**Molecular Genetics Unit Test – MONDAY APRIL 25, 2016**

**1) DNA Structure (5.1)**

* Experiments that lead to the discovery of a transforming factor, DNA vs. protein and DNA’s structure (Griffiths, Hershey & Chase, ) (5.1)
* DNA structure → labeling a DNA molecule, nucleotide structure, bases, pyrimidines vs purines (5.1)

**2) DNA Replication (5.2)**

* all enzymes and their functions
* Be able to describe the entire process
* Semi-conservative, conservative, dispersive

**3) Transcription and Translation (Ch. 6)**

* The genetic code (6.1)
* RNA vs DNA
* Transcription (6.2)
	+ Describe initiation, elongation, termination, enzymes involved
	+ Sense (coding) vs anti-sense (template) strand
	+ mRNA processing in eukaryotes (poly A tail, G cap, splicing of exons)
	+ Exons vs introns, alternate splicing
* Translation (6.3)
	+ Structure of tRNA
	+ Structure of ribosome
	+ Initiation, elongation, translocation, termination
	+ Using the codon chart to determine amino acids (you will be given the chart!)
* Mutations (6.3)
	+ frameshift  vs. point mutations, missense, nonsense, silent

Given a DNA sequence, you should be able to write the mRNA transcript and the amino acid sequence

**4) Prokaryotic Gene Expression (6.4)**

* Inducible vs. Repressible operons
* Role of regulator genes for both types of operons ( operator region of promoter )
* *lac* Operon
	+ be able to describe what it is and how it regulates the expression of genes that code for enzymes that help break down lactose.
* *trp* Operon
	+ be able to describe what it is and how it regulates the expression of genes that code for enzymes that help make tryptophan.

**5) Biotechnology (Ch. 7)**

* Recombinant DNA technology/ Cloning a plasmid (Bacterial Transformation) (7.1)
	+ How do you create designer plasmids? Use of restriction enzymes. What are sticky ends?
	+ Be able to explain entire process of how you create a plasmid to transforming the bacteria and ensuring that the bacteria you are growing have to appropriate plasmid.
* PCR (7.1)
	+ What is the purpose?
	+ How does it work? Briefly describe the process. (increase heat/ strand separation/ use of *taq* polymerase/ elongation)
* Gel Electrophoresis (7.1)
	+ Be able to explain the entire process: restriction enzyme use, how DNA travels through the gel, the purpose of the gel, charge of DNA and how that allows you to separate DNA.
	+ The uses….Paternity, forensics, evolutionary relationships etc.
	+ be able to analyze a gel (Compare crime scene, paternity)