Name: Key

REVIEW GUIDE FOR 8 From DNA to Proteins

State Standards- what the state says you need to know. Will be tested on the ACT test junior year.	**Terms-** vocabulary words from our unit that you need to know	**Questions/Review-** complete these review exercises to help you prepare for your quizzes, tests, etc. You should also review your labs, homework, journal, and other class activities.
B1.1E Describe a reason for a given conclusion using evidence from an investigation. B1.1H Distinguish between scientific explanations that are regarded as current scientific consensus and the emerging questions that active researchers investigate.	8.1 • Bacteriophage • Transformation info passed to offspring as genes in DNA	1. List the conclusion about hereditary material that each of the following scientists made AND what they learned in their experiment to base that conclusion. • Griffith • Avery • Hershey and Chase 2. Before Hershey and Chases experiment, what did scientists think was the genetic material? 3. What were the three tests that Avery used to prove his hypothesis?

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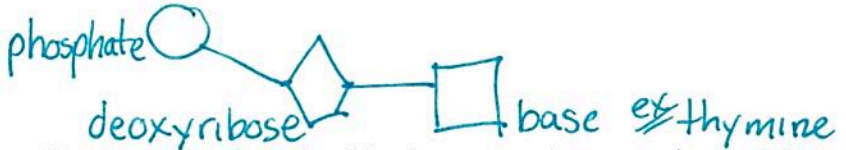
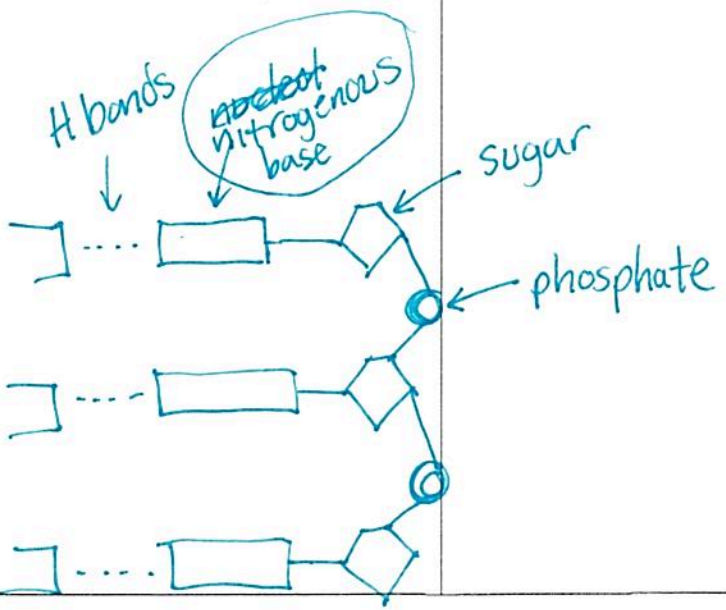
B4.2B Recognize that every species has its own characteristic DNA sequence. B4.2C **Describe the structure and function of DNA.**	8.2 • Double helix • Nucleotide • Deoxyribose • Base-pairing rules • Complementary • Adenine • Thymine • Cytosine • Guanine atbcdefg	4. What did Chargaff find when he looked at the DNA of different organisms? #A = #T #C = #G therefore, CCT would pair with GGA on other strand 5a. What are the building blocks of nucleic acids? nucleotides b. What are the parts to these building blocks?  c. How are these building blocks put together to make the DNA molecule? Use the terms purines and pyrimidines in your answer. 6, What part of the molecule allows for genetic diversity? What parts are the same in every molecule? all organisms have nucleotides, DNA, amino acids, proteins... nucleotide SEQUENCE in DNA is different! 7. What is the job of DNA in living cells? 8. Draw and label the structure of DNA. double stranded helix

changeable, diverse



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B4.2g Describe the process of replication.	8.3 • Replication • DNA polymerase	8. When will DNA replicate? 9. What is the role of each of the following, in DNA replication? a. DNA helicase b. nucleotides c. DNA polymerase (name two jobs) 10. What happens at a replication fork? Add a diagram. 11. How is DNA replication different in a prokaryote than and eukaryote?

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B4.2f Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms. B4.2g Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology.	8.4 • Central Dogma • Ribonucleic acid (RNA) • Uracil • Transcription • RNA polymerase • Messenger RNA • Transfer RNA • Ribosomal RNA • Translation • Start Codon • Stop Codon • Codon • Anticodon • Genetic code	12a. Which part of the DNA molecule carries the genetic information that codes for proteins? nucleotide sequence in a gene codes for a protein b. Relate the protein sequence to the DNA sequence. 13. Which molecule carries the "message" from DNA in the nucleus, to the ribosomes in the cytoplasm? 14. What evidence do we have that DNA works the same in all life forms? 15. What is the role of RNA polymerase in transcription? 16. How is transcription similar to DNA replication? * all 3 processes use enzymes, nucleic acids, & complementary base pairing

DNA
thymine
in nucleus
deoxyribose
2 strands

mRNA
uracil
leaves nucleus
ribose
1 strand

★ both genetic codes made of nucleotides

all organisms use same nucleotides, enzymes, amino acids
ONLY DNA sequence is different!

17. How is transcription different from DNA replication?

DNA is rewritten as single strand of messenger RNA
mRNA uses U instead of T

18. Why transcribe the genetic code from DNA to mRNA?

19. For what does each codon, on the mRNA, code?

an amino acid
★ this code is universal! works for humans, plants, fungi...

20. What is the role of each of the following in translation?

a. ribosomes

b. mRNA

c. tRNA

d. amino acids

State Standards- what the state says you need to know.	**Terms-** define these terms on a **separate** piece of paper	**Questions/Review-** complete these review exercises to help you prepare for your quizzes, tests, etc. You should also review your labs, homework, journal, and other class activities.
B4.1B Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins B4.2D Predict the consequences that changes in the DNA composition of particular genes may have on an organism. B4.2E Propose possible effects (on the genes) of exposing an organism to radiation and toxic chemicals. B4.4a Describe how inserting, deleting, or substituting DNA segments can alter a gene. Recognize that an altered gene may be passed on to every other cell that develops from it and that the resulting features may help, harm, or have little or no effect on the offspring's success in its environment..	8.7 Mutation Point mutation • Substitution • Deletion • Insertion • Frameshift Chromosomal Mutations: • Deletion • Duplication • Translocation Mutagen * DNA recombination (sex reprod.) → different siblings embryonic stem cells are not differentiated	21a. Explain the relationship between a gene-DNA molecule-chronmosome AND draw and label this relationship. 22b. What does a gene do? 23b. Describe how a point mutation can cause changes in an individual. mutation → different DNA sequence → different amino acid → different protein → possible disorder ex/ sickle cell anemia 24. Which environmental factors can cause mutations? chemicals ex/ asbestos radiation ex/ UV, gamma → alters sequence of nitrogenous bases 25. Distinguish insertion, deletion, and substitution point mutations. 26. If you had a mutation in a skin cell, what could be the possible effects (name more than one)? - no effect - helpful trait - harmful disorder *not passed to offspring because its not a germ cell 27. Will all mutations cause a change in the "appearance" of the trait? Explain your answer.

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HSCE REVIEW GUIDE FOR EVOLUTION: Chapter 10, 11.1 & 11.2

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B5.1A Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions). B5.1e Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants, depending upon environmental conditions).	**10.1** evolution species fossil catastrophism gradualism uniformitarism **10.2** variation adaptation **10.3** artificial selection heritability natural selection population fitness **10.4** biogeography homologous structure analogous structure vestigial structure **10.5** paleontology	1. List and describe scientists that contributed to early evolutionary thought. 2. Explain the three different theories of geology related to Darwin's theory. 3. Describe three animals that live in the Galapagos and the adaptations that they have to survive. finches - beak shape matches food source 4. How is artificial selection different than natural selection? Use the example of domestic dogs. 5. Why is it important that the traits are heritable? 6. What did Darwin call the process of evolution? natural selection: well-adapted organisms survive & reproduce * different traits in different ecosystems! 7. Listed below are the four main elements of natural selection. In your own words, explain how each contributes to evolution. a. All species have genetic variation. diversity improves the odds of species survival!

B5.1B Describe how natural selection provides a mechanism for evolution.		b. Organisms tend to produce more offspring than their environment can support. this creates survival pressure c. Individuals within a population that are better able to cope with the challenges of their environment tend to leave more offspring than those less suited to the environment.
B5.1C Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g.., use fossil records, embryonic stages, homologous structures, chemical basis)		d. The traits of the individuals best suited to a particular environment tend to increase in a population over time. 8b. What did Thomas Kettlewell find with the peppered moths in London before and after the industrial revolution?
B5.1f Explain, using examples, how the fossil record, comparative anatomy, and other evidence supports the theory of evolution.		9 There are many areas of study that provide evidence to evolution. For each of those listed below, EXPLAIN how EACH provides evidence that organisms have evolved (changed over time) and shows relationships between organisms. ALSO, give a specific example of each. a. Fossil records show series of fossils, characteristics are modified over time.
B5.1D Explain how a new species or variety originates through the evolutionary process of natural selection.		b. geography
B5.3B Describe the role of geographic isolation in speciation.		c. Comparative embryology

B5.3C Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.

B3.4B Recognize and describe that a great diversity of species increases the chance that at least some living organisms will survive in the face of cataclysmic changes in the environment.

B2.4A Explain that living things can be classified based on structural, embryological, and molecular (relatedness of DNA sequence) evidence.

ex mammals are related, have similar DNA & structures

ex organisms with the fewest amino acid differences are most closely related

d. Anatomy
homologous structures indicate common ancestor

10. What is a transitional form of a fossil?

11. Describe the four different pieces of molecular and genetic evidence in your own words.

a. DNA sequence analysis
closely related species have similar DNA

b. protein comparisons
closely related species have similar proteins (amino acid sequence)

12. What are some of the field of science to which evolutionary biology contributes?

13. Explain why species that reproduce sexually have a better chance of surviving changes in their environment than species that reproduce asexually. (Think in terms of variation.)
sex. reprod. → new combinations every time! ☺
asexual → copies that are nearly the same every time ☹

14. How are the sources of evidence for evolution (fossil record, comparative anatomy, embryology and biochemistry) used to classify organisms?
all used to classify, double-check classification

B2.4d Analyze the relationships among organisms based on their shared physical, biochemical, genetic, and cellular characteristics and functional processes.		15. How does a cladogram show evolutionary relationships among organisms?
B5.3A Explain how natural selection acts on individuals, but it is populations that evolve. Relate genetic mutations and genetic variety produced by sexual reproduction to diversity within a given population.	11.1 • Gene pool • allele frequency 11.2 • normal distribution • microevolution • directional selection • stabilizing selection • disruptive selection	1. How does natural selection change trait distribution in a population. ~~changes in acts on environment, can change mutation rate, can alter geno & phenotypes~~ * change allele frequency in gene pool (ex more spoons!) * acts on phenotype → change in genotype
B5.1g Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.		2. Why is it that the selection against recessive unfavorable traits is slow? (Such as hemophilia or cystic fibrosis)
		4. There are 5 forces that cause genetic change in a population. For each of the forces EXPLAIN how, in a population, they cause genetic change. Also. for each, give an example. *a. mutation*
B5.3C Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.		*b. gene flow (migration)*
B5.3e Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of a new		*c. nonrandom mating*

species.	individuals that can inter breed & produce FERTILE offspring are usually considered the same species	*d. small population size* *e. natural selection* ex dark moths survive on dark, sooty trees *5. Two populations of the same species become physically separated and over time become two new species.* *a. What role does changes in genes (think mutation and genetic recombination) play in this speciation?* squirrels at Grand Canyon *b. What else would have to be different in the two populations?*
B5.3f Demonstrate and explain how biotechnology can improve a population and species.		6. What role does genetic engineering play in improving and changing populations? Think in terms of crops, artificial breeding of animals, helping endangered species, etc. (Pulling together from chapters 8, 9, 10, 16.1)

BIOTECH (ch 9)

- ethical & environmental considerations
- can make crops that resist bugs, tolerate drought, adapt to soils