

# 7<sup>th</sup> Grade Science

## Genetics Unit Information

Milestones Domain/Weight: Cells & Genetics (includes the Human Body) 35%

Purpose/Goal(s): Within the Cells and Genetics domain, genetic content knowledge includes an awareness of the importance of genes and chromosomes in the process of inheriting a specific trait and the mechanisms of reproduction. Students should know that through selective breeding, small differences can accumulate in successive generations with the end result of producing plants and animals with desired traits.

Content Map: [Genetics Content Map](#)

Prerequisites: [Genetics Elementary Standards](#)

Unit Length: Approximately 15 days

[Genetics Study Guide](#) | [Genetics Study Guide KEY](#)

Click on the links below for resources by Essential Question:

[EQ 1: How does sexual and asexual reproduction affect the passing of traits to offspring?](#)

[EQ 2: How are genes, chromosomes, and heredity “related” to one another?](#)

[EQ 3: How is the combination of genes important in determining the inheritance of biological traits?](#)

# TCSS 7<sup>th</sup> Science Genetics Unit

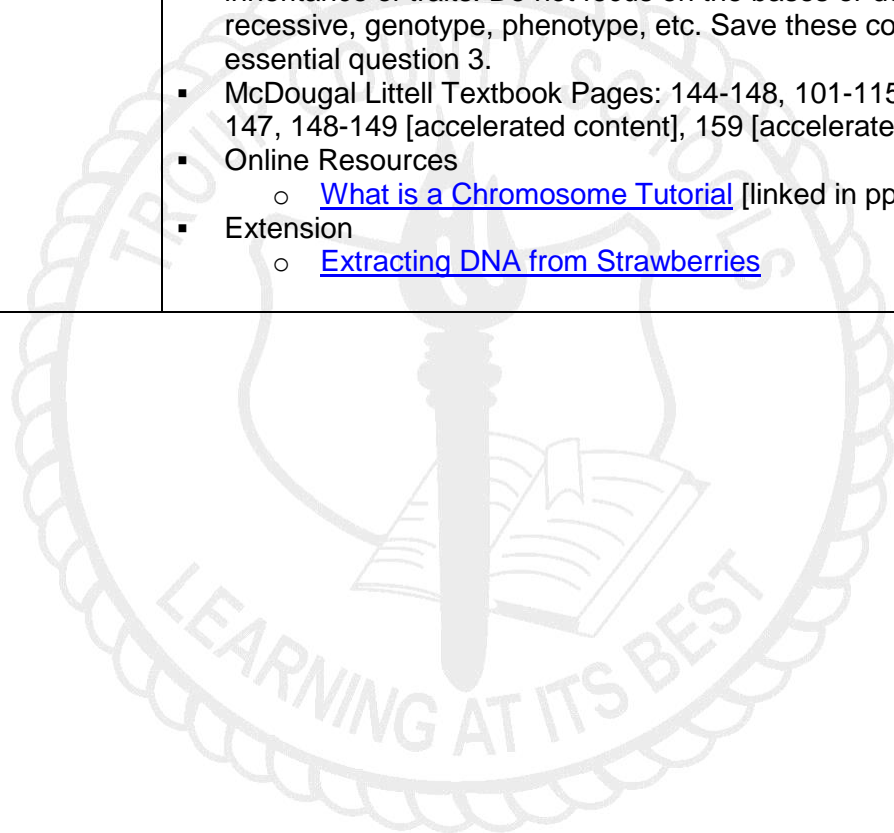
Standard(s) and Essential Question	Vocabulary	Resources <a href="#">[Back to Top]</a>	Assessment
<p><u>Standard(s):</u> S7L3b. Compare and contrast that organisms reproduce asexually and sexually (bacteria, protists, fungi, plants, and animals)</p> <p><u>Essential Question:</u> 1. How does sexual and asexual reproduction affect the passing of traits to offspring?</p>	<p><u>Essential*</u> Sexual reproduction [Sexually] Asexual reproduction [Asexually]</p> <p><u>Supplemental**</u> Meiosis Binary fission</p> <p>*Essential Vocabulary listed in the GPS Standards</p> <p>**Supplemental Vocabulary listed in the state frameworks and/or other state document</p>	<p>The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Asexual and Sexual Reproduction ppt [Includes “I Do”, “You Do”, and “We Do”]</a> See “Notes” on ppt slides for suggested instructional approaches where applicable or view the <a href="#">Asexual and Sexual Reproduction PPT Notes</a></li> <li>▪ <a href="#">Asexual and Sexual Reproduction Notes [“You Do”]</a> – Students use the notes to record important information from the lesson</li> <li>▪ <a href="#">Asexual and Sexual Reproduction Images Sort [“You Do” or “We Do”]</a> - Students or small groups must identify which numbers illustrate asexual reproduction and which images illustrate sexual reproduction. An explanation must also be provided</li> <li>▪ <a href="#">Investigating Reproductive Strategies Activity [“We Do”]</a> - Students work in pairs to compare five aspects of an organism that reproduces sexually with one that reproduces asexually.</li> <li>▪ <a href="#">Asexual and Sexual Reproduction Comparison Summarizer - [“You Do”]</a></li> <li>▪ <a href="http://learn.genetics.utah.edu/content/variation/reproduction/">http://learn.genetics.utah.edu/content/variation/reproduction/</a> Click on organisms, read information and determine if they produce asexually or sexually</li> <li>▪ McDougal Littell Textbook Pages: 135-136, 88-92, 117-119, 120-122 [accelerated content], 320-321, 372</li> </ul>	<ul style="list-style-type: none"> <li>▪ <a href="#">S7L3b. Sample Assessment Items</a></li> </ul>

# TCSS 7<sup>th</sup> Science Genetics Unit

Standard(s) and Essential Question	Vocabulary	Resources <a href="#">[Back to Top]</a>	Assessment
<p><u>Standard(s):</u> S7L3a. Explain the role of genes and chromosomes in the process of inheriting a specific trait.</p> <p><u>Essential Question:</u> 2. How are genes, chromosomes, and heredity “related” to one another?</p>	<p><u>Essential*</u> Genes Traits Chromosomes Inheriting [Heredity]</p> <p><u>Supplemental**</u> DNA Genetic material</p> <p>*Essential Vocabulary listed in the GPS Standards</p> <p>**Supplemental Vocabulary listed in the state frameworks and/or other state document</p>	<p>The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Genes, Chromosomes, and Heredity ppt</a> [Includes “I Do”, “You Do”, and “We Do”] - This lesson is intended to be a general introduction to these concepts. The concepts will be taught in depth during essential question 3. See “Notes” on ppt slides for suggested instructional approaches where applicable or view the <a href="#">Genes, Chromosomes, and Heredity PPT Notes</a></li> <li>▪ <a href="#">Genes, Chromosomes, and Heredity Notes</a> [“You Do”] – Students use the notes to record important information from the lesson</li> <li>▪ <a href="#">An Inventory of Traits Activity</a> [“You Do” and/or “We Do”] – Students take an inventory of some common traits. The activity can take a few minutes or can be expanded to include whole class data collection. Other trait activities: A Tree of Genetic Traits   Handy Family Tree</li> <li>▪ <a href="#">Study Jams Video on Heredity</a> [introduces dominant and recessive]</li> <li>▪ Models of DNA – select one of the following             <ul style="list-style-type: none"> <li>○ <a href="#">Have Your DNA and Eat it Too</a> [“You Do” and/or “We Do”] Note: students do not have to know the base pairs. You may want to mention to students that the structure of DNA has patterns, but they will learn the patterns in-depth in high school. The activity above will need to be modified for this purpose. After models have been created, have each student demonstrate a gene.</li> <li>○ <a href="#">DNA Origami</a> [“You Do” and/or “We Do”] – Make paper models of DNA. There are two versions, one that is already colored and one that is not colored. If you select the version that is not colored, DO NOT spend a lot of time allowing students to color the models. Have students color the models at home, during homeroom, during bellwork, etc. Additionally, as in the other DNA activities, students do not have to know the base pairs. Modify the activity or instructions as needed to focus only on the basic structure. After models have been created, have each student describe a gene from the model.</li> </ul> </li> <li>▪ <a href="#">Sticky Genes Demonstration</a> [“I Do”] : Using a toy/object that can be</li> </ul>	<ul style="list-style-type: none"> <li>▪ <a href="#">S7L3a. Sample Assessment Items</a></li> </ul>

# TCSS 7<sup>th</sup> Science Genetics Unit

Standard(s) and Essential Question	Vocabulary	Resources <a href="#">[Back to Top]</a>	Assessment
		<p>“stuck” together (connecting beads, connecting blocks, Unifix cubes) to represent individual genes, lead students to see that genes do not “stick” to a chromosome, but that genes link together to form chromosomes.</p> <ul style="list-style-type: none"> <li>▪ <a href="#">A Recipe for Traits Activity</a> [“You Do” and/or “We Do”] – This activity is intended to show the relationship between DNA, genes, and the inheritance of traits. Do not focus on the bases or dominant, recessive, genotype, phenotype, etc. Save these concepts for essential question 3.</li> <li>▪ McDougal Littell Textbook Pages: 144-148, 101-115, 123, 127, 144-147, 148-149 [accelerated content], 159 [accelerated content]</li> <li>▪ Online Resources               <ul style="list-style-type: none"> <li>○ <a href="#">What is a Chromosome Tutorial</a> [linked in ppt]:</li> </ul> </li> <li>▪ Extension               <ul style="list-style-type: none"> <li>○ <a href="#">Extracting DNA from Strawberries</a></li> </ul> </li> </ul>	



# TCSS 7<sup>th</sup> Science Genetics Unit

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<p><u>Standard(s):</u> S7L3a. Explain the role of genes and chromosomes in the process of inheriting a specific trait.</p> <p>S7L3c. Recognize that selective breeding can produce plants or animals with desired traits.</p> <p><u>Essential Question:</u> 3. How is the combination of genes important in determining the inheritance of biological traits?</p>	<p><u>Essential*</u> Genes Trait Inheriting Chromosomes Selective breeding</p> <p><u>Supplemental**</u> Purebred Genotype Genetic cross Probability Heterozygous Homozygous Punnett Square True breeding Hybrid Alleles Cloning Phenotype Pedigree Mutation</p> <p>*Essential Vocabulary listed in the GPS Standards</p> <p>**Supplemental Vocabulary listed in the state frameworks and/or other state document</p>	<p>The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Combination of Genes ppt [Includes “I Do”, “You Do”, and “We Do”]</a> - See “Notes” on ppt slides for suggested instructional approaches where applicable or view the <a href="#">Combination of Genes PPT Notes</a></li> <li>▪ <a href="#">Combination of Genes Notes [“You Do”]</a> – Students use the notes to record important information from the lesson</li> <li>▪ <a href="#">Reebop Genetics [“You Do” or “We Do”]</a> – Use pages 11-14 of the Reebop activity to apply the concepts on alleles, phenotype, genotype, dominant, recessive, homozygous, and heterozygous. Do not construct the baby reebop at this point just use the chromosomes and genes to apply the vocabulary. Have students add to the Reebop chart the following: the alleles, dominant allele, recessive allele, homozygous or heterozygous</li> <li>▪ <a href="#">Genotype, Phenotype, Homozygous and Heterozygous Practice Handout [“You Do” and/or “We Do”]</a></li> <li>▪ Teacher Demonstration: Dominant/Recessive [“I Do”]             <ul style="list-style-type: none"> <li>○ Fill on beaker half full with water colored with dark green food coloring.</li> <li>○ Fill a second beaker half full of water colored with yellow food coloring.</li> <li>○ Mark the water level in each beaker.</li> <li>○ Pour some of the yellow water into the green water and ask students to make and record observations. Have students hypothesize where the yellow water has gone. Discuss.</li> <li>○ Pour all of the green water into the yellow water. Have students make and record observations.</li> <li>○ Discuss what happened to the yellow water. Lead students to the conclusion that the yellow water is still present but is covered by the green water.</li> <li>○ Lead students to make the connection that this is how a dominant gene “covers” a recessive gene, realizing that the recessive gene is still present but is covered by the dominant gene. Discussion should also include genotype, phenotype,</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ <a href="#">S7L3a. Sample Assessment Items</a></li> <li>▪ <a href="#">S7L3c. Sample Assessment Items</a></li> </ul>



# TCSS 7<sup>th</sup> Science Genetics Unit

Standard(s) and Essential Question	Vocabulary	Resources <a href="#">[Back to Top]</a>	Assessment
		<p>homozygous, and heterozygous.</p> <ul style="list-style-type: none"> <li>▪ <a href="#">Punnett Square Practice</a> ["You Do"]</li> <li>▪ <a href="#">Four Square Punnett Square Modeling</a> ["I Do" and "We Do"]</li> <li>▪ <a href="#">Mutation Introduction Demonstration</a> ["I Do"]</li> <li>▪ Selective Breeding Optional Activity: Flower Power ["You Do" or "We Do"] - Seeds Galore, a Georgia Seed company, wants us to develop a new flower for next year's sale on Mother's Day. The teacher will prepare information on 5-8 plants with different characteristics (smell, insect resistant, color, height, amount of sun, thorns, width, etc.) Students will select two plants. They will then determine what characteristics from each of those two plants they want to see reproduced in a new plant. List the characteristics of the new plant. Illustrate the flower.</li> <li>▪ <a href="#">Combination of Genes Summarizer</a> ["You Do"]</li> <li>▪ Worksheets for applying the combination of genes [do not use all of the sheets; select appropriate sheets as necessary]: ["You Do"] <ul style="list-style-type: none"> <li>○ <a href="#">Dominant and Recessive Genes Worksheet</a></li> <li>○ <a href="#">Harry Potter Genetics Lesson 1</a>   <a href="#">Harry Potter Genetics Lesson 2</a> [lesson 2 should be used only for differentiation if needed]</li> <li>○ <a href="#">Genetics with a Smile</a>   <a href="#">Genetics with a Smile Wrapping It Up!</a></li> <li>○ <a href="#">Bikini Bottom Genetics</a>   <a href="#">Bikini Bottom Genetics 2</a>   <a href="#">Bikini Bottom Genetics Review</a>   <a href="#">Sponge Bob Genetics Quiz</a></li> <li>○ <a href="#">Simple Genetics Practice Problems</a></li> <li>○ <a href="#">Earlobes and Tongue Rolling Questions</a></li> </ul> </li> <li>▪ Activities for applying the combination of genes [it is not intended for all of the activities to be completed. Select one or two to use initially and another might be used for reinforcement during differentiation]: ["You Do" and/or "We Do"] <ul style="list-style-type: none"> <li>○ <a href="#">Reebops</a></li> <li>○ <a href="#">Genetic Plastic Eggs</a></li> <li>○ <a href="#">Hornimonster Heredity Simulation</a></li> <li>○ <a href="#">Penny Genetics</a></li> <li>○ <a href="#">How Does Chance Affect the Combination of Genes</a></li> <li>○ <a href="#">Genotype and Phenotype Activity</a></li> <li>○ <a href="#">Crazy Snowman Genetics</a></li> </ul> </li> <li>▪ McDougal Littell Textbook Pages: [S7L3a.] 144-148, 101-115, 123, 127, 144-147, 148-149 (accelerated content), 159 (accelerated)</li> </ul>	

# TCSS 7<sup>th</sup> Science Genetics Unit

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		<p>content); [S7L3c.] 150-154, 110-116, 123, 181</p> <ul style="list-style-type: none"> <li>▪ Differentiation ["You Do"] <ul style="list-style-type: none"> <li>○ <a href="#">Tiered Genetics RAFTS</a></li> <li>○ Students struggling completing Punnett Squares: Show students a multiplication table grid [Multiplication Grid]. Discuss how to find the product of 2 numbers on the grid. Show/draw a Punnett Square for students to see. Lead students to use the same method as used with the multiplication table to find or fill in the Punnett Square</li> <li>○ Level 3 Students <ul style="list-style-type: none"> <li>▪ <a href="#">Dihybrid Cross</a></li> <li>▪ <a href="#">Bikini Bottom Dihybrid Crosses</a></li> <li>▪ <a href="#">Bikini Bottom Genetics Incomplete Dominance</a></li> <li>▪ <a href="#">Pick the Risk</a></li> <li>▪ <a href="#">Pedigree Problems</a></li> <li>▪ <a href="#">Make Your Own Pedigree</a></li> </ul> </li> </ul> </li> <li>▪ Supplemental <ul style="list-style-type: none"> <li>○ <a href="#">Genetic Mutations</a></li> <li>○ <a href="#">Antifreeze Gene</a></li> </ul> </li> <li>▪ Online Resources <ul style="list-style-type: none"> <li>○ Video clip on Genes and Inheritance: <a href="http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/classification_inheritance/genesandinheritanceact.shtml">http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/classification_inheritance/genesandinheritanceact.shtml</a></li> <li>○ Mendel's Experiments Online Tutorial: <a href="http://www.sumanasinc.com/webcontent/animations/content/mendel/mendel.html">http://www.sumanasinc.com/webcontent/animations/content/mendel/mendel.html</a></li> <li>○ Genetics Web Lab: <a href="http://www2.edc.org/weblabs/WebLabDirectory1.html">http://www2.edc.org/weblabs/WebLabDirectory1.html</a></li> <li>○ BioLogica Web Labs: <a href="http://biologica.concord.org/webtest1/web_labs.htm">http://biologica.concord.org/webtest1/web_labs.htm</a></li> <li>○ <a href="#">Furry Family</a> - Students combine genes by completing a Punnett Square based on goal characteristics</li> <li>○ <a href="#">Stanford at the Tech: Understanding Genetics</a></li> <li>○ <a href="http://learn.genetics.utah.edu/content/inheritance/intro/">http://learn.genetics.utah.edu/content/inheritance/intro/</a> [linked in ppt]</li> <li>○ <a href="http://learn.genetics.utah.edu/content/inheritance/patterns/">http://learn.genetics.utah.edu/content/inheritance/patterns/</a></li> <li>○ <a href="http://content.bfwpub.com/webroot_pubcontent/Content/BCS_5/phelanphys2e/Q%20Animations/0701/START_C.html">http://content.bfwpub.com/webroot_pubcontent/Content/BCS_5/phelanphys2e/Q%20Animations/0701/START_C.html</a></li> </ul> </li> </ul>	

# TCSS 7<sup>th</sup> Science Genetics Unit

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		<p>[requires Macromedia player]</p> <ul style="list-style-type: none"><li>○ <a href="http://www.biologycorner.com/norns/norn_genetics.swf">http://www.biologycorner.com/norns/norn_genetics.swf</a></li><li>○ <a href="#">Your Sex is from Genetics Song</a></li><li>○ <a href="#">Genetics Rap</a> [linked in ppt]</li><li>○ <a href="#">Greg Mendel Meiosis Song</a></li></ul>	

