

Semester 2 Final Exam Study Guide

Unit 1: Molecular Genetics

Related Textbook Chapters: 10.1,10.3,10.4; 11.4; pg. 342-343; 12.2-12.3; All of Chapter 13

Essential Concepts:

- Understand that there is redundancy built into the genetic code
- Describe the structure of DNA
- Relate the structural design of DNA to the mechanism of DNA replication
- Know how to replicate a strand of DNA
- Describe the process of DNA replication
- Know how to translate a sequence of mRNA using the codon chart
- List the flow of genetic information from DNA to physical trait
- Compare and contrast the structure of DNA and mRNA
- Explain how cellular differentiation is possible within multicellular organisms even though all the cells within a single organism have the same DNA
- Understand the effect of crossing over on genetic diversity in organisms
- Explain how meiosis and fertilization cycle to maintain a constant chromosome number in organisms

Key Terms

- Genetic code
- Cancer
- Anticodon
- Hox genes

Unit 2: Inheritance

Related Textbook Chapters: Chapter 11 (except 11.4) and 14.1-14.2

- Understand the difference between genotype and phenotype
- Understand the difference between homozygous and heterozygous
- Punnett Squares
 - Identify possible combinations of alleles in parent gametes (what goes on top and on the left side of the Punnett square)
 - Correctly fill in expected offspring genotypes
 - Understand that Punnett squares show expected results and not actual results
 - Complete and interpret Punnett squares for different patterns of inheritance, including:
 - Simple dominant/recessive
 - Incomplete dominance
 - Codominance
 - Multiple alleles (blood type)
 - Sex-linked
- Identify the principle of independent assortment, and understand how it relates to dihybrid crosses

Unit 3: Common Ancestry & Diversity

Related Textbook Chapters: 16.1; pg. 454-455; 16.4; 18.2; 19.3

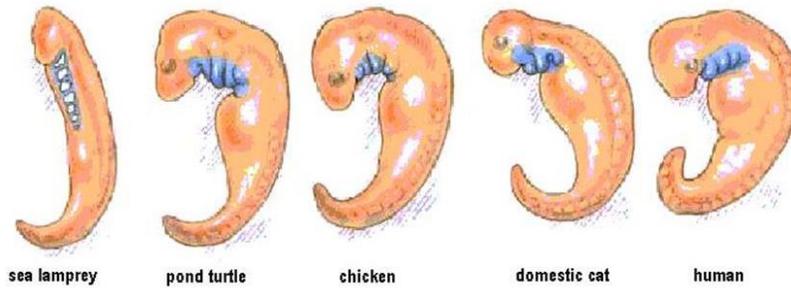
Key Terms

- Amino acid sequence comparison:
- Analogous structures:
- Cladogram:
- Embryological Evidence:
- Nitrogen fixation:
- Theory:

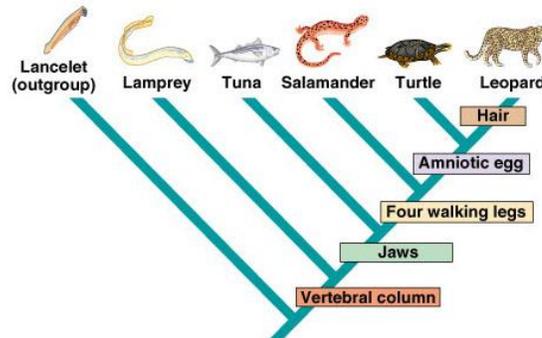
- Cyanobacteria:
- Prokaryotes:
- Fossil:
- Theory of Evolution:
- Nitrogen Fixing Bacteria:
- Vestigial Structures:
- Homologous Structures:

Essential Concepts:

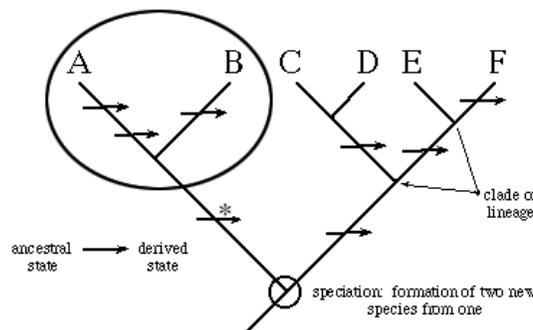
- How old is the Earth?
- Urey and Miller performed experiments where they made _____ from methane gas, water, ammonia, and hydrogen under conditions that probably existed on the early earth.
- List five types of evidence that support the theory of evolution.
- Using embryological evidence, scientists have noticed how closely related organisms have similar embryological structures. In the figure below, which organism seems to be most closely related to a human?



- Study the cladogram below. Which structures do salamanders, turtles, and leopards share that would indicate that they share a common ancestor?



- In the cladogram below, which organisms would be more closely related?
 - C and D
 - C and E
 - B and C
 - C and F



Selected Amino Acid Positions in the Hemoglobin of some vertebrates

Human	V K A H G K K V L G A F S D G L A H L D
Chimpanzee	V K A H G K K V L G A F S D G L A H L D
Gorilla	V K A H G K K V L G A F S D G L A H L D
Baboon	V K A H G K K V L G A F S D G L N H L D
Lemur	V K A H G K K V L T A F S E G L H H L D
Dog	V K A H G K K V L N S F S D G L K N L D
Chicken	V R A H G K K V L T S F G D A V K N L D
Frog	V L A H G E K V L A A I G E G L K H P E

- Compare the amino acid sequences above. Which organism has the most differences compared to the humans?

Unit 4: Mechanisms of Evolution

Related Textbook Chapters: 16.2-16.3; 17.1-17.3; 19.2

- Know all parts of Darwin's Theory of Natural Selection
- Be able to give examples of adaptations that help in organisms' survival
- Know Adaptive Radiation and be able to answer questions about the finch diagram
- Know the parts of the Hardy-Weinberg principle and what conditions are required for a population to reach genetic equilibrium
- Know the three types of natural selection (Stabilizing, Disruptive, and Directional) and be able to identify the graph for each.
- Know the types of Reproductive Isolation
- Be able to define Convergent Evolution, Divergent Evolution, and Co-evolution.