

# Unit Plan: Year 11 Genetics 1.9

<p><b><u>Curriculum Link:</u></b>  <b>LW</b>  <b>Evolution L6</b></p> <ul style="list-style-type: none"> <li>• <b>Recognise, name, draw, give characteristics, and provide a reason as to how and why genetic variation occurs</b></li> <li>• <b>Explore patterns in the inheritance of genetically controlled characteristics</b></li> </ul> <p><b>NOS</b>  <b>Communicating L6</b></p> <ul style="list-style-type: none"> <li>• <b>Use a wide range of science vocabulary, symbols and conventions</b></li> </ul>		<p><b><u>Key Competency:</u></b></p> <p>Using language, symbols and texts:          Students will use genetic language and symbols to solve inheritance problems, interpret given data and understand /explain pedigree charts.</p>
<p><b><u>Literacy Goal:</u></b></p> <p>To learn new terms and use these biological terms appropriately</p>	<p><b><u>Numeracy Goal:</u></b></p> <p>To do simple monohybrid inheritance problems and be able to calculate possible genotype and phenotype ratios</p>	<p><b><u>Science Goal:</u></b></p> <p>Recognise patterns in the inheritance of genetically controlled characteristics and explain the importance of variation within a changing environment.</p>
<p><b><u>Assessment:</u></b>          Written test</p>		

Lesson Number	SPECIFIC LEARNING OUTCOME	POSSIBLE LEARNING EXPERIENCES	RESOURCES	HOMEWORK/VO CAB
1-3	<p><b>Describe the structure of DNA</b></p> <p><b>Define alleles, genes and chromosomes</b></p>	<p><b>Genetics/DNA:</b> What is genetics? What is DNA and where is it found, recognise the basic structure of DNA , double helix with the bases, definitions –genes, alleles chromosomes</p> <p><b>Reading:</b> Year 11 Science Study Guide p67, Year 11 pathfinder p 16-17,New Directions in Science p136-137</p> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Class discussion on what is genetics-leading to study of genetics as the study of inheritance and thus to DNA</li> <li>• Use a DNA model to teach the structure of DNA-perhaps use Brainpop as an introduction</li> <li>• Characteristics of DNA – double helix, bases-cytosine, adenine, thymine, guanine, bases</li> <li>• Teach the bonding between the bases-adenine to thymine, guanine to cytosine – complementary base pairing</li> <li>• Yr 11 Science Study Guide, do question 6A p67</li> <li>• Define new terms- genes, alleles chromosomes, genome</li> </ul>	<p><a href="http://serendip.brynmawr.edu/sci_edu/waldron/pdf/GeneticsProtocol.doc">http://serendip.brynmawr.edu/sci_edu/waldron/pdf/GeneticsProtocol.doc</a> (this site has many student activities and teacher notes for this whole unit of genetics)</p> <p>Video – DNA Master Molecules of Life</p> <p><a href="http://www.woodrow.org/teachers/bi/1994/">http://www.woodrow.org/teachers/bi/1994/</a></p> <p><a href="http://www.accessexcellence.org/R/C/VL/GG/">http://www.accessexcellence.org/R/C/VL/GG/</a></p> <p>Brainpop – basic information movie + quiz-DNA</p>	<p>Genetics, double helix, bases, chromosomes</p>

		<ul style="list-style-type: none"> <li>• New directions in Science text-read p 136, answer questions 2 and 3, p.137</li> <li>• Scipad workbook p178 definitions, 179-182 chromosomes and DNA</li> </ul>	<a href="http://ghr.nlm.nih.gov/handbook/basics/dna">http://ghr.nlm.nih.gov/handbook/basics/dna</a> Genes  Sheet; What is genetics	
4	DNA extraction	DNA – a molecule which can be seen  <b>Activity:</b> <ul style="list-style-type: none"> <li>• DNA extraction sheet-the class extracts DNA from cauliflower or their own DNA (use small tubes for this which can be discarded)</li> </ul>	DNA extraction sheet, cauliflower, blender, cloth, dishwashing detergent, meths, wire and bottle	
5-6	Describe the relationship between DNA, alleles, genes and chromosomes  Describe the link between DNA and phenotypes	<b>DNA and phenotypes:</b> Chromosomes are made of DNA. An allele is an alternative form of a gene. For each characteristic an organism inherits 2 alleles (gene)-one from each parent. The DNA holds the code that determines the proteins made and therefore the visible effect (phenotype) of the allele combinations (genotype)  <b>Reading:</b> Pathfinder year 11 16-17  <b>Activity:</b> <ul style="list-style-type: none"> <li>• Brainstorm the links between DNA, alleles, genes and chromosomes</li> <li>• Teach that <b>a gene is a length of DNA that codes for a particular protein which determines a trait.</b></li> </ul>	<a href="http://www.accessexcellence.org/R/C/VL/GG/">http://www.accessexcellence.org/R/C/VL/GG/</a> Structure of DNA  <a href="http://ghr.nlm.nih.gov/handbook/basics/chromosome">http://ghr.nlm.nih.gov/handbook/basics/chromosome</a> Chromosomes	Genes, alleles, genotypes, phenotypes

		<ul style="list-style-type: none"> <li>• Scipad workbook p184-187</li> <li>• Scipad workbook p188-192 – chapter review DNA</li> </ul>		
8-9	Distinguish between continuous and discontinuous variations	<p><b>Variation:</b> Continuous and discontinuous variations, relationship between genotype and phenotype</p> <p><b>Reading:</b> Yr 11 Science Study Guide p79-80</p> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• Note variations in class (eg height, skin colour, hand spans)</li> <li>• Measure and record variations in height of all students in the class, graph the result and link to continuous variation.</li> <li>• NDS –read page 128-129. Do questions from p.129.</li> <li>• Collect data on eye colour, free earlobes, tongue rolling and link it to discontinuous variation. Use a Result table to show the variations observed in class.</li> <li>• How are the 2 types of variations different-do a compare and contrast table. (Yr 11 Science Study Guide p80-81)</li> <li>• Scipad workbook p220-224</li> </ul>	<p><a href="http://www.brooklyn.cuny.edu/bc/ahp/BioInfo/GP/Relationship.html">http://www.brooklyn.cuny.edu/bc/ahp/BioInfo/GP/Relationship.html</a> Variations</p> <p>Human migrations <a href="http://www.bradshawfoundation.com/journey/">http://www.bradshawfoundation.com/journey/</a></p> <p>Sheets: Genotypes and phenotypes</p> <p><a href="#">Resources\continuous discontinuous traits.pptx</a></p>	Variations, Continuous and discontinuous variations, genotypes, phenotypes
11	Define mutation	<b>Mutations:</b> define mutations, alleles. What is the link between mutations and new alleles in a population?	Brainpop-genetic mutations	mutation

	Describe the role of mutations in producing new alleles	<p><b>Reading:</b> Science Plus book 2 (pg26-27).</p> <p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• brainstorm “what is mutation”</li> <li>• link mutation to new alleles and variation in a population</li> <li>• Read Science Plus book 2 (pg26-27). Do activity and review questions</li> <li>• Scipad workbook p230-231</li> </ul>	<p><a href="http://www.accessexcellence.org/R/C/VL/GG/">http://www.accessexcellence.org/R/C/VL/GG/</a> mutations</p> <p><a href="http://www.genetichealth.com/G101_Changes_in_DNA.shtml">http://www.genetichealth.com/G101_Changes_in_DNA.shtml</a> Changes in DNA</p> <p>Sheets: Evolution and mutation</p>	
<b>12-14</b>	<p>Describe the process of meiosis</p> <p>Describe the process of DNA replication</p> <p>Describe the terms gametes, zygote</p> <p>Recognise that sexual reproduction produces a new mix of alleles</p>	<p><b>Meiosis and sexual reproduction-</b> What is meiosis? Why is it needed and where does it occur. Comparison between mitosis and meiosis.</p> <p>Asexual and sexual reproduction-the differences between them.</p> <p>Resource: Yr 11 Science Study Guide p72-74 New Directions in Science p126 -127, p140 – 141 Science Plus book 2 p22 – 23</p> <p><b>Activity:</b></p> <ul style="list-style-type: none"> <li>• NDS, read p.126-127</li> <li>• Scipad workbook p183 DNA replication</li> <li>• Scipad workbook p 226-227 Meiosis, p228-229 Sexual reproduction,</li> <li>• The process of meiosis-cell division which occurs only for the production of sex cells, eggs and sperms. It takes place in ovaries and testes of animals</li> </ul>	<p><a href="http://www.woodrow.org/teachers/bi/1994/Meiosis">http://www.woodrow.org/teachers/bi/1994/Meiosis</a></p> <p>Brainpop-mitosis, asexual reproductions</p> <p>Flower dissection</p> <p>Video ‘The Life Cycle of a Flowering Plant’</p>	<p>Pathfinder year 11 p22 q 4,6 p.23 q 7,9</p>

		<p>and ovaries and anthers of plants. It produces sex cells with half the normal number of chromosomes for the species</p> <ul style="list-style-type: none"> <li>• Comparison between mitosis and meiosis cell divisions-teaching leading to a compare and contrast table completed by the students.</li> <li>• NDS, read p140 – 141</li> <li>• Describe the process of meiosis using diagrams (Yr 11 Pathfinder p17)</li> <li>• A class discussion on meiosis and link to gamete production</li> <li>• Science Plus p22 – 23, do activity, do review question p2</li> </ul>	<p><a href="http://www.rothamsted.ac.uk/notes/courses/guide/movie/meiosis.htm">http://www.rothamsted.ac.uk/notes/courses/guide/movie/meiosis.htm</a> Meiosis</p>	
<b>15-17</b>	<p>Distinguish between sexual and asexual reproduction</p> <p>Describe the terms</p>	<p>Asexual and sexual reproduction-the differences between them.</p> <p>Class discussion of sexual and asexual reproduction Resource Pathfinder yr 11-p 12-13 New Directions in Science p126 -127 Activity</p> <ul style="list-style-type: none"> <li>• Class discussion of sexual and asexual reproduction</li> <li>• Scipad workbook p225 – Asexual reproduction</li> </ul>	<p>Geranium cuttings, onion/daffodil bulbs</p> <p>Flowers, dissection equipment-scalpels etc. per group</p>	<p>Sexual and asexual reproduction, gametes, zygote</p>

	<p>gametes, zygote Recognise that sexual reproduction produces a new mix of alleles</p>	<ul style="list-style-type: none"> <li>• Write some examples of asexual reproduction in plants</li> <li>• Growing geraniums from cuttings or other plant asexual reproduction examples</li> <li>• NDS,p127-do questions 1 and2</li> <li>• Flowers introduced as reproductive structures in flowering plants.</li> </ul> <p>Flower dissection in groups –cross-section to observe the parts involved in reproduction.</p> <ul style="list-style-type: none"> <li>• Draw the cross-section and label the parts(NDS p. 126-127)</li> </ul> <p>Class discussion on sexual and asexual reproduction</p> <ul style="list-style-type: none"> <li>• Read NDSP p126 – 127</li> </ul> <p>Do a compare/contrast table on sexual / asexual reproduction (use Pathfinder Yr 11 p12-15)</p> <ul style="list-style-type: none"> <li>• Do question 1 p14 Yr 11 Pathfinder or a similar vocabulary activity</li> </ul> <p>Year 11 Study Guide do activity 6c p74-75</p>		
18-24	<p>Punnet squares and pedigrees</p>	<p>Define terms heterozygous, recessive, dominant, homozygous, phenotype, genotype and pure breeding, Use punnet squares for monohybrid crosses ,analysis of pedigree charts.</p> <p>Resources: Yr 11 Pathfinder (p20 – 23) New Directions Science p132 - 137, 141 -143 Science Plus BK 2/CD p24 – 25 Year 11 Science Study Guide p 67 – 77</p> <p>Activity:</p>	<p>Sheets: Understanding genetic terms 1 and2 Dominant alleles</p>	<p>Punnet, heterozygous, homozygous, dominant, recessive, phenotype, genotype, pure breeding, hybrid, pedigree</p>

		<ul style="list-style-type: none"> <li>• Scipad workbook p183-212 Punnett square and pedigree chart exercises</li> <li>• Scipad workbook p213-219 chapter review on predicting inheritance</li> <li>• Use Mendelian studies ( NDS p132-135) to introduce the principles of genetics leading to genetic crosses.</li> <li>• vocab activity for defining terms – heterozygous, homozygous, dominant, recessive, phenotype, genotype</li> <li>• Teach monohybrid cross with a few examples</li> <li>• Science Plus Book 2, read p24 - 25(basic problems)</li> </ul> <p>Do review question p25 Do activities 1 &amp; 2 p25(basic problems)</p> <ul style="list-style-type: none"> <li>• Teach phenotype/genotype ratios from monohybrid crosses</li> <li>• NDS, read p134 – 135</li> </ul> <p>Do questions from p135</p> <ul style="list-style-type: none"> <li>• NDS p 142-143-read and do questions from page 143</li> </ul>		
<b>25-26</b>	Sex Determination	<p>Monohybrid problems with sex determination examples –sex chromosomes X and Y and of the equal chance of a boy or a girl being conceived.</p> <p>Resources: Year 11 Study guide-p75-77</p>		Sex chromosomes, autosomes, somatic cells, sex cells



	<p>Environment and phenotype</p> <p>Variation and its importance for survival</p>	<p>Recognise that the environment can effect the phenotype of an organism without changing its genotype – e.g. scars, malnutrition. Identical twins are not completely identical.</p> <p>Variation is important for the survival of species as when environmental conditions change e.g. disease, temperature, there needs to be differences between members of the same species that allows at least some to survive. Those that survive will pass on their favourable alleles to the next generation</p> <p><b>Activity:</b> Scipad workbook p232-236 Scipad workbook Chapter review p237-243</p>		
<b>30</b>	Review	Scipad workbook Practice assessment p244-251	<p>Sheets:</p> <p>What is genetics Genetics terms Genetics an overview</p>	
<b>31</b>	Written assessment			