**Unit 2 Test**

**Chapters 10-14**

**Biology/Biotech**

**You may include diagrams, pictures, haikus, poems, stories, etc in your answers as appropriate and helpful in order to demonstrate your understanding of the topic of each question. Quality, not necessarily quantity, is what I am looking for! Be thorough and thoughtful!**

**Chapter 10 Cell Division**

**Choose 1 of the following questions**

1. Discuss the role of cell division in cancer; how is it different from in normal cells?

*Vocabulary to use*: cyclins, DNA damage, repair, cell division, contact inhibition, tumor suppressors

1. Why do cells divide? What happens during cell division? How is cell division regulated?

*Vocabulary to use*: Surface area to volume ratio, daughter cells, DNA, replication, cell growth, phases of cell cycle, growth phases and checkpoints, cyclins, cytokinesis

**Chapter 11 Introduction to Genetics**

**Choose 2 of the following questions**

1. Compare and contrast mitosis and meiosis

*Vocabulary to use*: 1N, 2N, # cells formed, crossing over, prophase, metaphase, anaphase, telophase

1. Discuss the concept of probability with regards to inheritance of traits. What is a Punnett square and what can it be used for? What are the limitations of Punnett squares?

*Vocabulary to use*: averages, sample size, dominant, recessive, probability, predicted ratios, coin toss, traits, phenotype, genotype

1. Discuss what independent assortment is and why it is important. Give an example. In what type of cells does it happen?

*Vocabulary to use*: independent assortment, segregation, homologous chromosomes, genetic variation

1. Define incomplete dominance and give examples. Define codominance and give examples. Define multiple alleles and give examples. Define polygenic trait and give examples.
2. What are linked genes and how are they used to map genes on chromosomes?

*Vocabulary to use*: distance, crossing over, frequency

**Chapter 12 DNA and RNA**

**Choose 2 of the following questions:**

1. Discuss mutations, gene regulation and gene expression in human diseases and development. Give examples.

*Vocabulary to use*: cancer, Hox genes, point mutations, frame shift mutations, chromosomal mutations, nonsense, missense, gene regulation, gene expression.

1. Describe the structure of DNA and chromosomes. What were the important events in the discovery of the structure of DNA. How does the structure of DNA result in the way DNA replicates?

*Vocabulary to use*: complementary bases, sugar phosphate backbone, hydrogen bonds, double helix, histones, chromatin, nucleosomes, semi-conservative, parent strand, daughter strand, A,T,C,G, Chargaff’s rules, X-ray

1. Describe the steps and the proteins involved in DNA replication

*Vocabulary to use*: nucleotides, DNA polymerase, helicase, parent strand, daughter strand, replication fork

1. What is the central dogma? Compare and contrast replication and transcription.

*Vocabulary to use*: DNA polymerase, RNA polymerase, nucleus mRNA, DNA, double stranded, single stranded, regulation, promoters, origins of replication, gene expression

1. What is translation? Describe the steps, location, machinery and molecules necessary.

*Vocabulary to use*: ribosome, cytoplasm, messenger RNA, ribosomal RNA, transfer RNA, codon, anticodon, amino acid, intron, exon, translation, peptide

**Chapter 13 Genetic Engineering**

**Choose 2 of the following questions:**

1. Discuss the types of selective breeding, give examples, and whether they increase or decrease genetic variation
2. Describe our RFP lab. Include steps, why we did each step, expected and actual results.

*Vocabulary to use*: recombinant plasmid, restriction enzyme, plasmid verification, electrophoresis, fragments, sizez of fragments, DNA ladder, transformation, gene expression, selective marker, amp-R, AraC, arabinose, RNA polymerase, promoter, RFP

1. Describe how to make a recombinant plasmid-steps, molecules necessary. Why can we make a protein from any organism in a bacterial cell?

*Vocabulary to use*: restriction enzymes, ligase, gene of interest, plasmid, recombinant plasmid, selective marker, verify, electrophoresis, genetic engineering, central dogma, transcription, translation, machinery

1. Describe PCR. How does it work, what is necessary for the reaction, how is it used in DNA fingerprinting and DNA sequencing

*Vocabulary to use*: nucleotides, DNA polymerase, thermal cycler, annealing, extension, denaturation, copies, specific genes, dideoxynucleotides, fluorescent tags, electrophoresis, sequence, comparing individuals

1. What are some applications of genetic engineering, what are the costs and benefits of those applications, what are the bioethical issues involved with those applications

**Chapter 14 Human Genetics**

**Choose 2 of the following questions:**

1. What is a karyotype and how is it used by genetic counselors? What does a normal human karyotype look like and what does an abnormal one, for example one from an individual with Down’s syndrome or Turner’s syndrome look like?

*Vocabulary to use*: discuss number or chromosomes, diploid, nondisjunction, somatic chromosomes, sex chromosomes

1. What is a pedigree and how is it used by genetic counselors? Analyze and interpret the following pedigree and discuss what you would advise to the family if you were their genetic counselor

*Vocabulary to use*: trait, affected individual, carrier, offspring, siblings

1. Describe how a change in DNA leads to a human disease. Give two examples.

*Vocabulary to use*: central dogma, DNA, RNA, protein, protein folding and structure, protein function

