MoSH

PLANT REPRODUCTION:
Suitcase Program [6-8]

TEACHER'S MANUAL

This Suitcase Program provides the materials and lesson plans for teachers of grades 6-8 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 6-8

7.LS1.1 Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.

7.LS1.3 Evaluate evidence that cells have structural similarities and differences in organisms across Kingdoms.

7.LS1.6 Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.

7.LS1.7 Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

7.LS1.9 Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.

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

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ACTIVITY I: Flower Dissection

DURATION OF ACTIVITY: 45-55 minutes

LESSON OBJECTIVES
Students will learn to differentiate between monocots and dicots by examining and dissecting them, making microscope wet mount slides, drawing, labeling and making notes, and using the internet to research.

GUIDING QUESTIONS
How do plants reproduce sexually? What are the differences between monocots and dicots?

TENNESSEE STATE STANDARDS
7.LS1.7 Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

7.LS1.9 Construct a scientific explanation based on compiled evidence for the processes of photosynthesis, cellular respiration, and anaerobic respiration in the cycling of matter and flow of energy into and out of organisms.

MATERIALS INCLUDED
Flower Model
Monocot and Dicot Flowers Bio-Plastic Mount
“Botany” (Flowers) poster
“Wisconsin Fast Plants” poster
Magnifiers (6)

MATERIALS PROVIDED BY TEACHER
Simple flowers of two varieties (one monocot and one dicot)
Clear tape
Plastic knives
Microscopes
Slides and cover slips
Paper towels
Water
Drawing paper
Colored markers

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

ACTIVITY II: Partners in Pollination

DURATION OF ACTIVITY: 45-55 minutes

LESSON OBJECTIVES

1. Students will do the Smithsonian “Bee-Free Barbecue” Activity, choosing foods that do not need bee pollinators to go with their hamburgers.
2. Students will do the Smithsonian “Looking at Adaptive Structures” Activity, choosing whether bees or hummingbirds would make the best pollinators for trumpet flowers.
3. Students will pair off to do the Smithsonian “Design Your Own Flower” Activity, designing flowers based on their partner’s color, shape, smell and snack preferences.
4. Take-Home Page: Students will design a fictional pollinator-plant pair.

GUIDING QUESTION

How are plants and animals partners in pollination?

TENNESSEE STATE STANDARDS

7.LS1.6 Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.

MATERIALS INCLUDED

Flower Model
Monocot and Dicot Flowers Bio-Plastic Mount
Botany (Flowers) Poster
Smithsonian “In Your Classroom” lesson plan
Laminated Photographs of trumpet flower, bee, hummingbird, hamburger

MATERIALS PROVIDED BY TEACHER

Small dish of corn starch or flour
Cotton swabs
Drawing paper
Construction paper
Scissors
Colored markers and/or crayons
Tacky glue
Pipe cleaners, large and small
Clear tape

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

ACTIVITY III: Classifying Plants

DURATION OF ACTIVITY: 45-55 minutes

LESSON OBJECTIVES
Students will observe live mosses, ferns, conifers and flowering plants, recording data about their parts, reproductive structures and life cycles, learning to group plants accordingly.

GUIDING QUESTIONS
What are common characteristics of plants? How are plants' differences used to classify plants?

TENNESSEE STATE STANDARDS

7.LS1.6	Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.
7.LS1.7	Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

MATERIALS INCLUDED
Plant Life Cycle Chart Set (fern, lily, pine, moss)

MATERIALS PROVIDED BY TEACHER
Samples of the following live or dried plants:
Mosses
Ferns
Conifers (pine)
Flowering plants

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

ACTIVITY IV: What Seed Is It?

DURATION OF ACTIVITY: 45-55 minutes

LESSON OBJECTIVES
Students will use the Seed Key to identify "unknown" seeds.

GUIDING QUESTION
How is a dichotomous key used to identify tree seeds?

TENNESSEE STATE STANDARDS

7.LS1.6	Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.
7.LS1.7	Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

MATERIALS INCLUDED
Seed Key from "What Seed is It?"
(26) Tree seeds (from Ward's "Seed Identification Kit")
Dry Fruits Chart
Ward's "Constructing a Dichotomous Key Lab Activity"

MATERIALS PROVIDED BY TEACHER
Make copies of the Seed Key for each student
Make copies of pp. 4-5 of Ward's "Constructing a Dichotomous Key Lab Activity" for each student

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

ACTIVITY V: Constructing a Dichotomous Key

DURATION OF ACTIVITY: 45-55 minutes

LESSON OBJECTIVES
Using 8 identified seeds, students will construct their own dichotomous key.

GUIDING QUESTION
How is a dichotomous key constructed?

TENNESSEE STATE STANDARDS

7.LS1.1	Develop and construct models that identify and explain the structure and function of major cell organelles as they contribute to the life activities of the cell and organism.
7.LS1.3	Evaluate evidence that cells have structural similarities and differences in organisms across Kingdoms.

MATERIALS INCLUDED
Zip-lock bag of 8 identified seeds (from Ward's "Constructing a Dichotomous Key Lab Activity")
Metric rulers (from same activity)
Ward's "Constructing a Dichotomous Key Lab Activity", pp.4-5

MATERIALS PROVIDED BY TEACHER
Make copies of pp. 4-5 of Ward's "Constructing a Dichotomous Key Lab Activity" for each student.

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

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