Supplemental Instruction – Biology 2300

SI Leader – Philipp Orbe

Session 2: DNA

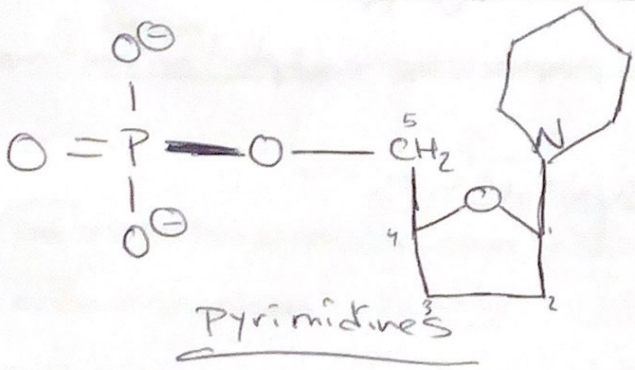
1. DNA and RNA are composed of monomers (building blocks) called nucleotides

   DNA - deoxyribonucleic acid

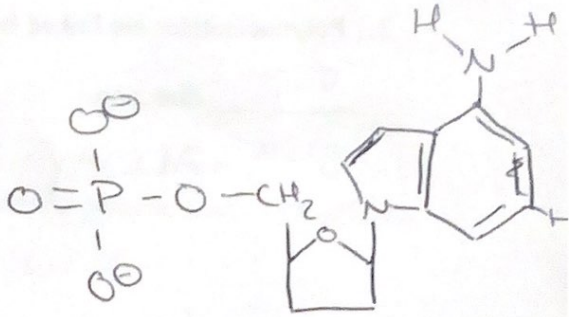
   RNA - ribonucleic acid

   a. What are the three components of DNA/RNA? Draw them.

   phosphate group, pentose sugar, nitrogenous base



Pyrimidines



purines

purine - two ring

pyrimidine - one ring

   b. the phosphate backbone is said to be negatively charged.

   +, -

2. What nitrogenous bases are present in DNA and RNA?

   a. There are two different classifications for nitrogenous bases, they can be

   purines or pyrimidines

   All Girls > are purines

   All Girls are pur

   Adenine

   Guanine

   Cytosine

   Thymine - DNA

   Uracil - RNA

   C, T, U pyrimidines

b. List the classification of each nitrogenous base.

purines - A, G

pyrimidines - C, T, U

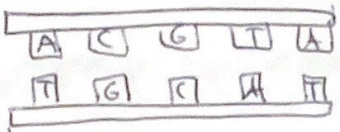
c. What are the base pairing rules for DNA and RNA?

DNA	RNA
A - T	C - G
C - G	U - A

3. Polynucleotides are linked from phosphate to sugar by dehydration reaction in a 5'-3' direction.

5'-3' - ALWAYS SYNTHESIS

4. A DNA molecule is composed of two complementary polynucleotide chains and are held together by hydrogen bonds between base pairs.



- antiparallel
- complementary

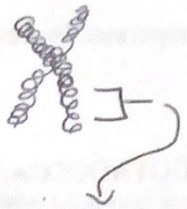
5. A pairs with T, forming 2 hydrogen bonds, G pairs with C, forming 3 hydrogen bonds.

2

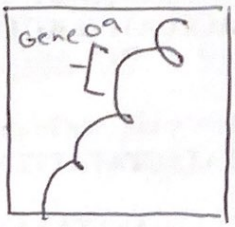
3

6. Define the following terms: powerpoint slides, book, google, duckduckgo

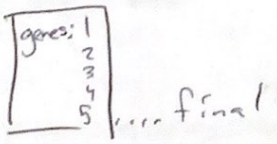
a. Chromosome –



b. Gene –



c. Genome –



7. True or False: Two closely related species can have similar genome sizes but a different number of chromosomes. Montjack 20 small
- 3 huge

8. What is the genetic code?

9. What is intergenic DNA - doesn't code for any known proteins
(98% of genome)

10. The two strands of a DNA helix can by separated by heating. Rank the DNA sequences by their melting points (high to low).

A-T = 2 HB
G-C = 3 HB

1 a. 5'-GCGGGCCAGCCCGAGTGGGTAGCCCAGG-3'

3'-CGCCCGGTCGGGCTCACCCATCGGGTCC-5'

2 b. 5'-ATTATAAAATATTTAGATACTATATTTACAA-3'

3'-TAATATTTTATAAATCTATGATATAAATGTT-5'

3 c. 5'-AGAGCTAGATCGAT-3'

3'-TCTCGATCTAGCTA-5'

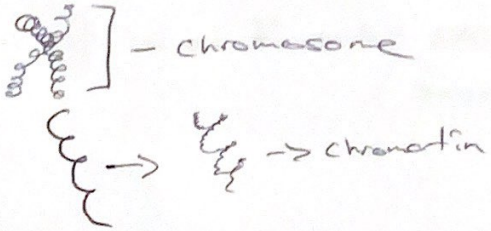
11. Show the direction of replication. Write out the complementary sequence. Transcribed to RNA?

a. 3'-CGATCCCTCATGCATGCTTT-5' 5'-3'

5'-GCTAGGGAGTACGTACGAAA-3'

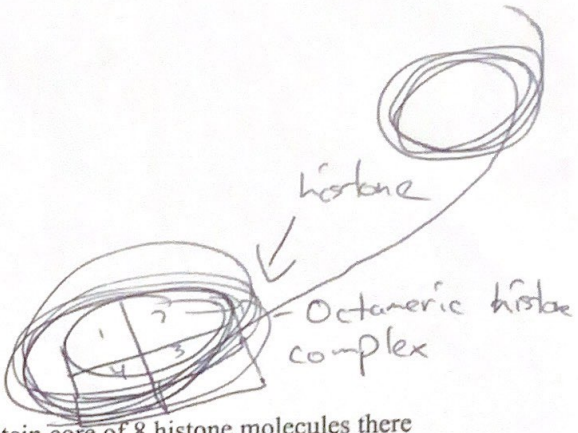
12. Define the following terms:

a. Chromatin



b. Histone

c. Nucleosome



13. A nucleosome contains DNA wrapped around a protein core of 8 histone molecules there are 2 of each: H2A, H2B, H3, H4

a. Are the amino acids of histones positively or negatively charged?

14. What is the function of an H1 histone?
Linker protein, links all nucleosomes together heterochromatin (tightly), euchromatin (loosely)

a. Is it likely to be modified during chromatin remodeling? Why?
No. Not part of the octameric core.