

Plant Genetics

Media Type: Microsoft® PowerPoint®

Duration: 211 slides

Goal: To gain an understanding of terms, technologies and applications of plant genetics.

Description: This presentation discusses the importance and basics of plant genetics. It identifies plant cell characteristics and functions as well as plant cell processes. It discusses the use of plant genetics and technologies for the advancement of production agriculture.

Objectives:

1. To identify the process of cell reproduction and growth.
2. To evaluate the importance of DNA in plant cells.
3. To discuss terms related to plant genetics.
4. To evaluate cell structures and functions.
5. To identify the history and use of plant breeding.
6. To discuss technologies used in agricultural plants.



Agriculture, Food & Natural Resources Career Cluster (AG)

Cluster	Standard
	Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster™.
	Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster™ and the role of agriculture, food and natural resources (AFNR) in society and the economy.
	Examine and summarize the importance of health, safety and environmental management systems in AFNR businesses.
Agribusiness Systems Career Pathway (AG-BIZ)	Apply management planning principles in AFNR businesses.
	Use record keeping to accomplish AFNR business objectives, manage budgets, and comply with laws and regulations.
	Develop a business plan for an AFNR business.
Food Products & Processing Systems Career Pathway (AG-FD)	Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.
Natural Resources Systems Career Pathway (AG-NR)	Demonstrate responsible management procedures and techniques to protect or maintain natural resources.
Plant Systems Career Pathway (AG-PL)	Develop and implement a crop management plan for a given production goal that accounts for environmental factors.
	Apply the principles of classification, plant anatomy and plant physiology to plant production and management.
	Propagate, culture and harvest plants and plant products based on current industry standards.
	Apply principles of design in plant systems to enhance an environment (e.g., floral, forest, landscape and farm).

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College & Career Readiness Anchor Standards for Reading

Reading Standards for Informational Text				
Key Ideas & Details	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.			
	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.			
	<table border="1"> <tr> <td>9-10.3</td> <td>Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.</td> </tr> <tr> <td>11-12.1</td> <td>Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.</td> </tr> </table>	9-10.3	Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.	11-12.1
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Craft & Structure	Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text relate to each other and the whole.			
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Range of Reading & Level of Text Complexity	Read and comprehend complex literary and informational texts independently and proficiently.			

College & Career Readiness Anchor Standards for Writing

Writing Standards							
Text Types & Purposes	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.						
	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.						
	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.						
Production & Distribution of Writing	<table border="1"> <tr> <td>9-10.6</td> <td>Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.</td> </tr> <tr> <td>11-12.5</td> <td>Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</td> </tr> <tr> <td>11-12.6</td> <td>Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.</td> </tr> </table>	9-10.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	11-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
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Research to Build & Present Knowledge	Draw evidence from literary or informational texts to support analysis, reflection, and research.						
	<table border="1"> <tr> <td>11-12.7</td> <td>Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</td> </tr> <tr> <td>11-12.8</td> <td>Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</td> </tr> </table>	11-12.7	Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.		
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College & Career Readiness Anchor Standards for Speaking and Listening

Speaking & Listening Standards	
Comprehension & Collaboration	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
Presentation of Knowledge & Ideas	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
	Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.
	<i>11-12.5</i> Make strategic use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

College & Career Readiness Anchor Standards for Language

Language Standards	
Conventions of Standard English	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
Knowledge of Language	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
	Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
Vocabulary Acquisition & Use	Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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Lesson Plan

Class 1: Distribute the *Plant Genetics Student Notes* and *Vocabulary Handout* then show slides 1 to 30 of the *Plant Genetics - Plant Reproduction* segment. Distribute the *Plant Reproduction Activity* and allow students time to work. Handout the *Mitosis Project* and instruct students this will be due during Class 9.



Slides
1-30

Class 2: Show slides 31 to 56 of the *Plant Genetics - Plant Reproduction* segment. Next, distribute the *Assessment* and have students complete it. Allow the remainder of the class to complete the *Plant Reproduction Activity*.



Slides
31-56

Class 3: Show slides 57 to 79 of the *Plant Genetics - Plant Biology* segment and have students continue to fill out the *Student Notes*. Allow the remainder of the class to work on the *Mitosis Project*.



Slides
57-79

Class 4: Show slides 80 to 108 of the *Plant Genetics - Plant Biology* segment. Students should use the *Student Notes* and *Vocabulary Handout* as reference. After the segment, distribute the *Assessment*.



Slides
80-108

Class 5: Begin the *Plant Genetics - Plant Breeding* segment and have students continue to fill out the *Student Notes*. After the segment, distribute the *Assessment*. Distribute the *Probability Theory Activity*. Assign the *Cross Breeding Plants Project* and provide a due date.



Slides
109-133

Class 6: Show slides 134 to 157 of the *Plant Genetics - Agricultural Biotechnology* segment and remind students to fill out the *Student Notes*. Students should continue to reference the *Vocabulary Handout*. Distribute the *Technologies in Agriculture Activity*. Assign the *Agricultural Biotechnology Project* and provide a due date.



Slides
134-157

Class 7: Show slides 158 to 192 of the *Plant Genetics - Agricultural Biotechnology* segment and remind students to fill out the *Student Notes*. After the segment, distribute the *Assessment*. Allow the remainder of the class to work on either the *Project* or the *Activity*.



Slides
158-192

Class 9: Distribute the *Plant Genetics Final Assessment*. Have students turn in the *Mitosis Project* and complete and turn in any unfinished work.



Slides
193-211

Lesson Links

USDA NIFA Plant Breeding, Genetics, & Genomics

- <http://www.csrees.usda.gov/plantbreedinggeneticsgenomics.cfm>

USDA ARS Plant Genetic Resources Unit

- http://www.ars.usda.gov/main/site_main.htm?modecode=19-10-05-00

Career & Technical Student Organizations

National FFA

- Agronomy CDE
- Environmental and Natural Resources CDE
- Nursery/Landscape CDE
- Arysta LifeScience North America FFA Scholarship

University of New Mexico

- Burnham School/Research by Pre-College Student Fellowship

National Association of Plant Breeders

- Membership opportunities

Career Connections

- iCEV50022, Bill Deavours, Pesticide Deputy, Tulare County, CA
- iCEV50025, Brock Dolman, Biologist, Occidental Arts & Ecology Center
- iCEV50088, Laura Barringer, Senior Associate, Global Harvest Initiative, John Deere
- iCEV50122, Michael Neff, Ph.D., Associate Professor of Crop Biotechnology, Washington State University

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Lab Activities

Plant Reproduction

Directions:

Distribute the *Plant Reproduction Activity*. Instruct the students to research plants which reproduce sexually, asexually or both. If the students use the Internet, only credible sites ending in .gov, .org and .edu should be used. Instruct the students to answer the questions on the *Activity* while they conduct their research.

Probability Theory

Directions:

Distribute the *Probability Theory Activity*. Refer to the teacher instruction sheet to instruct students how to participate in the *Activity*.

Technologies in Agriculture

Directions:

Distribute the *Technologies in Agriculture Activity*. Split the students into groups of three or four. Instruct the students to choose a crop which is affected by a technology. The students should research their crop and answer the questions on the *Activity*.



Projects

Mitosis

Directions:

Distribute the *Mitosis Project*. Instruct students to create an illustration of the mitosis process including all phases and cell structures involved. Instruct students to label each phase and each structure in the cell. Instruct students to use a variety of colors to differentiate cell structures.

Cross Breeding Plants

Directions:

Distribute the *Cross Breeding Plants Project*. Instruct the students to choose two plants and create a genotype for each plant. Instruct students to use a Punnett square to cross the two plants and create their own cross bred plant. Instruct the students to draw each product of the cross breeding in the Punnett square, then write an explanation of their new plants.

Agricultural Biotechnology

Directions:

Distribute the *Agricultural Biotechnology Project*. Instruct students to research more about agricultural biotechnology and develop a stance on the subject. Then, the students should gather information to support their stance. Inform students they need to use credible websites such as .gov, .org or .edu. The students should then create a Microsoft® PowerPoint® presentation showing their stance and the information they found to support it.