	CUU, CUC, CUA, CUG: Leu	CCU, CCC, CCA, CCG: Pro	CAU, CAC: His; CAA, CAG: Gln	CGU, CGC, CGA, CGG: Arg	U, C, A, G
A	AUU, AUC, AUA: Ile	ACU, ACC, ACA, ACG: Thr	AAU, AAC: Asn; AAA, AAG: Lys	AGU, AGC: Ser; AGA, AGG: Arg	U, C, A, G
	AUG: Met or Start				
G	GUU, GUC, GUA, GUG: Val	GCU, GCC, GCA, GCG: Ala	GAU, GAC: Asp; GAA, GAG: Glu	GGU, GGC, GGA, GGG: Gly	U, C, A, G

53. Determine the sequence of amino acids using the DNA below:

5’ TATGCAATCGCAAGC

A. ala – cys – asp – cys – ile
B. ile - arg – stop
C. met – pro – gly – pro – glu
D. ser – try – val - phe - his
E. lys - met – glu – asn – asp

MICROBIOLOGY

54. Which of the following is an INCORRECT match?

A. mycobacterium: acid fast cell *wall*

B. *E. coli* has this type of cell wall: gram negative cell wall

C. Stains purple when gram stained: gram positive cell wall

D. Has an inner membrane, peptidoglycan layer, then outer membrane: gram positive cell wall

E. Has isoprenoid lipids: archael cell wall

55. Cell membranes are composed of mainly what two components?

A. proteins and phospholipids

B. Proteins and polysaccharides

C. Lipopolysaccharide and amino acids

D. Nucleotides and phospholipids

E. Capsule and ribosomes

56. What is the correct order of the components involved in the DNA replication process? A) primase B) ligase C) helicase D) DNA polymerase E) single stranded binding protiens

A. a, b, c, d, e

B. e, d, c, b, a

C. c, e, a, d, b

D. c, b, e, d, a

E. c, a, d, b, e

57. Which of the following is not a mean of horizontal gene transfer in prokaryotes?

A. conjugation

B. transduction

C. transformation

D. translation

58. The TCA cycle in *E. coli* is active

A. only during aerobic respiration

B. during all respiration and fermentation states

C. only during fermentation

D. only during anaerobic respiration

E. only with respiration but not fermentation

59. Fermentation can be defined as completion of metabolism:

A. without a terminal electron acceptor

B. in the presence of oxygen

C. using the electron transport chain

D. only in gram positive bacteria

E .all of the above

60. You isolate an unknown bacterium, which characteristics would it **not** possess if it were a member of Enterobactericeae?

A. Gram negative
B. Forms endospores
C. Oxidase negative
D. Facultative anaerobes

61. Which of the following statements is NOT true concerning the three domains of life?

A. developed in 1850.
B. Based 16S rRNA sequence analysis
C. Composed bacteria, archea, and eukaryotes
D. Does not include viruses

62. Which of the following is the major target for antimicrobial agents in bacteria

A. plasma membrane
B. nucleus
C. cell wall
D. LPS

63. You discover a novel pathogen and elucidate that it is acid tolerant and enterotoxin. Which of the following would likely been the route of transmission between hosts?

A. Arthropod vector
B. Aerosols
C. Direct sexual contact
D. Fecal-oral

GENETICS

64. An ideal model organism for genetic study would possess which of the following characteristics.
    A. a relatively short life-cycle
    B. produces a large number of offspring
    C. a large number of genetic and phenotypic variations among individuals
    D. easy to handle in genetic experiments
    E. all of the above

65. The enzyme activity of a telomerase is best described as a
    A. DNA polymerase
    B. DNA gyrase
    C. Reverse transcriptase
    D. DNA topoisomerase
    E. GTPase

66. Which macromolecule is not directly involved in translation?
    A. messenger RNA
    B. transfer RNA
    C. DNA
    D. ribosomal RNA
    E. translation Initiation factors

67. In DNA electrophoresis, DNA fragment separation is based on
    A. nucleotide composition of the fragment
    B. charge of the DNA fragment
    C. length of the DNA fragment
    D. sequence of the DNA fragment
    E. all of the above

68. Genes that affect many phenotypes are
    A. Polygenic
    B. Epistatic
    C. Pleiotropic
    D. Multifactorial
    E. Polymorphic

69. A plasmid used as a cloning vector in *E. coli* must have
    A. a selectable marker
    B. unique restriction sites
    C. an *ori* (replication origin) sequence
    D. B and C only
    E. All of the above

70. If two genes are not linked, then the expected phenotypic ratio resulting from an F2 cross is
    A. 3:1
    B. 9:3:3:1
    C. 1:1:1:1
    D. 1:2:1
    E. 12:3:1

71.The condition resulting from a trisomy of human chromosome-21 is
    A. Klinefelter syndrome
    B. Down syndrome
    C. Cri-du chat syndrome
    D. Turner syndrome
    E. Edward syndrome

72. What kind of analysis allows visualization of an individual's chromosomal morphology?
    A. Karyotype analysis
    B. Genotype analysis
    C. Pedigree analysis
    D. Deletion mapping
    E. Genome mapping

73. The "C-value" is the amount of DNA in a/an
    A. Diploid genome
    B. Nuclear genome
    C. Eukaryotic genome
    D. Mitochondrial genome
    E. Haploid genome

74. In his monohybrid cross for seed color in peas, Mendel reported 6,024 yellow seeds and 2012 green seeds in F2 generation. How many of each color class were expected?
    A. All should be green
    B. 4,018 green and 4,018 yellow
    C. 6,024 yellow and 2,012 green
    D. 6,027 yellow and 2,009 green
    E. All should be yellow

75. What does a bacterial gene actually code for?
    A. An amino acid
    B. A polypeptide
    C. A protein
    D. Multiple polypeptides
    E .An enzyme

76. Which one is the ultimate source of all genetic variation in populations?
    A. spontaneous mutation
    B. genetic recombination
    C. independent assortment of homologous chromosomes
    D. random fertilization of male and female gametes
    E. all of the above

77. Given that a nucleic acid has 30% A, 20% T, 40% C, and 10% G, this macromolecule is a _____.
    A. double stranded DNA
    B. double stranded RNA
    C. single stranded DNA
    D. single stranded RNA
    E. single chain polypeptide

78. A bacterial protein consists of 100 amino acids. What will be the number of codons and total nucleotides in the gene that code for that protein?
    A. 100 and 300
    B. 101 and 303
    C. 99 and 297
    D. 100 and 303
    E. 101 and 300

79. A mutation during DNA replication causes a G to be inserted after the first nucleotide of the codon for tryptophan. How will this affect the growing polypeptide chain?
    A. The reading frame will be shifted to the left, and the wrong amino acids will be added from this point on.
    B. Elongation will stop prematurely.
    C. There will be a single amino acid substitution.
    D. An extra amino acid will be added, but the reading frame will not be affected
    E. Primary sequence of the polypeptide will not be affected.

80. In double stranded helical DNA, which is not true?
    A. G = C
    B. A = T
    C. G+C = A+T
    D. A+G = T+C
    E. Pyrimidine = Purines

81. Genes that are linked
    A. are on non-homologous chromosomes
    B. segregate to opposite poles during meiosis
    C. are always on the X-chromosome
    D. do not assort independently during meiosis
    E. segregate independently during meiosis

82. Antiparallel strands of the DNA means that
    A. each DNA molecule consists of one old and one new strand.
    B. there is complementary base pairing between two strands.
    C. one strand is right handed and other strand is left stranded.
    D. the two polynucleotide chains run in opposite directions.
    E. C and D are correct.

83. In both prokaryotic and eukaryotic organisms, DNA replication is
    A. unidirectional and dispersive
    B. bidirectional and dispersive
    C. bidirectional and semiconservative
    D. dispersive and semiconservative
    E. conservative and discontinuous

ECOLOGY

84. A research who studies how predation rates of the Amazon Molly change during the mating season is working at the

A. Organismal level of ecology
B. Population level of ecology
C. Community level of ecology
D. Ecosystem level of ecology
E. Global scale of ecology

85. Which would likely be most affected if the rotation of the Earth was reversed?

A. Location of the tropics
B. Location of Mediterranean biomes
C. Location of the tundra
D. Location of the temperate biomes
E. none would be affected.

86. Elevated CO_2 in the atmosphere is likely to result in all but

A. increase global temperature
B. rise in sea level
C. increase productivity of plants
D. reduce pH of oceans
E. decrease rainfall across the earth

87. The tundra biome is best defined by

A. coniferous trees
B. deciduous trees
C. permafrost
D. short growing seasons
E. little available water

88. Which biome is best defined by a constant 12:12 light-dark cycle throughout the year?

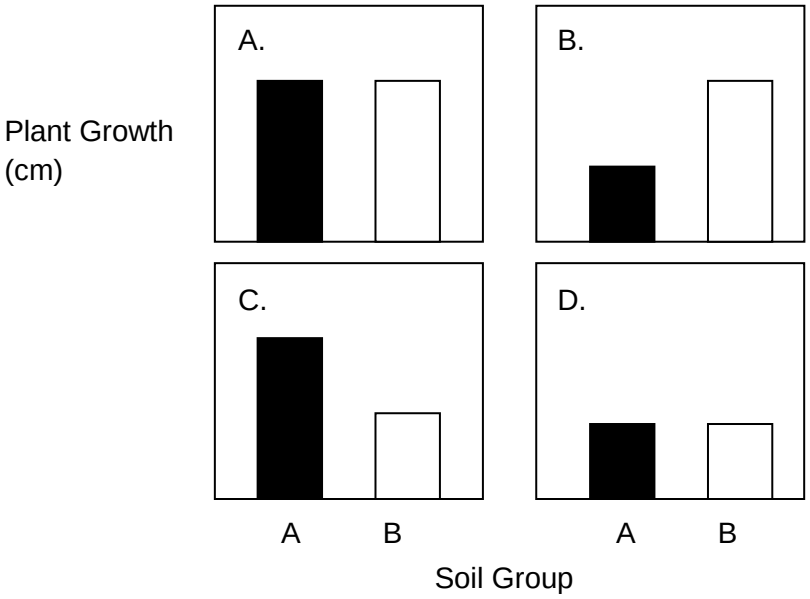
A. coniferous forest
B. Tundra
C. Desert
D. Chaparra
E. Tropical

89. In theory, one would endure no fitness cost by dying to save the life of

A. 1 full sib
B. 4 half sibs
C. 4 cousins
D. 6 cousins
E. none of the above

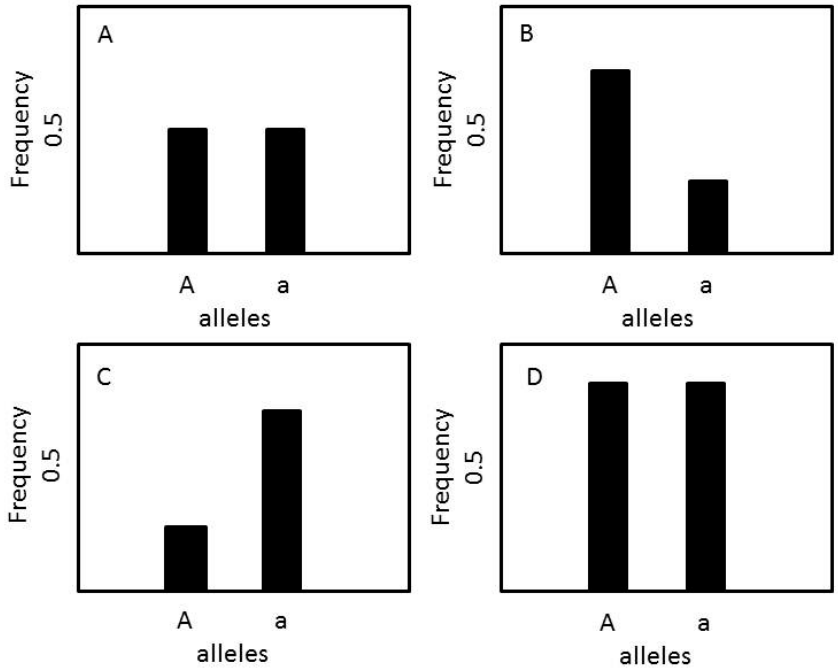
90. As the human population increases all increase except
A. environmental degradation
B. intraspecific competition
C. Unexploited habitats
D. density-dependent population regulation
E. all of the above

91. Assume you took soil from a forest and separated it into two groups. Group A remained unchanged, but Group B was sterilized. You now grew plants in Group A and Group B soil. What is your expected result?



92. Assume the N:P of grass in a prairie ecosystem is 4:1. The amount of N and P in a m^3 of soil is 80 mg and 10 mg, respectively. A species that increases soil nitrogen via a nutrient subsidy is likely to
A. have no effect.
B. increase the grass growth.
C. decrease grass growth.
D. drive phosphorus limitation
E. none of the above

Use the following graphs as your answer choices for the following question.
For each scenario, assume the population begins with an allelic frequency of 0.5 for both alleles.



93. A gene codes for number of eggs (fecundity). Allele-A codes for many small eggs and Allele-a codes for few large eggs. How would the allelic frequency change if offspring had low mortality rates.

A.
B.
C.
D.

Use The figure below to answer the following two questions.

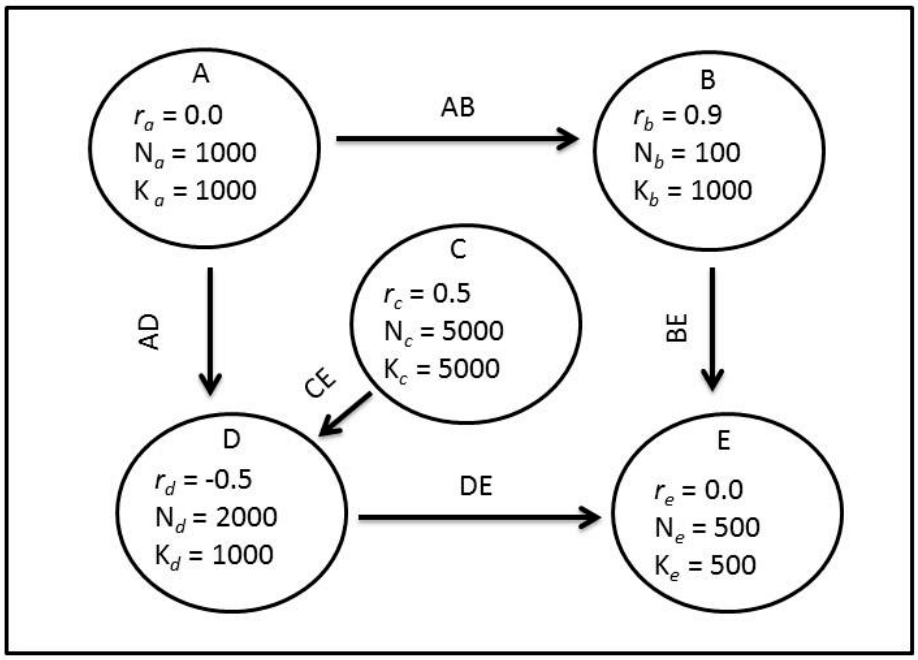


Figure 4. Source-sink model for a field mouse population on Galveston Isl. Each circle shows a given subpopulation and the intrinsic rate of population growth (*r*), size of the sub population (N) and carrying capacity of the patch (K). Arrows indicate **possible** movement corridors among patches.

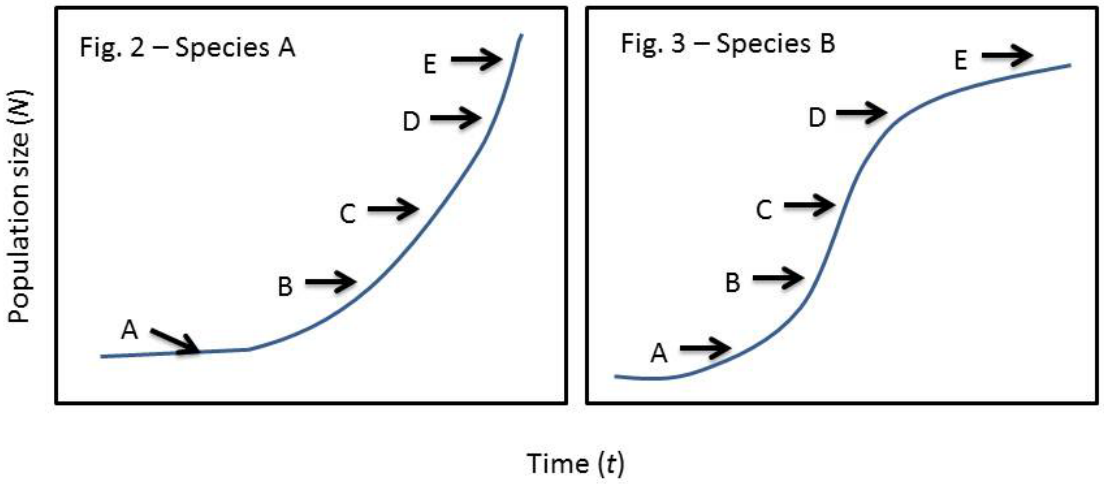
94. Which patch has a population decreasing?

A.
B.
C.
D.
E.

95. Which patch currently has the lowest environmental quality?

A.
B.
C.
D.
E.

Use the following figures (Fig. 2 and 3) to answer the next two questions.



Figs. 2 & 3. Population growth models for two species.

96. At which point on Fig 2 is the population for species a growing the fastest?

A.
B.
C.
D.
E.

97. Which is the correct ordering of *r* (i.e., instantaneous rate of population growth for species B? NOTE: r_x denotes *r* at each labeled point on each growth curve.

A. $r_a > r_b > r_c > r_d > r_e$
B. $r_a < r_b < r_c < r_d < r_e$
C. $r_a > r_b = r_c = r_d < r_e$
D. $r_a < r_b < r_c > r_d > r_e$

Use the figure below to answer the next question.

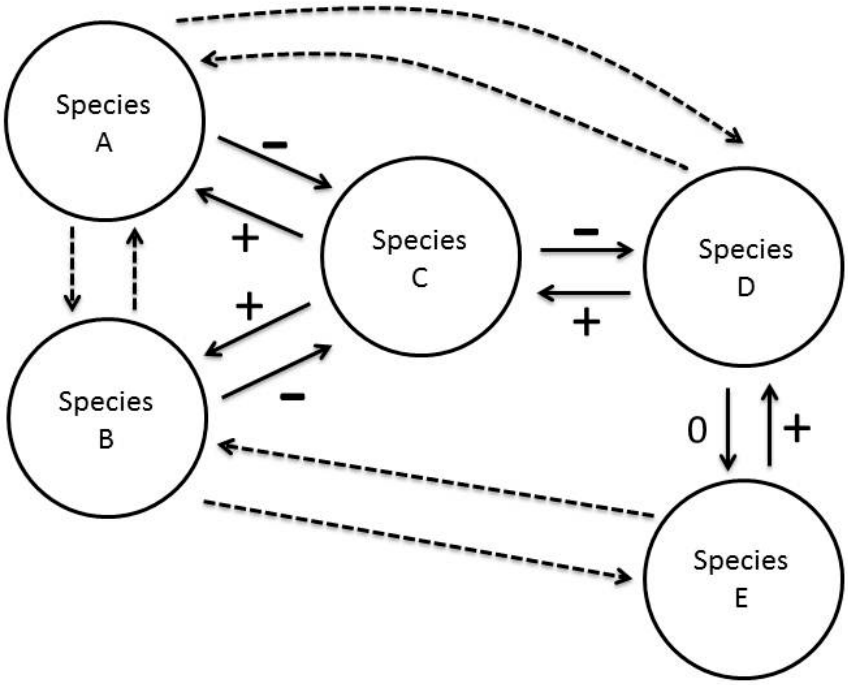


Fig. 3. A interaction food web model showing all direct and some indirect interactions among species.

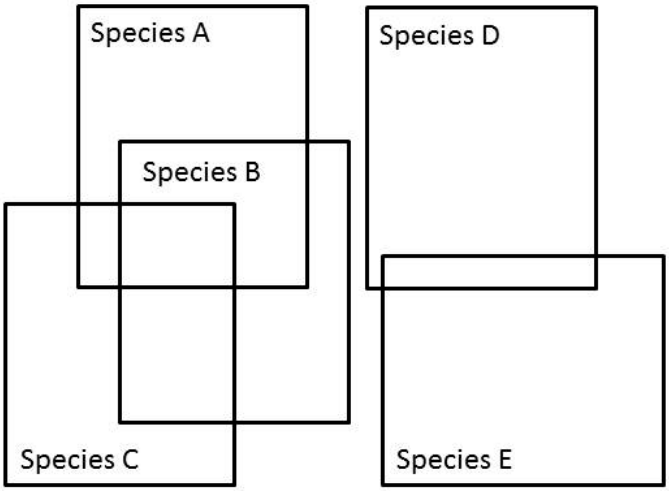
98. What happens to species D if we increase species A?

A. Increase

B. decrease

C. doesn't change

Use the figure below to answer following the question.



Competitive ability among species
A > B > C = D > E

Fig. 2. Fundamental niche space for 5 species (A through E). Assume each fundamental niche holds equal number of individuals for each species. Assume realized niche can be determined based on competitive ability.

99. Which species fills its/their complete fundamental niche (more than one answer applies)?

A.
B.
C.
D.
E.

Answer the following question using the figure below.

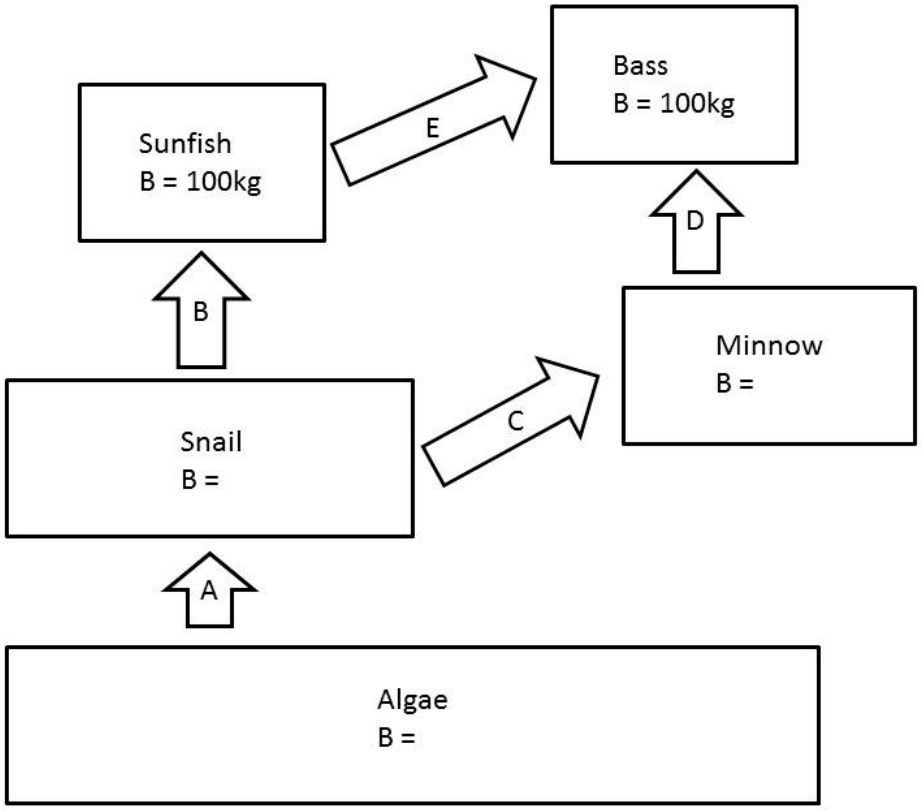


Figure 1. Food web diagram showing energy flux among food web compartments. Assume that biomass is analogous to energy and assume 10% energy transfer efficiency among each compartment.

100. What is the biomass of algae?

A. 100
B. 1,000
C. 10,000
D. 100,000
E. 1,000,000