


The word "KIDZANTS" is written in a large, white, stylized font. The letters are interconnected by thin white lines that form a network. A single black ant is positioned on the letter 'A'. To the right of the word, a trail of several white ants is shown moving downwards. The background is a solid red color.

KIDZANTS

FIRE ANT CURRICULUM FOR YOUTH
LEADER GUID 



FIRE ANT CURRICULUM FOR YOUTH LEADER GUIDE

Authors

Nathan Riggs, Paul Nester and Wizzie Brown

Extension Agents, Integrated Pest Management (Fire Ant Project)
The Texas A&M University System

Contributors

Darlene Locke, Extension Agent

Beth Barbee, Extension Assistant

Vera Johnson, Typesetter

Steven Keating, Assistant Graphic Designer

Jerry Nucker, Assistant Graphic Designer

Diane Bowen, Associate Editor

Beth Hickman, Former Extension Agent IPM–Dallas County



Educational support materials from the

Texas Imported Fire Ant Project

Texas Imported Fire Ant Research & Management Project

in collaboration with

Texas Agricultural Experiment Station

Texas Cooperative Extension of The Texas A&M University System

Texas Tech University

University of Texas

Texas Department of Agriculture



Dear Educator:

Welcome to the wonderful world of KIDzANTS! In these lessons, you will find an interesting world of history, biology and many other interesting facts about the red imported fire ant in Texas.

Red imported fire ants are exotic, introduced insects that have tipped the ecological balance within the food chain in their favor and have taken advantage of disturbed landscapes to spread throughout the eastern two-thirds of Texas.

In this KIDzANTS package is information about where red imported fire ants originated; how their bodies are built; what are their favorite foods, favorite places to nest, life cycle, hustle and bustle within their mound nests; and how they compare with other native ant species in the landscape.

We hope that children will learn about the importance of fire ants from a health standpoint and also learn how to recognize them easily outdoors. We hope that this knowledge leads to better and more responsible management of fire ants in the future. And we hope you enjoy this as much as we enjoyed creating it!

Regards,

Nathan Riggs
Texas Cooperative Extension
Bexar County

Paul Nester
Texas Cooperative Extension
Harris County

Wizzie Brown
Texas Cooperative Extension
Travis County

CONTENTS

LESSON 1 INVADERS BY SEA	7
Activity 1-1: Just Floating Along!	8
Activity 1-2: Where in the World?	9
Activity 1-3: My Island Home	12
Activity 1-4: Habitat Lap Sit	13
LESSON 2 FIRE ANT PHYSIQUES	15
Activity 2-1: What's Buggin' You?	16
Activity 2-2: Make an Ant	19
Activity 2-3: Rolling for Parts of an Ant	20
LESSON 3 LIVING LA VIDA DEL FIRE ANT	23
Activity 3-1: Life Cycle Game	25
Activity 3-2: Protective Coloring	30
LESSON 4 MOUND, SWEET MOUND	33
Activity 4-1: Mound of Trouble Matching Game.....	35
Activity 4-2: Insect Condominiums	42
LESSON 5 BED AND BREAKFAST	43
Activity 5-1: What's a Fire Ant to Eat?	45
Activity 5-2: What Do You Like to Eat?.....	48
LESSON 6 FIRE ANTS AND BIG-HEADED ANTS	
AND CRAZY ANTS — OH, MY!	49
Activity 6-1: Be an Ant Scientist!	50
Activity 6-2: Be an Ant Detective	52
APPENDIX	59
Glossary	61
KIDzANTS Pre/Post Test and Key	63
Educational Support Materials	65

LESSON 1

INVADERS BY SEA



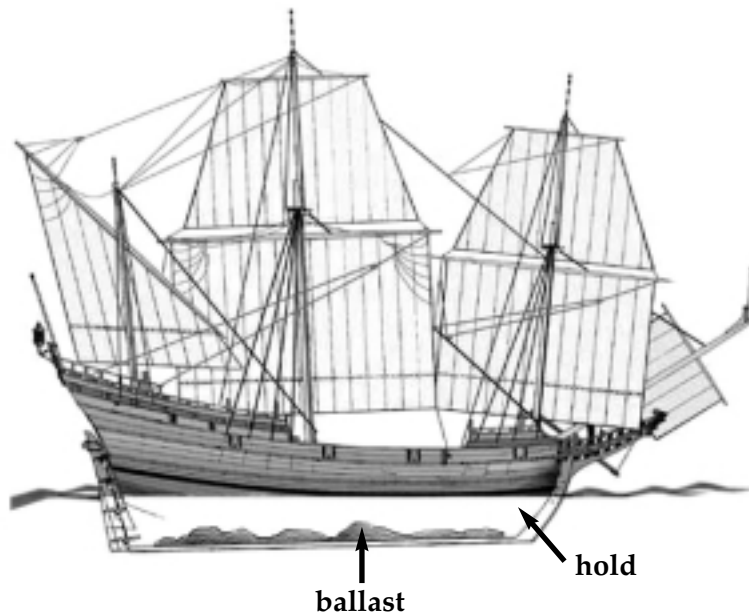
Red imported fire ants are not **native** to Texas or the United States. They are native to Brazil and Argentina.

In the late 1920s, the ants are thought to have been **imported** on a boat from Brazil that landed in Mobile, Alabama, loaded with products to sell in the United States. As the boat was being unloaded and then reloaded with materials to take back to South America, the dock workers removed soil that was used for **ballast** in the **hold** of the ship. The soil was dumped out at the port in Mobile. Unknown to the dock workers, fire ants were living in the soil that was dumped from the ship.

Because of this accidental introduction of fire ants, we now see red imported fire ants across a large part of the southern United States and in isolated areas of southern California. Fire ants are somewhat limited by cold weather. As a result, areas where winter temperatures drop down to 15 °F may have few to no fire ants at all.

VOCABULARY WORDS

ballast
hold (noun)
imported
native



JUST FLOATING ALONG!

ACTIVITY 1-1



OVERVIEW

Students will place plastic bags (of various weights) filled partly with soil or rocks, in the center of a plastic container cut lengthwise that is floating in a container of water. The students will observe how the empty plastic container floats on the water, then make similar observations as the bags of soil or rock are placed in the center of the plastic container.

OBJECTIVE

Students will better understand the concepts of “hold” and “ballast.” This activity will demonstrate the need for ballast in the hold of a ship to maintain the ship in an upright position as it travels the seas from port to port.

TEKS

Science

- 3.1.b, 3.2.a, 3.2.b, 3.2.c, 3.2.d,
- 3.3.a, 3.3.c, 3.5.a, 3.5.b
- 4.1.b, 4.2.a, 4.2.b, 4.2.c, 4.2.d,
- 4.3.a, 4.3.c, 4.5.a, 4.5.b, 4.6.b, 4.7.b
- 5.1.b, 5.2.a, 5.2.b, 5.2.c, 5.2.d, 5.3.c, 5.5.a, 5.5.b



MATERIALS

- Plastic 1-liter soft drink bottles, or plastic toy boats if desired
- Sturdy scissors that can cut through the plastic bottles
- Containers (large enough that the plastic bottles will fit into lengthwise) filled with water
- Plastic sandwich bags filled with soil, sand or rocks (Make the filled plastic bags of various weights.)

INSTRUCTIONS

1. Cut the plastic bottles in half lengthwise to resemble a boat (the teacher may demonstrate or have the students work in groups).
2. Place the plastic bottles into the containers filled with water.
3. Observe how the plastic bottle floats.
4. Place a filled sandwich bag (“ballast”) into the center of the bottle.
5. Observe how the bottle floats.
6. Place more bags into the bottle until it sinks, making observations on how the bottle floats.

QUESTIONS TO ANSWER

- Does the bottle sit evenly or unevenly in the water?
- Does adding the filled sandwich bag stabilize the bottle so it floats better?
- Does it matter where you place the sandwich bag in the plastic container? Front? Middle? Back?
- What happens when you place too many bags in the plastic bottle?

WRAP-UP

Remind the students that the inside of the plastic bottle could be considered the “hold.” The sandwich bags could be considered as ballast.

- Is “ballast” important for ship to float correctly? What happens when too much “ballast” is placed in the hold of a ship? Too little?
- Could water be used as “ballast?”
- What type of ship would want to take on too much “ballast” to make it sink? Submarines take on water as “ballast” to help it sink below the water line.



WHERE IN THE WORLD?

ACTIVITY 1-2



OVERVIEW

The students will use a Web site to learn about geographic regions and to determine if those regions provide the conditions that are essential for fire ant survival. The students will indicate on U.S. and South America maps the areas where fire ants are found now and where conditions may be too cold for them to survive in the United States.

OBJECTIVE

Students will learn about the country where red imported fire ants came from originally and the date and location of their arrival in the United States.

TEKS

Science

- 3rd grade: 3.8.a, 3.8.b, 3.8.c, 3.8.d, 3.9.a, 3.9.b
- 4th grade: 4.5.a, 4.5.b, 4.8.a, 4.8.b
- 5th grade: 5.9.a, 5.9.b, 5.9.c

Social Studies

- 3rd grade: 3.4.a, 3.5.a, 3.5.b, 3.5.d
- 4th grade: 4.6.a, 4.6.b, 4.7.a, 4.7.b, 4.7.c
- 5th grade: 5.6.a, 5.6.b, 5.7.a, 5.7.b, 5.7.c



MATERIALS

- Colored pencils, crayons or markers
- Maps of the United States and South America

INSTRUCTIONS

Use the KIDzANTS Web site (<http://kidzants.tamu.edu>) to find information about the locations of current and future fire ant infestations. Look at the maps in the “Maps” section. Have each student take a map of the United States and color in red the areas where fire ants are found, and color in blue the areas where it is probably too cold for them to survive.

Also have the students color in the areas of the South America map where the red imported fire ants originated.

WRAP-UP

- Ask: Have any students in the class lived in a state without ants?
- Have the students show their maps to their parents.
- You might also extend the discussion to include the introduction of diseases, plants, animals and other organisms into the country “by accident.”



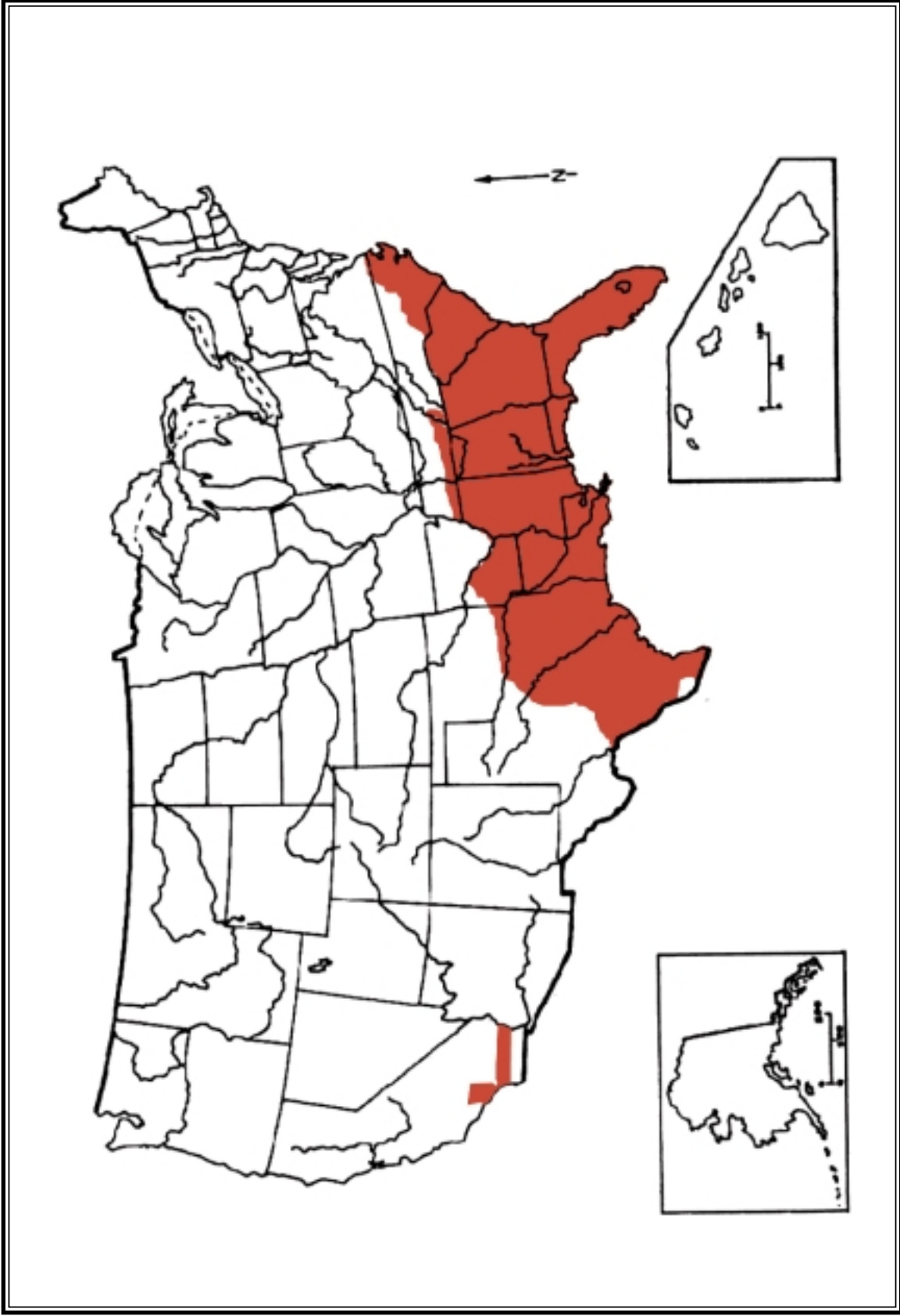
SOUTH AMERICA MAP KEY



The shaded areas are where fire ants originated.



UNITED STATES MAP KEY



The shaded areas are where red imported fire ants now live.

MY ISLAND HOME

ACTIVITY 1-3



OVERVIEW

Students will observe ants in an island habitat, symbolic of their natural habitat.

OBJECTIVE

Students will learn the requirements necessary for a habitat to be suitable for fire ants.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.2.a, 3.2.b, 3.3.c, 3.8.a, 3.8.b, 3.8.c, 3.8.d

4th grade: 4.1.a, 4.1.b, 4.2.a, 4.2.b, 4.3.c, 4.5.a, 4.5.b

5th grade: 5.1.a, 5.1.b, 5.2.a, 5.2.b, 5.9.a, 5.9.b, 5.9.c

MATERIALS

- Large bowl
- Water
- Floral foam or dense sponge
- Scissors



INSTRUCTIONS

For this activity, the students will need to be able to go outside to find live ants. Give them these instructions:

1. Carefully cut a piece of floral foam or dense sponge to fit into the bowl. You may ask an adult to help you if needed. Cut the foam (or sponge) small enough so that it does not touch the sides of the bowl.
2. Pour water into the bowl, 2 to 3 inches deep. Wait about 15 minutes for the water to be absorbed.
3. While you are waiting, find an ant (or two) for your island. Where are you going to look? Under a log or in a field might be a good place to start. Use a stick to transport the ant to the "island."
4. You'll need to supply the ant with food. What kind of food could you place on the island?
5. You could also place some broken sticks into the foam, providing the ant with something to climb on in this artificial habitat you have created.
6. Keep the water level at 2 to 3 inches deep to maintain the "island" effect. Observe the ant(s) and its activities.

WRAP-UP

Describe how this habitat is different from a natural habitat where ants are typically found.

HABITAT LAP SIT

ACTIVITY 1-4



OVERVIEW

An animal's habitat includes food, water, shelter and space. If any one or more of these elements is missing, the animal will be affected. These and other components must also be in a suitable arrangement.

Besides food, water, shelter and space, an ant's habitat can also be affected by diseases, predators, pollution, accidents and climatic conditions. All of these factors are interrelated.

OBJECTIVES

Students will:

- Identify the components of a habitat.
- Recognize how humans and other animals depend upon habitat.
- Explain how the loss of or a change in habitat can affect people and wildlife.

TEKS

Science

3rd grade: 3.3.c, 3.8.a, 3.8.b, 3.8.c

4th grade: 4.3.c, 4.5.a, 4.5.b

5th grade: 5.3.c, 5.9.a, 5.9.b, 5.9.c



MATERIALS

- Dominoes

INSTRUCTIONS

Use dominoes to generate interest in the topic of interrelation. Line the dominoes on a table ready to be pushed over to show chain reaction. Have the students watch as one student pushes over one domino, which results in all of them being knocked down.

Next go outdoors or to a large room for this activity:

1. Have the students form a circle, with all of them facing toward the center of the circle.
2. Count off each student in the circle: 1, 2, 3, 4, 1, 2, 3, 4 Then tell them that the 1s will be "food," the 2s = "water," 3s = "shelter" and 4s = "space."
3. Ask the students to turn to their right. They should now be in a circle, all facing the same direction, looking at the back of the head of the student in front of him or her.
4. Ask the students to take one step toward the center of the circle. They should now be just a little closer to one another, still looking at the back of the head of the student in front of him or her.
5. Don't panic. This will work. Ask everyone to listen carefully. The students should place their hands on the shoulders of the person in front of them. Then the students should slowly sit down as you count to three. On three, the students should sit down — on the knees of the person behind them, keeping their own knees together to support the person in front of them. You say, "Food, water, shelter and space in the proper arrangement are needed to have a suitable habitat." This is demonstrated by students sitting on one another.
6. Have everyone return to a standing position.

7. Now, explain to students that it has been a rough year. There were drought conditions and water is not as plentiful as before. Ask all students who were water (number twos) to step out of the circle.
8. With the water (twos) removed, again instruct students to place their hands on the shoulders of the person in front of them. Students should again slowly sit down as you count to three. At the point of three, you want the students to be seated on the knees of the person behind them, keeping their own knees together to support the person in front of them. It will be much more difficult, but they should be able to do it.
9. Have everyone return to a standing position. Discuss with the students that although it was difficult to sit on the person behind them in the second round because a link was missing, this is how it is in nature. When an animal's habitat is sacrificed and one or more parts are missing, the links are broken. It is harder for the animal to survive.
10. Depending on the students, you may remove another link and again try to have students sit. Again discuss the missing link and how it affects the species.

WRAP-UP

Ask the students to talk about what this activity means to them. Ask them to summarize the main ideas they have learned. They could include:

- A habitat is an area where food, water, shelter and space are arranged appropriately.
- Humans and other animals depend on their habitat.
- If any of these elements are lost from the habitat, the animals living there will be affected.
- For animals to survive, the components of their habitat must be arranged to suit their needs.



FIRE ANT PHYSIQUES

How can you distinguish an ant from other insects? How can you tell one species of ant from another?

Ants share important characteristics with all other insects. Most insects have bodies that are divided into three parts and have three pairs of legs and a pair of antennae. When you're trying to identify specific insects, it's helpful to know and be able to name these body parts.

The ant's body has three parts to it — the **head**, **thorax** and **abdomen**. Unlike humans, ants do not have a brain only in their heads. Instead, they have little clumps of nerves in each region of their bodies that help control the activities in that area.

Ants have poor eyesight and can detect only changes in light and darkness. Some ants are nearly blind. Rather than seeing, ants use their antennae to "smell" food, to sense their surroundings and to communicate with other ants.

Ants have chewing mouthparts that they use to break food particles into sizes that are easily carried to the nest. However, they do not eat the solid part of foods; they only sip the liquids from the food particles.

Most ants do not have wings. However, mature ant colonies produce winged males and females, called "reproductives." The reproductives fly from the nest to begin their own nests elsewhere. The wings (if present) and legs on ants (and all other insects) are attached to the **thorax**. The thorax is the center section of the ant's body.

The third body section of an ant is called the **abdomen** and contains the digestive organs and the stinger (Note: not all **species** of ants have a stinger). The thorax and abdomen are connected by a waist-like extension of the abdomen called the **petiole**. Petioles can have one or two swellings, or nodes. Often you can count the nodes to help you determine the particular species of ant. For example, the fire ant has two nodes.

Most ants cannot be identified by color alone, as many species of ants are similar in color. However, other characteristics can help you determine the specific **identity** of an ant. Some ants have hairy bodies; some have smooth bodies; and some have ridges, spines or dimples on their bodies.

VOCABULARY WORDS

abdomen
coloration
identity
petiole
species
thorax

WHAT'S BUGGIN' YOU?

ACTIVITY 2-1



OVERVIEW

Students will use a pattern to build a three-dimensional (3-D) model of a fire ant. They will learn the different parts of an ant and new vocabulary words.

OBJECTIVE

Students will learn the body regions of the ant and compare them to other insects.

TEKS

Science

3rd grade: 3.3.c, 3.9.a

4th grade: 4.1.a, 4.3.c, 4.6.c, 4.8.a, 4.8.b

5th grade: 5.1.a, 5.3.c, 5.9.a, 5.9.b, 5.9.c



MATERIALS

- *Red Imported Fire Ant Model*, assembled
- Glue
- Scissors
- Colored pencils, markers or crayons
- *Red Imported Fire Ant Model* pieces, photocopied onto heavy card stock, one set for each student
- *Red Imported Fire Ant Model* assembly instructions, one for each student
- Optional: *Parts of an Ant* worksheet, one for each student

ACTIVITY

Before class, photocopy the *Red Imported Fire Ant Model* pieces onto heavy card stock. The pieces and assembly instructions are on the KIDzANTS CD and on the project's Website at <http://kidzants.tamu.edu>.

Also before class, assemble your *Red Imported Fire Ant Model* and have it on display so the students can refer to it.

1. Distribute one set of pieces to each student.
2. Have each student cut out the parts.
3. The students should then assemble the parts according to the instructions.
4. Ask the students to glue the labels onto their worksheets and compare the ant model with other types of insects, noting the similarities and differences.
5. The students can color their ants with natural or customized color patterns.

ALTERNATIVE ACTIVITIES

The students may work individually or in teams to assemble several *Red Imported Fire Ant Model* kits (ordering information is in the Appendix). Besides the kits, you may also need sandpaper or a file to sand the edges of the parts.

Or, the students may simply color the *Parts of an Ant* worksheet and label the body parts.

WRAP-UP

After comparing ants to butterflies, grasshoppers or other common insects, the students should be able to discuss the similarities and differences of the types of insects.



RED IMPORTED FIRE ANT MODEL ASSEMBLY INSTRUCTIONS

INSTRUCTIONS

Cut out the pieces and slide them together to match the numbers associated with each slot. For cardboard versions, you can glue the pieces together to hold the shape in place.

Assemble the pieces as shown below:

Remove Part A and Part B
Insert Part B into Slot 1
Remove Part C and Part D
Insert Part C into Slot 2
Insert Part D into Slot 3
Remove Part E
Insert Part E into Slot 4
Remove Part F
Insert Part F into Slot 5
Remove Part G
Insert Part G into Slot 6
Remove Part H
Insert Part H into Slot 7
Remove Part I
Insert Part I into Slot 8
Remove Part J
Insert Part J into Slot 9
Remove Part K

Insert Part K into Slot 10
Remove Part L
Insert Part L into Slot 11
Remove Part M
Insert Part M into Slot 12
Remove Part N
Insert Part N into Slot 13
Remove Part O
Insert Part O into Slot 14
Remove Part P
Insert Part P into Slot 15
Remove Part Q
Insert Part Q into Slot 16
Remove Part R
Insert Part R into Slot 17
Remove Part S
Insert Part S into Slot 18

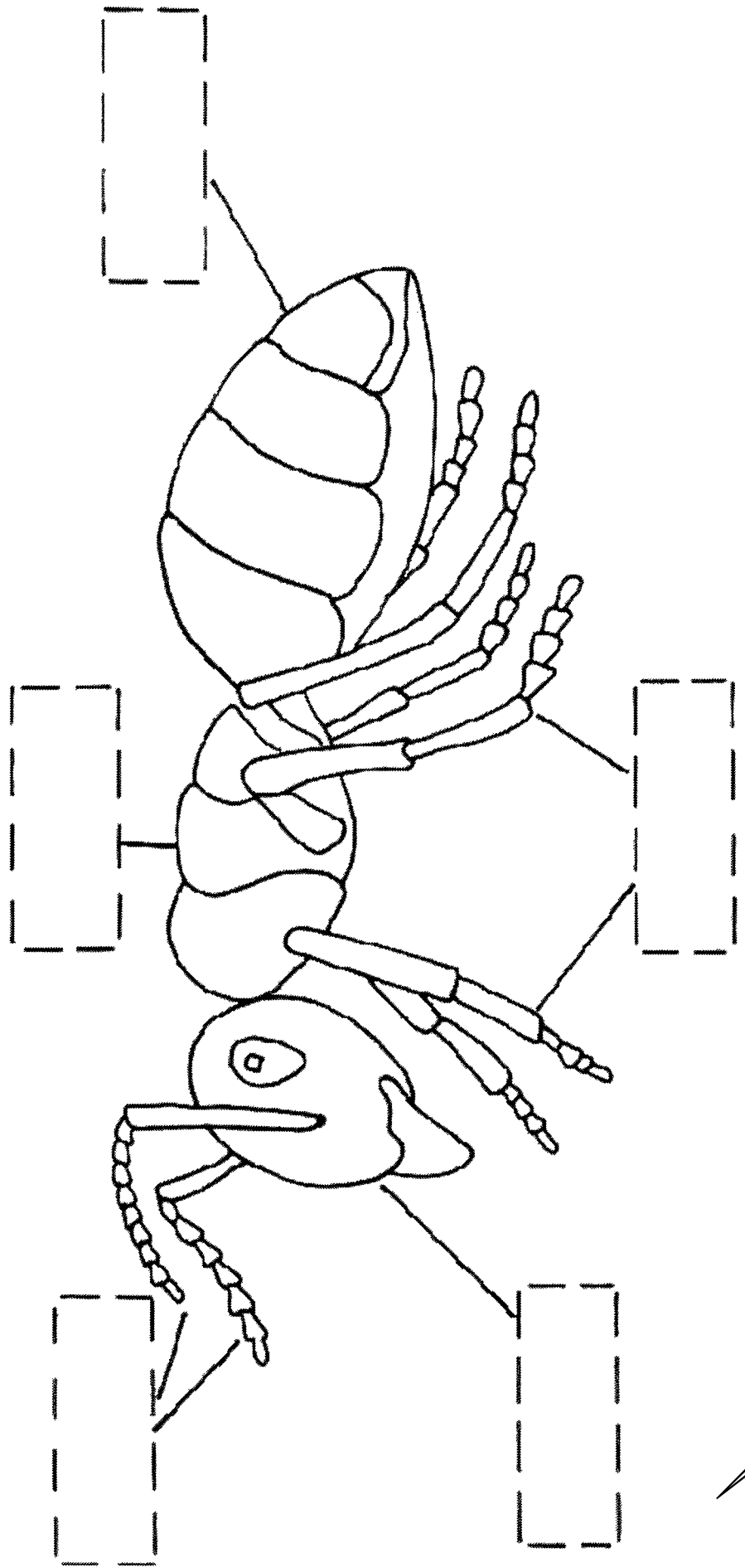


Name _____ Date _____



PARTS OF AN ANT

Cut out the labels and glue them in the correct places.



head	thorax	abdomen	antennae	legs
------	--------	---------	----------	------

MAKE AN ANT

ACTIVITY 2-2



OVERVIEW

Students will create a model of an ant using balloons and papier-mache. They will learn the parts of an ant and that an ant's body is symmetrical.

OBJECTIVE

Students will learn about the parts of insects and insect symmetry using a model.

TEKS

Science

3rd grade: 3.1.b, 3.9.a

4th grade: 4.3.c, 4.6.c, 4.8.a, 4.8.b

5th grade: 5.3.c, 5.9.a, 5.9.b, 5.9.c

MATERIALS

- Long balloons, one for each student
- String
- White glue
- Warm water
- Bowls to mix water and glue in for papier-mache
- Paint, red
- Pipe cleaners, 8 for each student
- Newspapers
- Materials for ant eyes (buttons, clay, small Styrofoam balls cut in half, etc.), one set for each student

ACTIVITY

Explain these instructions to the students:

1. Blow up the balloon and tie the end. Do not blow it up too tight.
2. Twist the balloon in two places to make the three body segments. Use string to tie the twisted parts. Emphasize the petiole area by using more string or a wider section of tape.
3. Cover the balloon with papier-mache. To make papier-mache, tear newspapers into strips about an inch wide and about 8 to 12 inches long. Mix two parts glue with one part warm water. (The mixture should be the consistency of wallpaper paste.) Dip the strips of paper into the bowl of water and glue mixture one at a time and wrap the strips around the balloon form. Cover the entire balloon with at least three layers of paper strips to make it strong.
4. Let the ant dry completely.
5. When it's dry, paint the body red.
6. Use pipe cleaners for the legs, pushing them into the side of the thorax.
7. Make the antenna from pipe cleaners, bending them as shown in the drawing.
8. Glue the eyes onto the head.
9. Paint the eyes.

WRAP-UP

Have the students discuss the parts of an ant and name other insects that have similar parts. Discuss the other insects and how they could make a model using this technique. What parts might need to be beaded? What parts would look different?



ROLLING FOR PARTS OF AN ANT

ACTIVITY 2-3



OVERVIEW

Students will match the parts of an ant to a diagram, completing the diagram by rolling the appropriate numbers on a pair of dice.

OBJECTIVE

Students will learn about the parts of insects and insect symmetry using the ant diagram.

TEKS

Science

3rd grade: 3.1.b, 3.9.a

4th grade: 4.3.c, 4.6.c, 4.8.a, 4.8.b

5th grade: 5.3.c, 5.9.a, 5.9.b, 5.9.c



MATERIALS

- Pair of dice
- Worksheet: *Parts of an Ant*, one for each student
- Colored pencils, markers or crayons for each student

ACTIVITY

Give each student a copy of the *Parts of an Ant* worksheet. The object of the activity is to be the first player to complete the diagram by rolling the dice.

Here's what they must roll to fill in each part of the diagram:



- | | |
|-------------|--------------|
| 1 - head | 7 - leg |
| 2 - thorax | 8 - leg |
| 3 - abdomen | 9 - leg |
| 4 - antenna | 10 - leg |
| 5 - antenna | 11 - leg |
| 6 - leg | 12 - petiole |



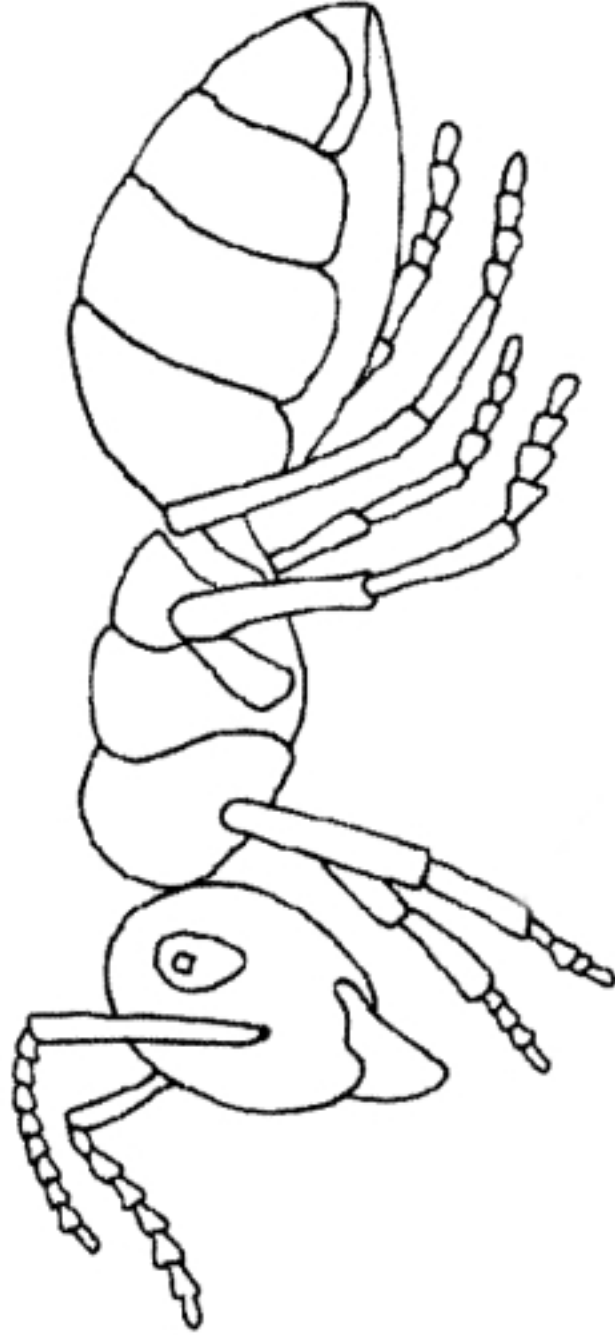
Each player rolls both dice at the same time and colors in the parts indicated by the dice. Each player may get only one ant part per roll. For example: If a player rolls a "1" and a "5," the player may color in the head (1) or one antenna (5) or one leg ($1 + 6 = 7$). Additional example: If a player rolls a "5" and a "6," the player may fill in an antenna (5) or a leg (6) or a leg ($5 + 6 = 11$).

The player who fills in all 12 pieces first wins.

WRAP-UP

When the game is over, the students should be able to identify the main parts of an ant.

ROLLING FOR PARTS OF AN ANT



LIVING LA VIDA DEL FIRE ANT

Colonies of red imported fire ants (*Solenopsis invicta*) include:

- Eggs
- Brood (larvae and pupae)
- Polymorphic (several sizes) workers
- Winged males
- Winged females
- One or more reproductive (able to lay eggs) queens

Among the sterile (unable to reproduce) workers, labor is divided by age and to a much lesser degree by size:

- Younger workers care for the developing brood.
- Middle-aged workers maintain and protect the colony.
- The oldest workers forage for food.

WINGED FORMS

The **alates** (winged forms) are most abundant in late spring and early summer, but they can be found at any time of the year. The winged **forms** are reproductives. Males can be easily distinguished from female alates — males are decidedly smaller, glossy black and have a small head. Although both alate males and females can be found in the same colony, as a general rule one form will be dominant.

Nuptial flights most often occur in the middle of the morning 1 or 2 days after a rainfall if the temperature is above 72 °F and the wind is light. The males fly first and await the females in the air.

The female alates emerge and take flight, rising into the cloud of waiting males. They **mate** in the air. After mating, the male dies and the newly mated female lands, sheds her now useless wings and begins searching for a suitable nesting site.

QUEENS

The new queen excavates a **brood** cell (chamber or room) about 1 or 2 inches (25 to 50 mm) underground. Often more than one new queen will occupy the same cell, but only one will survive to establish a **monogynous** (single queen) colony.

However, in Texas, most colonies are polygynous (many queens), and more than one queen may survive and occupy a cell. Queens do not forage for food but rely on fat reserves and the energy acquired from absorbing her wing muscles to survive until her first workers are ready to take on the task of colony maintenance.

At first, the new queen will **oviposit** (lay) 10 to 15 eggs. These hatch into larvae in 7 to 10 days and are fed by the queen through **trophallaxis**, which is the mouth-to-mouth exchange of foods, as when a mother bird feeds her babies. In 6 to 10 days, the larvae pupate, and 10 to 15 days later they emerge.

VOCABULARY WORDS

alate
brood
form
instar
larva
mate
molt
monogynous
nuptial
oviposit
polygynous
polymorphic
pupa
trophallaxis
Solenopsis invicta

These workers, called minors, are tiny because of the limited amount of energy the queen could devote to their development. These small workers open the brood cell to the outside world and begin foraging for food to feed the queen.

EGGS, LARVAE AND PUPAE

The queen continues to lay eggs throughout her life. She can live up to 7 years and produces an average of 1,000 eggs a day.

The eggs hatch into white, legless, grub-like **larvae** that are now fed by the workers. The larvae develop through four progressively larger stages called **instars**. They molt (shed their “skin”) between stages.

The worker ants feed solid food to the oldest larvae (last instar). These last instars digest the food, then secrete a nutritious liquid that the workers feed on and pass to the queen through trophallaxis.

The last larval instar becomes a **pupa**. Instead of spinning a cocoon, the larva sheds its outer skin to reveal an ant-like form that gradually changes from white to brown. Pupae do not eat, but slowly develop into an adult ant that emerges from the pupa.

The size of the larvae depends on what their ultimate form will be. Worker larvae are relatively small; future queens and males (known as “reproductives”) develop from larger larvae. All worker ants in the colony are females that sting but cannot lay eggs.

WORKERS

Within 30 days, larger workers emerge and the colony begins to grow. Workers start to emerge daily within 6 months, several thousand workers can occupy the colony and a “mound” is readily visible.

As the colony matures, the **polymorphic** (many sizes) nature of the worker becomes more apparent. The largest workers in the colony can be as much as 10 times the size of the smallest workers. At maturity, a **monogynous** (one queen only) fire ant colony can consist of more than 250,000 fire ants; a **polygynous** (many queens) fire ant mound can consist of more than 500,000 fire ants.

Note: Because the vocabulary list is extensive, you might opt to expose the students to the words ahead of time and have them become familiar with them before the lesson or activities.



LIFE CYCLE GAME

ACTIVITY 3-1



OVERVIEW

The students will learn about life cycles of insects by using the fire ant as an example. They will study the different developmental stages in the fire ant life cycle.

OBJECTIVE

Students will learn about the life cycle and development of the red imported fire ant.

TEKS

Science

3rd grade: 3.2.e, 3.9.a

4th grade: 4.2.c, 4.2.e, 4.8.a

5th grade: 5.2.c, 5.2.e, 5.5.a, 5.6.c, 5.9.a



MATERIALS

- Poster: *Red Imported Ant Life Cycle*
- Worksheet: *Red Imported Ant Life Cycle* for labeling and coloring (one for each student)
- Game spinner

ACTIVITY

Have the students label the *Ant Life Cycle* worksheet with the names of each stage, then color it. Place the large life cycle poster where all the students can see it.

Play the *Life Cycle Game*:

1. Divide the class into three groups.
2. Decide which group goes first, second and third.
3. Have a representative from the group spin the spinner.
4. Note where on the spinner the arrow points (worker adult, winged adult, eggs, larvae, pupae) and pose a question about that area to the group. (Refer to the questions supplied with this lesson; you may also use other questions you deem appropriate.) If the group answers the question correctly, award it a point.
5. Then have the next group turn the spinner, and ask the group a related question. Give a point if the question is answered correctly.
6. Give each group five chances. In case of a tie, choose a life cycle area and ask a question. Each of the groups participating in the tie breaker writes down the answer. Give a point for each correct answer.
7. Recognize all the students for their participation.

WRAP-UP

Discuss how the life cycle of a fire ant is similar to the growth and development of other insects (such as butterflies and beetles) and of humans (such as from a baby to child to young adult to parent).

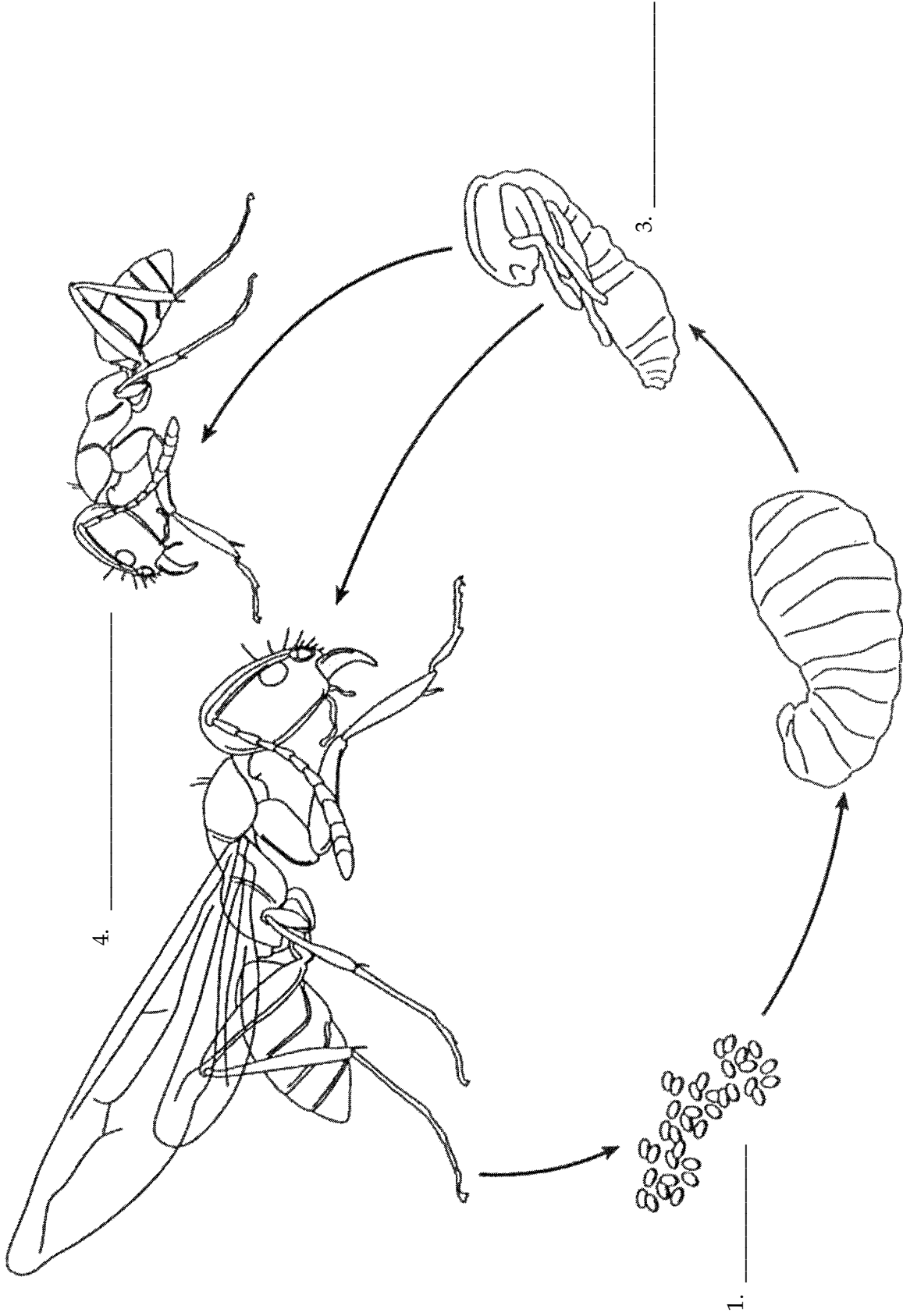
Compare the sharing of work responsibilities among workers in a fire ant colony to that of a family or community.

Discuss how failure of one of the groups to do their job can affect the colony.





RED IMPORTED FIRE ANT LIFE CYCLE



1. _____
2. _____
3. _____
4. _____

Fill in the names of the four stages of the red imported fire ant's life cycle.

LIFE CYCLE GAME QUESTIONS: TRUE OR FALSE

WINGED ADULTS

- 1) Winged adults are most abundant in the late spring and early summer but can be found at any time of the year. TRUE
- 2) Winged adults are also known as “alates.” TRUE
- 3) Red imported fire ant male alates are much bigger than the female alates. FALSE
- 4) The nuptial flight of the male and female alates occurs at midnight. FALSE
- 5) The male alates fly out of the nest first and are joined by the female alates in the air. TRUE
- 6) After the nuptial flight the female alate lands, sheds her now useless wings and begins searching for a suitable nesting site. TRUE
- 7) Winged adults have two wings that are the same size. FALSE
- 8) The wings on the winged adults are clear (transparent) and hairless. TRUE



EGGS

- 1) A new queen only lays one egg to begin her new nest. FALSE
- 2) A new queen lays 10 to 15 eggs to start her new nest. TRUE
- 3) The eggs laid by the queen hatch in 7 to 10 days and are fed by the queen. TRUE
- 4) The feeding of the newly hatched eggs by the queen is by trophallaxis (mouth-to-mouth exchange of foods). TRUE
- 5) The queen can live up to 7 years and lay more than 1,000 eggs per day. TRUE
- 6) A new queen uses her wings to fly and search for food for her newly hatched eggs. FALSE
- 7) A new queen excavates a brood cell to lay her eggs in. TRUE
- 8) The eggs develop into male worker ants. FALSE



LARVAE

- 1) The eggs hatch into larvae. TRUE
- 2) The larvae are black with 12 legs. FALSE
- 3) The larvae develop through four progressively larger stages called instars. TRUE
- 4) The larvae molt (shed their “skin”) between instar stages. TRUE
- 5) The larvae molt four times over a 12- to 15-day period. TRUE
- 6) The oldest larvae (last instar) digest the food given by the worker ants and secrete a nutritious liquid that the workers feed on and pass to the queen through trophallaxis. TRUE
- 7) Worker larvae are relatively small, while future queens and males (known as “reproductives”) develop from larger larvae. TRUE
- 8) The oldest larvae crawl around looking for food to feed the youngest larvae. FALSE



PUPAE

- 1) The last larval instar becomes a pupa. TRUE
- 2) Instead of spinning a cocoon, the larva sheds its outer skin to reveal a pupa that gradually changes from white to brown. TRUE
- 3) The pupae are black with 12 legs. FALSE
- 4) Imported red fire ant pupae are all one size. FALSE
- 5) The pupae take 9 to 16 days to develop. TRUE

- 6) The pupa is the last stage before the adult. TRUE
- 7) The large pupae eat more food than the smaller pupae. FALSE
- 8) The pupa, part of the fire ant brood, develop into different size workers and winged forms. TRUE

ADULT WORKERS

- 1) All workers ants in the colony are females that sting but cannot lay eggs. TRUE
- 2) There is only one worker ant in each mound. FALSE
- 3) The worker ants feed and care for the queen ant. TRUE
- 4) The queen ant is fed by the worker ants through trophallaxis. TRUE
- 5) The largest workers in the colony can be as much as 10 times the size of the smallest workers. TRUE
- 6) The smallest workers are referred to as "minims." TRUE
- 7) Young worker ants are assigned the job of caring for the developing brood. TRUE
- 8) Middle-aged worker ants maintain and protect the colony. TRUE
- 9) The oldest worker ants forage for food. TRUE
- 10) A fire ant mound in Texas can have more than one queen. TRUE
- 11) The fire ant queen leaves the mound once a day for fresh air. FALSE

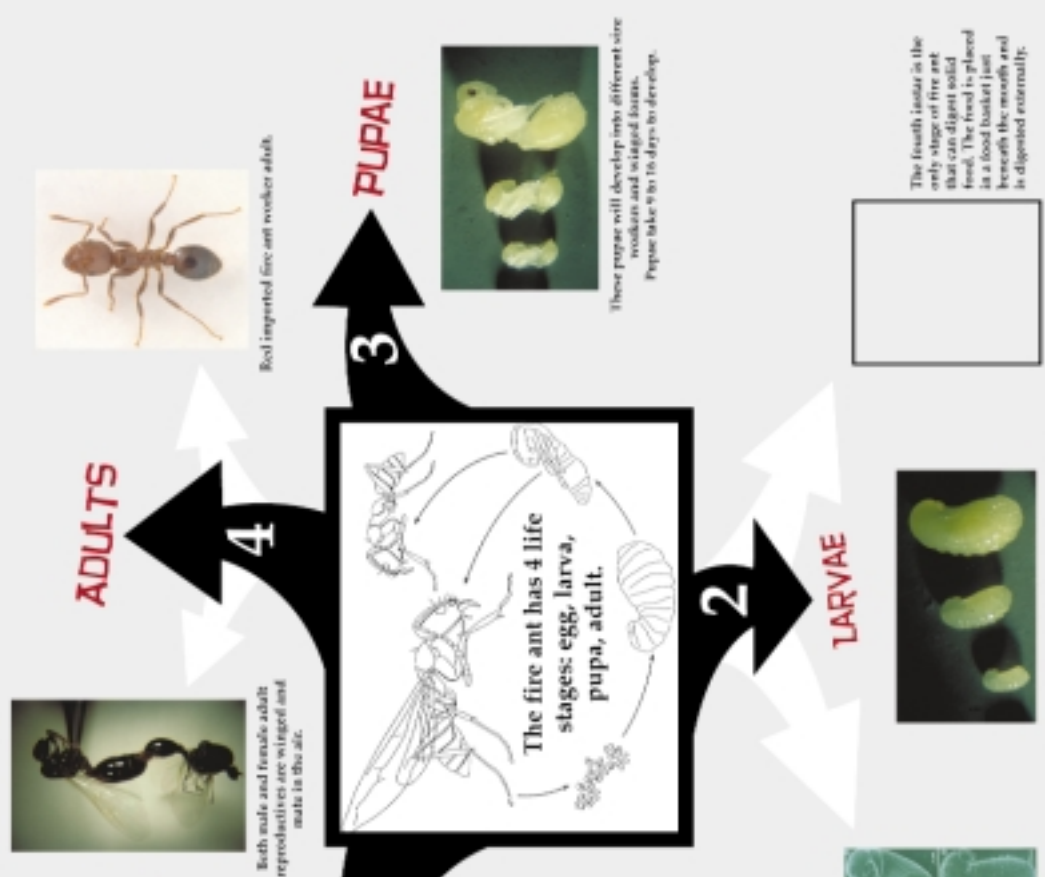


If you need more questions in a section, change some of the true statements to make them false, or vice-versa, such as changing, "There is only one worker ant in each mound. (FALSE)" to "There are many worker ants in each mound. (TRUE)."

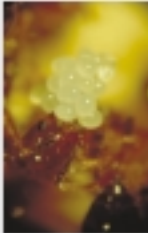


ANT LIFE CYCLE POSTER

KIDZANS RED IMPORTED FIRE ANT LIFE CYCLE

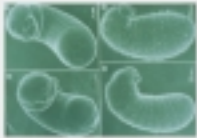


EGGS



Eggs are found in the brood chamber of a mound. They usually take 7 to 10 days to hatch.

LARVAE



Larvae molt four times over a 12- to 15-day period. The first three molts are fed regurgitated liquid food.



These larval instars will develop into different size workers.

1

3

2

4

PUPAE



These pupae will develop into different size workers and winged forms. Pupae take 9 to 15 days to develop.

ADULTS



Both male and female adult reproducers are winged and mate in the air.



Red imported fire ant worker adult.



The fourth instar is the only stage of fire ant that can digest solid food. The food is placed in a food basket just beneath the mouth and is digested externally.

PROTECTIVE COLORING

ACTIVITY 3-2



OVERVIEW

The group will observe how camouflage can protect insects from predators.

OBJECTIVE

Students will observe and identify the characteristics that help insects survive.

TEKS

Science

3rd grade: 3.1.b, 3.2.b, 3.3.c, 3.9.a, 3.9.b

4th grade: 4.1.b, 4.2.b, 4.3.c, 4.8.a, 4.8.b

5th grade: 5.1.b, 5.2.b, 5.3.c, 5.9.a, 5.9.c



MATERIALS

- Four slices of bread
- Food coloring: red, blue, green
- Cookie sheet(s)

ACTIVITY

Preparation: On the day before activity, break each slice of bread into 20 pieces, keeping them separate. Leave one slice of bread (pieces) white. The other three will be colored.

To color bread pieces: mix together 1/4 cup water and 10 drops of food coloring (red, blue or green). Soak the pieces of bread in the food coloring/water mixture. Spread the pieces onto a cookie sheet and allow them to air dry overnight.

Instructions: Select an area outdoors with short grass and where birds have been known to visit. Choose four areas about 6 feet apart, and place the bread in a circle of about 12 inches in diameter. (One color per circle.)

Ask the students what they think will happen to the bread.

Leave the bread in place for 4 hours. Then have students harvest any remaining pieces. Have the students record the number of pieces for each color of bread. Which bread pieces were consumed? Were there more pieces left of any color?

The students should see that more of the blue, red and white pieces were eaten, while the green ones were not as popular. The green was camouflaged in the grass and more difficult for the birds to see.

ALTERNATE ACTIVITY

TEKS

Science

3.1.b, 3.2.b, 3.2.c, 3.2.d, 3.3.c, 3.9.a, 3.9.b

4.1.b, 4.2.b, 4.2.c, 4.2.d, 4.3.c, 4.8.a, 4.8.b

5.1.b, 5.2.b, 5.2.c, 5.2.d, 5.3.c, 5.9.a, 5.9.c



MATERIALS

- 15 to 30 pieces of round colored candy such as Skittles or M&Ms, or small pieces of colored paper for each round of the game
- Large sheets of paper in colors to match the candy or the small pieces of paper
- Blindfolds
- Stopwatch/timer

ACTIVITY

This activity can be done for each individual student or for groups of students. You can vary the length of time for the experiment to see the differences in foraging when there are time constraints.

1. Before beginning, explain the activity to the students.
2. Give one student or a group of students a sheet of large colored paper.
3. Blindfold a student or group of students.
4. Have the non-blindfolded students scatter 15 to 30 pieces of candy or small pieces of paper onto the large colored sheet.
5. Set the timer for 15 seconds, 30 seconds or 1 minute.
6. Say go, and start the timer.
7. The blindfolded students should remove the blindfolds and begin picking up the pieces of candy (they can either set it aside or eat it your choice) or paper one at a time off the large sheet.
8. At the end of the time period, stop the students.
9. All of the students should then sort the leftover candy or pieces of paper by color and count the number of each color that was left on the paper.

The idea is that more of the colored candy pieces or pieces of paper that match the color of the large colored paper will remain at the end of the time period because they blend with the background and are harder to spot. Usually, more is left of the colored candy or paper that closely matches the background color.

WRAP-UP

Discuss how this activity can relate to the color of insects. Does the color of an insect help protect it from predators?



MOUND, SWEET MOUND

One of the identifying characteristics of a fire ant colony is its earthen nest or mound. The mound is a **conical** (cone-shaped) dome of **excavated** (dug up) soil. The mound begins as a small cell, like a small room, a few inches deep in the ground, where the newly fertilized queen seals in herself to begin her colony.

As workers are produced, they begin to tunnel into the surrounding soil, making many interconnected chambers. The soil removed during the formation of the chambers and tunnels is carried above ground, where it is used to form many more chambers and tunnels.

A mature fire ant colony (a year or so old) consists of a mound averaging 12 to 15 inches wide and about 10 inches tall. The mound's size and shape differs to some extent from other mounds based on soil type.

The surface of a fire ant mound usually has a slight crust that protects it. The inside of the fire ant mound is filled with tunnels and chambers. These chambers form a cone that extends 1 to 3 feet into the ground. Some tunnels may extend downward 5 or more feet, depending on the water table.

Most fire ant mounds have no visible entrances or exits except during mating flights. At mating time, the workers open many holes on top of the mound. The holes are closed promptly after use.

TUNNELS

The fire ant workers leave and return to the mound by way of lateral tunnels just under the soil surface. These shallow tunnels are 1 to 4 inches underground and **radiate** or extend several yards in many directions from the mound. There may be smaller tunnels branching off from the main tunnel.

At points along the tunnel's length are openings that lead to the surface. Fire ants use these surface openings when foraging or feeding. Openings have been found as far as 132 feet from the mound. Other tunnels extend from the bottom of the fire ant mound to the nearest water table.

MOVING THE QUEEN AND BROOD

Although a fire ant mound is elaborate, the fire ants cannot regulate its temperature or humidity. Instead, they continually move the queen and brood (eggs, larvae and pupae) to the most suitable location within the mound. Thus, in the early morning during summer, the brood and queen are usually near the top, on the sunny side of the mound, to take advantage of the warm, humid conditions. As the sun dries out and heats the mound, the brood and queen are moved deeper into the mound. During drought, the fire ants may remain deep in the ground for long periods.

During the dry hot days of late summer and early fall, fire ants do not form new mounds or maintain older mounds. However, as soon as rains and moderate weather return, they rework the fire ant mounds, which become quite noticeable.

Although ants spend much time and energy setting up and maintaining their mound, the mound is not permanent. If it is disturbed, the ants often move and build a new mound several feet to many yards away.

VOCABULARY WORDS

conical
excavate
radiate

Sometimes the ants move for no apparent reason. At other times, they move because of unfavorable conditions, such as too much shade, the presence of pesticides or the presence of other biological enemies (predators, diseases, etc.). However, some mounds may be disturbed repeatedly (such as mowing over them) without causing the ants to move.

Although mounds are important to a colony, they are not essential for its survival. Given a dark, protected site with enough moisture and food, fire ants will nest in a wide variety of sites (such as rotten logs, walls of buildings, under sidewalks and roads, in automobiles, in dried cow manure). Fire ants have proven to be very adaptable.



MOUND OF TROUBLE MATCHING GAME

ACTIVITY 4-1



OVERVIEW

Like any animal, the fire ant needs a place to live. Students will learn about the construction and organization of a fire ant mound.

OBJECTIVES

The students will learn the three purposes of an ant mound:

- To serve as a flight platform for mating flights
- To raise the colony above the water table in saturated ground
- To act as a passive solar collector (absorb heat from sun) to warm the colony during the winter.

TEKS

Science

3rd grade: 3.8.a, 3.9.a

4th grade: 4.5.a, 4.6.a, 4.8.a, 4.11.a, 4.11.c

5th grade: 5.6.c, 5.8.a, 5.9.a, 5.9.b, 5.9.c, 5.10.b



MATERIALS

- Mound diagram for labeling and coloring
- *Mound of Trouble Matching Game* poster and cards
- Game spinner

INSTRUCTIONS

Before class, cut apart the *Mound of Trouble* matching cards. You may laminate them if you wish.

In class, have the students label the “mound diagram” and color it; they may add “ant” figures if they wish. Then play the *Mound of Trouble Matching Game*:

1. Before starting the game, out of sight of the students, place the picture cards face down on the *Mound of Trouble Matching Game* board. The game board is bordered by four colors: blue, green, yellow and brown. These colors correspond with different areas of the board the blue corresponds with the sky; the green with the vegetation; yellow with the mound; and brown with the rest of the underground area.

The matching cards each have a photograph on one side and one of the four colors on the back. There are two cards for each photograph; one is smaller than the other.

Place the larger cards face-down on the borders, matching the color of the border to the color on the back of the card. (Example: The larger blue cards go face-down on the blue border.)

Place the smaller cards face-down in the area of the board that corresponds to the color on the border. That is, place the small blue cards face-down on the sky, the small yellow cards on the mound, the small green cards on the vegetation and the small brown cards on the underground area that’s not the mound.

2. Divide the class into two to four teams. If they wish, the students can name their team using a fire ant theme.
3. Place the game board where all can see it.
4. Decide which team goes first, second, etc.
5. The first team spins the spinner, and notes what color it points to.

6. The team turns over one of the cards on the border of the same color. (Example: If the spinner points to green, the students pick a card from the green border.)
7. The team then turns over another picture from the corresponding area of the mound diagram. If the two pictures match, remove both pictures and set them aside. Each time a picture is chosen, the instructor should identify the picture (information is available in the *Mound of Trouble Matching Game Picture ID Guide* on the following pages) and give a brief description to reinforce the lesson material already taught to the students.
8. The team then spins the spinner, draws another card and tries to match two more pictures. If the pictures don't match, replace them face down and the next team draws a card from the deck.

The object is to uncover all the cards from one colored area. It will be up to the instructor to decide whether to stop the game at that point. The game can be continued until all pictures are uncovered. The team with the most matches wins.

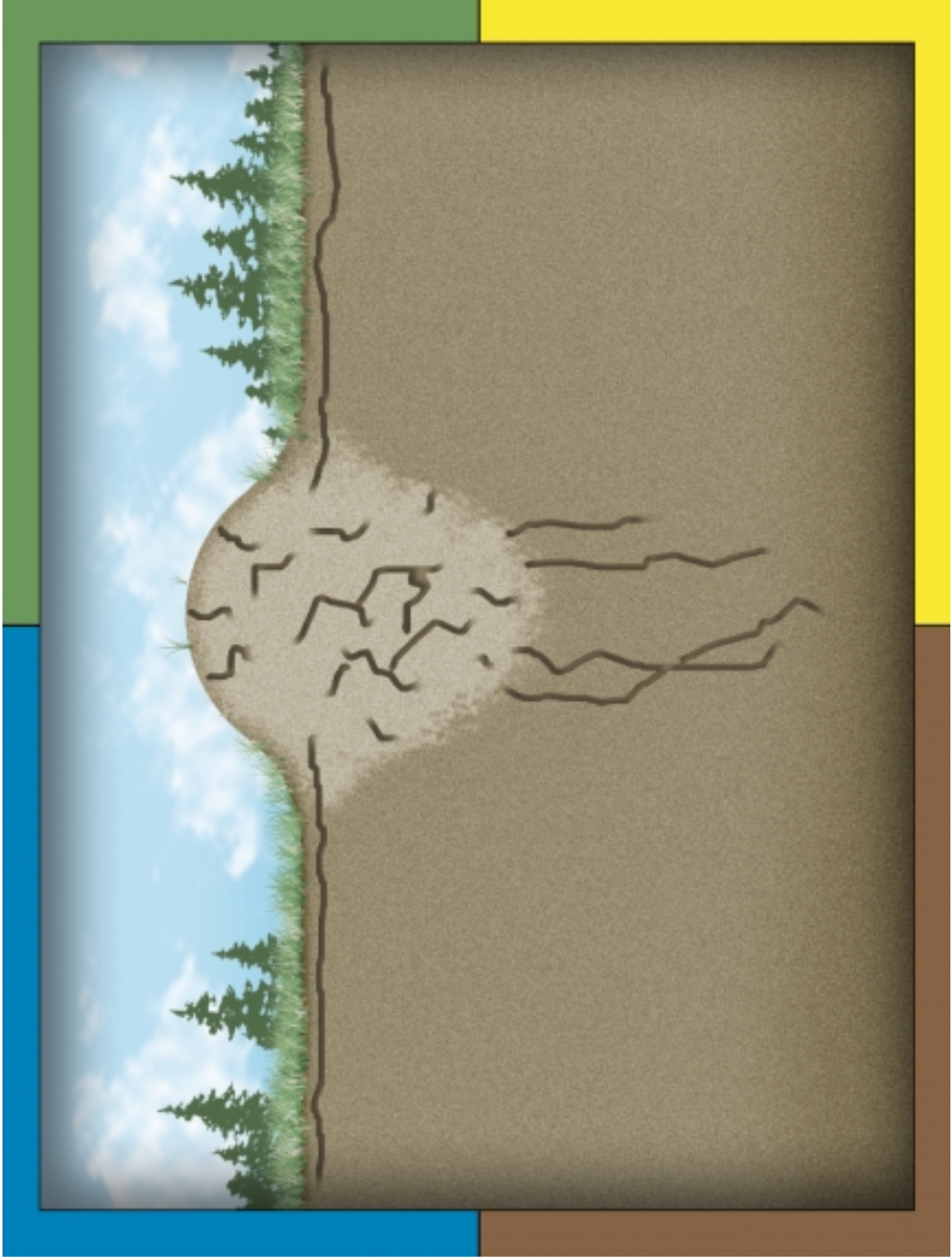
WRAP-UP

Discuss the various types of homes or shelters that other animals have. How are they like or unlike a fire ant mound?

The tunnels in mounds are like tiny caves. Ask the students to discuss what types of work they would be able to do if they lived in dark tunnels and could not see. What would they be unable to do?



RED IMPORTED FIRE ANT MOUND



MOUND OF TROUBLE MATCHING GAME PICTURE ID GUIDE

Here is the information to tell the students when they uncover each card in the *Mound of Trouble Matching Game*.

BLUE BORDER/BACKGROUND



1. Airplane broadcasting bait

Airplanes are very versatile pieces of equipment. They can be used when agricultural products (such as seed, fertilizer or chemicals) must be spread over large areas. They can spread products easily and efficiently. Airplanes can be used to spread fire ant bait products to help manage this pest.



2. Dragonfly

Almost everyone knows about dragonflies. They are often found near lakes, stock tanks and streams, where the eggs are laid and the immature stages develop. These insects hunt and catch their prey while in flight. Like fire ants, dragonflies mate in flight. Dragonflies eat mosquitos. They can be considered a beneficial insect.



3. Fire ant winged reproductives

Only the male and female adult reproductives of the red imported fire ant have wings. They are also called "alates." After they leave the mound, they fly and mate in the air. The newly mated queen falls to the ground, sheds her wings and searches for a suitable location to begin her mound.



Photo courtesy Larry Gilbert,
University of Texas

4. Phorid fly attacking fire ant workers

A parasitic fly, the phorid fly, may help control fire ants. The phorid fly female injects an egg into the midsection (thorax) of the fire ant's body. The egg hatches and the larvae burrows into the ant's head, where it grows and eventually causes the ant's head to fall off. Inside the decapitated head, the larva pupates and emerges as a mature fly. However, the real effect of these flies is to reduce fire ant foraging activities which, in turn, allows native ant species to better compete with fire ants.



5. Horsefly

The horsefly comes from a large insect family in the order Diptera (pronounced DIP-ter-uh). It is a medium to large fly with a stout body and large head. Horseflies range in size from that of a housefly to the size of a bumblebee. The females of practically all species suck the blood of both wild and domestic animals. The deerfly, a relative of the horsefly, also attacks people.

GREEN BORDER/BACKGROUND

1. Fire ant attacking corn earworm larvae

A larva is one of the developmental growth stages of insect species that undergo "complete metamorphosis." The fire ant also undergoes "complete metamorphosis." This is a corn earworm larva. The red imported fire ant hunts and finds other insects to eat as food. Here a fire ant is attacking a corn earworm larva.



2. Fire ants on an okra bud

Fire ants occasionally feed on germinating seeds and seedlings of corn, sorghum, peanuts, soybeans, watermelons, cucumbers, sunflowers and other crops. Particularly in the spring when the weather is dry. They sometimes cause stand loss by feeding on the seeds, causing the seed to die and not germinate. Growers of okra, a common vegetable plant in the southern United States, are constantly battling fire ants because they are attracted to the oils in the plant.



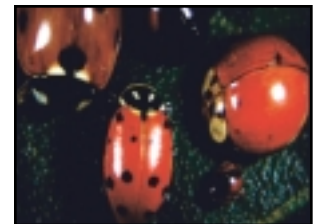
3. Fire ant worker ants

Worker fire ants are wingless, sterile females. They protect the queen by defending the nest from intruders. They feed the queen only food that other worker fire ants or larvae have eaten first. They move the queen if she is in danger.



4. Lady beetles

Lady beetles are also called "ladybugs" or "lady-bird beetles." They are from the order Coleoptera. Both adults and larvae are beneficial. They hunt and feed on aphids, scale insects, spider mites, insect eggs and larvae.



5. Monarch butterfly

The Lepidoptera are one of the largest and most important orders of insects. There are almost 150,000 species in this order. Members of the order are readily recognized by the scales on the wings and body. An example is the adult monarch butterfly. It is orange with black wing veins and bodies.



BROWN BORDER/BACKGROUND

1. Deer with fire ant stings



Many wild animals are stung by the red imported fire ant. Here, a young deer must have disturbed a fire ant mound while feeding. It has many stings on its nose. Fire ants have been known to kill young animals if the animals fall onto a mound.

2. Fire ant baits



A fire ant bait is an insecticide that ants sense to be food. The fire ant workers find the bait particles and carry them back to the colony, where larvae, workers and queens eat and circulate it. Conventional formulated baits have three main components: de-fatted corn cob grit granules, soybean oil and an active ingredient (the insecticide).

3. Fire ant worker ants



Worker fire ants are wingless, sterile females. They protect the queen by defending the nest from intruders. They feed the queen only food that other worker fire ants or larvae have eaten first. They move the queen if she is in danger.

4. Pyramid ant mound



This is the mound of a pyramid ant. Unlike the fire ant mound, the pyramid ant mound has a single entry/exit hole. Fire ant mounds have no visible entry/exit hole. The pyramid ant is a native ant of Texas and is an enemy of the fire ant. Many times you can see fire ant body parts surrounding the pyramid ant mound.

5. Velvet ant



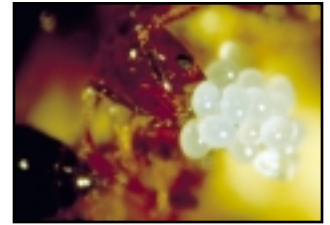
The so-called “velvet ant” is not an ant at all. Even though it is in the same order as the ant, Hymenoptera, the velvet ant is really a ground dwelling, wingless wasp. You must be careful around them — if you step on one, it will sting you. These insects are also called “cow killer ant.”



YELLOW BORDER/BACKGROUND

1. Fire ant egg cluster

This is a photograph of a red imported fire ant egg cluster laid by the fire ant queen. Normally the queen lays eggs in clusters of 10. The queen cares for these eggs until the pupae hatch into adult worker ants. The worker ants now care for the queen as she begins her egg-laying duties.



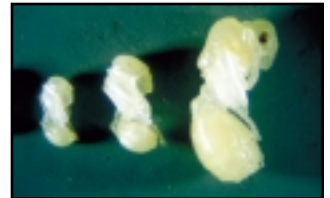
2. Fire ant larvae

The larval stage is one of the developmental stages of the red imported fire ant. Larvae molt four times over a 12- to 15-day period. They then develop into pupae. The fourth instar fire ant larva is the only stage of fire ant able to digest solid food. The food is placed in a special pocket, called a "food basket," just below the mouth and is digested externally. The fluid that is produced by the digestion process is picked up by the worker ants and fed to the queen and the other larval stages.



3. Fire ant pupae

The pupa is one of the developmental stages in a fire ants life cycle. Pupae develop into different size workers and winged forms. The pupae do not eat, nor do they move by themselves.



4. Fire ant queen with worker ants

A newly mated queen lays about a dozen eggs. When they hatch 7 to 10 days later, the larvae are fed by the queen. These larvae develop into small worker ants that will feed the queen and her subsequent offspring. Later, a queen fed by worker ants can lay from 800 to 1,000 eggs per day if needed.



5. Fire ant worker ants

Worker fire ants are wingless, sterile females. They protect the queen by defending the nest from intruders. They feed the queen only food that other worker fire ants or larvae have eaten first. They move the queen if she is in danger.



INSECT CONDOMINIUMS

ACTIVITY 4-2



OVERVIEW

The students will use problem-solving techniques and critical thinking skills to build and maintain a home specifically suited to their insect pets.

OBJECTIVE

To familiarize the students with ecologically based concepts such as niche, habitat and survival requirements of insects and to reinforce the importance of observation in the scientific method of problem solving.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.3.c, 3.8.a, 3.8.b, 3.8.c, 3.8.d

4th grade: 4.1.a, 4.1.b, 4.3.c, 4.5.a, 4.5.b

5th grade: 5.1.a, 5.1.b, 5.3.c, 5.9.a, 5.9.b

MATERIALS

- Insects, either purchased at a pet store or caught by students
- Paper, one sheet for each participant
- Pens or pencils, one for each participant
- Various sizes and shapes of plastic containers (suggestions include 2-liter bottles, juice containers, ice cream buckets, etc.)
- Scissors
- Clear packing tape
- Netting (panty hose, tulle, screen, cheesecloth)
- Permanent markers
- Other odds and ends such as beads, buttons and craft items for decorating

ACTIVITY

1. Either the students can go outside to catch insects, or the teacher can buy crickets, mealybugs or other insects at a pet store and bring them to class.
2. Have each student draw a blueprint of his or her family's house.
3. Discuss with the class what things all of the houses have in common and why these items and rooms are included in most homes. Also discuss the differences and benefits or drawbacks these would have in other homes.
4. Have the students create home for their insects using recyclable materials. Each student may use one container or attach several together. The student will need to devise a way to open and close the container without losing the insect. Methods for watering and feeding will also need to be devised. The students may decorate the houses with markers or by gluing craft items onto them. The teacher may need to help cut, glue or tape if the students wish to connect more than one container.
5. The students should then look for and collect the necessary materials for the insect to live in its condo — grass, leaves, soil, water, other live animals, bedding materials, etc.
6. Later the students should release their insects outside.

WRAP-UP

Have the students explain their condos to one another; what components did they include and why?

Discuss how the condo model relates to the insect's natural habitat.



BED AND BREAKFAST

Fire ants are **omnivorous** insects. They feed on insects and **arthropods** as well as small birds, small **mammals**, **amphibians** and **reptiles**. These food sources satisfy the **protein** requirements in the colony so the queens can produce eggs and the brood can develop.

Fire ants also collect and feed on oily seeds such as walnuts, peanuts and sunflowers. These seeds help fulfill the colony's requirements for fat and protein.

In addition, fire ants eat the **honeydew** produced by leaf-sucking insects such as aphids, mealy bugs and scale insects. Honeydew is composed of sugars and water; it is the by-product of undigested plant sap that is excreted by the insects. It provides a source of quick energy for all members of the ant colony.

Fire ants have also been known to feed on seed pods, tubers (roots) and fruits. But they tend to avoid foods that contain chocolate, molasses, citrus or other aromatic oils. It is thought that these foods contain substances that are unattractive or possibly toxic to the ants.

Fire ants must have a constant source of water. If necessary, they will dig tunnels down to the **water table** to bring water to the colony. Fire ants also need plenty of **moisture** in the soil so it stays relatively cool in summer and allows the mound to hold together.

Fire ants tend to look for protein-rich foods throughout the year, but especially in spring and early fall. During hot, dry summers or cold winters fire ants seek out sources of sugars for energy. They will also reduce the production of eggs and offspring to conserve energy during these stressful times.

FOOD WEB AND FOOD CHAIN

Few insects prey on fire ants, so they are not an important part of the **food web**. Although dragonflies may eat a few winged fire ants as they leave their mounds and armadillos may eat a few of the developing brood inside of the mound, the ants themselves are not an important food for other animals.

In the insect **food chain**, however, fire ants are at the top: They prey on all types of insects and smaller organisms.

Fire ants prefer to live in open, sunny areas. They need the sun's energy to warm the colony and allow the developing ants to grow. They do not like shade. Rarely will they build mounds under trees or in a wooded area unless there is plenty of sunlight on the ground for several hours daily.

Fire ants also prefer soils such as clay or loam that "stick together" for building the raised mounds in which they live.

Fire ants dislike being flooded. If a mound is flooded during a rainstorm or other high-water situation, all the ants will cling together and form a living "raft" to protect the queen (or queens) and the developing offspring. Once this raft of ants hits a tree, rock or other dry object, all of the ants will climb onto it and wait for the water to go down.

After rains, fire ant mounds seem to "magically" appear in sunny areas. The ant colonies build a taller mound to escape the really wet soil under the ground and live above the ground.

VOCABULARY WORDS

amphibian
arthropod
food chain
food web
honeydew
mammal
omnivorous
protein
reptile
water table

Fire ants may be more active on warm, cloudy days than hot, clear days. The ideal temperatures for fire ant activity ranges from 70 °F to 95 °F. If the surface temperature of the soil is more than 95 °F, the ants will remain in the ground until temperatures are cooler. During the summer, fire ants may not come out during the day, but will forage for food at night.



WHAT'S A FIRE ANT TO EAT?

ACTIVITY 5-1



OVERVIEW

This lesson will teach students about the diet of red imported fire ants by allowing them to offer fats, proteins and carbohydrates (sugars) to the ants and observe their attraction (or lack thereof) to the various foods. Students will also observe preferred habitat of ants.

OBJECTIVE

The student will be able to identify the food types and landscape areas that are most attractive to fire ants.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.2.b, 3.2.c, 3.2.3, 3.7.a, 3.8.a

4th grade: 4.1.a, 4.1.b, 4.2.b, 4.2.c, 4.2.e

5th grade: 5.1.a, 5.1.b, 5.2.b, 5.2.c, 5.2.e

MATERIALS

- Bait stations (note cards or another type of heavy paper)
- Permanent markers Food items: olive oil, canned tuna, potato chips, Vienna sausage, honey, peanuts, sunflower seeds, dry dog food (any other foods high in fats, proteins, or sugar), citrus peels, molasses, chocolate chips, peppermints
- Pens or pencils, one for each student
- Soap
- Sting medications
- *Data Observation Sheet*, one copy for each student

Safety tip: Worker fire ants will sting, so watch out where students place their hands!

First aid for fire ant stings: Commercially available sting medications can help relieve the stinging. Washing the stings with soap and water will clean the area and help reduce the chances of secondary infection. Some individuals may experience allergic reactions to the bites. Refer to the Fire Ant Project fact sheet, *Medical Problems Associated with the Imported Fire Ant* (FAPFS023), for more information on medical issues.

Tell them that they should not scratch the sting or rupture the pustule that might occur at the sting site because secondary infections may occur. The pustule is a normal result of a fire ant sting and is sterile unless ruptured.

INSTRUCTIONS

1. Before beginning the outdoor activities, discuss fire ant safety.
2. Have the students label each of the bait stations with the name of the food that will be placed on it.
3. Then they should place the bait stations with different foods at equal distances around large fire ant mounds to see which foods are most attractive and least attractive. Bait stations may be placed from 6 to 12 inches from the mound in a circular pattern. If the outdoor temperature is above 70 °F, ants should find the foods within 15 minutes. If outdoor temperatures are slight-

ly cooler than this, it may take 30 minutes or longer for the fire ants to visit the bait stations. If temperatures are cooler than 60 °F or hotter than 95 °F, fire ants may not emerge from the ground at all.

4. While waiting for the ants to find the bait, you may opt to do some other activity with the students such as gathering weather information or examining the area to see where fire ant mounds are located and whether they are in sunny or shady areas.
5. Students should use the *Data Observation Sheet* to record their observations: favorite and least favorite ant foods, time until ants found the food, numbers of ants at the food (many, few, none). They may also record whether other types of ants came to the food and the relative size of the mound (large, medium, small) that they selected to test. Weather conditions such as temperature and sky condition (cloudy, clear, partly cloudy, etc.) should be recorded for reference.

WRAP-UP

Ask: Which food types were most attractive? Which were the least attractive? Did the ants avoid any of the foods altogether? Why do you think they avoided a food selection? How would the feeding activities be different under different weather conditions?

Have the students write a short paragraph about the types of food you used and which ones attracted more ants. Where do they think ants fit into the food chain?



WHAT DO YOU LIKE TO EAT?

ACTIVITY 5-2



OVERVIEW

This lesson will teach students to compare what they like to eat with that of an ant and also will enable them to create a model of an ant and then eat it!

OBJECTIVE

The student will be able to identify food they are attracted to and food sources to use in creating a model of an ant.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.3.c, 3.8.b

4th grade: 4.1.a, 4.1.b, 4.3.c, 4.7.a

5th grade: 5.1.a, 5.1.b, 5.3.c



MATERIALS

- Refrigerated sugar cookie dough
- Baking sheet
- Assortment of various food items: chocolate chips, chocolate coated candies, pretzel sticks, chow mein noodles, seeds such as pumpkin or sunflower, nuts such as peanuts, almonds, cashews, decorator sprinkles
- Cake icing (to use as “glue” if necessary)

Safety tip: Because this activity requires the use of an oven, adult participation is encouraged. The pan will be very hot, and students should be advised not to touch.

INSTRUCTIONS

1. Following the directions on the cookie dough, preheat the oven to the appropriate temperature.
2. Prepare the work area by disinfecting the countertop. The students should wash their hands.
3. Shape the cookie dough into gumdrop-size balls and position them on baking sheet, three balls per “bug.” The balls should just barely touch. Note: the dough will flatten and spread, and this varies by brand. Bake the cookies according to the package directions.
4. While the cookies are in the oven, students should choose from the various food items — the candies, nuts, etc. — to create their bug.
5. Remove the cookies from the oven. Caution: The pan will be very hot. Be careful!
6. Move the cookie “bugs” to the work surface, preferably a plate or serving tray.
7. While the cookies are still warm, push the food items into the dough to create a “bug.” Work quickly while the cookies are still warm; if they cool and harden, use cake icing to “glue” the decorations onto the cookie.

WRAP-UP

Ask: Which food items did you use to create your bug? How many legs does your bug have? Does it have wings? Why did you choose the food items, are they your favorite?

Have each student describe his or her bug to the rest of the class. All students can then celebrate by eating their bugs!



FIRE ANTS AND BIG-HEADED ANTS AND CRAZY ANTS — OH, MY!

More than 210 different types, or **species**, of ants are native to Texas. This number does not include red imported fire ants because they are not native to Texas. Several of these species of ants are common; others usually go unnoticed.

Some of the commonly seen ants (including red imported fire ants) are pests in and around homes. Others live in lawns and other places but are not considered pests. Most ant species are **beneficial** because:

- They aerate the soil, which allows air and water to reach plant roots more easily.
- They feed on a wide variety of foods most of which are other insects, including pest insects.

Some ants, such as sugar ants, crazy ants, carpenter ants and fire ants, are harmful because they sometimes live in our homes and may damage our homes or landscape. Texas leaf cutter ants actually cut leaves off trees and other plants and carry the pieces back into their nests. The ants use the leaves to grow **fungus**, which they eat.

It is important to know which ants are helpful and which ants have the **potential** to be pests. Some of these ants even “help” humans by battling fire ants in “ant to ant” combat. In areas where there are not many imported fire ants, native ants can **flourish** and keep fire ants at bay. But areas where many fire ants live have very few, if any, other ant species.

The most common types of ants we see outdoors are big-headed ants, little black ants, false honey ants, pavement ants, acrobat ants, carpenter ants, crazy ants, red harvester ants, Texas leaf cutter ants, native fire ants and red imported fire ants.

Of those species, the ants that are successful **competitors** with imported fire ants are pavementants, little black ants, crazy ants and native fire ants. Areas where these types of ants are present contain much fewer fire ants than others on average; areas with many fire ants have very few of these “competitor” ants. If given the opportunity, these “competitor” ants can kill very small colonies of fire ants.

VOCABULARY WORDS

aerate
beneficial
competitor
dichotomous key
flourish
fungus
infestation
potential

BE AN ANT SCIENTIST!

ACTIVITY 6-1



OVERVIEW

Students will trap ants using attractants (foods) to see what species are found in their areas. The students will learn about dichotomous keys and how they are used to identify insects.

OBJECTIVE

Students will become familiar with many types of ants in the environment and determine whether they are harmful or beneficial. They will learn to use a dichotomous key to identify a species of ant.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.2.b, 3.2.c, 3.2.d, 3.4.a

4th grade: 4.1.a, 4.1.b, 4.2.b, 4.2.c, 4.2.d, 4.4.a

5th grade: 5.1.a, 5.1.b, 5.2.b, 5.2.c, 5.2.d, 5.4.a



MATERIALS

- Small (1-ounce) condiment cups with snap-on lids
- Canned tuna, potato chips, dry cat food, Vienna sausage, etc., to use as bait
- Hand lens or other magnifying instrument
- Permanent markers
- Fire Ant Project Fact Sheet FAPFS010, *Texas Pest Ant Identification — An Illustrated Key*, available at <http://kidzants.tamu.edu>, one copy for each student.
- Soap
- Sting medications
- Paper, one sheet for each student
- Pens or pencils, one for each student
- *Be an Ant Detective Game Picture Cards*, printed from the CD or the project's Web site, <http://kidzants.tamu.edu>.

Safety tip: Discuss fire ant safety with the students before beginning the outdoor activities. Fire ants are likely to be attracted to the bait cups, so be careful when inspecting cups to minimize the possibility of stings.

First aid for fire ant stings: Commercially available sting medications will help. Washing stings with soap and water will clean the area and help reduce the chances of secondary infection. Some individuals may experience allergic reactions to the bites. Refer to the Fire Ant Project fact sheet, *Medical Problems Associated with the Imported Fire Ant* (FAPFS023), for more information on medical issues.

Tell them that they should not scratch the sting or rupture the pustule that might occur at the sting site because secondary infections may occur. The pustule is a normal result of a fire ant sting and is sterile unless ruptured.

ACTIVITY

1. Have the students familiarize themselves with the *Texas Pest Ant Identification — An Illustrated Key* fact sheet (FAPFS010).
2. Each student should write his or her name on a condiment cup.
3. Then each should select an ant attractant (food) and place a small amount of it on the inside of the cup lid.

4. Take the class outdoors and have each student place the lids, food side up, anywhere they wish.
5. Leave the lids undisturbed for 30 minutes.
6. After 30 minutes, help the students snap their cups down onto the lids and return to the classroom with the captured ants.
7. Kill the ants collected by placing the cups in the freezer overnight or by placing them in alcohol.
8. The students should use hand-held magnifying glasses or other magnifying instruments to take a closer look at their ant.
9. Using the *Pest Ant Key* and *Ant Detective Game Picture Cards*, try to identify the ants as best as possible.

Note: Explain to the students that all ants are extremely prolific and that killing a few will not harm the overall population of ants. Also explain that ants cannot feel pain and freezing them is the best way to observe them for study.

WRAP-UP

- Ask: Were the ants trapped among the list of competitors of fire ants? How many different types of ants were collected?
- Compare the number of trapped ant species to what was learned about fire ants. Does the presence of these species affect the number of fire ants found? Were there many fire ants and only a few others (competitors), or many competitors and few fire ants?
- Write a short story about a day in the life of an ant.

BE AN ANT DETECTIVE

ACTIVITY 6-2



OVERVIEW

Students will learn about dichotomous keys and how they are used to identify various ants by playing a game in which they follow clues handed to them and then match their clues to those placed in a diagram on the floor.

OBJECTIVE

To become familiar with the use of dichotomous keys for identification.

TEKS

Science

3rd grade: 3.1.a, 3.1.b, 3.2.b, 3.2.c, 3.2.d, 3.4.a

4th grade: 4.1.a, 4.1.b, 4.2.b, 4.2.c, 4.2.d, 4.4.a

5th grade: 5.1.a, 5.1.b, 5.2.b, 5.2.c, 5.2.d, 5.4.a

MATERIALS

- *Be an Ant Detective: Ant Body Parts*, one copy for each student
- Drawing of an ant with body parts labeled
- *Be an Ant Detective: Schematic Key* for the floor cards
- *Be an Ant Detective: Clue Sheets*
- *Be an Ant Detective: Floor Cards*
- Tape to guide from one possible choice to the next possible choice
- *Certified Ant Detective Bookmarks*, photocopied onto colored paper to give as rewards for identifying an ant

PREPARATION NOTES

- Electronic files of the floor cards, ant drawing, schematic key, clue sheets and bookmarks, required for this game are on the CD in the KIDzANTS kit and on the project's Web site (<http://kidzants.tamu.edu>).
- Print out the floor cards and laminate them to protect them from shoes and dirt.
- Print out the Clue Sheets on 8¹/₂- by 11-inch sheets of paper with the picture of the ant at the top of the page. They may be laminated also to make them last longer.
- Additional adult monitors will be needed to make suggestions so the students will be successful in this game.
- This game does require space to put down the floor cards.

ACTIVITY

This game is a dichotomous key that will allow elementary schoolchildren to learn to make paired choices based on a clue sheet with a picture. The picture and the name of the ant will be hidden under the last choice floor card. The children can learn the parts of an ant that are necessary for basic identification.

The game is based on a dichotomous key, *Texas Pest Ant Identification: An Illustrated Key* by Jerry L. Cook and Bastiaan M. Drees; *Identification and Distribution of Native Texas Ants* by Sean T. O'Keefe, Jerry L. Cook and S. Bradleigh Vinson; photographs by Jerry Cook, Sean O'Keefe and Bart Drees; and drawings by Sean O'Keefe and Sherry Ellison.

GAME SETUP

1. Place the floor cards on the floor in the arrangement indicated by the *Be an Ant Detective Schematic Key*.
2. Place a tape line on the floor and label it START HERE. The tape will help hold the cards onto the floor and to give an overview of possible paths.

3. From START HERE, place tape lines to lead the students either to the left for 1 Node with its resulting choices or to the right for 2 Nodes and its resulting choices.
4. Place the last card (answer) face down, so that the student will “discover” the name of the ant by flipping over the card.
5. Hang the ant poster on the wall. You could also place copies of the same poster on the floor at or nearby each of the first two choices to give a ready reference if many children are playing.

SUGGESTIONS

If the floor space is long and narrow, the START HERE card could be placed in the center of floor. All the one-node cards could go to the left, and all the two-node cards could go to the right.

Colored masking tape is very effective for putting down the cards. You could use one color of tape for the one-node path, and another color of tape for the two-node path. Black electrical tape may also be used.

GAME INSTRUCTIONS

1. Give each student or group of students one of the eight Clue Sheets.
2. Tell the students: Can you identify the ant in your hand and become a Certified Ant Detective? Follow the clues on your page, match your clues to the steps on the floor, and find your ant.
3. When the students find the answers, give them a *Certified Ant Detective Bookmark*.

WRAP-UP???????

BE AN ANT DETECTIVE: CLUE SHEET LIST

CLUE SHEET 1

Characteristics

1. 2 nodes
2. Stinger
3. Eyes usually large
4. Base of antennae covered
5. Second node joined to base or middle of gaster
6. Antennae with 12 segments
7. 3 pairs of spines on thorax

Answer: Leaf-cutter ant (*Atta*)

CLUE SHEET 2

Characteristics

1. 2 nodes
2. Stinger
3. Second node joined to base or middle of gaster
4. Antennae with 12 segments
5. Thorax without 3 sets of spines
6. Thorax with 1 pair of spines near node
7. Rows of hairs on underside of head

Answer: Harvester ant (*Pogonomyrmex*)

CLUE SHEET 3

Characteristics

1. 1 node
2. No stinger
3. Circle of hairs at end of gaster
4. Thorax uneven
5. Very long legs
6. Few stiff hairs

Answer: Crazy ant (*Paratrechina longicornis*)

CLUE SHEET 4

Characteristics

1. 2 nodes
2. Stinger
3. Eyes usually large
4. Base of antennae covered
5. Second node joined to base or middle of gaster
6. Antennae with 12 segments
7. Thorax without 3 sets of spines
8. No spines on thorax
9. Black

Answer: Little black ant (*Monomorium minimum*)

CLUE SHEET 5

Characteristics

1. 2 nodes
2. Stinger
3. Eyes usually large
4. Base of antennae covered
5. Second node joined to base or middle of gaster
6. Antennae with 10 segments
7. Red head and thorax, black abdomen

Answer: Fire ant (*Solenopsis invicta*)

CLUE SHEET 6

Characteristics

1. 2 nodes
2. Stinger
3. Eyes usually large
4. Base of antennae covered
5. Gaster joined below second node
6. Heart-shaped gaster

Answer: Acrobat ant (*Crematogaster*)

CLUE SHEET 7

Characteristics

1. 1 node, no stinger
2. Circle of hairs at end of gaster
3. Thorax evenly rounded
4. Orange head and thorax
5. Black gaster

Answer: Wood ant (*Camponotus*)

CLUE SHEET 8

Characteristics

1. 1 node
2. No stinger
3. No circle of hairs at end of gaster
4. Thorax with cone-shaped bump near node

Answer: Pyramid ant (*Dorymyrmex*)

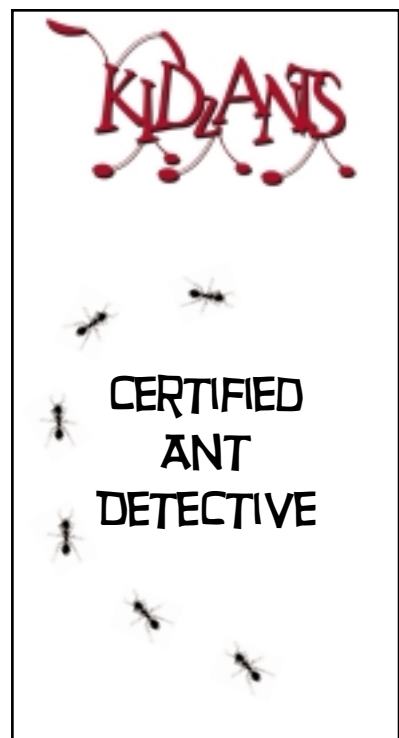
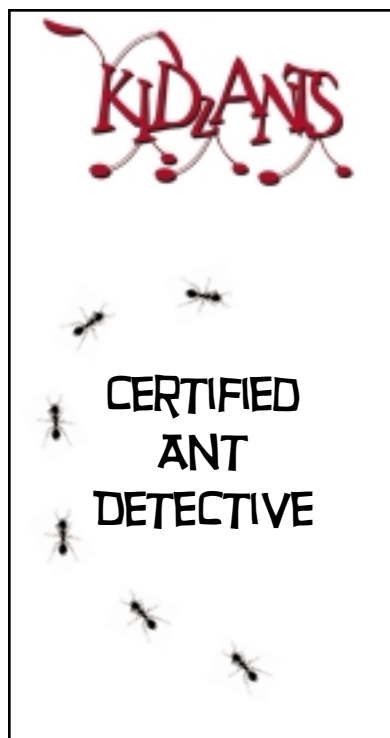
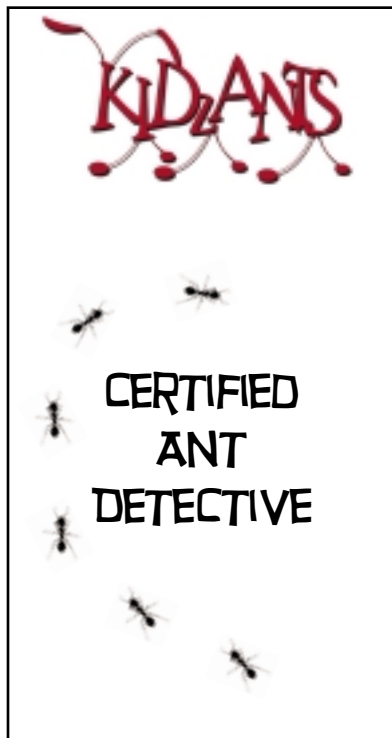
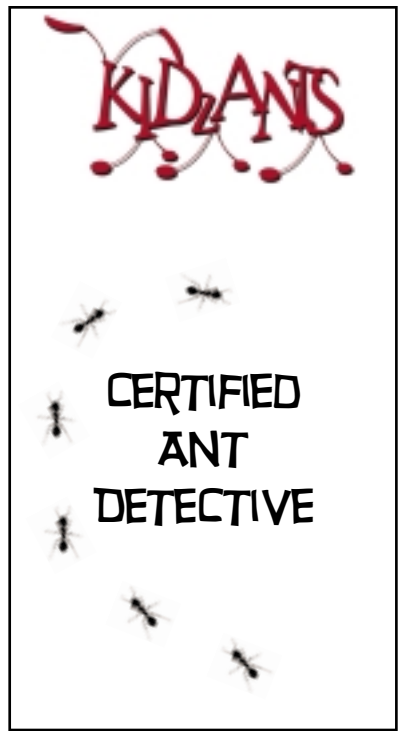
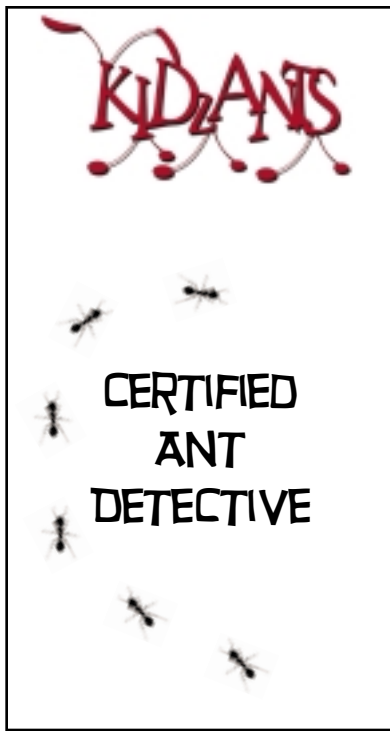
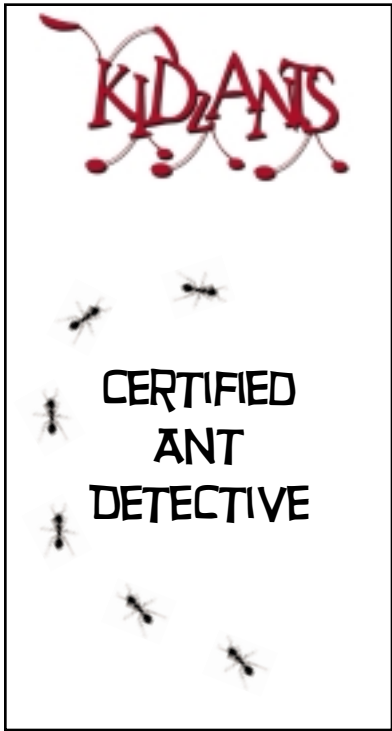
BE AN ANT DETECTIVE: SCHEMATIC KEY



Lay out the Floor Cards as shown in the diagram above.

BE AN ANT DETECTIVE:
ANT BODY PARTS

CERTIFIED ANT DETECTIVE BOOKMARK





APPENDIX

GLOSSARY

abdomen	the hind part of the body in insects
aerate	to supply with air or expose to air circulation
alates	winged, reproductive forms of some insects
amphibian	any of a class of cold-blooded animals (such as frogs and newts) with backbones that in many respects are between fishes and reptiles.
arthropod	any of a group of animals without backbones (such as insects and spiders) having a segmented body, jointed limbs and an outer shell that is shed periodically
ballast	heavy material that is placed in the hold of a ship or gondola of a balloon to make it
beneficial	producing or promoting a favorable result; advantageous
brood	the young of certain animals
coloration	an arrangement of colors
competitor	something that competes with another, as in sports or business; a rival
conical	of, relating to, or shaped like a cone
dichotomous key	a chart used to identify organisms that consists of characteristics that are arranged in twos
excavate	to remove by digging or scooping out
flourish	to grow well or luxuriantly; thrive
food chain	a series of organisms in community in which each organism uses the next, usually lower, member as a food source
food web	all the food chains in an area
fungus	any of a major group of flowerless plants (such as molds, mildews and mushrooms) that do not have chlorophyll and are parasites or live on dead or decaying organic matter
hold (noun)	the lower interior part of a ship or airplane where cargo is stored
honeydew	a sweet sticky substance excreted by various insects, especially aphids, on the leaves of plants
identity	the set of characteristics by which a thing is definitively recognizable or known
import	to bring or carry in from an outside source, especially to bring in (goods or materials) from a foreign country for trade or sale
infestation	a group of organisms in numbers large enough to be harmful, threatening or obnoxious
instar	a stage of an insect or other arthropod between molts
larva	a young, wingless, often wormlike form (such as a grub or caterpillar) that hatches from the egg of many insects



mammal	any of a class of warm-blooded vertebrates that include human beings and all other animals that feed their young with milk produced by mammary glands and have the skin usually more or less covered with hair
mate	to pair (animals) for breeding
molt	to shed periodically part or all of a coat or an outer covering, such as feathers or skin, which is then replaced by new growth
native	originating, growing or produced in a certain place or region
omnivorous	eating both animal and vegetable foods
oviposit	to lay eggs
petiole	a slender, stalk-like part, such as what connects the thorax and abdomen in certain insects
potential	the ability of something to develop or become actual
protein	a complex group of organic molecules that are the basic components of all living cells
pupa	the nonfeeding stage between the larva and adult in the metamorphosis of some insects, during which the larva typically changes completely inside a protective cocoon or hardened case
radiate	to extend like rays in straight lines from or toward a center
reptile	any of a group of cold-blooded air-breathing vertebrates (such as snakes, lizards, turtles and alligators) that usually lay eggs and have skin covered with scales or bony plates
<i>Solenopsis invicta</i>	a species of fire ant that was brought to the United States from South America
species	a category of living things that can produce fertile offspring
thorax	the second or middle region of the body of some insects
trophallaxis	the mouth-to-mouth exchange of food between adults and larvae of some insects
water table	the level below which the ground is completely soaked with water



KIDZANTS PRE/POST TEST

1. Are red imported fire ants native to the United States? _____
2. What factor can limit the spread of the red imported fire ant? _____
3. Can red imported fire ants be found in Texas? _____
4. How many body parts does an ant have? _____
5. Do ants have a brain? _____
6. Do ants eat solid food? _____
- 7: What are the four life stages of the red imported fire ant? _____
- 8: True or False: Both male and female adult reproductives are winged and mate in the air. _____
- 9: True or False: The larvae develop through four progressively larger stages called instars.
- 10: True or False: One of the identifying characteristics of a fire ant colony is the earthen nest or mound. _____
- 11: True or False: The fire ant workers leave and return to the mound through a large distinctive hole in the top of the mound. _____
- 12: True or False: The mound built by the red imported fire ant is a very permanent structure that lasts for many years. _____
- 13: True or False: Fire ants prefer to live in shady, wooded areas. _____
- 14: Red imported fire ants are at the top of the _____.
- 15: Name three foods that red imported fire ants eat. _____
- 16: There are more than how many different types, or species, of ants in Texas. _____
- 17: True or False: Most ants are very beneficial because they help aerate the soil and allow more air and water to reach the roots of plants and trees. _____
- 18: Name three types of common outdoor ants other than red imported fire ants. _____

KIDZANTS PRE/POST TEST KEY

1. Are red imported fire ants native to the United States?
A: No. They are native to South America
2. What factor can limit the spread of the red imported fire ant?
A: The climate
3. Can red imported fire ants be found in Texas?
A: Yes
4. How many body parts does an ant have?
A: Three (head, thorax, abdomen)
5. Do ants have a brain?
A: No
6. Do ants eat solid food?
A: No
7. What are the four life stages of the red imported fire ant?
A: Egg, larva, pupa and adult
8. True or False: Both male and female adult reproductives are winged and mate in the air.
A: True
9. True or False: The larvae develop through four progressively larger stages called instars.
A: True
10. True or False: One of the identifying characteristics of a fire ant colony is the earthen nest or mound.
A: True
11. True or False: The fire ant workers leave and return to the mound through a large distinctive hole in the top of the mound.
A: False. Fire ant workers leave and return to the mound in lateral tunnels just under the soil surface that radiate (extend in several directions) out from the mound.
12. True or False: The mound built by the red imported fire ant is a very permanent structure that lasts for many years.
A: False. Although ants spend a lot of time and energy setting up and maintaining their mound, the mound is not permanent. If the mound is disturbed, the ants often move and build a new one several feet to many yards away. Sometimes the ants move for no apparent reason.
13. True or False: Fire ants prefer to live in shady, wooded areas.
A: False. Fire ants prefer sunny, open areas where there is plenty of warmth for their developing young.
14. Red imported fire ants are at the top of the _____.
A: Food chain. Red imported fire ants are not a very important food source for other animals or insects, but they are a top predator in the food chain.
15. Name three foods that red imported fire ants eat.
A: Any of the following: insects, small birds, small mammals, amphibians and reptiles that they might find on the ground; oily seeds such as walnuts, peanuts, sunflower seeds, pecans; honeydew produced by sap sucking insects such as aphids, mealybugs and scale insects or other natural sources of sugar.
16. There are more than how many different types, or species, of ants in Texas.
A: 210. There are many species of ants that we never see unless we are looking for them. Some are in our lawns, others are in trees, and some are even in our houses!
17. True or False: Most ants are very beneficial because they help aerate the soil and allow more air and water to reach the roots of plants and trees.
A: True
18. Name three types of common outdoor ants other than red imported fire ants.
A: Any of the following: big-headed ants, little black ants, false honey ants, pavement ants, acrobat ants, carpenter ants, crazy ants, red harvester ants, Texas leaf cutter ants or native fire ants.



EDUCATIONAL SUPPORT MATERIALS

Unless otherwise indicated, the materials listed below are available from the Texas Fire Ant Research and Management Project office, Department of Entomology, Texas A&M University, College Station, TX 77843-2475 (Anna Kjolen, telephone: 979.845.5878; Fax: 979.845.7029; e-mail: a-kjolen@tamu.edu).

They also can be viewed and downloaded from the Web, <http://fireant.tamu.edu>.

FIRE ANT PLAN FACT SHEETS

The ABC's of Fire Ants and Their Management (FAPFS005)

Animal and Plant Health Protection Product Evaluation (FAPFS003)

Broadcasting Ant Bait Products for Individuals with Limited Mobility or in Rough Terrain (FAPFS035)

Calculating Areas for Pesticide Treatment Around the Home (FAPFS027)

Collecting and Maintaining Colonies of Red Imported Fire Ants for Study (FAPFS008)

Commercial Pest Control Operator Involvement Community-Wide Management Programs (FAPFS002)

Community-Wide Imported Fire Ant Management Kit (FAPFS015)

Considerations for Developing and Applying Individual Red Imported Fire Ant Mound Drenches (FAPFS037)

Considerations for Development of Red Imported Ant Insecticide Products (FAPFS025)

Considerations for Planning, Implementing and Evaluating a Spot-Eradication (FAPFS030)

Considerations for Selecting Imported Fire Ant Control Insecticide Products (FAPFS036)

Control of Red Imported Fire Ants in Cool Weather (FAPFS029)

Diagnosing and Treating Animals for Red Imported Fire Ant Injury (FAPFS022)

Fire Ant Control Methods for Pets (FAPFS014)

Fire Ant Management Options for Golf Courses (FAPFS017)

Fire Ants and the Texas IPM in Schools (FAPFS020)

Flooding and Fire Ants: Protecting Yourself and Your Family (FAPFS038)

Home-made Boric Acid Mint-Apple Jelly Bait for Indoor Ant Control (FAPFS024)

Imported Fire Ant Model (FAPFS033)

Know Your Fire Ant Baits from Your Contacts (FAPFS034)

Managing Fire Ants in Vegetable Gardens (FAPFS004)

Managing Red Imported Fire Ant in Electrical Equipment and Utility Housings (FAPFS011)

Managing Fire Ants in Texas Schoolyard and Butterfly Gardens (FAPFS016)

Managing Red Imported Fire Ants in Wildlife Areas (FAPFS006)

Medical Problems Associated with the Imported Fire Ant (FAPFS023)

Potential Biological Control Agents for the Red Imported Fire Ant (FAPFS009)

Red Imported Fire Ant Control Around Bodies of Water (FAPFS021)

Red Imported Fire Ant Considerations for Beekeepers (FAPFS019)

Red Imported Fire Ants: A Threat to Nursing Homes and Day Care Centers (FAPFS032)

Red Imported Fire Ants May Find Some Landscape Design Elements Unattractive (FAPFS026)

A Review of "Organic" and Other Alternative Methods for Fire Ant Control (FAPFS012)



Selecting a Strategy and Contracting a Commercial Pest Control Service for Community-Wide Management Programs (FAPFS001)
Survey-Based Management of Red Imported Fire Ants (FAPFS007)
Texas Fire Ant Identification: An Illustrated Key (FAPFS013)
Texas Imported Fire Ant Research and Management Project Covenant Not to Sue and Agreement to Hold Harmless (FAPFS018)
Texas Pest Ant Identification (FAPFS010)

FACT SHEETS IN SPANISH (FAPTFS)

Hormiga Brava (#001)
Cómo Controlar las Hormigas Bravas en el Huerto (#004)

OTHER DOCUMENTS

Directory of Fire Ant Project Personnel
Fire Ant Trails newsletter
Overview of Fire Ant Projects Overview of Research and Management Plan
Overview of Starting a Community-Wide Management Program
Overview of Past Research and Education Successes
Result Demonstration Signs
Texas Imported Fire Ant Research and Management Plan

CD

Images of the The Red Imported Fire Ant: Biology, Impact and Management (110 images, \$200)

EXTENSION PUBLICATIONS

Broadcast Baits for Fire Ant Control (B-6099)
Carpenter Ants (L-1783)
House-Infesting Ants and Their Management (L-2061)
Managing Imported Fire Ants in Urban Areas (B-6043)
Managing Red Imported Fire Ants in Agriculture (B-6076)
Red Harvester Ants (L-5314)
The Texas Two-Step Method: Do-It-Yourself Fire Ant Control for Homes and Neighborhoods (L-5070)



Produced by Agricultural Communications, The Texas A&M University System
Extension publications can be found on the Web at: <http://tcebookstore.org>

Visit Texas Cooperative Extension at: <http://texasextension.tamu.edu>

Educational programs of Texas Cooperative Extension are open to all people without regard to race, color, sex, disability, religion, age or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Chester P. Fehlis, Director, Texas Cooperative Extension, The Texas A&M University System.

500 copies, New