**Genetics and Biotech Exam Review Guide**

**Introduction to Genetics**

* Define genetics
* Define trait
* Identify the Mendel's principle findings on the patterns of genetics (inheritance patterns)
  + What does it mean for a trait to be dominant or recessive?
  + What does the Law of Segregation state? How is this shown during meiosis?
  + What does the Law of Independent Assortment state? When does this occur during meiosis?
* Define genotype and phenotype
  + What is an allele?
  + How is genotype used to determine phenotype?
* Distinguish between a homozygous genotype and a heterozygous genotype
  + How is a homozygous dominant genotype different from a homozygous recessive genotype?

**Monohybrid & Dihybrid Crosses**

* Identify the purpose of a Punnett square
  + How is the Law of Segregation demonstrated while using a Punnett square?
  + How does this demonstrate the Law of Independent Assortment?
  + How is fertilization demonstrated while using a Punnett square?
  + Why is it important to realize that this is a PROBABILITY and not a certainty?
* Use a Punnett square to show the possible genotypes of the offspring in a monohybrid cross
* Calculate the genotypic and phenotypic ratio for a monohybrid cross
* Define monohybrid cross and dihybrid cross
* Determine the possible gametes from a parental genotype representing two traits
* Use a Punnett square to show the possible genotypes of the offspring in a dihybrid cross
* Calculate the genotypic and phenotypic ratio for a dihybrid cross

**Biotechnology**

* Identify the purpose of gel electrophoresis
  + What properties about the molecules allow them to move across the gel at faster or slower rates?
  + What is being applied to the molecules to make them move?
  + What is present in each band on the gel electrophoresis?
* Describe the steps for using gel electrophoresis
  + Where do you place the samples and with what piece of equipment?
  + What could be in the samples?
* Identify the molecular properties that mostly determine the rate at which those molecules travel through a gel during gel electrophoresis
  + What charge does DNA and RNA possess? Extra – what gives them this charge?
  + Which end will these nucleic acids move toward? What is this electrode called?
* Identify and explain the reason why polysaccharide agarose is used to make the gels
  + What if the two molecules are the same size, what else could make them move faster or slower?
* Identify the roles of the buffer
* Identify potential uses for gel electrophoresis