Unit 5 Test Review

Name: KEY Date: _____ Hour: _____ Test #: _____

1. Define each of the following words:
   a. DNA: Deoxyribonucleic acid - makes up chromosomes, controls protein synthesis and all other cellular activities
   b. Nucleotide: 3 parts units that make up nucleic acids, contain 1 sugar group, 1 phosphate group, and 1 nitrogen base
   c. Purine: double ring of carbon and nitrogen atoms - Adenine and Guanine
   d. Pyrimidine: Single ring of carbon and nitrogen atoms - Thymine and cytosine
   e. RNA: ribonucleic acid - near copy of DNA that carries the code for protein synthesis from nucleus to cytoplasm
   f. Anticodon: three nucleotides on the RNA that are complementary to the sequence of a codon in mRNA
   g. Transcription: process through which a single strand of mRNA is copied from a DNA strand
   h. Translation: process of translating the mRNA strand into a protein (amino acids)
   i. Triplet Codon: groups of 3 bases on a mRNA strand that acts as a code word for a specific amino acid
   j. Nucleic Acids: complex biological compounds made of chains of nucleotides, serve as instructions for protein synthesis
   k. Amino Acids: building blocks of proteins
   l. Ribosomes: site of protein synthesis in the cytoplasm of the cell
2. Describe the structure of DNA. sides of the DNA are sugar/phosphate, 4 bases are ATCG, double helix shape
3. How are nucleic acids named? from the sugar (DNA - deoxyribose, RNA - ribose)
4. Explain the significance of each of the following scientists:
   a. Watson and Crick: in 1953, first to put together a model of DNA → relied heavily on the work of other scientists
   b. Fredrick Griffith: Suggested that bacteria are capable of transferring genetic information, called transformation
   c. Rosalind Franklin: used x-ray diffraction photographs of DNA crystals to show the structure of DNA
   d. Erwin Chargaff: Showed the amounts of the four bases in DNA
5. What are the base pairing rules in DNA? A-T, G-C

6. Describe the role of the following enzymes in DNA replication:
   a. DNA Polymerase: attaches spare nucleotides to the "old" complementary bases, proofreads and corrects mistakes
   b. Helicase: splits apart the bases to begin replication

7. Briefly list the steps of DNA replication.
   a. DNA unwinds from double helix and unzips down the center when bonds between the bases break
   b. Single-strand binding protein attaches and keeps the 2 DNA strands separated and untwisted
   c. As the 2 DNA strands open at the origin, replication bubbles form
   d. Replication begins at the origin of replication, two strands open forming 2 replication forks
   e. Spare nucleotides move in and attach to their proper old bases using DNA polymerase
   f. TWO identical DNA molecules are formed. Half is "old" and half is "new"
8. What would be the complementary strand to CCTAGCTA in DNA? GGATCGAT
9. Name the three types of RNA and describe their functions.
   a. Messenger RNA (mRNA): copies DNA's code and carries the genetic information from the nucleus to the ribosome
   b. Transfer RNA (tRNA): transfers amino acids to the ribosomes where proteins are synthesized (anticodon on one end, amino acid on the other)
   c. Ribosomal RNA (rRNA): globular form of RNA that makes up ribosomes, along with protein
10. What are the three differences between RNA and DNA? Ribose is the sugar in RNA/deoxyribose is in DNA, RNA contains uracil instead of Thymine, RNA is a single strand/DNA is double stranded
11. What is the name of the organelle where protein synthesis occurs? Ribosome
12. What are the main steps of transcription? RNA polymerase binds to a promoter, complementary RNA nucleotides are joined, once a termination signal is reached - mRNA is released
13. What are the main steps in translation? Start codon is AUG (Methionine), tRNA carrying a specific amino acid binds to codon, peptide bonds form between amino acids, reaches a stop codon, new protein is released and used
14. What is the function of RNA polymerase? binds to gene's promoter, matches up complementary bases and once a termination signal is reached, transcription stops

15. Use the mRNA Codon Chart to complete the DNA triplets, mRNA codons, tRNA anticodons, and amino acids in the table below.

DNA Triplet	mRNA codon	tRNA anticodon	Amino Acid
TTC	AAG	UUC	Lysine
GGC	CCG	GGC	Proline
GTC	CAG	GUC	Glutamine
TTA	AAU	UUA	Asparagine
AAA	UUU	AAA	Phenylalanine
GTG	CAC	GUG	Histidine
CTC	GAG	CUC	Glutamic Acid
TGT	ACA	UGU	Threonine
TAT	AUA	UAU	Isoleucine
TCG	AGC	UCG	Serine
ATT	UAA	AUU	Stop
CCA	GGU	CCA	Glycine
GGC	CCG	GGC	Proline