MoSH

PLANT REPRODUCTION:
Suitcase Program [3-5]

TEACHER'S MANUAL

This Suitcase Program provides the materials and lesson plans for teachers of grades 3-5 with content and activities increasing in difficulty by grade level. Activities in this Suitcase Exhibit may assist in meeting the Tennessee State Standards.

ACTIVITIES

TENNESSEE STATE STANDARDS FOR 3-5

3.PS1.3	Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
3.LS1.1	Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.
3.LS4.2	Infer that plant and animal adaptations help them survive in land and aquatic biomes.
4.LS2.1	Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
4.LS2.5	Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.
4.ETS2.1	Use appropriate tools and measurements to build a model.
5.LS3.1	Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment.
5.LS3.2	Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.
5.ETS2.1	Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

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ACTIVITY I: Plant Parts

DURATION OF ACTIVITY: 30-45 minutes per lesson

LESSON OBJECTIVES
Part A: Classifying real fruits and vegetables. Students will observe and sort a variety of fruits and vegetables, inventing their own classification systems.
Part B: Broadening the classification system. Using grocery ads, students will compile a larger list of fruits and vegetables. They will classify these into convenient groups for store-owners and shoppers.

GUIDING QUESTIONS
How can we describe and classify the parts of plants that we eat? Why is this type of classifying (sorting) useful?

TENNESSEE STATE STANDARDS
3.PS1.3	Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
3.LS1.1	Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.

MATERIALS INCLUDED
"Parts of a Plant" Floor Puzzle

MATERIALS PROVIDED BY TEACHER
Selection of fruits and vegetables
Grocery store advertisements
Lines file cards
Poster paper

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

ACTIVITY II: Fruits

DURATION OF ACTIVITY: 30-45 minutes per part

LESSON OBJECTIVES

Part A: Students will examine fruits, cut them in half, and collect their seeds. They will record their similarities and differences, in writings and drawings.
Part B: The class will design a classification system and group the drawings accordingly.

GUIDING QUESTION

What is the function of a fruit and how is a fruit formed?

TENNESSEE STATE STANDARDS

3.PS1.3	Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
4.LS2.1	Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
5.LS3.2	Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.

MATERIALS INCLUDED

Dry Fruits Chart
Fleshy Fruits Chart
Giant Flower Model
Magnifiers (10)

MATERIALS PROVIDED BY TEACHER

Selection of fresh fruits such as tomatoes, cucumbers, citrus fruits, cantaloupes, apples, avocados, pea or bean pods
Plastic knives
Towels
Envelopes

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ACTIVITY III: Seed Structure and Germination

DURATION OF ACTIVITY: 30-45 minutes per lesson*
(*Students will also observe germinating seeds over several weeks, time permitting.)

LESSON OBJECTIVES
Part A: Students will use lima beans and the Germination Model to observe and record the parts of a seed and their functions.
Part B: Students will compare and contrast seeds collected in Activity II. Students will germinate these seeds, recording their growth with drawings.
Part C: Students will identify the adaptations for dispersal of the seeds in the Seed Dispersal mount.

GUIDING QUESTION
How does a seed grow into a new plant?

TENNESSEE STATE STANDARDS

4.LS2.1	Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
4.LS2.5	Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.
5.ETS2.1	Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.

MATERIALS INCLUDED
Seed Dispersal Bio-Plastic Mount
Germination Model and Activity Set
Magnifiers (10)

MATERIALS PROVIDED BY TEACHER
Lima beans
Towels
Seeds from previous lesson, or other live seeds
Petri dishes or plastic containers with lids

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ACTIVITY IV: Flowers and Pollinators

DURATION OF ACTIVITY: 30-45 minutes per lesson

LESSON OBJECTIVES
Students will identify the most important features of different flowers and the appropriate pollinators for different flowers. Groups will construct imaginary flowers with pollinators in mind.

GUIDING QUESTION
What adaptations increase the chance that flowers will be pollinated so that seeds will form?

TENNESSEE STATE STANDARDS

3.LS1.1	Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.
3.LS4.2	Infer that plant and animal adaptations help them survive in land and aquatic biomes.
4.LS2.1	Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
4.ETS2.1	Use appropriate tools and measurements to build a model.
5.LS3.1	Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment.

MATERIALS INCLUDED
Flower Model
Botany (Flower) Poster
Laminated picture of pollinators

MATERIALS PROVIDED BY TEACHER
A variety of fresh flowers
Index cards
Large poster boards and markers, or chalkboard and chalk
Scissors
“Tacky” glue
Pipe cleaners
Tape
Construction paper or white paper
Crayons or markers
Glitter

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

ACTIVITY V: Life Cycle of Flowering Plants

DURATION OF ACTIVITY: 45 minutes

LESSON OBJECTIVES
Students will observe, record, discuss life cycle of flowering plants.
Students will create illustrations of a flower and explain life cycle.

GUIDING QUESTION
What are the common features of the life cycle of flowering plants?

TENNESSEE STATE STANDARDS

3.LS1.1	Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.
3.LS4.2	Infer that plant and animal adaptations help them survive in land and aquatic biomes.
4.LS2.1	Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.

MATERIALS INCLUDED
Botany (Flower) Poster
Flower Model
“The Flower of a Flowering Plant” Microslides
Microviewer (2)
Master copy of “Plant Life Cycle”
Laminated circle sheets
“Wisconsin Fast Plants” Poster

MATERIALS PROVIDED BY TEACHER
Paper
Colored markers, crayons, pencils

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SUITCASE EXHIBIT INVENTORY CHECKLIST

School: _____
Check Out: _____
Return Date: _____

MoSH Check In:	Teacher Check In:	Item	Books/Videos/Posters	Teacher Return:
		A	Teacher's Manual	
		B	Photo: "Trumpet Flower"	
		C	Photo: "Hamburger"	
		D	Photo: "Bee"	
		E	Photo: "Hummingbird"	
		F	2 Micro-Slide-Viewer booklets each containing one slide strip "The Flower of a Flowering Plant" (F.1 & F.2)	
		G	Poster: "Fleshy Fruit	
		H	Poster: "Dry Fruit"	
		I	Poster: "Moss Life Cycle"	
		J	Poster: "Fern Life Cycle"	
		K	Poster: "Lily Life Cycle"	
		L	Poster: "Pine Life Cycle"	
		M	Poster: "Wisconsin Fast Plants"	
		N	Poster: "Flower"	
		O	Book: **Audubon Society Field Guide to Flowers**	
		P	Book: **The Science Book of Things That Grow**	
		Q	Book: **How a Plant Grows**	
		R	Binder: Plants	
		S	Photo: Pollinator - Ant	
		T	Photo: Pollinator - Beetle	
		U	Photo: Pollinator - Wasp	
		V	Photo: Pollinator - Butterfly	
		W	Photo: Pollinator - Moth	

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SUITCASE EXHIBIT INVENTORY CHECKLIST

MoSH Check In:	Teacher Check In:	Item	Materials	Teacher Return:
		1	Floor Puzzle 1.1 Roots 1.2 Stem 1.3 Leaf 1.4 Leaf 1.5 Leaf 1.6 Petal 1.7 Seeds	
		2	Germination Model Hanger	
		3	2 Micro-Slide-Viewers (3.1, 3.2)	
		4	Giant Dicot Flower Model (12 pieces number coded to match key in Teacher's Manual/Misc.)	
		5	13 Identified Seeds (5.1- 5.13) (see attached page for seed sample identification)	
		6	26 Unidentified Seeds (2 sets numbered 1-13)	
		7	15 Metric Rulers	
		8	3 x 3 Bags	
		9	Ziploc Bags (several)	
		10	Pipettes	
		11	Honeybee Life History Plastomount	
		12	Monocot / Dicot Plastomount	
		13	Seed Dispersal Plastomount	
		14	6 Magnifiers	
		15	4 dried bees in magnifier boxes	
		16	Inflatable Bee	
		17	Pumpkin Seeds	
		18	Split Peas	
		19	2 Kidney Beans (19.1, 19.2)	
		20	Grass Seeds	
		21	Soybeans	
		22	Oats	
		23	Russian Sunflower	
		24	Mung	
		25	Wheat	
		26	Corn	
		27	Wrinkled Pea	
		28	15 Seed Samples (28.1- 28.15) (see attached page for sample identification)	

SUITCASE EXHIBIT INVENTORY CHECKLIST

Seed Samples Identification

Item#	Materials	
5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.13	Black Walnut Sycamore Cottonwood Redbud Catalpa Scotch Pine Silver Maple Black Willow Green Ash Hackberry Red Cedar American Elm Sweetgum	
28.1 28.2 28.3 28.4 28.5 28.6 28.7 28.8 28.9 28.10 28.11 28.12 28.13 28.14 28.15	Ash Swamp Privet Box Elder Hophornbeam Mallow Paw Paw Yellow Wood Pecan White Indigo Larkspur Bottlebrush Grass Sumac American Lotus Thoroughwort Common Milkweed	