

# Center for Puppetry Arts Study Guide

## The Adventures of MIGHTY BUG

by Jon Ludwig

January 6 - March 13, 2005



CENTER FOR PUPPETRY Arts

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## A Note from the Education Department

Dear Educator,

Welcome to the Center for Puppetry Arts and our production of *The Adventures of Mighty Bug*, written and directed by Jon Ludwig. Founded in 1978, the Center is a cherished cultural and educational resource in Atlanta. We value your patronage and are delighted that you have chosen us as a teaching resource. Your students are in for a big treat!

This study guide was designed to enhance student learning before and after your visit to the Center for Puppetry Arts. *The Adventures of Mighty Bug* is a bug's eye view of insect life brought to life through the magic of shadow puppetry. This spectacular show is the perfect accompaniment to a thematic unit on insects, animal biology, superheroes or storytelling in general.

All three areas of programming at the Center for Puppetry Arts (performance, puppet-making workshops and Museum) meet Georgia Quality Core Curriculum Standards (GA QCCS). To access the GA QCCS that have been correlated to each programming area according to grade level, click the links below:

- [The Adventures of Mighty Bug, P-K & K](#)
- [The Adventures of Mighty Bug, Grade 1](#)
- [The Adventures of Mighty Bug, Grade 2](#)
- [The Adventures of Mighty Bug, Grade 3](#)
- [The Adventures of Mighty Bug, Grade 4](#)
- [The Adventures of Mighty Bug, Grade 5](#)
- [The Adventures of Mighty Bug, Grade 6](#)

To access a complete list of GA QCC Standards for all grades and subjects, please visit [www.glc.k12.ga.us](http://www.glc.k12.ga.us).

Thank you for choosing the Center for Puppetry Arts for your study trip. We hope that your students' experience here will live on in their memories for many years to come.

Sincerely,

Alan Louis  
Director of Museum and Education Programs

## Selected Bibliography

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## Recommended Web Sites

**<http://cvs.anu.edu.au/andy/beye/beyehome.html>**

See the world through the eyes of a honeybee and experience compound eyes at work.

**<http://antcam.com>**

Check out the Antcam: two live cameras show you busy ants in action. Includes instructions on how to build your own ant farm.

**<http://www.ento.vt.edu/~sharov/3d/3dinsect.html>**

Amazing 3D virtual insects up close from the Department of Entomology, Virginia Tech.

**<http://www.ent.iastate.edu/>**

Begin your bug research here. A directory and search engine of insect-related resources from Iowa State University of Science and Technology.

**<http://www.manataka.org/page160.html>**

Edible insects? Visit this site to learn how and why people use bugs as a food source.

**<http://www.ent.iastate.edu/misc/insectsasfood.html>**

Insects are a source of food for people all over the world. Visit Iowa State University's Tasty Insect Recipes web site.

**<http://www.insects.org>**

Up with bugs! #1 site for bug bios and insect appreciation.

**<http://www.paperfolding.com>**

Learn how to make origami insects.

**<http://www.si.edu/resource/faq/nmnh/buginfo/start.htm>**

Check out Bug-info, a wealth of information from the Smithsonian Museum of Natural History's Department of Entomology.

# Vocabulary

**abdomen** – the stomach area of an insect.

**antennae** – the plural of antenna. A pair of feelers on an insect's head that the insect uses to touch, smell and taste with.

**arachnids** – arthropods that have eight legs and bodies divided into two parts. Unlike insects they have no wings, no antennae and small, simple eyes. Scorpions, mites, ticks and spiders are arachnids.

**arthropods** – a class of invertebrate animals that have exoskeletons and jointed legs.

**compound eyes** – insect eyes are called "compound" because they are made up of hundreds of tiny eyes that enable an insect to detect movement around it in almost every direction at once.

**entomophagy** – the eating of insects by humans.

**entomology** – the study of insects.

**exoskeleton** – the hard, protective external covering of an insect, arachnid or crustacean. The exoskeleton must be shed several times so that the animal can grow to adult size.

**insects** – arthropods that have six legs, bodies divided into three parts, compound eyes, antennae and typically one or two pairs of wings. Bees, moths, ants, grasshoppers, beetles and cockroaches are insects.

**parasites** – insects that feed off other animals or birds. Parasites live directly on the body of a "host" animal or very close to the host animal's home or nest.

**saliva** – a digestive liquid secreted into the mouth that lubricates and breaks down food.

**thorax** – the chest of an insect.

# Synopsis

Welcome to the insect community of Bugville, a jumpin' little place that swings to the Bugville Boogie and the sweet sounds of WBUG Radio star Morpha Butterfly. Watching over the ants, fleas, crickets, water spiders, beetles and bees is the one and only Mighty Bug, a superhero with super strength, smell, hearing and flying ability. His watchful compound eyes detect friends in danger who rely on Mighty Bug to fly to their rescue. But Mighty Bug isn't the only arthropod with an eye on Bugville. The evil arachnid Scorpiana, fresh from a prison stay in a nearby entomologist's lab, has assembled a group of insect-eating animals to attack Bugville while she captures Mighty Bug and the lovely Morpha. Scorpiana, however, is no match for our insect heroes – the most successful animal species on earth, after all. With the help of Professor Rhinoceros Beetle, the insects of Bugville join forces to save the town from Scorpiana's wrath and peace and tranquility are restored. This show was written and conceived by the Center's Associate Artistic Director and longtime innovator of shadow puppetry techniques, Jon Ludwig.

# Style of Puppetry

*The Adventures of Mighty Bug* is performed with a variety of shadow puppets built by a team of artists in the Center's puppet-building workshop. In countries like China or Indonesia, where shadow puppet traditions have existed for centuries, puppeteers hold flat figures made of animal skin directly against a shadow screen. The puppets are illuminated from behind by a torch or electric light. In our show, the flat shadow figures are cut out of Plexiglas and never actually touch the screen. They are performed in an "alley" between the shadow screen and several bright lights that sometimes follow the puppets around. This way, the silhouette image that the audience sees can be much larger than the actual puppet itself. Some of the bug puppets used in our show are flat and some are three-dimensional. Some are manipulated by control rods (rod puppets), while others are controlled by strings (marionettes). Sometimes you see masked actors on stage, and sometimes just their shadows, but wherever the puppeteers take us, the effect is amazing!

# Learning Activities

## P-K & K: Build a Bug that's Mighty Tasty!

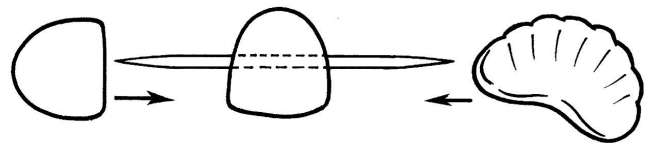
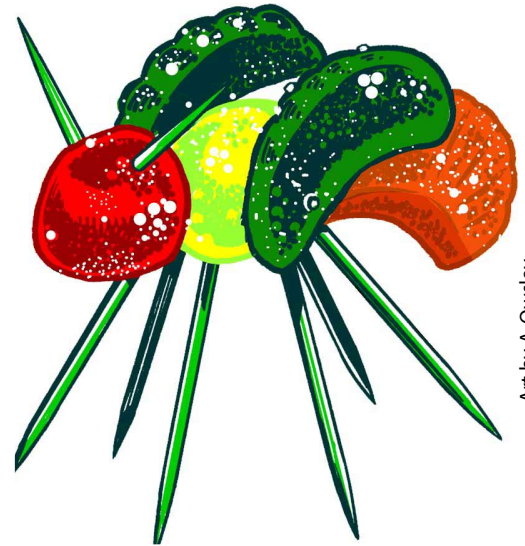
**GA QCC Standards covered:** Kindergarten: Science (Life Science):12; Language Arts, (Oral Communication):1,9.

**Objective:** Students will construct a model of an insect and identify the characteristics of an insect: three main body parts (head, thorax and abdomen), six legs, antennae and typically, wings.

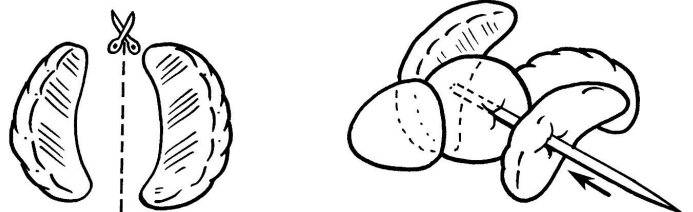
- Materials:**
- 2 large gumdrops
  - 2 large jelly fruit slices
  - 9 toothpicks
  - 1 plastic knife

### Procedure:

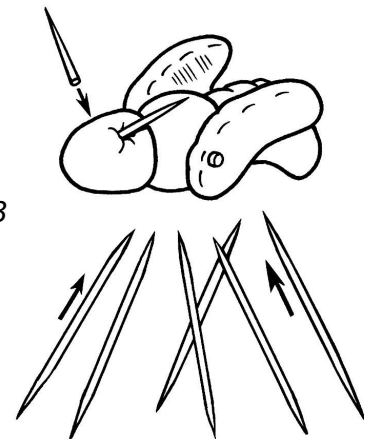
1. Push a toothpick through a gumdrop until the gumdrop is in the center of the toothpick. This is the middle section, or **thorax**. Turn a gumdrop on its side and attach at one end for the **head** and a fruit slice (curving downward as shown) at the opposite end for the **abdomen**.
2. To add **wings**, cut a fruit slice in half lengthwise. Attach one **wing** to each side with a single toothpick through the center of the **thorax**. Break off the sharp ends of the toothpick if desired.
3. Add 6 toothpick legs to the **thorax**. Arrange them so your bug stands by itself. Break another toothpick in half. Add halves to **head** to form **antennae** as shown.
4. Now draw your bug in its natural environment. Color your bug and label (or name) the body parts. Give your bug a name. What are the super powers that your bug has? How is it different from other animals?



Procedure 1



Procedure 2



Procedure 3

**Assessment:** Observe students for comprehension. Collect drawings for student work portfolios.

# Learning Activities

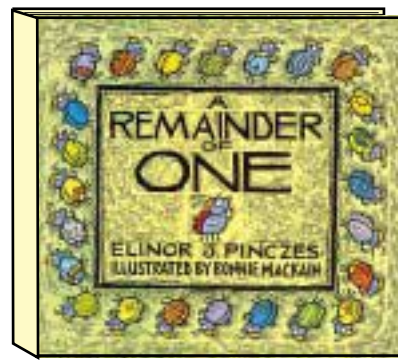
## **1st & 2nd Grade: Bugs, Math and Fun with *A Remainder of One***

**GA QCC Standards covered:** Grade 1: Language Arts, Oral Communication, (Listening/Speaking): 2, 3, 4, 5, 6; (Literature): 39, 40; Mathematics, Number Sense and Numeration; Fractions & Decimals (Number Sentences): 25, (Sets): 30. Grade 2: Mathematics, Patterns & Relationships; Algebra (Sets): 25; (Numerical Relationships): 26; Whole Number Computation; Estimation; Whole Number Operations (Multiplication Readiness): 40; (Addition and Subtraction): 43, 43; Language Arts, Oral Communication (Listening/Speaking): 2, 22; (Literature): 46, 47.

**Objective:** Students will group and regroup 25 math manipulatives to represent division with and without a remainder.

**Materials:**

- Book: *A Remainder of One* by Elinor J. Pinczes
- 25 math manipulatives (buttons, beads, candy, etc.)
- A clean sheet of paper



### **Procedure:**

1. Read *A Remainder of One* by Elinor J. Pinczes. (Summary: When the queen of the bugs demands that her army march in even lines, Private Joe divides the marchers into more and more lines so that he will not be left out of the parade.)
2. Discuss the story with your class. What is Joe's problem? How does he solve it?
3. Distribute math manipulatives spread out on a clean sheet of paper. Have students check to make sure they have a total of 25.
4. Recalling the story, have students model the bug's first configuration – two rows of twelve with a remainder of one. Then have students model three rows of eight, four rows of six, and finally, five rows of five with no remainder.

**Assessment:** Monitor students to make sure that they are meeting lesson objective.

# Learning Activities

## **3rd & 4th Grade: Insect Survival – Camouflage Activity**

(from Texas A & M University: <http://iitc.tamu.edu/1998and2000/lessons/lesson13.html>)

**GA QCC Standards covered:** Grade 3: Mathematics, Statistics and Probability (Graphs): 39; Science, Inquiry (Inquiry): 1; (Activities/Tools): 4. Grade 4: Science, Inquiry (Reference Skills): 2.

**Objective:** Students will participate in a hands-on science activity to draw conclusions regarding the advantages of camouflage in nature.

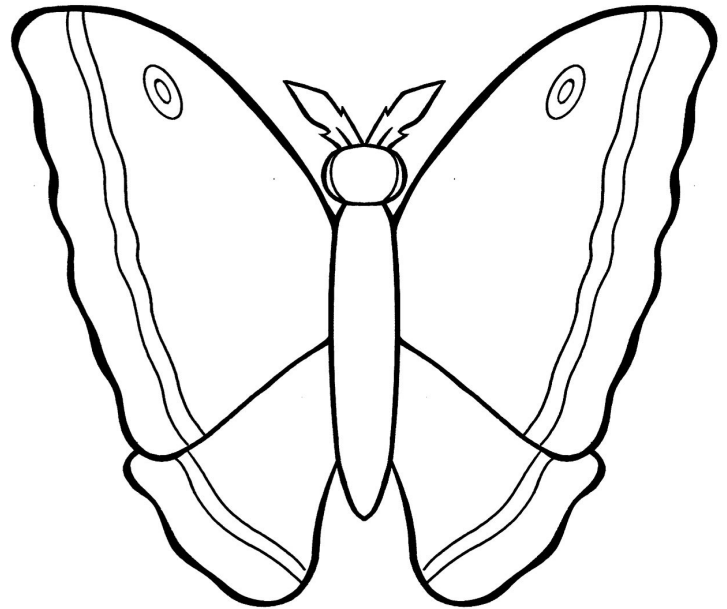
**Materials:**

- Scissors
- Newspaper (no colored ads)
- Black construction paper
- Moth templates
- Pencils

### **Procedure:**

1. Make a class set of templates from card stock or file folder by tracing and cutting the moth template shown here.
2. Group students in pairs. One student should trace and cut 20 moths from newspaper while the other student traces and cuts 20 moths from black construction paper. While students are occupied with this task, teacher should spread several sheets of newspaper out in a long line. Next, place a long line of black construction paper parallel to the newsprint.
3. When students have completed the cutouts, have students line up along the newsprint. While one member of the pair turns away, the other should spread all 40 moths on the newsprint, making sure they are interspersed.
4. The teacher then has the partner turn and, when it is time to begin, the student will bend down and pick up ONE moth and stand up; repeat for 20 seconds, making sure to stand completely after each moth. When time is up, partner #2 records the total number of black and newsprint moths collected. Then the group moves to the black paper and repeats, switching jobs.
5. Once the activity is completed, the teacher should compile the data for the entire class and ask questions regarding the results, leading the students to observe any patterns or associations.
6. Finally, students should graph the results of the activity.

Moth Template



**Assessment:** Teacher should monitor students during activity for comprehension. Check graphs for accuracy.

# Learning Activities

## **5th and 6th Grade: Create an Insect Travel Brochure**

(from Texas A & M University: <http://iitc.tamu.edu/1998and2000/lessons/lesson18.html>)

**GA QCC Standards covered:** Grade 5: Language Arts, Written Communication (Writing): 42, 45, 49, 50. Science, Life Science (The Living World: Animals): 17, 18; Science, Inquiry (Reference Skills): 2. Grade 6: Language Arts, Writing (Writing): 70, 71, 72, 73, 74, 75; Science, Physical Science (Reference Skills): 4.

**Objective:** Students will become familiar with concepts of: autotrophs, heterotroph, producer, consumer, herbivore, carnivore and omnivore. Students will be able to explain what a trophic level is and how different organisms fit into different trophic levels. (This lesson assumes that students have been introduced to trophic levels and food webs.)

**Materials:**

- Construction paper
- Glue
- Markers
- Poster board
- Other various art supplies
- Computer with Internet access
- Travel guides and brochures
- Library time for studying insect reference material

### **Procedure:**

1. Begin by asking students about their favorite vacation. Where did they go? What did they like best? How did students learn about these vacation spots? The teacher will then distribute various travel guides to show how different places advertise for people to come and visit.
2. Ask students to create a travel brochure/ad campaign that will try to entice a particular insect to come for a visit. Students should select any insect they choose, and in selecting a particular insect, identify where it fits into the trophic level. The students will need to utilize library as well as Internet resources in order to learn as much as they can about their particular insect. Students must then think of creating their own imaginary land that would be best suited to the insect. Are the students looking to please an herbivore, carnivore, or omnivore? What places should there be for the insect to dine? What types of housing arrangements are available? How will this insect's basic needs for food, water, shelter, and air be met? The brochure should answer all of these questions. The brochure or ad campaign should include a picture of the insect, as well as drawings of the locale.
3. When finished, have students exchange travel brochures with each other. Ask them to evaluate each other's work. Do the brochures entice the insect to the destination?

**Assessment:** Check students' work to see if brochures are appropriate to the type of insect chosen.