

# The Intimate Side of Plants!

**Grade Level:** Fifth Grade (Science)  
**Written by** Susan Bryant, Monument Academy, Monument, CO  
**Length of Unit:** Four lessons (90-180 minutes each)

## I. ABSTRACT

This is a unit written for fifth grade on the asexual and sexual reproduction of plants. It will cover in detail the topics outlined in the Life Science section of the *Core Knowledge Sequence* (page 127). References are made to the previous units of plant classification, cell structure, vascular and non-vascular structure of plants and photosynthesis. Labs are included to reinforce the main ideas of how various types of plants reproduce and what conditions are needed for the germination of radish seeds. The life cycles of conifers, mosses and ferns and flowering plants are compared and studied. The unit consists of four lessons that are designed to be covered in a three to four week period.

## II. OVERVIEW

- A. Concept Objectives
  1. Students will understand that cyclical changes are common to systems of nature.
  2. Students will understand how to conduct scientific investigations using the scientific methods of inquiry.
- B. Content from the *Core Knowledge Sequence* (page 127)
  1. Asexual Reproduction (example – algae) and three types of plants that reproduce by vegetative reproduction (runners, bulbs and tubers)
  2. Sexual reproduction by spore-bearing plants – non-vascular plants (mosses)
  3. Sexual reproduction by spore-bearing plants – vascular plants (ferns)
  4. Sexual reproduction on non-flowering seed plants – conifers
  5. Male and female cones
  6. Method of pollination by wind
  7. Sexual reproduction of flowering plants, including the functions of sepals and petals, stamen, and pistil.
  8. Process of seed and fruit production and methods of pollination.
  9. Seed germination and plant growth, including information of monocots and dicots.
- C. Skill Objectives
  1. Define asexual reproduction (see vocabulary).
  2. Give an example of a living organism that reproduces asexually.
  3. Describe three methods of vegetative reproduction.
  4. Identify two types of plants that reproduce by spores.
  5. Distinguish between non-vascular and vascular spore-bearing plants.
  6. Classify mosses in Bryophyte Phylum and ferns in Pteridophyte Phylum.
  7. Label the life cycle of a moss and a fern.
  8. Conduct scientific investigations.
  9. Identify the four groups of trees that belong to the Gymnosperm phylum.
  10. Define Gymnosperms (see vocabulary).
  11. Understand and label the life cycle of conifers.
  12. Chart the characteristics of each of the four types of gymnosperms.
  13. Identify methods of how non-flowering plant seeds are transported.
  14. Define the terms according to their functions: sepals, pistils, stamen. anther, petals, and ovary (see vocabulary).
  15. Define the function of a flower.

16. Explain the process of seed and fruit production using a diagram of the process.
17. Tell three main ways that plants are pollinated.
18. Describe the process of germination and plant growth.
19. Define what the function is of the seed coat (cotyledons), embryo and endosperm (see vocabulary).
20. Identify the characteristics of monocots and dicots and be able to distinguish between the two in drawings.

### III. BACKGROUND KNOWLEDGE

- A. For Teachers
  1. Burne, D. *Plant*. New York: Alfred A Knopf. 1989. ISBN 0-394-82252-8.
  2. Greenway, T. *The Plant Kingdom*. Austin: Steck-Vaughn Company. 2000. ISBN 0-8172-5886-8.
  3. *The Visual Dictionary of Plants*. New York: Dorling Kindersley, Inc.1992. ISBN 1-56458-016-4.
- B. For Students
  1. Background knowledge of classification system.
  2. Background knowledge of plant cell structure.
  3. Background knowledge of non-vascular and vascular plant structures.
  4. An understanding of the process of photosynthesis.

### IV. RESOURCES

- A. *Studying Plants* (transparency book by Milliken), by E. Ortleb and R. Cadice (Lessons Two, Three, and Four)
- B. *What Your Fifth Grader Needs to Know*, by E.D. Hirsch (Lessons Two, Three, and Four)
- D. *Eyewitness Plants* (video by DK Publishing, Inc.) (35 minutes) (Lesson Four)
- E. *Incredible Plants*, by R. Carolin (Lesson One)
- F. *Eyewitness Books- Plants*, by D. Burnie (Lesson One)
- G. *The Visual Dictionary of Plants*, by Dorling Kindersley (Lessons One and Three)
- H. *The Plant Kingdom*, by T. Bernstein (Lessons Two and Three)
- I. *Today's World Plants*, by L. Bender (Lesson Three)

### V. LESSONS

#### Lesson One: Asexual Reproduction (two class periods, 45 minutes each)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students will understand that cyclical changes are common to systems of nature.
  2. Lesson Content
    - a. Asexual Reproduction (example – algae) and three types of plants that reproduce by vegetative reproduction (runners, bulbs and tubers).
  3. Skill Objective(s)
    - a. Define asexual reproduction (see vocabulary).
    - b. Give an example of a living organism that reproduces asexually.
    - c. Describe three methods of vegetative reproduction.
- B. *Materials*
  1. Appendix A - Student Handout - Asexual Reproduction in Algae
  2. Teacher resource books such as:
    - a. *Incredible Plants*, by R. Carolin
    - b. *Eyewitness Books- Plants*, by D. Burnie
    - c. *The Visual Dictionary of Plants*, by Dorling Kindersley

3. Appendix B- Vegetative Reproduction Drawings - Student Handout
  4. Index cards- white/lined/whole-punched in upper left hand corner (they will need a packet of these to use throughout the unit)
  5. Brads – large size (one per student) or metal ring (one per student to hold the index cards together)
- C. *Key Vocabulary*
1. Asexual reproduction: process by which living organisms produce their offspring with only one parent
  2. Vegetative reproduction: plants reproduce new plants through bulbs, runners, and tubers
- D. *Procedures/Activities*
1. Discuss types of reproduction already learned in previous units (monerans/fission; fungi/spores; yeast/budding). Discuss what other types of reproduction they are familiar with (examples: animals, humans, flowers).
  2. Read Appendix A together and highlight or take notes. Key concepts to point out - definition of asexual reproduction and example - algae.
  3. Read pages from any of a variety of plant books, such as *Eyewitness Books-Plants* or *Incredible Plants*. Share pictures and discuss examples of bulbs, runners, and tubers. Label drawings on Appendix B.
  4. Make five study index note cards of key concepts (asexual reproduction, algae, runners, bulbs, tubers) in lesson. Put word or picture on front and definition on back. See Appendix C for example.
- E. *Assessment/Evaluation*
1. Collect and assess note cards, based on completeness and accuracy

**Lesson Two: Sexual Reproduction in Spore-Bearing Plants (four-five class periods, 45 minutes each)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand that cyclical changes are common to systems of nature.
    - b. Students will understand how to conduct scientific investigations using the scientific methods of inquiry
  2. Lesson Content
    - a. Sexual reproduction by spore-bearing plants – non-vascular plants (mosses)
    - b. Sexual reproduction by spore-bearing plants – vascular plants (ferns)
  3. Skill Objective(s)
    - a. Identify two types of plants that reproduce by spores.
    - b. Distinguish between non-vascular and vascular spore-bearing plants.
    - c. Classify mosses in Byrophyte Phylum and ferns in Pteridophyte Phylum.
    - d. Label the life cycle of a moss and a fern.
    - e. Conduct scientific investigations.
- B. *Materials*
1. *Studying Plants* (transparency book by Milliken), by E. Ortleb and R. Cadice
  2. Books with pictures of mosses and ferns such as:
    - a. *The Plant Kingdom*, by T. Bernstein
    - b. *Visual Dictionary of Plants*, by Dorling Kindersley
  3. *What Your 5<sup>th</sup> Grader Needs to Know*
  4. White construction paper (one sheet per student)
  5. Microscopes

6. Slides and cover slips (one per group of three to four students)
- C. *Key Vocabulary*
1. Rhizoid: root-like structures in mosses that anchor the plant to the soil
  2. Spores: asexual reproductive cells of mosses and ferns (not male and female)
  3. Sporophyte: consists of spore case or capsule and stalk/ produces the spores
  4. Gametophyte: young plant/ produces sperm and egg sex cells
  5. Frond: mature fern leaf
  6. Fiddlehead: young fern plant
  7. Sorus: special structure on backside of frond that produces spores
  8. Bryophyte: phylum of plants that are non-vascular and are anchored by rhizoids
  9. Pteridophytes: phylum of plants that are vascular and have rhizomes
  10. Rhizomes: underground stems found in ferns
- D. *Procedures/Activities*
1. Share pictures of various types of mosses and ferns from plant books listed in Resources. For homework assignment have students bring examples of mosses and ferns from home or collect them from fields or wooded areas, if possible, with parent supervision.
  2. Use *Studying Plants*, transparency #2 and information in *What Your 5<sup>th</sup> Grader Needs to Know*, page 343-344, discuss the life cycle of mosses. Be sure to include discussion of non-vascular type plants (learned in earlier unit). Review classification of living things and classify mosses in plant phylum of Bryophyte.
  3. Add terms and definitions/pictures to index cards started in Lesson One.
  4. Label life cycle diagram on *Studying Plants Worksheet #2a* and answer questions together.
  5. Use *Studying Plants*, transparency #3, and information in *What Your 5<sup>th</sup> Grader Needs to Know*, discuss the life cycle of ferns. Include in discussion that ferns are vascular plants (covered in earlier unit). Classify ferns in Pteridophyte phylum.
  6. Have students fill in *Studying Plants Worksheet #3a* (alone or in pairs). Collect and grade.
  7. On chalkboard or on overhead, draw table and compare how mosses and ferns are alike and how they are different. Have students copy the table and draw examples of each type of plant on the sheet. See Appendix D for sample.
  8. Conduct Moss and Fern Labs (Appendix E).
  9. Give students a class period to review lesson worksheets. Use a game format such as Around the World or Zap (see Appendix F for rules) or let them quiz a partner.
  10. Give written assessment (Appendix G).
  11. Assess index cards for neatness and accuracy.
- E. *Assessment/Evaluation*
1. Written test-you may choose to provide a word bank and/or a drawing of the cycle you want the students to label
  2. Assess index cards for accuracy and neatness

**Lesson Three: Sexual Reproduction on Non-Flowering Seed Plants (two-three class periods, 45 minutes each)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand that cyclical changes are common to systems of nature.
  2. Lesson Content

- a. Sexual reproduction on non-flowering seed plants – conifers
- b. Male and female cones
- c. Method of pollination by wind
- 3. Skill Objective(s)
  - a. Identify the four groups of trees that belong to the Gymnosperm phylum.
  - b. Define Gymnosperms.
  - c. Understand the life cycle of conifers.
  - d. Chart the characteristics of each of the four types of gymnosperms.
  - e. Identify method of how non-flowering plant seeds are transported.
- B. *Materials*
  - 1. *Studying Plants* (transparency book by Milliken), by E. Ortleb and R. Cadice
  - 2. Teacher resource books such as:
    - a. *The Visual Dictionary of Plants*, by Dorling Kindersley
    - b. *The Plant Kingdom*, by T. Bernstein
    - c. *Today's World Plants*, by L. Bender
  - 3. White construction paper folded in four sections/ one sheet per student
  - 4. *What Your 5<sup>th</sup> Grader Needs to Know*
  - 5. Encyclopedias, Internet access on computers, or other reference resources
- C. *Key Vocabulary*
  - 1. Gymnosperms: group of seed trees that have naked or uncovered seeds (non-flowering)
  - 2. Conifer: softwood plant or evergreens/ main group of gymnosperms
  - 3. Resin: sticky substance found in gymnosperms
  - 4. Cones: contain male and female reproductive cells of gymnosperms
  - 5. Pollen: contain sperm/male cells
  - 6. Pollination: transfer of pollen from male to female pine cone
- D. *Procedures/Activities*
  - 1. Collect a variety of types of pinecones or have pictures of them and have them displayed in front of the class. Allow the students to examine them. Discuss the similarities and differences.
  - 2. Use *Studying Plants*, transparency #4 to display different types of gymnosperm trees. Have students use folded construction paper and label each section with a type of gymnosperm (cycad, conifer, ginkgo and ephedra). Using classroom encyclopedias, Internet, library books and other resources available have students list 5 or more facts about each type of tree. Include a picture or drawing of each. Collect and access.
  - 3. Complete *Studying Plants* worksheet #4a together.
  - 4. Add terms and definitions/pictures to set of index cards started in Lesson One.
  - 5. Discuss the life cycle of a conifer and how pollen is transported by the wind. Label Appendix H in class.
- E. *Assessment/Evaluation*
  - 1. Assessment of Gymnosperm chart/grade on neatness
  - 2. Assess index cards and terms according to neatness and accuracy

#### **Lesson Four: Sexual Reproduction of Flowering Plants**

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand that cyclical changes are common to systems of nature
    - b. Students will understand how to conduct scientific investigations using the scientific methods of inquiry.

2. Lesson Content
  - a. Sexual reproduction of flowering plants, including the functions of sepals and petals, stamen and anthers.
  - b. Process of seed and fruit production and methods of pollination.
  - c. Seed germination and plant growth, including information of monocots and dicots.
3. Skill Objective(s)
  - a. Define the terms according to their functions: sepals, pistils, stamen, anther, petals, and ovary.
  - b. Define the function of a flower.
  - c. Explain the process of seed and fruit production using a diagram of the process.
  - d. Tell three main ways that plants are pollinated.
  - e. Describe the process of germination and plant growth.
  - f. Define what the function is of the seed coat (cotyledons), embryo and endosperm.
  - g. Identify the characteristics of monocots and dicots and be able to distinguish between the two in drawings.

B. *Materials*

1. *Studying Plants* (transparency book by Milliken), by E. Ortleb and R. Cadice
2. Books with visuals of flowering plants as listed in earlier lessons
3. *What Your Fifth Grader Needs to Know*
4. *Eyewitness Plants* (video by DK Publishing, Inc.)
5. White construction paper (one sheet per student)
6. Jumbo colored sidewalk chalk (each group will need three to four colors)
7. One package of radish seeds per class
8. One package of Styrofoam cups (four per group, depending on size of groups)
9. One large bag of potting soil

C. *Key Vocabulary*

1. Angiosperm: plants with enclosed or covered seeds; phylum of all flowering plants
2. Sepal: thin, tiny leaf that protects the internal parts of a bud; supports an opened flower
3. Petals: colorful part of the flower; attract the bees and insects
4. Stamen: male reproductive part of the flower
5. Anther: produces the pollen or sperm
6. Pistil: female reproductive part of the flower
7. Ovary: swollen base of; the pistil that contains the eggs; develops into the fruit
8. Pollination: transfer of pollen from an anther to a stigma
9. Germination: sprouting of a seed/ requires moisture, proper temperature and oxygen
10. Seed coat: cotyledon; protection for the seed; feeds and nourishes the seed
11. Embryo: beginning of a plant; the “baby”
12. Endosperm: stores food for the young plant
13. Monocot: one seed coat; flower parts in multiples of three; parallel veins in leaves; xylem and phloem in stem are scattered in bundles throughout
14. Dicot: two seed coat/ flower parts in multiples of four or five; branching veins in leaves; xylem and phloem in stems are in a ring
15. Fertilization: male sperm and female egg unite

- D. *Procedures/Activities*
1. Show Video *Eyewitness- Plants*. It is 35 minutes long. Discuss what new ideas they acquired about plants.
  2. Do Lab on growing radish seeds in different conditions. Have students observe and record their observations throughout Lesson Four. Collect their sheet on completion of Lesson Four and assess for completeness and accuracy. See Appendix I.
  3. Using Transparency #5, discuss the pictures of various types of angiosperms. Define the term angiosperms, and discuss how this type of plant is different from gymnosperms.
  4. Have students add words and definitions/pictures to index cards started in Lesson One. Continue to add to them as new terms are introduced.
  5. Introduce the terms monocot and dicot. Make a chart on the blackboard or on an overhead and compare the characteristics of them. Use information found in Key Vocabulary above. Have students make their own chart. See Appendix J.
  6. Do Lab--Appendix K- on classifying plants into monocots and dicots.
  7. Using Milliken Worksheet 10b, make a transparency of diagram on top half of sheet (blow it up first to fit an 8" X 11" page), if possible. Give students Worksheet 10b and discuss the process of germination in monocots and dicots. Allow students to work in pairs (or small groups) and complete the worksheet. Correct it together.
  8. Using Appendix L, have students answer the questions, in complete sentences, on the various methods of how seeds travel from one place to another. Collect these and assess answers for completeness and accuracy.
  9. Using Milliken Transparency # 9, label the male and female parts of a flower. Discuss the function of a flower, and fill in worksheet 9a.
  10. Divide the class into groups of three or four, on the outside sidewalks, or pavement, have the groups draw large flowers and label the parts. (I used the jumbo sidewalk chalk and it worked great.) Assess their work for accuracy and have them tell you the function of each part as they point it out to you
  11. Use Milliken Transparency #10 and worksheet 10a to discuss and label the cycle of plant pollination and fertilization. Assign the bottom half of the worksheet and correct together.
  12. Review the fourth lesson using any method you choose.
  13. Give formal assessment. See Appendix M.
- E. *Assessment/Evaluation*
1. Assess index cards for completeness and accuracy
  2. Assess Lab on Radish Growth; set up a rubric or any other method you choose
  3. Assess Lab chart on monocots and dicots comparison
  4. Final assessment (Appendix M)

## VI. CULMINATING ACTIVITY (Optional)

- A. If you have a Botanical Garden or Park near your school, you might plan a field trip to go and enjoy the different types of plant and flowers that you have just studied.

## VII. HANDOUTS/WORKSHEETS

- A. Appendix A: Asexual Reproduction in Algae (Student Handout)
- B. Appendix B: Vegetative Reproduction (Asexual)
- C. Appendix C: Asexual Reproduction
- D. Appendix D: Similarities and Differences Between Mosses and Ferns
- E. Appendix E: Moss Lab and Fern Lab

- F. Appendix F: Zap Rules
- G. Appendix G: Quiz on Mosses and Ferns
- H. Appendix H: Facts on Sequoia Trees
- I. Appendix I: Life Cycle of a Conifer
- J. Appendix J: Radish Seed Germination Lab and Chart
- K. Appendix K: Monocot and Dicot Chart
- L. Appendix L: Seeds
- M. Appendix M: Angiosperm Test

### VIII. BIBLIOGRAPHY

- A. Bender, L. *Today's World Plants*. New York: Shooting Star Press, 1993. ISBN 1-56924-018-3.
- B. Bernstein, T. *The Plant Kingdom*. Austin, TX: Raintree Steck-Vaughn, 2000. ISBN 0-8172-5886-8.
- C. Burnie, D. *Eyewitness Books- Plants*. New York: Alfred A. Knopf, Inc., 1989. ISBN 0-394-82252-8.
- D. Carolin, R. *Incredible Plants*. USA: Time Life Books, 1997. ISBN 0-7835-4799-4.
- E. *Eyewitness-Plants*. New York: DK Publishing, Inc., 1997. ISBN 0-7894-2149-6 (video-35 minutes).
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- G. Ortleb, E. & Cadice, R. *Studying Plants*. St. Louis: Milliken Publishing Co., 1986. ISBN 1-55863-094-5 (workbook and transparencies).
- H. Silverstein, A., & V., & R. *The Kingdom of Life-Plants*. New York: Twenty-First Century Book. 1996. ISBN 0-8050-3519-2.
- I. Taylor, B. *Incredible Plants*. London: Dorling Kindersley Limited, 1997. ISBN 0-7894-1505-4.
- J. *The Visual Dictionary of Plants*. New York: Dorling Kindersley, Inc., 1992. ISBN 1-56458-016-4.

## Appendix A-The Intimate Side of Plants

### **Asexual Reproduction in Algae (Student Handout)**

Some types of algae are examples of plant-like organisms that reproduce asexually. Algae can live in fresh or seawater. They contain green pigment, chlorophyll, and make their own food by the process of photosynthesis. Asexual reproduction is the process by which living organisms produce their offspring with only one parent. The offspring is identical to their parent. In reproducing, sperm cells are formed, leave the cell and then they swim back to the same organism's egg cells and form a new cell. This cell grows into a new algae.

**Appendix B, page 1-The Intimate Side of Plants**

**Vegetative Reproduction (Asexual)**

**1. Runners**

- Ex. - strawberries
- creeping horizontal stems that will take root and will produce a new plant

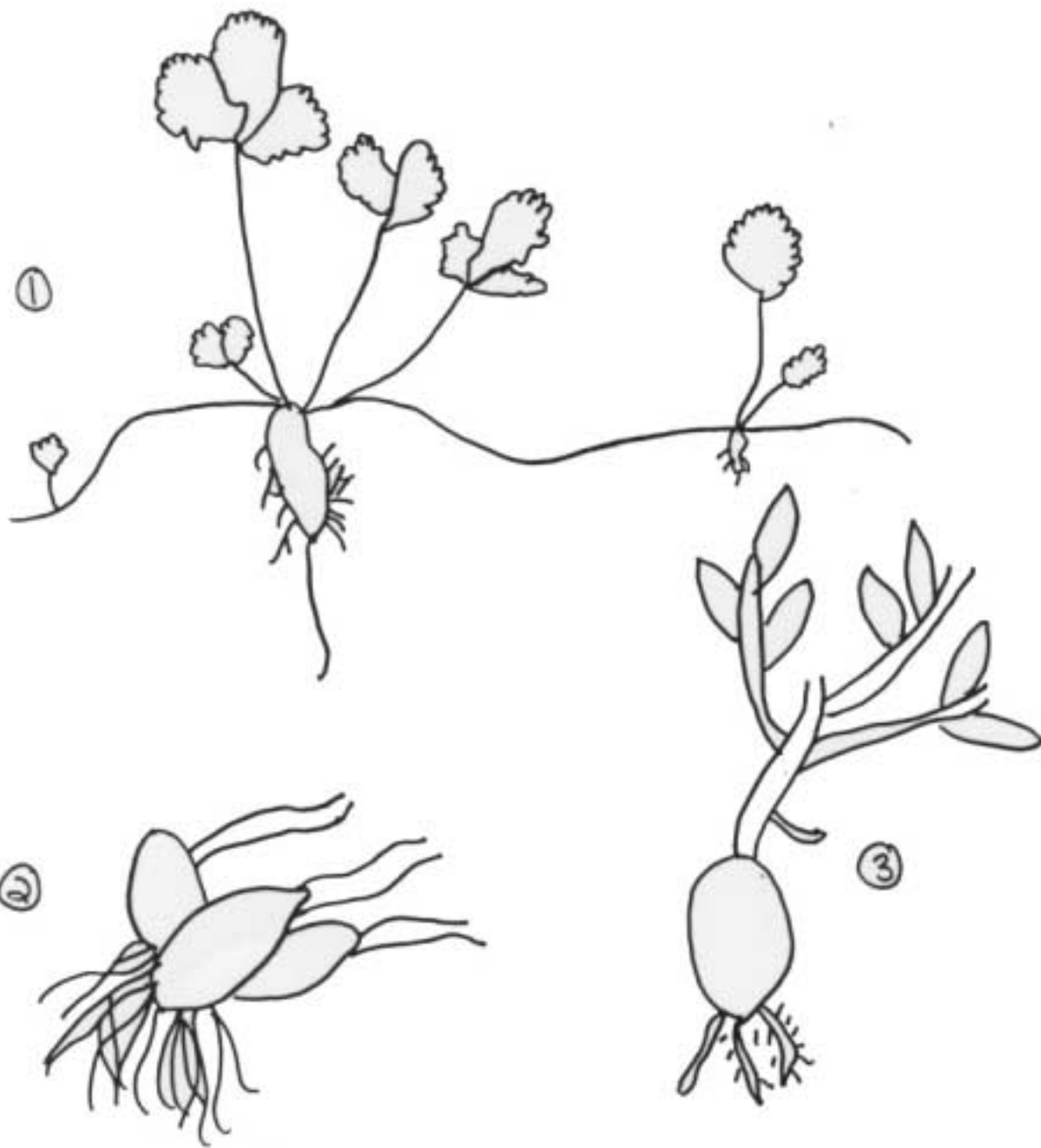
**2. Bulbs**

- Ex. - tulips
- bulbs develop on base of old bulb and can be broken off to make a new plant

**3. Tuber**

- Ex. – potatoes
- underground stems that swell/ food is stored and produces new plants

Appendix B, page 2-The Intimate Side of Plants



**Appendix C-The Intimate Side of Plants**

**Asexual  
Reproduction**

**process by which  
living organisms produce  
their offspring with  
only one parent**

## Appendix D, page 1-The Intimate Side of Plants

### Similarities and Differences between Mosses and Ferns

#### Similarities

- both are types of plants
- both carry on photosynthesis
- both reproduce by spores
- both need moisture to reproduce

#### Differences

- mosses are non-vascular/ ferns are vascular
- mosses have rhizoids(not true roots or stems)/ ferns have rhizomes(underground stems)
- mosses must live in moist places/ ferns can live almost anywhere
- mosses only grow close to the ground and are small in size/ ferns grow in a variety of sizes from one inch to tall trees

Appendix D, page 2-The Intimate Side of Plants

<b>Differences</b>		<b>'Picture' of Fern</b>
<b>Similarities</b>		<b>'Picture' of Moss</b>

Appendix E, page 1-The Intimate Side of Plants

**Moss Lab**

**Materials**

- 1. Sample of Mosses
- 2. Hand Lens
- 3. Tweezers/ or toothpicks will work
- 4. Ruler with metric measurements

**Procedures**

- 1. Observe and draw picture of moss sample below
- 2. Using tweezers or toothpick, separate a small piece of moss from the sample
- 3. Using hand lens, observe sample closely, and draw what you see below. Color it, using the correct colors.

**Observations**

- 1. Describe what you saw in Step 1. Include the total measurement of the clump and the measurements of all the parts of the moss.

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- 2. Describe your sample in Step 3.

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Drawing of Moss Clump

Drawing of Single Moss (Label leaf-like, stem-like and root-like parts)

Appendix E, page 2-The Intimate Side of Plants

Fern Lab

Materials

- 1. Microscopes
- 2. Slides and cover slips
- 3. Samples of ferns
- 4. Toothpicks

Procedures

- 1. Examine backside of a frond of a fern. Draw a picture of what you see below.
- 2. With a toothpick, carefully scrape off the brown sorus onto a microscope slide.
- 3. Examine under low power. Draw what you see below.
- 4. Remove slide- with fingertip or toothpick, smash sorus. Place cover slip on it and return to microscope. Observe again and draw what you see below.

Questions

- 1. What is found in the sorus?

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- 2. Describe the process of reproduction in the fern. Be sure to include all of the life cycle studied in class.

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Visual Backside of Frond

Sorus(10x)

Spores(10x)

## Appendix F-The Intimate Side of Plants

### Zap Rules

1. Divide class into 2 equal size groups and line them up on opposite sides of the room or simply leave them in their seats and decide where the division line is. Assign names to the teams.
2. On overhead or on chalkboard, make a list of the alphabet (see below):

A  
B  
C  
D

On an index card (for your eyes only) do the same and assign each letter a point value (A=15, B=1, etc.) Assign two letters “ZAP”. When they choose that letter and answer the question correctly, they loose all their points. Be prepared for some cheering! I usually go from 1-24 points, but the choice is up to you.

3. Give the first team a review question. Let them choose a letter first. If they answer the question correctly assign the point value to their team. (I usually have a team chart on the board to record the points on.) If they miss the question, let the second team try. If they answer correctly, assign the points to them. Continue with the review to cover all the information for the quiz. The team with the most points – wins. I sometimes give rewards to the winners (candy, fish crackers, etc.)

**Appendix G-The Intimate Side of Plants**

**Quiz on Mosses and Ferns**

1. What is the difference between a nonvascular and a vascular plant?  
\_\_\_\_\_  
\_\_\_\_\_
2. The two names for the only nonvascular plant are \_\_\_\_\_ and \_\_\_\_\_ (scientific name).
3. A 'root like' structure found in mosses is called \_\_\_\_\_.
4. The structure that contains the spores in a fern is the \_\_\_\_\_.
5. A sperm cell needs \_\_\_\_\_ in order to swim to the egg and fertilize it.
6. Ferns belong to the \_\_\_\_\_ phylum of plants.
7. A rhizome is the horizontal, underground stem in a \_\_\_\_\_.
8. Another name for a young fern is a \_\_\_\_\_.
9. The \_\_\_\_\_ is the leaf structure on a fern plant.
10. On the back of this sheet, draw and label the life cycle of either a fern or a moss. Be sure to include all major parts discussed in class.

## Appendix H-The Intimate Side of Plants

### Facts on Sequoia Trees

- grow naturally only in California/ western side of Sierra Nevada Mts.
- largest living tree
- grow up to 250 ft. tall/ trunks can be 30 ft. wide
- among oldest living things on earth/ can live over 2000 years
- are conifers
- have male and female cones/ pollen bursts from male in winter/ drifts in wind/ reaches female cones and pollination takes place/ seeds grow in female cone
- takes a few years for seed to start to grow into tree
- forest fires dry out cones/ scales open/ seeds fall/ covered with ash from fire/ helps it to grow
- takes 500-700 years to reach full growth
- General Sherman is the biggest sequoia/ 274 ft high/ 102 ft. around trunk

Facts are from Wadsworth, G. *Giant Sequoia Trees*. Minneapolis: Lerner Publications Co. 1995. ISBN 0-8225-3001-5.

Appendix I-The Intimate Side of Plants

Life Cycle of Conifer



## Appendix J, page 1-The Intimate Side of Plants

### Radish Seed Germination Lab

#### Materials

1. Bag of potting soil
2. One package of radish seeds for each class (20 students)
3. One package of Styrofoam or plastic cups (need 4 cups for each group)
4. Water
5. One marking pen /group

#### Procedures

1. Each group needs to label their 4 cups with a group name and with a number 1/2/3/4.
2. Fill each cup with soil about ½ full. Put 4-5 seeds in each cup. Push them down about ¼ inch into the soil. Don't push down any further or they will not germinate.
3. Water a little, just to moisten the soil: Cups 1, 3, and 4 only. Do not water Cup 2.
4. Put the cups in the following locations:
  - Cup 1 – Cool spot like in a refrigerator
  - Cup 2 – Sunny spot on windowsill
  - Cup 3 – Inside a closet or cabinet where there will be no sunlight
  - Cup 4 – Sunny spot on windowsill
5. Make a hypothesis about which seeds will grow. Record it on chart on back side of this lab sheet.
6. Observe each cup each day and record observations on chart. Be neat and include such information as height of plant, color of plant, is it upright or lying down, does it look healthy or sick.
7. After 5 days, on a separate sheet of paper, draw and color the final results that you observed. Be prepared to turn this in for a grade, along with your completed chart.

#### Questions

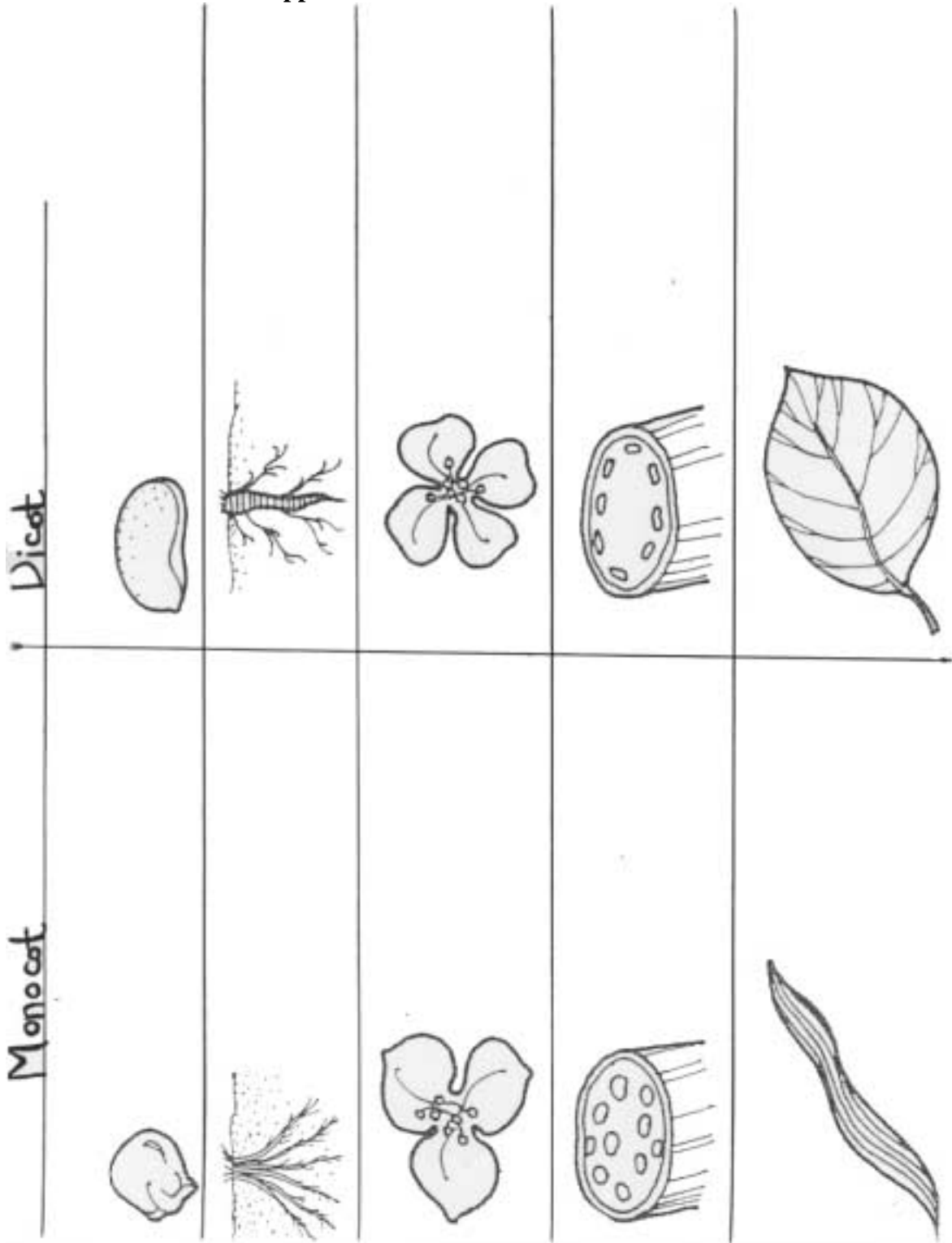
1. Were your predictions correct? Answer Yes or No  
Cup 1 \_\_\_\_\_  
Cup 2 \_\_\_\_\_  
Cup 3 \_\_\_\_\_  
Cup 4 \_\_\_\_\_
2. If they were not correct, explain what conditions were missing so that the seeds did not germinate.  
Cup 1 \_\_\_\_\_  
Cup 2 \_\_\_\_\_  
Cup 3 \_\_\_\_\_  
Cup 4 \_\_\_\_\_

**Adapted from The Wild Goose Co. 1995**

**Appendix J, page 2-The Intimate Side of Plants**

<b>Day 5</b>	<b>Day 4</b>	<b>Day 3</b>	<b>Day 2</b>	<b>Day 1</b>	<b>Hypothesis</b>	
						<b>Cup 1 (cool)</b>
						<b>Cup 2 (sun-no water)</b>
						<b>Cup 3 (cabinet)</b>
						<b>Cup 4 (sun-water)</b>

Appendix K-The Intimate Side of Plants



Adapted from 'Plants'-Teacher Created Materials (1994)

## Appendix L-The Intimate Side of Plants

In complete sentences, describe how seeds are being dispersed from one place to another.



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Adapted from Life Science Instructional Fair (1994)

**ANGIOSPERM TEST**

NAME \_\_\_\_\_

**MATCH THE TERM AND DEFINITION**

- |                    |  |
|--------------------|--|
| 1. sepals _____    | a. male reproductive part                        |
| 2. petals _____    | b. produces pollen                               |
| 3. stamen _____    | c. swollen base of pistil/<br>contains eggs      |
| 4. anther _____    | d. the stalk of the stamen                       |
| 5. pistil _____    | e. sticky top of the pistil                      |
| 6. ovary _____     | f. connects stigma and ovary                     |
| 7. pollen _____    | g. female part of the flower                     |
| 8. style _____     | h. colorful part/attracts<br>insects             |
| 9. stigma _____    | i. tiny leaves that protect the<br>flower bud    |
| 10. filament _____ | j. male sperm/sticks to hair of<br>bee or insect |

Appendix M, page 2-The Intimate Side of Plants

Choose from the following terms to answer the questions below.

angiosperms	monocot	hardwood
dicot	cotyledon	rose
seeds	parallel	wind
enclosed seed	germination	moisture
circular	petals	oxygen
center	rain	man
warm temperature	conifer	pine cone

1. The purpose of the flower is to produce \_\_\_\_\_.
2. \_\_\_\_\_ is the process of a seed sprouting.
3. The xylem and phloem are arranged in a \_\_\_\_\_ pattern in a dicot.
4. Angiosperm means \_\_\_\_\_.
5. The veins in the leaves of a monocot are \_\_\_\_\_.
6. An angiosperm is usually a \_\_\_\_\_ tree.
7. A \_\_\_\_\_ is a type of angiosperm that has 1 seed leaf and petals in multiples of three.
8. An angiosperm that has leaves which are broad and are branched and has a taproot is a \_\_\_\_\_.
9. Another name for the seed coat or seed leaf is the \_\_\_\_\_.
10. The anther is located in the \_\_\_\_\_ of the flower.
11. \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ can all be agents of pollination.
12. A \_\_\_\_\_ is an example of a fragrant flower and is a dicot.
13. Germination requires \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ to get started.

**Appendix M, page 3-The Intimate Side of Plants**

Describe the processes of fertilization and pollination. Include the 6 main steps involved in the processes.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_

**LABEL THE PARTS OF THE FLOWER**

(You will need to put your own picture of a flower in here to label. I usually use the one from the Milliken Workbook, page 9a.)