

Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	IB Biology 11 SL (H)	Unit Title:	Genetics	Grade Level(s):	11
Assessed Trimester:		Pacing:		Date Created:		Last Revision Date:	9/2/2014

Course Understandings: *Students will understand that:*

-

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals	
<ul style="list-style-type: none">	
Transfer	
Students will be able to independently use their learning to: (product, high order reasoning)	
<ul style="list-style-type: none">	
Meaning	
Unit Understanding(s): Students will understand that: <ul style="list-style-type: none">How geneticists use principles of probability to predict results of breedingHow meiosis creates gametes for sexual reproductionThe structure of DNAWhat a gene is in relation to DNAHow gene mutations cause mutations in the organismHow and why scientists manipulate DNAThe human karyotypeThe reasons why the human genome has been decodedHow DNA relates to forensic investigationsHow genetically modified crops/animals will help to solve nutrition problems around the world	Essential Question(s): Students will keep considering: <ul style="list-style-type: none">
Acquisition	
Knowledge - Students will: <ul style="list-style-type: none">The relationship between DNA, genes and chromosomesThe structure and function of DNAThat different species of multicellular organisms have a characteristic number of chromosomes, and that in typical humans there are 22 autosomal pairs and 2 sex chromosomesHow genetic information is transmitted from parents to offspring through the processes of meiosis and fertilization as they relate to chromosome recombination and sexual reproductionThe difference between dominant, recessive, codominant, incomplete dominant, polygenic, multiple allele and sex-linked traitsAbout mutations, their types and causes and their role in genetic variation.How gel electrophoresis is used in DNA profiling	Skills - Students will: <ul style="list-style-type: none">State that eukaryotic chromosomes are made of DNA and proteinsDefine gene, allele and genomeDefine gene mutationExplain the consequence of a base substitution mutation in relation to the processes of transcription and translation, using the example of sickle-cell anemiaState that meiosis is a reduction division of a diploid nucleus to form haploid nucleiDefine homologous chromosomesOutline the process of meiosis, including pairing of homologous chromosomes and crossing over, followed by two divisions, which results in four haploid cellsExplain that non-disjunction can lead to changes in chromosome number, illustrated by reference to

<ul style="list-style-type: none">• That the genetic code for humans is universal• The potential benefits and possible harmful effects of genetic modification Reasoning - Students will: <ul style="list-style-type: none">•	<p>Down Syndrome</p> <ul style="list-style-type: none">• State that in karyotyping, chromosomes are arranged in pairs according to their size and structure.• Analyse a human karyotype to determine gender and whether non-disjunction has occurred• Define genotype, phenotype, dominant allele, recessive allele, codominant alleles, locus, homozygous, heterozygous, carrier and test cross• Determine the genotypes and phenotypes of the offspring of a monohybrid cross using a Punnett grid• State that some genes have more than two alleles• Describe ABO blood groups as an example of codominance and multiple alleles• Explain how the sex chromosomes control gender by referring to the inheritance of X and Y chromosomes in humans• State that some genes are present o the X chromosome and absent from the shorter Y chromosomes in humans• Define sex linkage• Describe the inheritance of color blindness and hemophilia as examples of sex linkage• State that a human female can be homozygous or heterozygous with respect to sex-linked genes• Explain that female carriers are heterozygous for X-linked recessive alleles• Predict the genotypic and phenotypic ratios of offspring of monohybrid crosses involving any of the above patterns of inheritance• Deduce the genotypes and phenotypes of individuals in pedigree charts• Outline the use of polymerase chain reaction to copy and amplify minute quantities of DNA• State that in gel electrophoresis, fragments of DNA move in an electric field and are separated according to their size• State that gel electrophoresis of DNA is used in DNA profiling, and describe the application of profiling to determine paternity and also in forensic investigations• Analyse DNA profiles to draw conclusions about paternity or forensic investigations• Outline three outcomes of the sequencing of the complete human genome• State that when genes are transferred between species, the amino acid sequence of polypeptides translated from them is unchanged because the genetic code is universal• Outline a basic technique used for gene transfer involving plasmids, a host cell, restriction enzymes and DNA ligase• State two examples of the current uses of genetically modified crops or animals• Discuss the potential benefits and possible harmful effects of one example of genetic modification• Define clone• Outline a technique for cloning using differentiated animal cells• Discuss the ethical issues of therapeutic cloning in humans
---	---

Common Misunderstandings <ul style="list-style-type: none">• Dominant traits are always more common in human populations• Crossing organisms with a particular trait will always produce a mix of that trait• There are only two types of a trait, dominant and recessive• Chromosomes in the cells are in the shape of an “X”• Scientists can see DNA. This is how we know it’s structure and is how we map where we find certain genes.	Essential new vocabulary <ul style="list-style-type: none">• Gene• Allele• Genome• Gene mutation• Meiosis• Homologous chromosomes• Crossing over• Karyotyping• Amniocentesis• Non-disjunction• Genotype• Phonotype
--	--

	<ul style="list-style-type: none">• Dominant allele• Recessive allele• Co-dominant alleles• Lucus• Homozygous• Heterozygous• Carrier• Test cross• Monohybrid• Punnett Grid• ABO blood groups• Sex chromosomes• Sex linkage• Genotypes• Phenotypes• Polymerase chain reaction• Gel electrophoresis• Plasmids• Host cell• Restriction enzymes• Clone
--	--