**Overview**

Review the differences between DNA/RNA. Review nucleotide structure and NA structure

**Transcription**

1. Draw and describe initiation. (include promoter, initiation factors, RNA polymerase, enhancer region)
2. Explain the process of (elongation) building the mRNA from the DNA transcript. (Which strand is used as the template, what direction are the mRNA nucleotides added, how are they added)
3. What occurs at termination? (Discuss termination region and how the RNA polymerase disengages from the DNA)

**RNA Processing**

1. Explain the addition of a 5’G cap and a poly-A tail. What are the roles of the cap and tail?
2. How are introns spliced out and exons spliced together?
3. Explain alternative splicing.

**Translation**

1. Explain initiation. (When is a ribosome functional?)
2. Explain the steps in Elongation. (discuss, EPA sites on ribosome, tRNA, anticodons, aminoacyl tRNA sythetase, peptidyl synthetase, amino acids, mRNA, codons, translocation step.)
3. Explain termination. (What causes translation to stop?)
4. Compare and contrast transcription and translation (make a Venn diagram)

**Post-translational processing**

1. Explain primary, secondary, and tertiary folding in proteins.

**Mutations**

Using the given DNA sequence 3’-T A C/ G G G/ G A C/ C C C/ G C T/ A T T – 5’

1. Transcribe and translate the original sequence.
2. What if a point mutation occurred at the 7th base in the DNA sequence and T was substituted for the current base? How would the mutation change the polypeptide chain? What type of point mutation occurred?
3. What if a point mutation occurred at the 13th base in the DNA sequence and A was substituted for the current base? Explain the result of the mutation and give then name for this type of mutation.
4. What if a frameshift mutation occurred at the 4th base and the G was deleted, explain the result of the mutation on the polypeptide chain.
5. Where would an insertion or deletion do the most damage to the polypeptide chain produced?
6. Explain the difference between gene and chromosomal mutations.
7. What happens in the following chromosomal mutation ABCDEFG 🡪 ABDCEFG?
8. What is the connection between mutations and evolution?

**Comparing Prokaryotes and Eukaryotes**

1. Describe the differences in the genomes of prokaryotes and eukaryotes.
2. Explain the term naked DNA.
3. What is plasmid DNA? (BTW – they self replicate)
4. Describe how the eukaryotic DNA is packaged.

**Prokaryotic Gene Regulation**

1. What is the operon hypothesis?
2. Describe a repressible operon. Use the trp operon as your example.
3. Describe an inducible operon. Use the lac operon as your example.
4. What is the role of the regulator gene in the lac operon?
5. Explain the role of allosteric inhibitors in each of the above operons.

**Eukaryotic Gene Regulation**

1. How much of the eukaryotic chromosome is transcribed and translated?
2. Why is it difficult to apply the operon model to eukaryotes?
3. Utilizing your notes – create a concept map outlining the different means of gene regulation.

(Hint 1-9 – end of class notes)