

Fundamental Plant Processes

Media Type: Video
Duration: 42 minutes

Goal: To understand how processes work in plants and the important role each process plays in plant functions.

Description: This presentation identifies the importance of plants and describes the functions of plant parts. The cell cycle and plant life cycles are identified as well. It identifies factors which affect plant growth and development such as important nutrients. Plant growth regulators are identified and major plant processes such as photosynthesis, respiration and transpiration are thoroughly discussed.

Objectives:

1. To identify the importance of plants.
2. To discuss the cell cycle.
3. To discuss the plant life cycle.
4. To identify factors which affect plant growth and development.
5. To evaluate the effects of plant growth regulators.
6. To discuss important plant processes.



Common Core Standards

Agriculture, Food & Natural Resources Career Cluster (AG)

Cluster	Standard
	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.
	Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.
Food Products & Processing Systems Career Pathway (AG-FD)	Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.
	Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.
	Select and process food products for storage, distribution and consumption.
	Explain the scope of the food industry and the historical and current developments of food products and processing.
Natural Resources Systems Career Pathway (AG-NR)	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
	Analyze the interrelationships between natural resources and humans.
	Develop plans to ensure sustainable production and processing of natural resources.
	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.	
	Craft & Structure	11-12.4
Integration of Knowledge & Ideas		9-10.7
	9-10.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.
	11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats as well as in words in order to address a question or solve a problem.
Range of Reading & Level of Text Complexity	Read and comprehend complex literary and informational texts independently and proficiently.	
	9-10.10	By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9–10 text complexity band independently and proficiently.
	11-12.10	By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band 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.	
Production & Distribution of Writing	9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	9-10.5	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.
	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.
	11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	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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Writing Standards	
Research to Build & Present Knowledge	Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
	Draw evidence from literary or informational texts to support analysis, reflection, and research.
Range of Writing	Write routinely over extended time frames and shorter time frames for a range of tasks, purposes, and audiences.

College & Career Readiness Anchor Standards for Speaking and Listening

Speaking & Listening Standards	
Comprehension & Collaboration	<p>9-10.2 Integrate multiple sources of information presented in diverse media or formats evaluating the credibility and accuracy of each source.</p>
	<p>11-12.2 Integrate multiple sources of information presented in diverse formats and media in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p>
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.

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 *Fundamental Plant Processes Vocabulary Handout* and the *Worksheet* for students to use as reference materials. Show the *Fundamental Plant Processes - Importance of Plants* and the *Fundamental Plant Processes - Plant Parts & Functions* segments. Distribute the *Assessment* and have students complete. Distribute the *Plants for Medicinal Uses Project* and instruct students to turn it in during Class 5.



Video
3 min.

Class 2: Show the *Fundamental Plant Processes - The Cell Cycle* and the *Fundamental Plant Processes - Plant Life Cycle* segments. Remind students to use the *Vocabulary Handout* and *Worksheet* as references. Distribute the *Assessments* and have students complete them. Distribute the *Meiosis vs. Mitosis Project* and instruct students to turn it in during Class 7. Begin the *Germination Test Activity* and instruct students to turn it in during Class 7.



Video
10 min.

Class 3: Disseminate the *Growing Environments Student Handout*. Show the *Fundamental Plant Processes - Plant Growth* and the *Fundamental Plant Processes - Plant Hormones & Growth Regulators* segments. Remind students to use the *Vocabulary Handout* and *Worksheet* as references. Distribute the *Assessments* and have students complete them. Distribute the *Light Duration, Plant Hormones* and *The Plant Soil Relationship Activities* and have students turn them in during Class 5.



Video
14 min.

Class 4: Show the *Fundamental Plant Processes - Plant Processes: Photosynthesis/Respiration/Transpiration* segment. Students should continue to use the *Vocabulary Handout* and *Worksheet* as references. Distribute the *Assessment* and have students complete it. Distribute the *Photosynthesis Diagram* and *Energy Flow Processes Projects* and assign an appropriate due date.



Video
15 min.

Class 5: Allow students to complete any unfinished work. Have students turn in

the *Plants for Medicinal Uses Project*, *Light Duration*, *Plant Hormones* and *The Plant Soil Relationship Activities*.

Class 6: Distribute the *Final Assessment* and have students complete it. Have students work on *Germination Test Activity*.

Class 7: Allow students to complete any unfinished work. Have students turn in the *Meiosis vs. Mitosis Project* and *Germination Test Activity*.



Lesson Links

USDA Plant, Soil and Nutrition Research

- http://www.ars.usda.gov/main/site_main.htm?modecode=19-07-05Website

Colorado State University Extension

- <http://www.ext.colostate.edu>

University of Missouri Extension

- <http://extension.missouri.edu>



Career & Technical Student Organizations

Texas A&M Department of Soil & Crop Sciences

- Scholarship for incoming freshmen

Texas Tech Department of Plant & Soil Science

- Scholarship for incoming freshmen

FFA

- Agronomy
- Floriculture
- Forestry
- Nursery/Landscape



Career Connections

Using the *Career Connections Activity*, allow students to explore the various careers associated with this lesson. See the *Activity* for more details. *If student licenses have been purchased:* Students will select the interviews to watch based on your directions. *If only a teacher license is purchased:* Show students all the career interviews and instruct them to only complete the interview form for the required number of interviews.

- iCEV50692, Keith Backman, Certified Professional Horticulturalist & Crop Advisor, Dellavalle
- iCEV50088, Laura Barringer, Senior Associate, Global Harvest Initiative, John Deere
- iCEV50112, Thomas Morgan Ph.D., Plant Research Scientist, Pioneer Hybrid International

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Lab Activity

Germination Test

Directions:

Purchase various kinds of plant seed and make sure there is enough for each student to have 10 or more seeds. The tests will be more effective if some students receive old seeds and some new. Provide a paper towel and at least 10 seeds to each student. Distribute the *Germination Test Activity* and instruct students to read the introduction and follow the directions.

Light Duration

Directions:

Distribute the *Light Duration Activity*. Instruct students to use various resources and answer the questions provided. Students should use credible sources ending in .edu, .gov or .org.

Plant Hormones

Directions:

Distribute the *Plant Hormones Activity*. Instruct students to use various resources and answer the questions provided. Students should use credible sources ending in .edu, .gov or .org.

The Plant Soil Relationship

Directions:

Students must research and list all of the ways in which plants depend upon soil and the ways soil depends on plants. Students will create a flow chart to illustrate the relationship, it may be hand drawn or computer generated.



Projects

Plants for Medicinal Use

Directions:

Distribute the *Plants for Medicinal Use Project*. Instruct students to conduct research using credible sources such as websites ending in .edu, .gov or .org. Instruct students to write a paper which is no longer than four pages, double-spaced about plants which are used in medicine. Students should include a works cited page with proper APA or MLA format.

Mitosis vs. Meiosis

Directions:

Using the Internet, library, presentation or any other available resources, students will research and draw phases of mitosis and meiosis. Students will use one piece of paper for each phase and label each part of the cell which is important to the specific phase. Remind students to use color and label each phase. On a separate sheet of paper, students will compare the processes of mitosis and meiosis.

Photosynthesis Diagram

Directions:

Distribute the *Photosynthesis Diagram Project*. Instruct students to draw the photosynthesis process using plenty of color and detail. Students should include the steps of photosynthesis, labels and the equation for the inputs and outputs of photosynthesis. Remind students to use credible sources ending in .edu, .gov or .org.

Energy Flow Processes

Directions:

Using the Internet, library or any other available resources, students will research and illustrate, by hand or with a computer aided software, the processes of photosynthesis and cellular respiration. After creating the illustration, students should write a paragraph which compares and contrasts the processes.