Freshman Biology Exam: DNA & RNA

NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Multiple choice: circle the best possible answer to the question provided.**

1. Each DNA nucleotide is comprised of :
   1. a deoyribose and a phosphate group
   2. a ribose and a phosphate group
   3. a deoxyribose, a phosphate group, and a nitrogenous base
   4. a ribose, a phosphate group, and a nitrogenous base
2. Generally speaking, DNA is found within the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is in the form of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. Nucleus, double helix
   2. Mitochondria, double helix
   3. Chromosome, single strand
   4. Nucleus, single strand
3. mRNA is
   1. created during translation.
   2. a single stranded RNA molecule containing codons.
   3. a single stranded RNA molecule containing anticodons.
   4. a double helix.
4. Transcribe the following DNA strand into RNA

**ACTGC**

* 1. UGACG
  2. GAUCT
  3. TGACG
  4. ACTGC

1. A purine is
   1. A single ringed structure
   2. In DNA, not RNA
   3. Adenine
   4. Thymine

**Matching: match the word given on the left with the appropriate definition on the right. Not all answer choices will be used.**

1. The complimentary base for U on RNA A. CAU
2. RNA B. AUG
3. Start codon C. A
4. Holds the anticodon bases in translation D. Single stranded
5. The protein that DNA is coiled around E. double stranded

F. tRNA

G. rRNA

H. Histone

**Record answers for matching here:**

6. \_\_\_\_\_\_\_\_\_\_ 7.\_\_\_\_\_\_\_\_\_\_\_ 8.\_\_\_\_\_\_\_\_\_\_ 9.\_\_\_\_\_\_\_\_\_\_\_\_ 10.\_\_\_\_\_\_\_\_\_\_\_

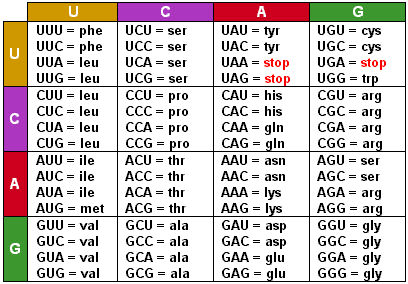
**True / False: circle true if the statement is COMPLETELY true. Circle false if there is one or more mistakes that makes the statement false.**

1. True/ False: a histone is negatively charged.
2. True/ False: the only difference between DNA and RNA is that DNA is double stranded and RNA is single stranded.
3. True/ False: point mutations are single nucleotide base changes in a gene’s DNA sequence.
4. True/ False: proteins are assembled on rRNA, a two subunit component that moves along the mRNA strands.

**Short answer:**

1. What is the process of replication and when does it occur in the central dogma? (give an example of this process using base pairs if it helps your explanation)
2. A DNA molecule reads: **5’ – ACTGCCAC – 3’** What would the complimentary sequence look like? (don’t forget to pay attention to the direction of the strand)
3. What is RNA editing? Explain the differences between introns and exons.

**Use the codon/amino acid chart for questions 18-20.**



1. Given the following DNA sequence, determine the mRNA sequence and translated Amino acid sequence

|  |  |
| --- | --- |
| DNA | TAC GCA ATG GAC AGG |
| mRNA |  |
| Amino Acid |  |

1. Looking at the DNA sequence from 13A, what type of mutation would result if **ATG** (third grouping of bases) was mutated to **ATC**? How would this mutation affect the rest of the sequence? Explain.

DNA \_\_\_ATC\_\_

RNA\_\_\_­­­\_\_\_\_\_\_\_\_

Amino Acid\_\_\_\_\_\_\_\_\_\_\_\_

1. If the codon for leucine **UUA** had a spontaneous mutation changing **UUA** to **UUG**, what would happen? What is this type of mutation called?