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ABSTRACT

This unit is designed to provide information on insects and spiders that special education students are capable of understanding. The activities are aimed at level 2 and level 3 educable mentally retarded classes. There are four topics: (1) Characteristics and Life Cycles of Insects; (2) Characteristics of Spiders; (3) Habitats and Food Sources of Insects and Spiders; and (4) Benefits of Insects. For each topic there are behavioral objectives, student activities, and teacher suggestions. The objectives taught can be evaluated by the pretest and posttest developed for the unit. The appendix provides teaching aids designed to help the teacher meet the needs of individual students. (JP)

environmental education curriculum

ENVIRONMENTAL EDUCATION PROJECT
ESEA TITLE III SECTION 306

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A unit developed by the Environmental Education Project Staff, September, 1972, revised June, 1973, for Level II and III Educable Mentally Retarded Special Education Classes.

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INSECTS

AND

SPIDERS

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FOREWORD

The world of the insect is a most interesting one. Some insects are cursed; others are praised. However, study shows that all insects, to some extent, play an important part in the balance of nature. Insects are an important link in the food web that exists in nature.

Spiders are fascinating to children. To watch a spider trap its prey, wrap it up in its web, and feast on it is an educational experience within itself. Spiders were chosen to be studied in this unit because of the great interest shown in them by children.

This unit is designed to provide information on insects and spiders that special education students are capable of understanding. The activities are aimed at Level II and III educable mentally retarded classes. There are four topics: 1) Characteristics and Life Cycles of Insects; 2) Characteristics of Spiders; 3) Habitats and Food Sources of Insects and Spiders; and 4) Benefits of Insects.

For each topic there are behavioral objectives, student activities, and teacher suggestions. The numbers in parentheses by the activity number indicate the objectives the activity helps develop. Teaching aids are located in the Appendix.

A variety of activities are given for each objective. It is not expected that every activity will need to be used to achieve a specific objective. The variety exists so that teachers may select the activities that are appropriate for individual students and their specific class. Teachers should feel free to modify or substitute activities to accomplish the objectives of the unit. Some objectives are more difficult than others. Teachers may select and teach those objectives in the unit that fit their class. Those objectives taught can be evaluated by pre and posttests developed for the unit.

Thad Whiteaker

Thad Whiteaker
Program Specialist - Special Education

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The needed support given the project by Dr. Merle R. Bolton, superintendent of schools, other members of the central administrative staff, the instruction department, personnel office, business office, data processing department, maintenance department and Lawrence Gaston, director of federal programs, is gratefully acknowledged.

Special recognition is given to the Board of Education for the Topeka Public Schools, who approved and are supporting this creative, exemplary and innovative project.

My sincere gratitude is extended to the program specialists for their tireless efforts in developing this unit. Curriculum development and revision has extended the working days for these staff members. My personal thanks are given to Glenn Clarkson, Bob King, and Thad Whiteaker for an outstanding job.

The enclosed curriculum is the result of input from the project's paraprofessionals and volunteers, special education teachers, Community Council members, parents, students, and interested lay citizens.

With the deepest appreciation, I acknowledge the work of the secretarial team. The constant revisions, pressures, deadlines, and demands for quality work were handled in a most outstanding manner by Dorothy Booher, Sandy Holmes, Rita Dreiling and Peggy Ketter.

Donald French
Project Coordinator

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Goals and Objectives

Goals:
1) To develop an understanding of the life cycle.
2) To develop an appreciation for the benefits of insects and spiders.
3) To understand the balance of nature and its importance.

Behavioral Objectives:

1. When given four choices, participating students will select "six" as the proper number of legs for an insect.

2. When given four choices, participating students will select "three" as the correct number of body parts for an insect.

3. When given four choices, participating students will select "four" as the number of wings that insects usually have.

4. When given four choices, participating students will select "the head" as the part of an insect where the antennae are found.

5. When given four groups of words, participating students will select "head, thorax, abdomen" as the group that names the three body parts of an insect.

6. Given four different arrangements of the developmental stages of a butterfly, students will select the group that is arranged in proper order.

7. When given four choices, participating students will select "eight" as the proper number of legs for a spider.

8. When given four choices, participating students will select "two" as the correct number of body parts of a spider.

9. When given four choices, participating students will select "abdomen" as the part of a spider that enables it to breathe.

10. When given four choices, participating students will select "antennae" as the body part not found on spiders.

11. When given four choices, participating students will select "spinneret" as the part of the spider that makes the spider web.

12. When given four choices, participating students will select "in the ground" as the place where grasshoppers lay their eggs.

13. When given four choices, participating students will select "scavenger" as a word that describes the food gathering habits of ants.

14. When given four groups of insects, participating students will select "dragonflies" as usually being found around water.

15. When given four choices, participating students will select "insects" as the main food source of spiders.

16. When given four choices, participating students will select "Ladybugs" as an example of an insect that helps control harmful insects.

17. When given four choices, participating students will select "aphids and grasshoppers" as insects that are harmful to plant life.

18. When given four choices, participating students will select "flies, mosquitoes, and spiders" as the group that can be harmful to the health of people.

Objective Summary Sheet

Objective Number	Concept Within the Objective	Test Question Number	Class Pretest Results	Class Posttest Results
1	Insects have six legs.	1		
2	Insects have three main body parts.	2		
3	Insects usually have four wings.	3		
4	An insect's antennae are located on its head.	4		
5	The three main body parts of an insect are the head, thorax, and abdomen.	5		
6	The four developmental stages of a butterfly are: egg, larvae, caterpillar, and adult.	6		
7	Spiders have eight legs.	7		
8	Spiders have two main body parts.	8		
9	A spider breathes through its abdomen.	9		
10	Antennae are not found on spiders.	10		
11	A spider makes a web with its spinnerette.	11		
12	Grasshoppers lay eggs in the ground.	12		
13	An ant could be called a scavenger.	13		
14	Dragonflies are usually found around water.	14		
15	Insects are the main food source for spiders.	15		
16	Ladybug beetles help control harmful insects.	16		

Objective Summary Sheet (Continued)

Objective Number	Concept Within the Objective	Test Question Number	Class Pretest Results	Class Posttest Results
17	Aphids and grasshoppers are harmful to plants.	17	_____	_____
18	Flies, mosquitoes, and spiders can be harmful to people.	18	_____	_____

Unit Time Line

DAY	
	Before the trip:
X	Administer pretest to students.
	Schedule all films that are to be used.
	Duplicate appendix materials needed.
	Begin living insect project (Activity 4) if you desire to use it.
	Begin study of unit.
	Determine a field trip date.
14	Submit request for field trip to building principal. Check with principal to see that all requirements for notification of parents have been fulfilled.
7	Meet with those helping with the trip to go over field trip details.
1	Contact program specialist to affirm readiness for trip on the following day. Give students the instructions they will need to be fully prepared for the trip.
0	Field Trip
	After the trip:
1	Begin follow-up study.
	Arrange to borrow microscopes from Environmental Education office if you wish to use them in follow-up study.
	Complete unit study.
	Administer posttest to students.
	Fill out Teacher's Unit Evaluation and submit to program specialist.

Materials Sheet

This materials list shows the materials that will be needed to effectively teach the unit. The list identifies and/or describes the activity needing materials, number of the activity in the unit, page number of the activity, and a list of materials needed for the activity.

Activity	Unit Activity Number	Unit Page Number	Materials
Insect picture display	1	8	Pictures of various kinds of insects.
Insect-spider learning center	2	9	Film strips, records, pictures, and books on insects and spiders.
View film and discuss	4	10	Film: Secrets of the Ant and Insect World.
Living insect collection	5	10	See Appendix 1. Materials needed will depend on the insects you are going to collect.
Insect characteristics	6	10	Duplicates of Appendix II.
Insect puzzle	7	11	Tagboard for duplicates of Appendix III.
View film and discuss	8	11	Film: Crickets: A Backyard Science.
View film and discuss	9	11	Film: The Monarch Butterfly Story.
Butterfly Life Cycle	10	12	Duplicates of Appendix VII.
View film and discuss	11	12	Film: Butterfly Mystery.
View film and discuss	12	12	Film: Insects and Painting.
Spider characteristics	13	14	Duplicates of Appendix IV.

Materials Sheet (Continued)

Activity	Unit Activity Number	Unit Page Number	Materials
Spider puzzle	14	14	Tagboard for duplicates of Appendix V.
View film and discuss	15	15	Film: Spiders: A Backyard Science.
View film and discuss	16	15	Film: Spider Engineer.
Insect-spider art	17	15	Pipe cleaners.
Field trip	18, 19	18	An insect net for each student, one collecting jar per group, one dip net per group, and one microscope per group.
View film and discuss	21	20	Film: The Wonders of a Grasshopper.
View film and discuss	22	20	Film: Insects That Help Us.
View film and discuss	23	21	Film: Nature's Half Acre.
Insect-Spider Identification Contest	24	21	A set of insect pictures.
View film and discuss	25	21	Film: Grassblade Jungle.

TOPIC I: Characteristics and Life Cycles of Insects

Behavioral Objectives:

1. When given four choices, participating students will select "six" as the proper number of legs for an insect.
2. When given four choices, participating students will select "three" as the correct number of body parts for an insect.
3. When given four choices, participating students will select "four" as the number of wings that insects usually have.
4. When given four choices, participating students will select "the head" as the part of an insect where the antennae are found.
5. When given four groups of words, students will select "head, thorax, abdomen" as the group that names the three body parts of an insect.
6. Given four different arrangements of the developmental stages of a butterfly, students will select the group that is arranged in proper order.

Student Activities	Teacher Suggestions
1. (Objectives 1-6) Insect Picture Display Observation of pictures that are displayed in the classroom.	1. (Objectives 1-6) Insect Picture Display 1. Be sure you have given unit pre-test before doing this activity. 2. Place insect picture, or pictures, in a conspicuous spot in the classroom a day or so before you begin the actual study of the unit. 3. See Appendix VIII for a listing of schools that have pictures of insects. 4. Do not offer any explanation for the pictures. Let the students observe and think about the pictures outside formal class time.

Student Activities	Teacher Suggestions
2. (Objectives 1-18) Insect-Spider Learning Center 1. Become familiar with materials in the learning center. 2. Study materials of interest.	2. (Objectives 1-18) Insect-Spider Learning Center 1. Establish an area in the classroom to be used as a learning center for insects and spiders. 2. Filmstrips, books, pictures, and records should be made available to the student at the center. Check with your school's media specialist for help in obtaining material to stock the center. 3. Make your own rules concerning use of the center. 4. Have some simple questions duplicated for the students to answer while at the center. The questions should be in line with the objectives of this unit.
3. (Objectives 1-10) Insect Roll Call 1. Respond to the call of your name by giving some interesting fact or other information about insects or spiders. 2. Try to say something no one has said already.	3. (Objectives 1-10) Insect Roll Call 1. Do this activity on the days that you choose to spend some time in studying the insect unit. 2. Call the roll as a means of beginning the study session. You might want to let one of the students lead the roll call. 3. When the student's name is called, he should respond by calling the name of an insect or by giving a bit of information related to an insect or spider. 4. You may get very little from the students at first. However, it can give you a feeling for what they already know about insects and spiders. 5. As you continue to use this activity, you can tell, to some degree, how much they are progressing.

4. (Objectives 1-5)

View and discuss film: Secrets of the Ant and Insect World.

4. (Objectives 1-5)

Film: Secrets of the Ant and Insect World

1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center.
2. Review unit objectives to be emphasized with this film.
3. Although this film is about ants, it can be related to the characteristics of all insects.
4. Locate the "stop film" switch on film projector. Plan to stop the film in certain spots so you can point out and emphasize such things as: 1) number of legs; 2) antennae (feelers); and 3) three body parts.
5. See Appendix IX for a synopsis of the film.

5. (Objectives 1-6)

Living Insect Collection

1. Catch and care for insects.
2. Observe your insects carefully.

5. (Objectives 1-6)

Living Insect Collection

1. If you use this activity, review objectives 1-6 to determine the points to be emphasized.
2. Instructions for the collecting and care of insects and containers are included in Appendix I.
3. Keep a chart. Observe the insects on a daily, or perhaps weekly, schedule. Record observations.
4. Impress upon the students that although you are keeping only one kind of insect, it is very much like other insects in many ways.

6. (Objectives 1-5)

Insect Characteristics

1. Study the insect drawing.
2. Locate the three main body parts.

6. (Objectives 1-5)

Insect Characteristics

1. See Appendix II for a drawing showing the characteristics of a typical insect. You may duplicate it for each student.
2. You may wish to let each student fill out his own sheet, or you may draw the insect on the board for a class activity.
3. Discuss the three main body parts: 1) head; 2) thorax (chest); and 3) abdomen (stomach).
4. The antennae are often referred to as "feelers."

Student Activities	Teacher Suggestions
7. (Objectives 1-5) Insect Puzzle 1. Cut out the insect parts on page A. 2. Fit the parts from page A on the drawing on page B.	7. (Objectives 1-5) Insect Puzzle 1. See Appendix III for puzzle parts. 2. Duplicate as many copies of pages A and B as you need. Use tag board! 3. Have the students cut out the parts of page A and fit them onto the drawing on page B. You may wish to have the pieces glued on.
8. (Objectives 1-5) View and discuss film: Crickets: A Backyard Science.	8. (Objectives 1-5) Film: Crickets: A Backyard Science 1. This film is in the Topeka schools' Film Library. Schedule it through your own media center. 2. Review objectives 1-5 before showing the film. These are the main objectives to emphasize. 3. Stop the film in various places to point out and discuss the various parts of an insect. 4. See Appendix IX for a synopsis of the film.
9. (Objectives 1-6) View and discuss film: The Monarch Butterfly Story.	9. (Objectives 1-6) Film: The Monarch Butterfly Story 1. This film is in the Topeka schools' Film Library. Schedule it through your own media center. 2. See Appendix IX for a synopsis of the film. 3. Review objectives 1-6 before showing the film. Objective 6 is the main objective to be taught. Be sure students understand the proper order for the developmental stages of the butterfly. 4. Locate the "stop film" switch on the projector. You will probably want to stop the film for discussion at different points.

Student Activities	Teacher Suggestions
10. (Objective 6) Butterfly Life Cycle 1. Cut out the four growth stages and place them in the proper location on the cycle chart.	10. (Objective 6) Butterfly Life Cycle 1. Appendix IV is made up of pages A and B. Page A contains a drawing of the four growth stages (life cycle) of a butterfly. Page B contains a cycle chart showing the progression of stages. 2. Reproduce one copy of each page of Appendix IV for each student. Use tag board for reproductions. 3. This can be a group or individual activity. 4. Have students cut out drawings of the four growth stages from page A and place or glue them on page B in the proper location. Emphasize the four stages!
11. (Objectives 1-6) View and discuss film: Butterfly Mystery.	11. (Objectives 1-6) Film: Butterfly Mystery 1. This film is in the Topeka schools' Film Library. Schedule it through your own school media center. 2. See Appendix IX for a synopsis of the film. 3. Review objective 6 before showing.
12. (Objectives 1,2,3,4,5,7,8,9,10) Insect-Spider Art Activity 1. Paint, or draw, an insect or a spider of your choice. 2. Be sure to make your painting as much like the actual things as you possibly can. 3. Compare the insect you have painted with one done by a classmate. Does their's have six legs, a head, thorax (chest), and abdomen (stomach), antennae (feelers), and wings? Does your insect have all these things?	12. (Objectives 1,2,3,4,5,7,8,9,10) Insect-Spider Art Activity 1. You may wish to view the film Insects and Painting prior to doing this activity. This film contains good information for the teacher. It probably would not need to be shown to students. This film is in the Topeka schools' Film Library. Schedule it through your school's media center if you desire to use it. 2. See Appendix IX for a synopsis of the film.

Student Activities

Teacher Suggestions

3. Review the objectives listed above to know the things to stress with this activity.
4. Any sort of art material can be used, tempra paint and crayons will probably be the most common.
5. Put some actual pictures around the room to serve as models.
6. You may wish to make a room or hall display with the pictures.
7. An insect mural would be especially interesting for the students.

TOPIC II - Characteristics of Spiders

Behavioral Objectives:

7. When given four choices, participating students will select "eight" as the proper number of legs for a spider.

8. When given four choices, participating students will select "two" as the correct number of body parts of a spider.

9. When given four choices, participating students will select "abdomen" as the part of a spider that enables it to breathe.

10. When given four choices, participating students will select "antennae" as the body part not found on spiders.

11. When given four choices, participating students will select "spinneret" as the part of the spider that makes the spider web.

Student Activities	Teacher Suggestions
13. (Objectives 7,8,9,10) Spider Characteristics 1. Study, discuss and complete Appendix V.	13. (Objectives 7,8,9,10) Spider Characteristics 1. See Appendix V. It is a drawing of a typical spider. Use it to duplicate as many copies as you need. 2. You may wish to let each student fill out his own sheet, or you may sketch the insect on the board and use it as a class activity.
14. (Objectives 7,8,9,10) Spider Puzzle 1. Complete the spider puzzle. 2. Mix the pieces from the insect and spider puzzles and put them together.	14. (Objectives 7,8,9,10) Spider Puzzle 1. See Appendix VI, a master copy of a typical spider. Use this activity in the same manner as you used activity 7. 2. After you have completed this activity, you might mix the pieces of the insect from activity 7 and the spider all together. Have the students piece them together. This will help you illustrate the difference between the two.

Student Activities	Teacher Suggestions
15. (Objectives 7,8,9,10,11) View and discuss the film: Spiders: Backyard Science.	15. (Objectives 7,3,9,10,11) Film: Spiders: Backyard Science 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Be sure to review objectives 7-11 before showing the film. These objectives are illustrated in the film. 3. See Appendix IX for a synopsis.
16. (Objectives 7,8,9,10,11) View and discuss the film: Spider Engineer.	16. (Objectives 7,3,9,10,11) Film: Spider Engineer 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Be sure to review objectives 7-11 before showing the film. 3. See Appendix IX for a synopsis.
17. (Objectives 1-11) Insect-Spider Art 1. Make a figure of an insect using pipe cleaners. Be sure to put the proper number of legs, body parts, and antennae on it. 2. Make a figure of a spider using pipe cleaners. Put the proper number of legs and body parts on it.	17. (Objectives 1-11) Insect-Spider Art 1. Use pipe cleaners to fashion figures of various insects and spiders. 2. The insect characteristics of six legs, three main body parts, and antennae can easily be illustrated through this activity. 3. The characteristics of eight legs, two main body parts for spiders can be emphasized with this activity.

TOPIC III: Field Trip - Habitats and Food Source of Insects and Spiders

Behavioral Objectives:

12. When given four choices, participating students will select "in the ground" as the place where grasshoppers lay their eggs.

13. When given four choices, participating students will select "scavenger" as a word that describes the food gathering habits of ants.

14. When given four groups of insects, participating students will select "dragonflies" as usually being found around water.

15. When given four choices, participating students will select "insects" as the main food source of spiders.

Overview of the Field Trip

The field trip will be an all-day trip to Lake Perry. The main purpose of the trip is to capture, observe, and discuss various insects and spiders. Objectives 12-15 will be specifically stressed during the trip and other objectives will be reinforced.

Field Trip Schedule

8:45 a.m.	Leave School
9:30	Arrive at Lake Perry
9:30 - 10:00	Students explore site staying within sight of leaders.
10:00 - 11:00	In groups of 3-5 students, collect insects and spiders.
11:00 - 11:45	Observe, study, and discuss insects and spiders caught by all groups.
11:45 - 12:30	Lunch (sack)
12:30 - 1:00	Insect-Spider Quiz Contest
1:00 - 2:00	Recreational Activities
2:00	Leave site and return to school.

Student Activities	Teacher Suggestions
18. (Objectives 11,12,13,14) Insect Collecting - 10:00 - 11:00 a.m. Collect and observe insects and spiders from water, woodlands, and grassland areas.	18. (Objectives 11,12,13,14) Insect Collecting - 10:00 - 11:00 a.m. 1. The program specialist will be responsible for the field trip. He will be assisted by the classroom teacher, paraprofessionals and qualified volunteers, if needed. 2. We should be in groups of 3-5 students per group. 3. Each student will need an insect net. 4. Each group will need a collecting jar and a dip net. 5. Leaders will lead the group on a collecting trip in water, grass and wooded areas. 6. Each student should try to capture the following: 1) ant; 2) harmless spider; 3) water insect (dragonfly - whirligig beetle if possible); 4) grasshopper; 5) fly; 6) insect galls; and 7) butterfly. 7. These, and any other insects collected, should be taken back to the study area for further observation and discussion. 8. The group leader should try to find a spider and web for the students to observe and discuss. Drop an insect into a spider's web and test the spider's reaction. 9. The group leader should try to find a colony of ants for observation and discussion. Drop some bread crumbs around the colonies to see how the ants react. 10. The group leader is to do the handling of spiders. This will ensure that the students are not in contact with harmful spiders. 11. Group leaders should review field trip objectives to make sure they are stressed during this and other sessions.
19. (Objectives 11,12,13,14) Study Station 11:00 - 11:45 a.m. Observe and discuss insects and spiders caught by all groups.	19. (Objectives 11,12,13,14) Study Station 11:00 - 11:45 a.m. 1. Each group leader will take their group to a prearranged area. 2. The study station should be equipped with a microscope for close observation of insects and a rather large piece of plywood, or poster board, for a layout of the various specimens captured on the collecting trip.

Student Activities	Teacher Suggestions
11:45 - 12:30 Lunch and Relax	
20. (Objectives 1-18) Participate in the Insect-Spider Quiz.	20. (Objectives 1-18) Insect-Spider Quiz Contest 1. Divide the class into several small groups. 2. Have a number of questions relating to insects and spiders prepared. 3. Taking turns, have each group draw a question to answer. 4. Give the group an opportunity to discuss the question before giving an answer. 5. Allow five points for a correct answer. You might deduct one point for one incorrect answer. 6. After the groups have had the opportunity to answer an equal number of questions, determine the winner. 7. The winners might be allowed to be first in a "fun" activity to follow.

TOPIC IV - Classroom Follow-Up - Benefits of Insects

Behavioral Objectives:

16. When given four choices, participating students will select "Ladybugs" as an example of an insect that helps control harmful insects.

17. When given four choices, participating students will select "aphids and grasshoppers" as insects that are harmful to plant life.

18. When given four choices, participating students will select "flies, mosquitoes, and spiders" as the group that can be harmful to the health of people.

Student Activities	Teacher Suggestions
21. (Objectives 1,2,3,4,5,6,11,16) View and discuss the film: The Wonders of a Grasshopper	21. (Objectives 1,2,3,4,5,6,11,16) Film: The Wonders of a Grasshopper 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Go over objectives 11 and 16 before showing the film. These two objectives will be met specifically by using the film. 3. Objectives 1-6 should be reinforced. 4. See Appendix IX for a synopsis of the film.
22. (Objectives 15,16) View and discuss the film: Insects That Help Us.	22. (Objectives 15,16) Film: Insects That Help Us 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Review objectives 15 and 16 before showing the film. These objectives should be accomplished. 3. See Appendix IX for a synopsis of the film.

Student Activities	Teacher Suggestions
23. (Objectives 6,13) View and discuss the film: Nature's Half Acre.	23. (Objectives 6,13) Film: Nature's Half Acre 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Try to especially emphasize objective 6 with this film. It will also reinforce many of the other objectives. 3. See Appendix IX for a synopsis of the film.
24. (Objectives 15,16,17) Insect-Spider Identification Contest 1. Try to identify pictures of aphids, ladybird beetles, grasshoppers, flies, mosquitoes, and spiders. 2. Try to answer questions asked by the teacher regarding the ways that each of the above mentioned things harm and/or help plants/ people.	24. (Objectives 15,16,17) Insect-Spider Identification Contest 1. This activity is designed specifically for objectives 15, 16, and 17. However, it can be used to reinforce other objectives of the unit. 2. A set of insect pictures will be furnished by the Environmental Education Project upon request. 3. See Appendix VII for instructions.
25. (Objectives 1,2,3,4,5,7,8,9,10, 15,16,17) View and discuss the film: Grassblade Jungle.	25. (Objectives 1,2,3,4,5,7,8,9,10 15,16,17) Film: Grassblade Jungle 1. This film is in the Topeka schools' Film Library. Schedule it through your own school's media center. 2. Review all objectives. This film can emphasize many of the unit's objectives. Be especially careful to try to emphasize objectives 15 and 16 with this film. 3. Emphasize that Ladybird Beetles eat aphids, thereby controlling them. 4. Emphasize that spiders prey on insects--that some species are poisonous. 5. See Appendix IX for a synopsis of the film.

Appendix I

Collection and Care of Live Insects

There is no better way to understand insects and spiders than through daily contact and observation. This appendix contains suggestions and instructions for collecting and caring for various live insects. Only a few are listed here. Use your own judgment regarding other insects. All the suggestions given in this paper contain only simple procedures. None of the suggestions are completely trouble free. However, they will produce good results most of the time.

Let the students take as much responsibility as you can possibly allow in preparing the containers, collecting the insects, and caring for them. Do not always be cleaning and starting over. Too much cleaning and handling can be harmful to your project. Sometimes the unexpected or failure is the best teaching tool.

1. Ants - Ants are always interesting to watch and relatively easy to maintain. A container can be made by placing a covered quart jar inside a gallon jar. Place a shallow layer of soil in the space between the two jars. When you collect the ants, be sure to get part of the ant hill soil too. The ants and ant hill soil should then be placed into the container on the shallow layer of soil. Fill the remainder of the space between the two jars with soil. Place a jar cap, with tiny holes for air passage, on the ant container. This outside container should be kept covered except for viewing the ants. The soil should be kept moist and firmly packed. An ant food of one part egg white, one part vegetable oil, one part syrup, and two parts water can be made and stored in the refrigerator. Place a few drops of the mixture in the container each week. Do not overfeed!

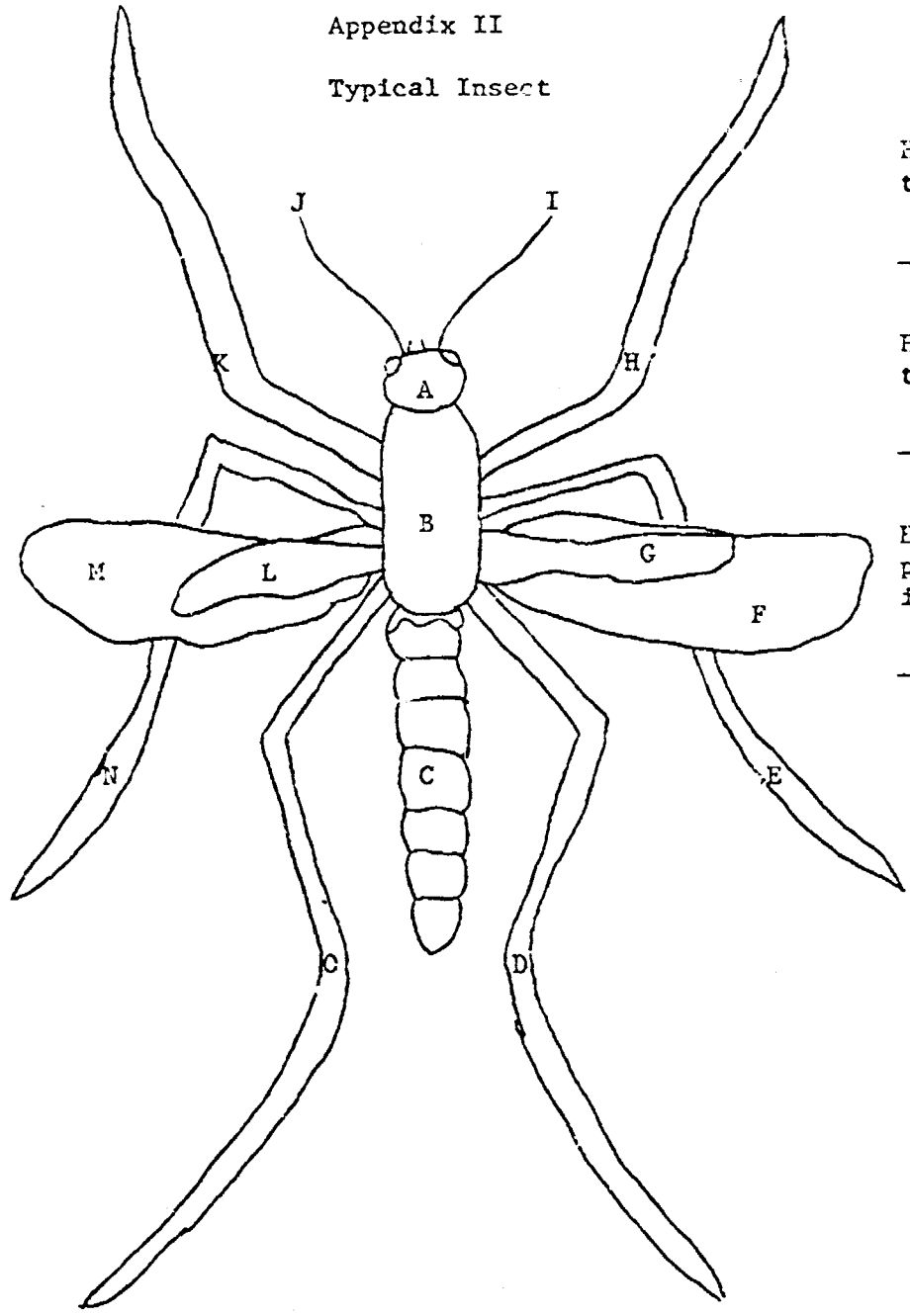
2. Crickets - Any container will work for keeping crickets. If it is eight or more inches high, no cover will be needed. Place an inch of moist sand in the bottom of the container. For adults, include a very shallow container of water. Crickets can live on rolled oats, but a better food is a paste consisting of rolled oats, sugar, skimmed milk powder, and water. Dry the mixture and cut into about one-inch squares. Feed the crickets one square every few days. Green plant material can also be used as food, however, it should be removed if it begins to mold.

3. Cockroaches - Cockroaches are excellent for illustrating some of the life cycles of insects. Keep them preferably in a glass container, where it is damp and warm, and smear vaseline around the inside upper edge to discourage their escape. When not under observation, cover them with a perforated lid as an added precaution against escape and put them where it is dark. Under no condition should they be exposed to sunlight. The floor of the container should be kept mildly damp at all times. This is easily accomplished when it is carpeted with fine sand, paper toweling, newspapers, moss, or blotting paper. Pop-bottle tops filled with water may be inserted for long weekends. For food, cockroaches like most kinds of table scraps (moist bread, cake, raw bits of apple and other fruits, lettuce and other greens).

4. Housefly - The container for houseflies can be a one-gallon jar. Cover the bottom of the jar with about an inch of a mixture of rolled oats, bran and alfalfa pellets. Add a pinch of mold inhibitor, such as sodium propionate. Dry powdered milk or granulated sugar in a small jar lid will suffice for the food supply. It can be placed on the bottom of the jar. Place a small bottle of water with a wick in it by the food lid. This will serve as the water supply. The lid on the container should have a screen or some material that will keep the flies in, yet allow free passage of air. Stock the container with a few adult flies.

Appendix II

Typical Insect



Leg
Wing
Antennae
Head
Thorax
Abdomen

Fill in the blank space with the words from the list above and you can tell how to know an insect when you see one.

A_____

B_____

C_____

D_____

E_____

F_____

G_____

H_____

I_____ M_____

J_____ N_____

K_____ O_____

L_____ P_____

How many wings does this insect have?

_____

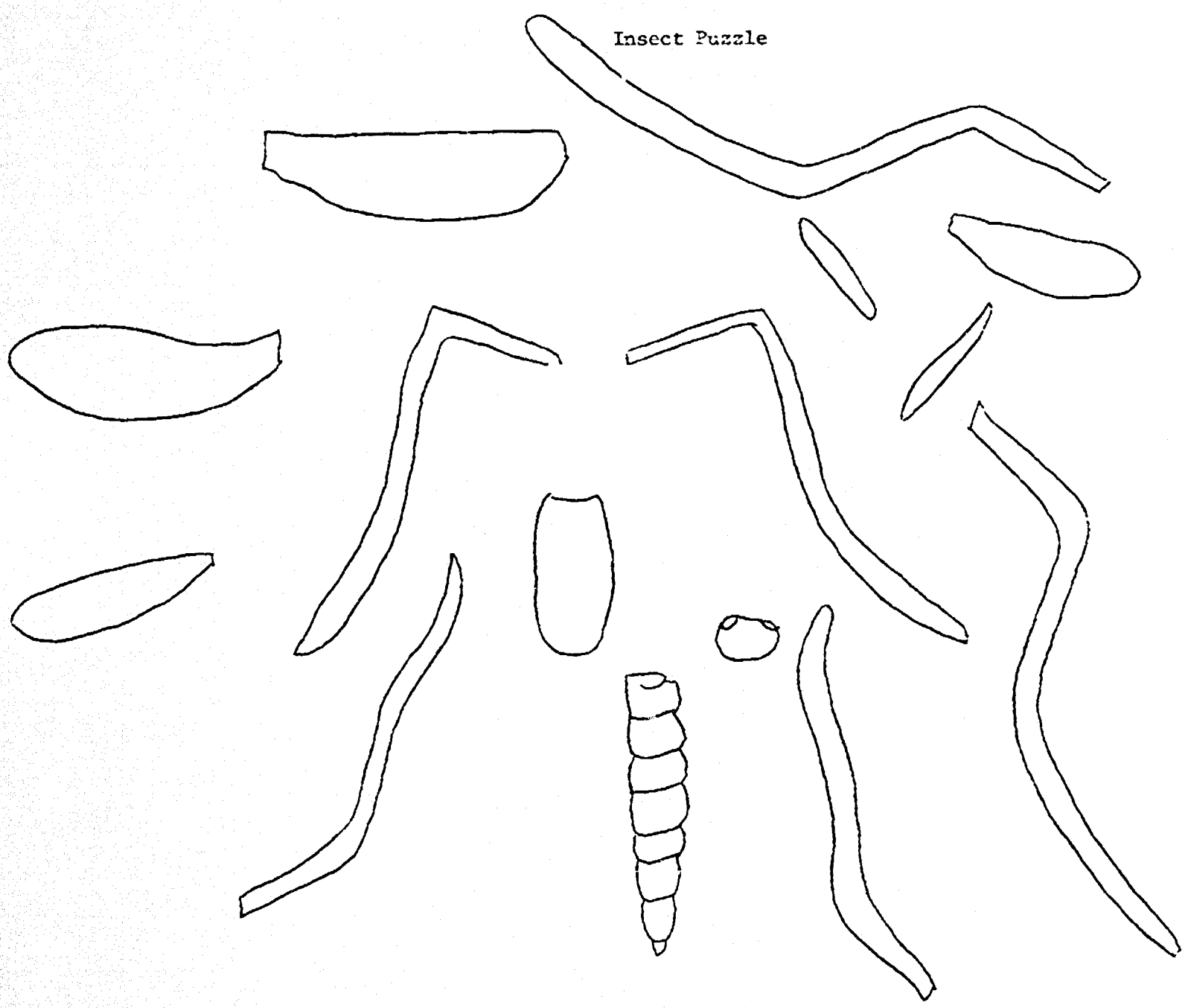
How many legs does this insect have?

_____

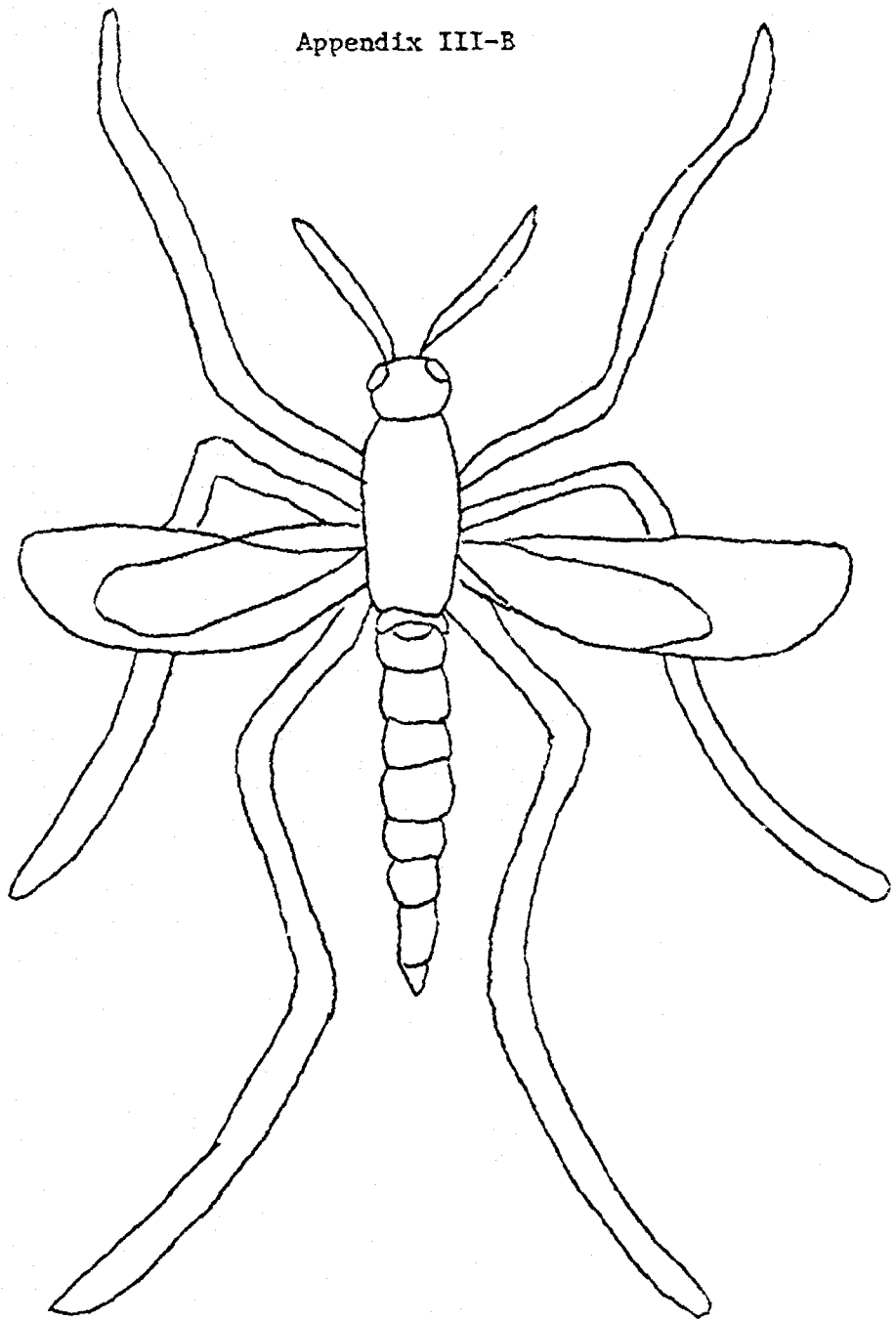
How many main body parts does this insect have?

_____

Insect Puzzle

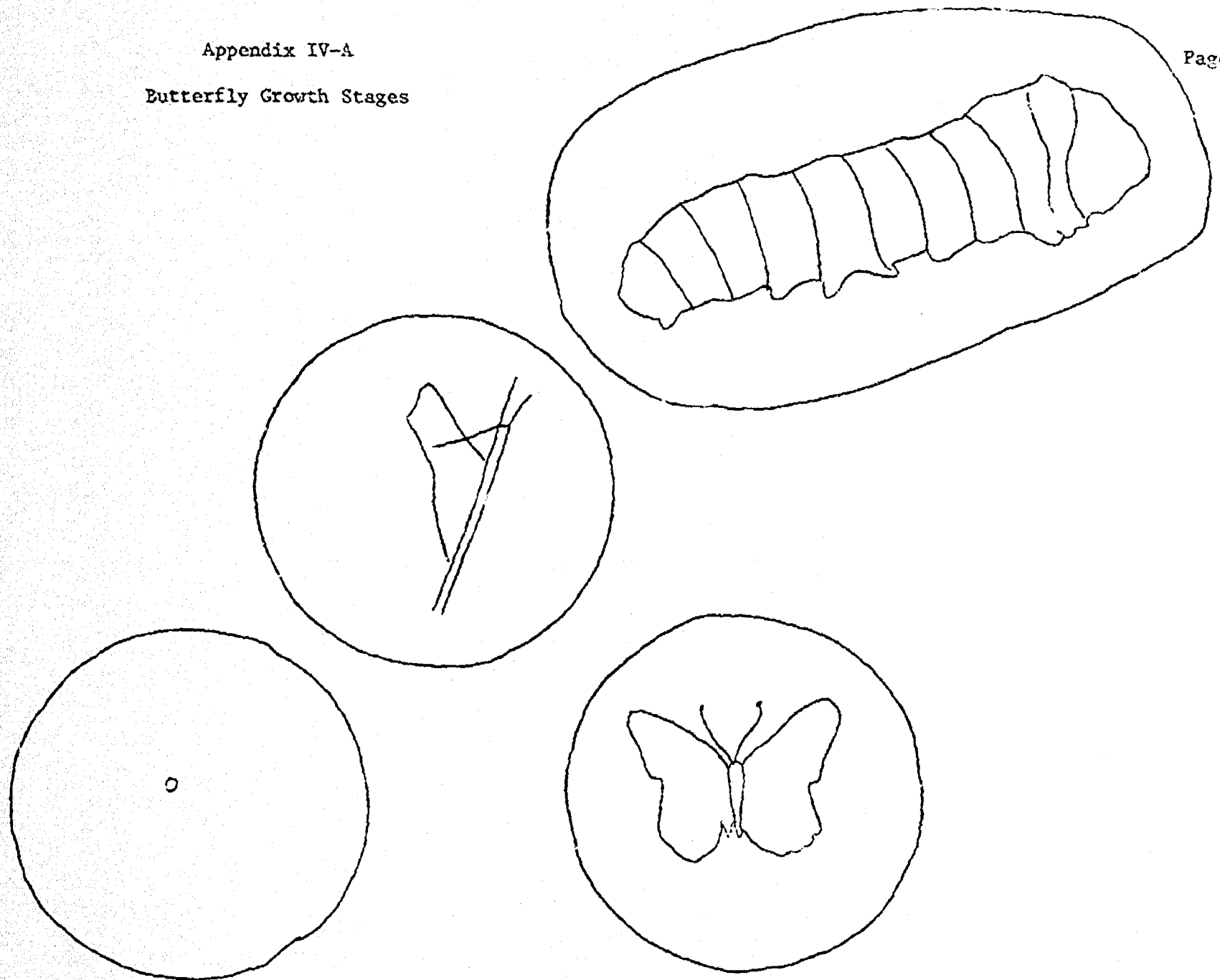


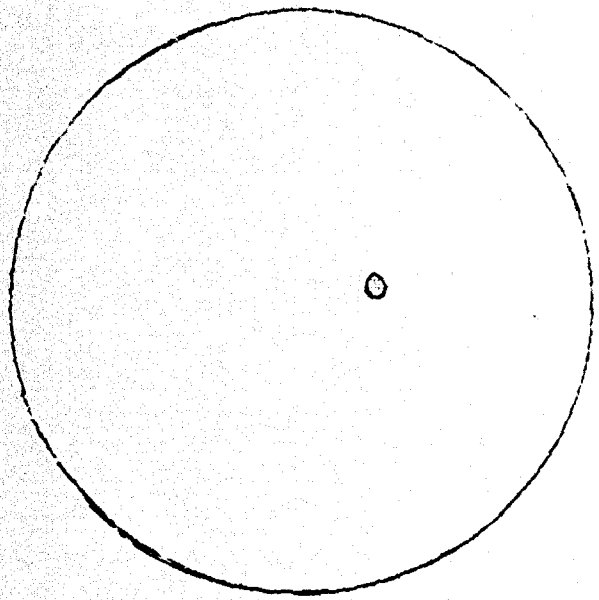
Appendix III-B



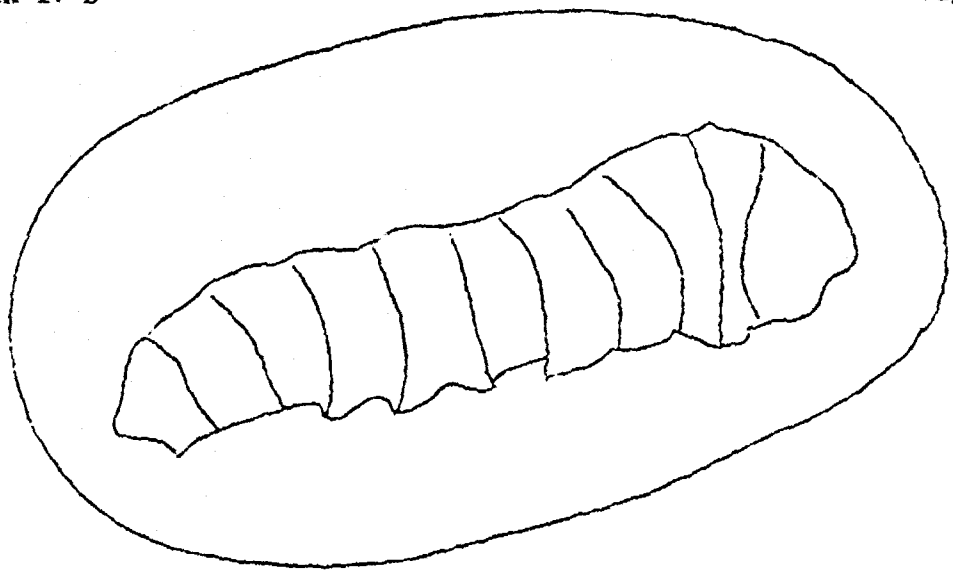
Appendix IV-A

Butterfly Growth Stages

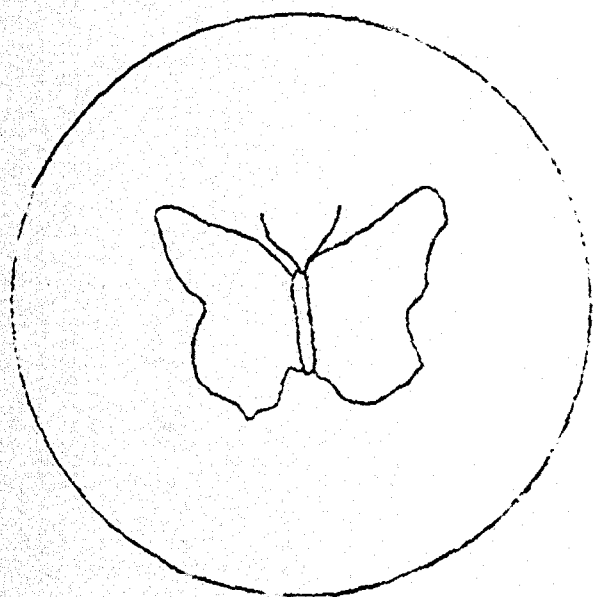




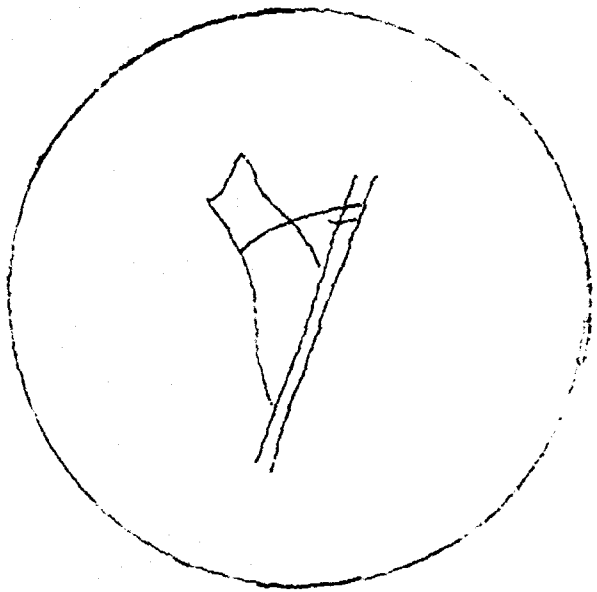
1 Egg



2 Larva



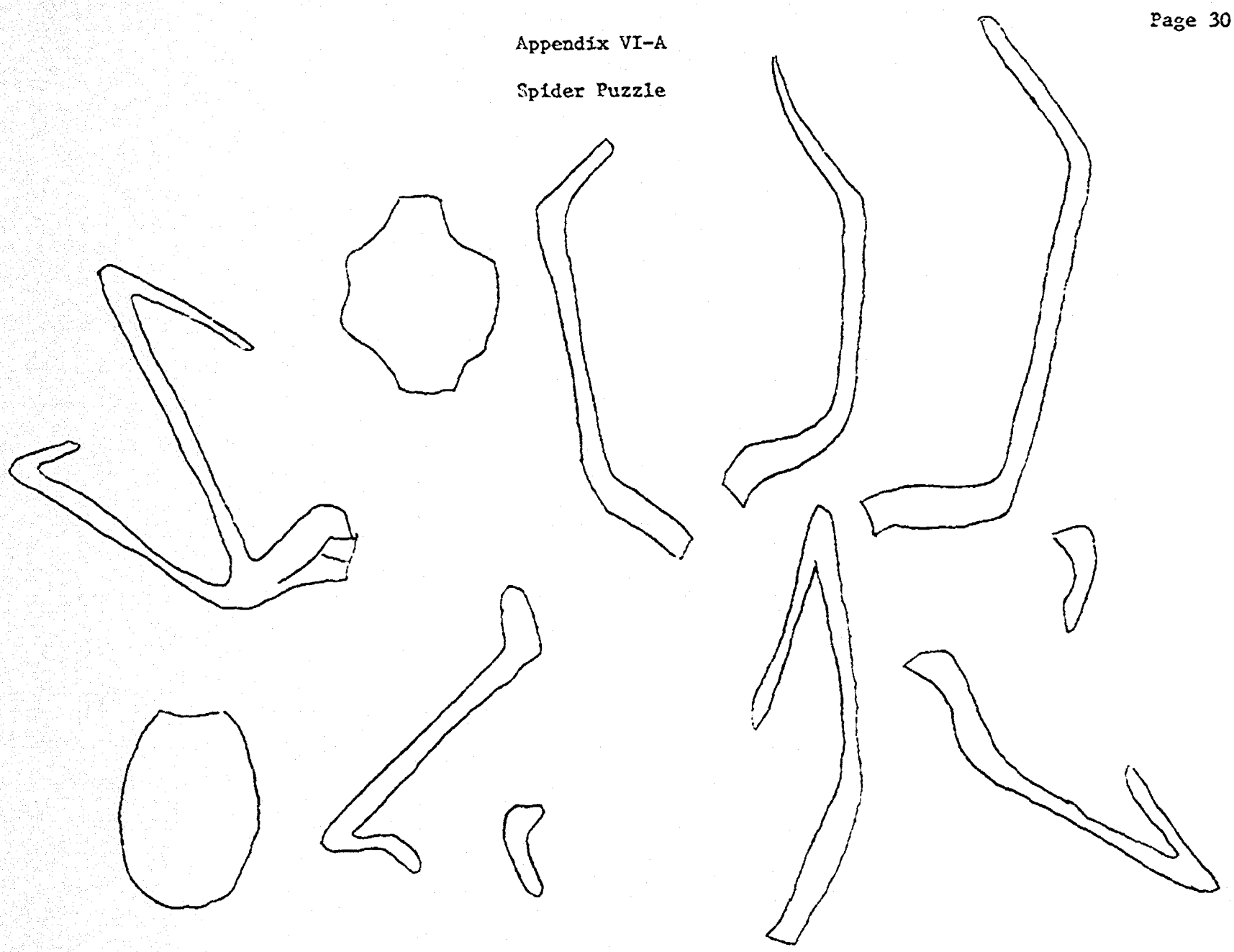
4 Adult



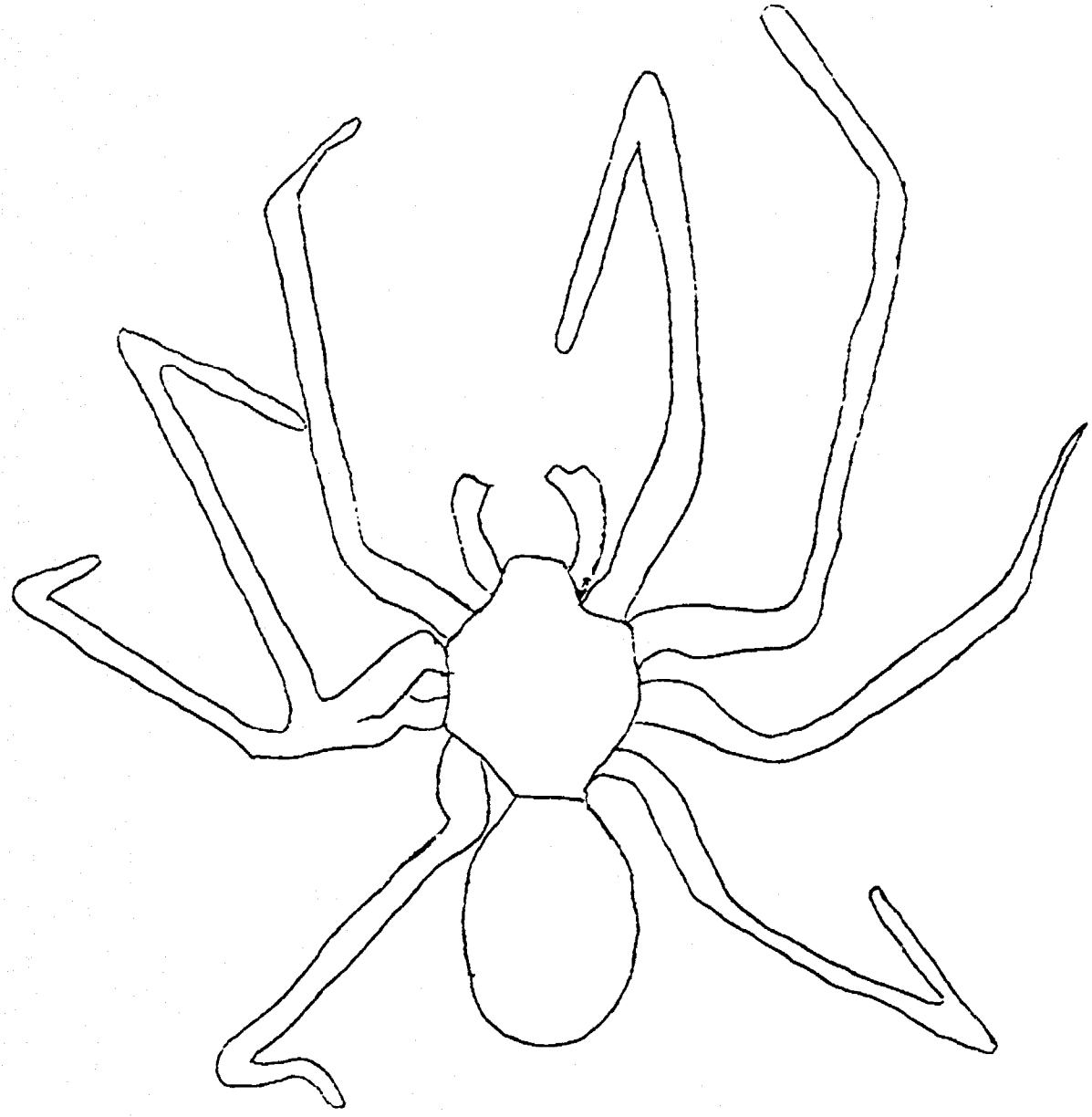
3 Pupa

Appendix VI-A

Spider Puzzle



Appendix VI-B



Appendix VII

Insect-Spider Identification Contest

Use flash cards of insects and spiders. These cards will be furnished by the Environmental Education Project upon request.

1. Use pictures of aphids, ladybird beetles, fly, mosquito, and spider.

2. The questions should be designed to emphasize objectives 15, 16, and 17.

3. Divide the class into small groups. Put a good student leader with each group, if possible.

4. Give the class these instructions:

   a. "I am going to hold up a picture. This picture will be either an insect or a spider."
   b. "I am going to ask you some questions about the insect or spider shown in the picture."
   c. "Tell me if the picture is of an insect or spider and what is its correct name? How can you tell whether or not it is an insect? Is it harmful or helpful?" etc.
   d. "The group that raises a hand first after I ask the question will get the opportunity to answer the question. You will have 30 seconds to talk about the question as a group before answering. Only one answer per group."
   e. "If you get the question right, you will receive two points for your group. If you answer the question wrong, your group loses one point."
   f. "If one group answers the question wrong, then the next group may try to answer the same question if they choose.

Appendix VIII

Unit Related Audio-Visual Materials

This list of audio-visual material on insects includes only a few of the materials that are available in our school system. A complete list is available in each school's media center.

To borrow filmstrips and other material from another school, a teacher should make the request through their own school's media center. No delivery service is available for this type of material, so teachers will need to pick up and return borrowed items.

Subject	Type	School
Insect Enemies and Insect Friends	Filmstrip	Crestview, Grant Potwin, Randolph
Harmful Insects	Filmstrip	Highland Park North Potwin
Helpful Insects	Filmstrip	Highland Park North Potwin
Common Insects and Spiders	Slides	Potwin
Insect Pests and Disease	Filmstrip	Belvoir
Collecting Insects	Filmstrip	Randolph, Crestview Grant, Potwin
Common Insects	Pictures (large)	Highland Park North Highland Park Central McClure
Finding Out About Insects	Filmstrip	Crestview, Grant Potwin, Randolph
Insects: Their Life Cycles	Filmstrip	McCarter

Appendix IX

Film Synopsis

Life in a Pond Coronet 11 min. C 1970

A group of children take a field trip to learn about the animal life on and beneath the ripples of a pond.

Crickets: Backyard Science Film Associates 11 min. C 1968

Shows and explains the complete life cycle of a cricket. Discusses how a cricket "sings" and how crickets can be easily raised for close observation.

Insects and Painting Bailey 5 min. C 1957

Youngsters are shown experimenting with thickened paint, while insects serve as subject matter. Exciting close-ups of insects are compared with common animals to indicate the wide range of interpretations.

Spider Engineers Moody 15 min. C 1956

The engineering skill and versatility of spiders are demonstrated by the discussion of four spiders. The Orb-Weaver utilizes several kinds of silk, the Bolas Spider makes use of a silk lariat, the Diving Spider lives under water by constructing its own diving bell and the Trapdoor Spider constructs a camouflaged trapdoor over her home.

Spiders: Backyard Science Film Associates 12 min. C 1968

The film shows the various parts of the spider's body and explains how these parts function. It also illustrates the life cycle of the spider and the methods the spider uses to trap insects.

Insects That Help Us Film Associates 11 min. C 1965

Explains the many ways animals are a vital part of nature: they carry pollen, work the soil allowing air and water to enter, eat insects that harm plants, etc.

Wonder of Grasshoppers Moody 12 min. C 1959

The life cycle of the grasshopper is vividly presented. Demonstrates the insect's amazing jumping ability. Examines many kinds of grasshoppers and the Florida Lubber "Locust" in particular.

Grassblade Jungle Bailey 11 min. C 1960

Encourages students to observe and understand the small animal world of the backyard. Here is a grassblade jungle, teeming with small creatures that have special functions, characteristics and relationships to each other. Most belong to the arthropod division of the animal kingdom, which includes insects, crustaceans, diplopods, chilopods, and arachnids. Explains differences between these classifications.

Butterfly Mystery Moody 11 min. C n.d.

Detailed pictures reveal the four main stages of butterfly reproduction and growth; the laying and development of the egg, hatching of the larva or caterpillar, formation of the pupa or chrysalis and finally the emergence of a beautiful adult butterfly.

Nature's Half Acre Disney 30 min. C 1951

Fifteen naturalist-photographers contributed footage of rare sights depicting the continuity of life among birds, plants, and insects and stresses the interdependence of each upon the others.

Secrets of the Ant and Insect World Disney 13 min. C n.d.

Tells many amazing facts about the wonders of the subterranean world of the ant. There are 5,000 species of ants each with a specialized existance. In digging tunnels, red ants often lift and carry things many times their own weight.

Monarch Butterfly Story EBE 11 min. C 1967

Portrays in detail the life cycle of one of nature's most fascinating insects. Depicts the Monarch laying its eggs, feeding, molting, forming its chrysalis, and emerging as a butterfly.

Appendix X

Instructions for Administering Student Test

1. This test may be given individually or as a group.

2. The student's first and last name should be on the test paper.

3. Each question relates to a specific objective (question 1 relates to objective 1). If you do not teach a certain objective, skip that question.

4. The questions may be read to the students.

5. Feel free to lower the vocabulary of the questions. Be sure the students understand what the question is asking.

6. There is only one answer per question.

7. Students may circle the letter to indicate their choice, or they may underline their answer. As a teacher, you are free to change the method by which they indicate their answers to fit your own situation.

8. The correct answer for each question is listed below.

1.	(C)	7.	(D)	13.	(A)
2.	(A)	8.	(A)	14.	(C)
3.	(B)	9.	(D)	15.	(D)
4.	(A)	10.	(C)	16.	(A)
5.	(B)	11.	(D)	17.	(D)
6.	(D)	12.	(C)	18.	(B)

Pre-test 079, Posttest 080

1. How many legs does an insect have?

   a. eight 8 c. six 6
   b. four 4 d. five 5

2. How many main body parts does an insect have?

   a. three 3 c. four 4
   b. two 2 d. one 1

3. How many wings does an insect usually have?

   a. three 3 c. one 1
   b. four 4 d. two 2

4. Where are the antennae of an insect found?

   a. the head c. the abdomen
   b. the thorax d. the legs

5. Which group of words tells you the correct names for the three main body parts of an insect?

   a. antennae, feelers, wings
   b. head, thorax, abdomen
   c. legs, eyes, hair
   d. claw, spinneret, eyes

6. Choose the group of words that tell the order in which a butterfly grows (life cycle).

   a. pupa, larva, egg, adult
   b. egg, adult, larva, pupa
   c. adult, pupa, egg, larva
   d. egg, larva, pupa, adult

7. How many legs does a spider have?

   a. six 6 c. five 5
   b. four 4 d. eight 8

8. How many main body parts does a spider have?

   a. two 2 c. one 1
   b. three 3 d. four 4

9. Which part of its body does a spider breathe with?

   a. head c. thorax
   b. mouth d. abdomen

Insects and Spiders
Pre-test 079, Posttest 080

10. Which one of the things listed below would not be found on a spider?

a. fangs
b. claws
c. antennae
d. spinneret

11. Which part does a spider use in making its web?

a. pedipalp
b. thorax
c. mouth
d. spinneret

12. Where does a grasshopper lay its eggs?

a. under a rock
b. on a leaf
c. in the ground
d. on the ground

13. Which of the words below tells what an ant might be called when talking about how it gets its food?

a. scavenger
b. glutton
c. decomposer
d. prey

14. Which of the insects listed below will usually be found around water?

a. grasshopper
b. aphids
c. dragonflies
d. crickets

15. Which of the things listed below would be the food supply for spiders?

a. worms
b. small birds
c. insect galls
d. insects

16. Which of the insects listed below help by eating harmful insects?

a. ladybug beetle
b. mosquitoes
c. whirligig beetle
d. ants

17. Which of the group of insects listed below are harmful to plants?

a. honeybees and bumblebees
b. butterflies and moths
c. mosquitoes and dragonflies
d. aphids and grasshoppers

18. Which of the four groups listed below can be harmful to the health of people?

a. dragonflies, aphids, ants
b. flies, mosquitoes, spiders
c. grasshoppers, praying mantis, ant lion
d. caterpillar, pupa, larva