AMAZING ARTHROPODS
THIRD-FIFTH

Life Science TEKS	
Third Grade:	3.9A, 3.9B, 3.10A, 3.10B
Fourth Grade:	4.9A, 4.9B, 4.10A, 4.10B, 4.10C
Fifth Grade:	5.9A, 5.9B, 5.9C, 5.9D, 5.10A, 5.10B,

Life Science Vocabulary

adaptation, arthropod, centipede, crustacean, ecosystem, exoskeleton, food web, inherited, jointed body, limbs, millipede, niche, organism, predators, segmented, symmetry

Pre-Show Activity

Pre-Show Lesson: Identifying Arthropods

Materials:

Per group: various pictures of arthropods (insects, millipedes, centipedes, crustaceans), field guides

Per student: science notebook, pencil, colored pencils, magnifying glasses

Procedure:

1. Ask students, “What group of organisms do you live with almost every day, even in the very cold winter months? They are everywhere and are the largest animal phylum -- about 85% of all known animals in the world are part of this class?” (Arthropods)

2. Tell students, “An arthropod is an animal that has certain inherited traits. These traits are what define it as an arthropod.” Give students various pictures of arthropods and see if they can figure out what traits they all have in common. Pictures should include: insects, millipedes, centipedes, and crustaceans.

Inherited Traits of Arthropods:

Bilateral symmetry (left to right)
Segmented body parts

Hard exoskeleton
Jointed body
Many pairs of limbs

3. Students will probably not get all of the traits. Go over these with them and create a chart to hang in your classroom.

4. Tell students you are going to go look for arthropods on the playground. Review the rules for field work:

Rules on the Research Field:

1. Stay with your group at all times.
2. Do not touch any insects with your bare hands. Some insects bite or sting.
3. Do not intentionally harm any living organism; plant or animal.
4. Leave the area cleaner than when you came. Be sure to take all of your belongings with you when you leave an area. You can even pick up a little trash along the way to give nature a hand!
5. Always walk when in transition.

Students will need their science notebooks, pencils, colored pencils, and magnifying glasses. Walk onto the schoolyard where grass, weeds, trees, or other plants are growing. Allow students to search the landscape for insects, spiders, and other arthropods. Each student should find 3 or 4 arthropods that interest them and make initial observations and drawings of the creatures in a notebook. Drawings should include all body parts with labels. (Note that they can draw and label back inside classroom, will save time especially on hot day)

Questions the students should keep in mind while making observations:

A. What body parts does the organism have? How many of each does it have?
B. How does the organism use the different parts of its body?
C. How does the organism move?
D. What does it eat?
E. What is unusual about the way that this creature looks?
F. What structures or behaviors (adaptations does this creature use to find and eat food or to escape predators?
F. Does it make any noise? What does it sound like?
G. How does the organism react when insects or other animals approach it?
H. What niche does this animal play in its ecosystem?

2. Using their observations and drawings, students will research using the Internet, field guides, and other resources to identify their creature and learn more about its behavior, structures, and ecological role. Students will then decide on 1 creature for which they will be

responsible. Try to make sure that each student has a different creature so that the classroom field guide will cover as many types as possible when it is completed.

3. Each student will create a page for the classroom field guide. This page should include a drawing that shows detailed body parts with labels. It should also have a paragraph describing the structures, their functions and the behaviors of this insect that help it to survive.

4. Collect the pages and bind them together or put them in a 3-ring binder to create a classroom field guide.

Post-Show Enrichment Activities

Activity One: Arthropod Acrostic

Students will write an acrostic poem using the word “arthropod” in order to show what they learned from watching the museum presentation. See example below.

A n animal group
R elies on land; insects, millipedes and centipedes
T heir body has bilateral symmetry
H ard exoskeleton
R elies on the ocean; crustaceans
O wns a jointed body
P airs of limbs
O ne head
D oes live on land or in the ocean

Activity Two: Arthropod Adaptations

1. Students will choose an arthropod that they learned about in the presentation. They will research this organism and create the chart below in their science notebook. Students will name a body part or behavior that the chosen arthropod has to help it meet each need. They will also give an explanation of how the body part or behavior that they listed helps them.
(See Appendix A-1)

Students can also create a food web for their chosen arthropod. You may want to give them an example of a food web so they know what one looks like or direct them to the pages in their science textbook which explain a food web.

Activity Three: What if People had Exoskeletons?

Students discuss in groups, “How is an insect’s exoskeleton similar to our skeleton? How is it different?” (Exoskeletons and Endoskeletons both protect the animal. Both are a place for the animal's muscles to attach. This lets the animal move its body. Both types of skeletons are useful for supporting the body and holding it off the ground. An exoskeleton cannot grow, and must be shed each time the animal gets larger. An endoskeleton can grow, and animals with internal skeletons do not have to shed anything.) Go over answers as a class.

Students will read the article in Appendix A-2 and create a Venn diagram comparing the soldier wearing an exoskeleton to an actual arthropod with an exoskeleton.

Appendix

A-1

Adaptations to Help Animals Compete for Needs		
Arthropod:		
	Characteristic (body part) and explanation of how it helps:	Behavior and explanation of how it helps:
Environment (shelter from predators, live in the climate)		
Water		
Food		
Oxygen		

A-2

What if People had Exoskeletons?

Human beings are like reptiles, amphibians, birds, and fish in the fact that we all have internal skeletons. Muscles connect to the skeleton to provide motion, and we have soft skin on the outside. However, a huge percentage of the life on this planet does it the other way around. They put their skeletons on the outside, in the form of **exoskeletons**. Insects are the most common example, and then there are crustaceans like lobsters.

Why might humans want to have exoskeletons? Anyone who has ever tried to crack open a crab leg knows that exoskeletons are strong. An exoskeleton would certainly cut down on cuts and bruises, and it would also eliminate the need for all those pads that professional football players have to wear!

So why don't people have exoskeletons? Probably the biggest reason we don't have exoskeletons is that, physiologically speaking, it's highly impractical and could actually be pretty dangerous. Many creatures that have exoskeletons experience a process known as molting -- they lose their entire outside shell. Unfortunately, the new exoskeleton isn't completely intact or finished when they shed their previous one. The time it takes the new encasement to harden is directly related to the size of the creature. The larger the animal, the longer it takes. During this time it's extremely vulnerable, exposed to the elements, predators and even disease.

Although having real exoskeletons wouldn't be prudent for humans, some folks believe there are reasons for fashioning a wearable variety. Humans aren't the swiftest creatures on Earth, and most of us are limited in the amount of weight that we can pick up and carry. These weaknesses can be fatal on the battlefield, and that's why the U.S. Army is investing $50 million to develop an exoskeleton suit for ground troops. This wearable robotic system could give soldiers the ability to run faster, carry heavier weapons and leap over large obstacles. These exoskeletal machines could be equipped with sensors and global positioning system (GPS) receivers. Soldiers could use this technology to obtain information about the terrain they're crossing and how to navigate their way to specific locations. The army is also developing computerized fabrics that could be used with the exoskeletons to monitor heart and breathing rates.

Basically, these wearable machines would give humans enhanced abilities. Imagine a battalion of super soldiers who can lift hundreds of pounds as easily as lifting 10 pounds and who can run twice their normal speed. The potential of non-military applications is also phenomenal.

If the U.S. military has its way, it will have throngs of super soldiers who can jump higher, run faster and lift enormous weight by strapping on these exoskeletons. However, developing these devices is expected to take years, if not decades.

Brain, Marshall. "What if people had exoskeletons?" 02 December 2006. HowStuffWorks.com. <http://science.howstuffworks.com/environmental/life/human-biology/what-if-exoskeleton.htm> 17 June 2012.