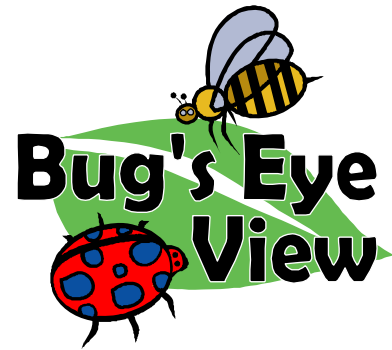




ACTIVITIES & RESOURCES

Bug's Eye View



PK KIT: Materials

Art Cards & Scripts: (In the Binder)

- Elements of Art- Bugs & Patterns art cards & scripts (7)
- Ch'i Pai Shih art cards & the accompanying scripts (4)
- Aboriginal art cards & the accompanying scripts (5)

Books:

- The Ugly Caterpillar*
- Diary of a Spider*
- Hi, Fly Guy* book
- The Paintings of Ch'i Pai Shih*
- I Wish I Were a Butterfly*
- Quick as a Cricket*

Activity Masters: (In the Binder)

- A Butterfly's Life
- Butterfly outline
- Drawing of a fly
- Grasshopper coloring
- Clothespin grasshopper instructions
- Fingerprint bumblebee instructions

Manipulatives:

- Magnetic bug patterns (3)
- Craft sticks
- Diary of a Spider finger puppets (3 ladybugs, 2 orange butterflies, 3 purple butterflies, 2 grasshoppers, 1 fly, 2 bees)
- Cricket puppet
- Bee Puppet
- Counting Bugs dominoes

Photos and Posters:

- Poster of a caterpillar
- Poster of a fly
- Poster of a spider
- Poster of a grasshopper
- Honeybee picture

CDs/ Videos

- The Ugly Caterpillar- CD
- Bugz- video

Other:

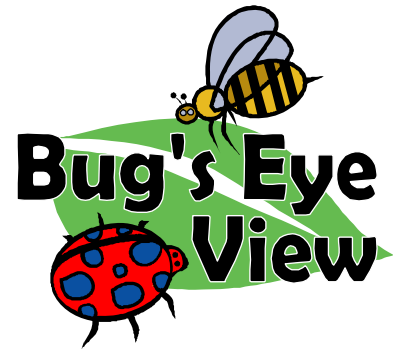
- Loy Allen butterfly sculpture & script



PK KIT: Lesson #1 ***Patterns: Butterflies and Caterpillars***

Materials Provided:

- Elements of Art- Bugs & Patterns art cards & scripts (7)
- Magnetic bug patterns (3)
- Poster of a caterpillar
- Loy Allen butterfly sculpture & script
- The Ugly Caterpillar* book
- The Ugly Caterpillar CD
- A Butterfly's Life copy master
- Butterfly outline copy master
- Craft sticks



Materials you supply: (depending on which activities you choose to do)

- Toilet paper tubes
- Scissors
- Markers or crayons
- Glue
- Black construction paper
- Cardboard
- Potatoes

Core Learning Concepts:

1. Pattern is when lines, shapes and/or colors repeat in a specific way.
2. There are many patterns in nature, such as the markings on butterflies and caterpillars.
3. Caterpillars change into butterflies through a process called metamorphosis.

Activity #1: Elements of Art – Bugs & Patterns

Share Elements of Art Bugs & Patterns with the children, using the 7 photo art cards with the scripts.

Activity #2: Loy Allen Sculpture

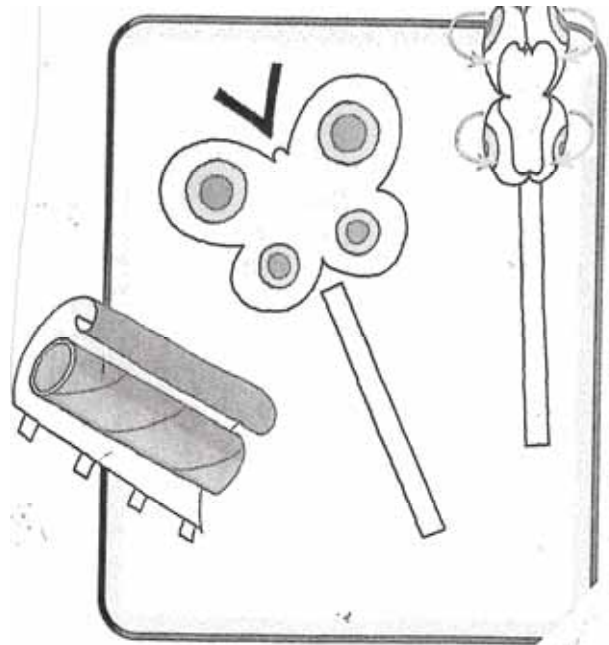
Take out Loy Allen's sculpture of a butterfly, share the accompanying script about Loy Allen, and discuss the butterfly sculpture.

Activity #3: The Ugly Caterpillar

Either read the book, *The Ugly Caterpillar*, a story that teaches respect for others, or play the accompanying CD for the children.

Activity #4: Complete Metamorphosis-

Ask how butterflies and caterpillars are related. Explain that they go through metamorphosis. Tell the children that a butterfly starts life as a tiny egg, hatches into an always-hungry larva (caterpillar), becomes a pupa in a chrysalis (case) and metamorphoses (changes form) into an adult butterfly. Display the color photo of the caterpillar, which is included with the kit. The children might be interested to know that metamorphosis is very different from growth. Explain that when animals such as butterflies, moths and frogs undergo metamorphosis, they change from one life form to another. For example, a caterpillar looks much different from the butterfly it will become. On the other hand, when animals grow, they keep the same form throughout life. (A foal is different only in size from an adult horse.)

**Optional activity:**

Pass out copies of the worksheet, A Butterfly's Life that is included in the lesson binder. Have the children trace over the letters in the words and then color in the pictures.

Activity # 5: Teach the caterpillar finger play:

<i>Words</i>	<i>Actions</i>
Ten little eggs	Hold hands up, fingers straight
All in a mound	Join hands together in a ball
Out come caterpillars, Crawling all around	Extend & wiggle fingers
Next they will sleep and We know why.	Lay head to one side on hands
Soon they'll come out as Butterflies	Hold hands up, fingers straight. Wave fingers.

Art Project #1: Metamorphosis

You will need toilet paper tubes, scissors, markers, paint or crayons, glue, copies of the butterfly outline made on heavy paper, black construction paper, wooden craft sticks or strips of cardboard....optional green construction paper or paint.

1. Either color the outside of the cardboard tube green or wrap it with green construction paper & tape. This is the caterpillar's chrysalis.
2. Cut out the butterfly (printed on heavy paper). The butterfly maybe colored on both sides, if you like. Cut out a V-shaped piece of black construction paper to make antennae and glue to the butterfly's head.
3. Cut out a strip of cardboard or use a wooden craft stick. Glue the butterfly to one end and let it dry.
4. Curl the butterfly's wings inward. Slide the curled butterfly inside of the chrysalis. Pull down on the cardboard strip or stick to see the butterfly emerge from the chrysalis.

Art Project #2- Potato print

Make a butterfly stamp out of a potato. Dip in paint and make prints on paper.

Extra Resources:

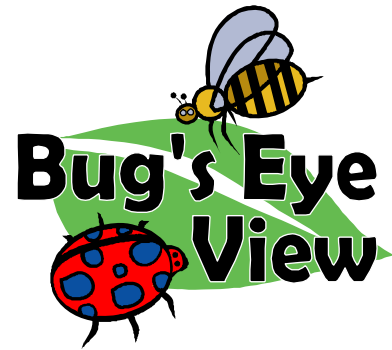
- Counting Bugs Dominoes
- Bugz. (a 35 min video that can be viewed in snippets.)



PK KIT: Lesson #2 Spiders and Flies

Materials Provided:

- Diary of a Spider* book
- Diary of a Spider* finger puppets (3 ladybugs, 2 orange butterflies, 3 purple butterflies, 2 grasshoppers, 1 fly, 2 bees)
- Hi, Fly Guy* book
- Drawing of a fly
- Poster of a fly
- Poster of a spider



Materials you supply: (depending on the activities chosen)

- Water color or tempera paint, or an inkpad
- White copy paper
- Drawing utensils
- Clay
- Toothpicks
- Egg cartons
- Pipe cleaners

Learning Core Concept:

1. Insects are invertebrates.
2. Invertebrates do not have backbones.
3. Spiders are not insects; they are arachnids.
4. Arachnids have 2 body parts instead of 3 body parts.
5. Flies are insects; they have 3 body parts.
6. It is important for flies to groom or clean themselves.

Activity#1: Diary of a Spider

Read the book, *Diary of a Spider*, a story about a spider who goes to school just like children and has a best friend that is a fly. After reading it once, have the children use the finger puppets to act it out while reading the book a second time.

Explain that many people believe that a spider is an insect like the fly. It is not. A spider is an arachnid. Both the fly and the spider do not have backbones; they are invertebrates. They have hard coverings on their bodies that protect the soft parts inside.

They have many differences though. A spider's body has only 2 sections, but a fly has 3. Although a spider has 8 legs, a fly only has 6. A spider does not have wings but a fly does. At the end of the spider's abdomen are spinnerets that spin silk threads. A fly has no spinnerets.

When a spider gets ready to eat, it pierces its prey with its fangs and injects it with venom to stun the prey. After the juices have softened the insides of the prey, the spider sucks out the soft insides. Meanwhile a fly vomits on its food, waits for it to liquefy and then he sucks it up. Even though the spider is an arachnid and the fly is an insect, they both end up sucking their food up.

Show the poster of the spider and the poster of the fly.

Art project#1:- Thumbprint Spiders & Flies

You will need watercolors, tempera paints or an inkpad, paper and drawing utensils. Make "thumbprint" spiders and flies. Have the children put their thumbs in watercolors, tempera paints or on an inkpad and place their thumbprint on paper. That would be the main body of the spider, and then they could print a smaller finger for its head. Then have them draw on eight legs. For the fly, the children could use their thumb, pointer & pinky fingers to make the 3 body parts and then draw on 6 legs.

Art project #2:- Clay Spiders & Flies

Make spiders and flies out of clay and toothpicks. Give each child a hunk of clay and some flat toothpicks. Make sure the spider has 2 body parts and 8 legs, and the fly has 3 body parts and 6 legs.

Activity#2: Flies

Read the book, *Hi, Fly Guy*, which is a story about a boy who wants to enter a pet contest but he has no pet. He goes searching for one and finds a fly.

Ask the children if they have ever seen a fly groom or clean its body. Lead the children into discovering why it is important for flies to groom or clean themselves. The eyes of the fly do not have eyelids to keep them clean so you might see a fly rubbing its eyes with its feet. The fly is not tired; it is cleaning its eyes. (How do your eyes stay clean?) A fly is always cleaning itself so that its hair and eyes can do their job. Display the photo of a fly and point out the large eyes.

Flies taste, smell and feel with the hairs that cover their bodies. Display the illustration of the fly and point out the hairs. (Compare this to how a child tastes smells and feels.) The fly uses the hairs on its mouthparts and feet for tasting. Flies taste what they walk on. If they walk into something tasty, they put down their mouth and taste it again. (How many of you have seen flies

walking on food before? What are they doing? What do you think they 'tasted' before landing on your food?)

Flies also use other hairs to tell them when they touch something. These hairs bend when touched.

Art project#3: Fly Mask

Make a fly mask using egg carton cups. You will need egg cartons, scissors, pipe cleaners, construction paper, glue and sequins.

1. Cut out 2 attached cups from a cardboard egg carton for each child. Cut a hole in the bottom of each cup for eyeholes.
2. Punch holes on the side of each egg carton cup and attach pipe cleaners. Form the pipe cleaners to go around the ears.
3. Cover the outside of each cup with glue and sprinkle with sequins. Let the glue dry.
4. Once they are dry, have the children put on their masks and pretend to clean their eyes as a fly does.

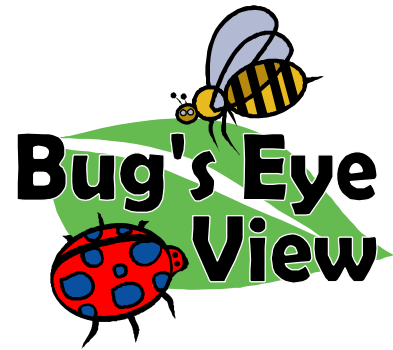
You can also glue the cups onto a strip of construction paper and wear it like a headband. If you do it this way, do not cut out the eyeholes. You could use the pipe cleaners for antennae.

Extra Resources:

- Counting Bugs Dominoes
- Bugz, a 35-minute video which can be viewed in snippets.



PK KIT: Lesson #3
Ch'i Pai Shih- Crickets & Grasshoppers-



Materials Provided:

- 4 Ch'i Pai Shih art cards & the accompanying scripts
- Ch'i Pai Shih Paintings* - book
- I Wish I Were a Butterfly*- book
- Quick as a Cricket*- book
- Grasshopper poster
- Cricket puppet
- Grasshopper coloring copy master
- Clothespin grasshopper instructions

Materials you supply:

- Clothespins
- Brown or green paint
- Wiggly eyes
- Pipe cleaners
- Glue
- Corsage pins
- Coloring utensils

Core Learning Concepts:

1. Nature is an important part of Oriental art.
2. Ch'i Pai Shih was a Chinese artist who painted insects from real life instead of from a model.
3. Crickets and grasshoppers are both invertebrates; they have no backbone.
4. Crickets and grasshoppers are insects who go through a process called simple metamorphosis as they grow.

Activity #1- Ch'i Pai Shih

Share the art of Ch'i Pai Shih (His name is pronounced like She Bye Shou[ld].) There are 4 cards of his art, along with the scripts that go with them. Have available the book, *Ch'i Pai Shih's Paintings*, in case there is any further interest in his paintings or you want more examples.

Activity #2: Story time

Read *I Wish I Were a Butterfly*, a story about a cricket who thinks he is ugly. Alternatively, you may choose to read *Quick as a Cricket*, a book that is full of self-awareness and similes (loud as a lion, etc)

Or you may choose to read both of the books.

Activity #3: Crickets and Grasshoppers

Display the cricket puppet and the grasshopper poster. Ask the children what is similar and what is different between the 2 insects. Explain that both of them are invertebrates, which means that they do not have a backbone. (Have the children try to feel their backbone.) Explain that the insects have 3 main body parts- a head, thorax and abdomen. On its head, an insect usually has 2 sets of jaws, 2 kinds of eyes, and one pair of antenna. An insect's thorax has 3 segments and each segment has a pair of jointed legs, so an insect has 6 legs. Most insects have one pair of wings attached to the middle segment and another pair of wings attached to the back.

The life of a cricket or a grasshopper consists of 3 stages: egg, nymph and adult. The eggs hatch into tiny crickets or grasshoppers called nymphs. As the nymphs grow, they molt several times (you may have to explain molting to the children) and develop wings. When they are adults, only male crickets chirp in order to attract females. The male chirps by rubbing his wings together. Male grasshoppers try to attract females also by rubbing their back legs together to make noise.

Activity #4: Cricket Song

Teach the children the cricket song. (sung to the tune of Frere Jacques)

Hopping cricket, hopping cricket

In the grass, in the grass

Hopping, hopping, hopping

Hopping, hopping, hopping

Very fast, very fast

Activity #5: Make either a grasshopper or a cricket from a clothespin.

Cricket: You will need clothespins, brown paint, wiggly eyes, pipe cleaners, and glue (hot glue works best but Elmer's will do)

1. Paint the clothespin brown. (You may need to do this ahead of time, as it can take a day for it to dry.)

2. Glue eyes on to the corners of the clothespin. (the part that would actually clamp the clothing)
3. When the clothespin is closed, there is a small circle near the eye area. Slide the pipe cleaner through and bend upwards so that you can twist it a few times and fasten it as antennae.
4. Use glue to fill in the hole where the antennae are. (This helps to prevent it from falling out.)

Grasshopper: You will need clothespins, green paint, green craft wire or pipe cleaners, headpins or corsage pins, wiggly eyes and glue.

1. Paint a clothespin green. Let dry.
2. Cut a 6" piece of green craft wire or use a pipe cleaner and bend into the shape of legs. Glue to the clothespin.
3. Glue on wiggly eyes.
4. Press 2 pins into place for antennae. (See the enclosed instructions.)

Optional Activity #6:

Color the grasshopper coloring page.

Extra Resources:

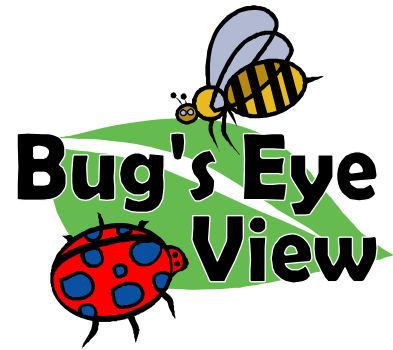
- Counting Bugs Dominoes
- Bugz, a 35-minute video which can be viewed in snippets.



PK KIT: Lesson #4 Aborigines, Ants and Bees

Materials Provided:

- Aboriginal art cards & the accompanying scripts (5)
- Honeybee poster
- Bee Puppet
- Fingerprint bumblebee instructions



Materials you supply: (depending on the activities chosen)

- Yellow and black paint
- White paper
- Honeycomb cereal
- Bubble-wrap
- Construction paper
- Yellow pom-poms

Core Learning Concepts:

1. Aborigines live in Australia.
2. Aborigines have made art for thousands of years.
3. Aborigines used bugs in their artwork and for food.
4. Honeybees are insects that have 3 body parts: head, a thorax and an abdomen.
5. Honeybees live in a hive and each bee has a job.

Activity #1: Aboriginal Art

Share the five cards of Aboriginal art and the scripts that go with them.

Activity #2: Honeybees

After discussing how the Aborigines ate the honey ants, ask the children if they know where else honey comes from. That's right... the honeybee. Show the poster of the honeybee and take out the bee puppet. Point out that honeybees, like all insects, have 3 body parts: the head, the thorax and the abdomen. Attached to the honeybee's head is a single pair of antenna. These are what a bee uses to smell. Bees also have 5 eyes. Honeybees have 4 wings attached to their thorax, that beat very rapidly; that's what makes their "buzz" sound.

Honeybees have a stinger that has barbs on it. When they sting someone, the barbs pull the stinger off away from the bee. Therefore, the bee can only sting once and then it dies, because the end of their abdomen is pulled off when she flies away. This is different from other bees and wasps (bumblebees, yellow jackets, etc) that do not have a barbed ovipositor (stinger) and can sting many times.

Activity #3: Bee Song

Teach the bee song, sung to the tune of Frere Jacques.

Busy bumblebee, busy bumblebee

In the air, in the air

Flying, flying, flying

Flying, flying, flying

Buzzing here, buzzing there

Art Project #1: Thumbprint Honeybees

You will need yellow and black paint, white paper and Honeycomb cereal, for added interest. (See enclosed instructions.)

1. Stamp the thumb in yellow paint. Make one stamp on the paper at whatever angle you want your bee to be flying. Press firmly for the body and gently for the head and stinger. Firm presses make oval shape, and gentle presses make circle shapes.
2. Dip the pinkie finger into black paint. Gently dot the head and make an even smaller dot for the stinger.
3. Make 2 side by side dots (about stinger size) in the middle for the black stripe.
4. Stamp the index finger into the black paint. Stamp many times onto a piece of scrap paper or paper towel until almost all of the paint is gone. Then stamp a wing above the body at a slight angle and a second wing above the body at an opposite angle.
5. Glue Honeycomb cereal onto the paper for the hive.

Activity #5: Hives

Tell the children that honeybees and bumblebees live in hives. As many as 60,000 bees can live in one hive. There are 3 kinds of bees. Each kind helps in a different way.

1. Workers: Most of the bees are workers. They are females and do all of the chores- like cleaning and storing nectar. They cannot lay eggs.
2. Drones: Drones are males. There are only a few in each hive. They make sure that the queen will have a mate.
3. Queen: There is only one queen to a colony. Her only duty is to lay eggs. She is much larger than the other bees. If she dies, the whole colony will die.

Art Project #2: Bubble-wrap honeycombs

You will need pieces of bubble-wrap, construction paper and paint. Yellow pom poms are optional. Explain to the children that you are going to make a honeycomb, where the bees live and make honey.

1. Give each child a piece of bubble-wrap and a piece of construction paper.
2. Have them dip their wrap into the paint and then press it on the construction paper.
3. Add pom poms for the bees or combine it with the thumbprint art project.

Extra Resources:

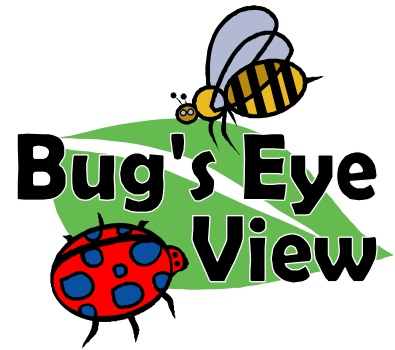
- Counting Bugs Dominoes
- Bugz, a 35-minute video which can be viewed in snippets.



Primary KIT: Materials

Art Cards & Scripts: (In the Binder)

- Aboriginal art cards & the accompanying scripts (5)
- MC Escher art cards and the accompanying scripts (4)
- Bugs & Patterns art cards & the accompanying scripts (7)
- Ch'i Pai Shih art cards & scripts (4)
- Loy Allen art cards & the accompanying scripts
- Seaguy art card & script
- How to draw bugs diagram cards (5)



Books

- Aboriginal Art*
- Diary of a Spider*
- Creepy, Crawly Baby Bugs*
- Ace Lacewing*
- Beetles*
- Crickwing*
- How to Draw Bugs*
- Bug, Bugs, Bugs*

Activity Masters: (In the Binder)

- Bug, Bugs, Bugs
- Diagram of an ant
- Wolf spider mask
- Feeding Frenzy directions
- Metamorphosis game
- Morpho butterfly finger puppet
- Butterfly book
- Complete Metamorphosis Timeline
- Simple Metamorphosis Timeline
- Build a Grasshopper Puzzle
- Clothespin grasshopper instructions
- Stained Glass Butterfly pattern

Manipulatives:

- Pictures of beetle, flea, moth and housefly mouths
- Pliers
- Baster
- Sponge
- Straws
- Magnetic bug patterns (3)
- dice (6)
- Green & white construction paper
- Great northern beans
- paint brushes (12)
- Cups
- Bags of 3 color pasta
- Large rubber bee
- Tiara
- Feather dusters (3)
- Packing peanuts
- Red pom- poms
- Cups
- Spray of artificial flowers
- Ladybug puppet
- Bug Projector & instructions
- Box of 5 Carolina Biological insect slides
- Bugs Floor Puzzle

Photos & Posters:

- Spider poster
- Large Escher Metamorphose poster
- Caterpillar poster
- Large honeybee poster
- Grasshopper poster
- 3 pages of ladybug photos (In the Binder)

DVDs:

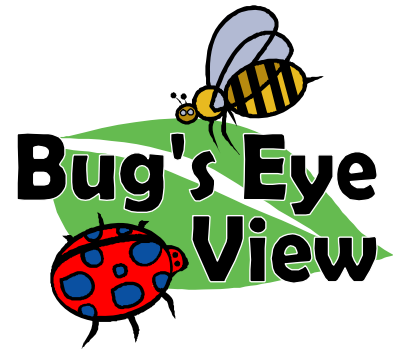
- Bill Nye DVD Spiders

Other:

- Loy Allen glass beetle sculpture



Primary KIT: Lesson #1 Aborigines, Ants, Spiders & Insect Mouths



Materials Provided:

- Aboriginal art cards & the accompanying scripts (5)
- Aboriginal Art* book
- Diagram of an ant
- Diary of a Spider*- book
- Spider poster
- Bill Nye DVD- Spiders
- Wolf spider mask copy master
- Pliers
- Baster
- Sponge
- Straws
- Pictures of beetle, flea, moth and housefly mouths
- Feeding Frenzy directions

Materials you supply: (depending upon the activities chosen)

- Clay
- Pipe cleaners
- Coloring utensils
- Scissors
- Yarn or string
- Cup with water

Core Learning Concepts:

1. Aborigines live in Australia.
2. Aborigines have made art for thousands of years.
3. Aborigines used bugs in their art and for food.
4. Ants are insects that live in colonies.
5. Spiders are arachnids and are not insects.

Activity #1: Aboriginal Art

Share the 5 Aboriginal art cards, along with the attached scripts. Have the Aboriginal Art book available in case there is more interest or you need more examples.

Activity#2: Ants

“We just read about the Aborigines and their honey ants. What else do you know about ants? Let's take a closer look.” First show the children the diagram of an ant. Ants are insects. Point out the 3 body segments- the head, thorax and abdomen. Point out the 6 legs and the antennae. The antennae are their feelers and are used to pick up smells. They help the ants find food easily. Ants also use their feelers to talk to other ants.

Ants are very strong; they can easily carry something that weighs 25 times more than they do.

Ants live in colonies. Each colony has a queen, workers, soldiers and males. The queen only lays eggs. The workers collect food, feed the members of the colony and enlarge the nest. The soldier ants are the large workers who defend the colony and raid other colonies so that they can capture slaves. The males mate with the queen and then die soon afterwards.

Art Project #1: Make an Ant

Give each child a hunk of clay, 6 pipe cleaners for legs and 2 short pipe cleaners for feelers. Tell them to make 3 body segments and attach the legs to the thorax (the second section) and attach the feelers to the head.

Alternatively, you could have the children make ants out of cut Styrofoam balls. Paint them black and then attach the pipe cleaner parts.

Activity#3: Spiders

What is a hard-shelled, eight-legged creature with sharp fangs? A body covered with hairs that sense vibrations? A face with 8 eyes? A silk-making machine composed of 600 special glands? If a friend told you that a creature answering that description lives on this Earth, you might feel like saying; “Your imagination is working overtime!” However, fantastic creatures like this live in our schools, our backyards- even in your own rooms. How do you spell its name? S-P-I-D-E-R! Read the book, *Diary of a Spider*, a story about a spider who goes to school just like the children do and who has a friend, the fly.

After reading the book, describe the difference between a spider and an insect. Spiders are like cousins to insects. They are in their own special class, called arachnids. Insects have 3 body segments, but spiders only have 2 body segments. Spiders have no antenna and insects do. Most insects have wings and spiders don't. Spiders usually have 8 eyes. Show the poster of the spider.

Spiders have a unique way of eating. They inject their victims with their fangs, which releases its paralyzing venom. Within a few minutes, the venom has turned the victim's insides into soup. All the spider has to do now is suck out the soup. Did you know that spiders sometimes eat each other or even their mother!?!?

Activity #4: Spiders

Show Bill Nye's video *Spiders*.

Extra Art Activity: Wolf Spider Mask

You will need copies of the wolf spider mask master, coloring utensils, scissors and yarn or string. Make copies of the wolf spider mask, have the children color it and cut it out. Holes can be punched in order to wear it as a mask, by adding yarn or string.

Activity #5: Insect Mouths

How do other insects eat? Do they have teeth? (Many of the children may say yes, since they may have been "bitten" by an insect.) Explain that insects do not have teeth as people and many other animals do. However, many do have sharp jaws for tearing and chewing food.

Next, hold up pictures of a beetle, housefly, flea and moth mouths and explain that each of these common insects has a different type of mouthpart. Then compare each of these insect mouths with the following tools: a pair of pliers, a baster/ syringe, a sponge and a straw.

A beetle's mouthparts work something like pliers to tear and chew plants. Their jaws move sideways, not up and down as people's do. (Hold the pliers sideways and work them back and forth.)

Fleas use their needle-like mouthparts to draw up blood in much the same way as a doctor uses a needle and syringe. (Put the syringe or baster into a glass of colored water and draw some of it up.)

A housefly's mouthparts work like a sponge to soak up liquids. A fly vomits on his food, which turns the food into a liquid. The liquid can then be soaked up. (Pour out a little water and sop it up with a sponge.)

Moths and butterflies feed on nectar from flowers. Explain that the long, tongue like mouthparts of many butterflies and moths are similar to a straw would be to sip up the nectar. (You could have a child sip some clean water from a glass or have cups with juice ready for the children to sip individually.)

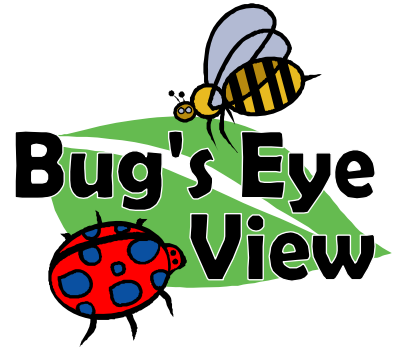
If you have an ambitious helper, you could do the Feeding Frenzy activity, which is included as an extra.

Extra Resources:

- Bugs Floor Puzzle
- Bugs, Bugs, Bugs* book



Primary KIT: Lesson #2 Escher, Patterns and Metamorphosis



Materials Provided:

- MC Escher art cards and the accompanying scripts (4)
- Large Escher Metamorphose poster
- Bugs & Patterns art cards & the accompanying scripts (7)
- Magnetic bug patterns (3)
- Creepy, Crawly Baby Bugs-book
- Caterpillar poster
- dice (6)
- Green & white construction paper
- Metamorphosis game copy master
- Great northern beans
- Morpho butterfly finger puppet copy master
- paint brushes (12)
- Butterfly book copy master
- Complete Metamorphosis Timeline
- Bags of 3 color pasta
- Cups
- Stained Glass Butterfly pattern copy master

Materials you Supply: (depending upon the activities chosen)

- Coloring utensils
- Twigs
- Paper plates
- Pipe cleaners
- Glue/ stapler
- Pasta: corkscrew, shell, bowtie
- Scissors
- Construction paper
- Tissue paper
- Wax paper
- Liquid starch

Core Learning Concepts:

1. MC Escher was an artist who used tessellations, i.e. repeating patterns.
2. Patterns are lines, shapes and/or colors that repeat in a special way.
3. Most insects go through a process called metamorphosis as they grow.
4. Caterpillars protect themselves by blending into their environment.

Activity #1: MC Escher

Share the 4 art cards of M.C. Escher, along with the accompanying scripts. Also talk about the large, rolled up poster version of *Metamorphose* by Escher.

Next share the 7 art cards of *Bugs and Patterns*, along with the accompanying scripts.

Display the large caterpillar poster and discuss its patterns.

Activity #2: Creepy, Crawly Bugs

Read the book, *Creepy, Crawly Baby Bugs*, a very appealing book about 20 kinds of insect babies in intimate detail. Have the students look for patterns in the pictures. (The children will find it interesting, especially when they see the wasp larvae hatch out of the caterpillar's body...high gross-out factor!)

Activity #3: Complete metamorphosis

Most insects, including butterflies, bees, beetles, ants, fleas, flies and wasps, go through the process of complete metamorphosis. These insects change so much between the egg and adult stages that it is hard to believe they are really the same animals. Display the picture "timeline" of complete metamorphosis.

It starts when a female lays an egg. Most eggs are laid on or near the type of food the young eat. When the insect hatches, it usually looks like a soft worm and it is a first instar larva.

Almost immediately, the larva starts eating and growing. Although the skin is soft, it can only stretch so far. Once the larva has grown too large for its skin, it molts, shedding its skin. Now it is a second instar larva. It eats and grows some more. Depending on the insect, there are usually between five and seven instars.

After the final instar, the larva moves to a protected area and pupates. Some insects, like butterflies and moths, spin a silken cocoon around themselves as protection during their pupation. This is a chrysalis. The pupal stage can last a few weeks, a few months, or even years. During pupation, the insect does not move around on the outside, but its insides are going topsy-turvy. The body tissues dissolve and reorganize; growing legs, forming wings, developing compound eyes, adding hard shells, and changing mouthparts. When the adult insect finally emerges, it will not grow or change any more. The main job for adult insects is to find mates so that they lay new eggs and cycle can start all over again.

Activity #4: Metamorphosis Game

Have the children play the metamorphosis game. The worksheet for the game is in this lesson binder. They will need one sheet per child and one die per group, along with crayons. The instructions are on the sheet. The first one to finish coloring the whole cycle is the one who wins.

Art Project #1: Metamorphosis:

PLEASE DO NOT USE THE 3 COLOR PASTA FOR THIS ACTIVITY; IT IS NEEDED FOR ANOTHER

Have some real twigs available, if you can. Each child will need a paper plate, some green and white construction paper, some tissue paper, pipe cleaners and a great northern bean. (or see the other option below)

1. Divide the paper plate into 4 sections with a marker or crayon. Label the sections: "egg", "larva", "pupa", and "adult".
2. In the egg section, cut out a leaf from the green construction paper and glue a great northern bean on it to represent an egg. Glue it on the plate.
3. In the larva section, twist 2 different colored pipe cleaners together to represent a caterpillar. Glue that on the plate.
4. In the pupa section, cut out a triangle from the white construction paper & roll it into a chrysalis shape. Glue or staple it together and glue on the plate, alongside a twig.
5. In the adult section, accordion fold a square of tissue paper, pinch it in the middle & tie with a pipe cleaner to represent the butterfly. Glue it on the paper plate.

Another option instead of using the more expensive pipe cleaners and construction paper would be to use pasta and a great northern bean. The bean represents the egg, corkscrew pasta as the larva (caterpillar), shell pasta as the pupa (chrysalis) and bow tie pasta would represent the adult butterfly. To be more realistic, add small leaves and twigs, (To color the pastas, use one tablespoon of rubbing alcohol and a few drops of food coloring in a sealable plastic bag. Add the pasta and shake or rub until the pasta is colored. Remove and allow to dry.)

Art Project #2: Morpho Butterfly Project

The morpho butterfly is a huge, shiny blue butterfly found in Central and South America. Make life-sized morpho butterflies to wear on their finger. You will need the morpho pattern, crayons, scissors, pushpins, and black pipe cleaners.

1. Have the children color the morpho pattern a bright blue and then cut it out. Color the undersides of the wings brown.
2. Fold the butterfly in half along the body. Match the wings together and crease on the underside.
3. Unfold the butterfly. Using a pushpin, poke a hole through each of the two white circles on the butterfly's body.
4. Cut a 4" piece of black pipe cleaner and fold it into a U-shape. Starting from the morpho's underside, poke each end of the pipe cleaner U through one of the holes in the body until about an inch of each end is visible from the morpho's upper side.

5. Have the children slip their index finger through the pipe cleaner loop poking out of the butterfly's underside. Make the ring fairly snug by gently pushing the morpho closer to the finger and then twisting the pipe cleaner together on the morpho's upper side. (only twist once.)
6. Bend the excess pipe cleaner up between the morpho's wings to form antennae.
7. Then have the children gently move their finger up and down to make the morpho fly.

Art Project #3: Stained glass butterflies

The children can create butterflies that look like stained glass when hung in the windows. Each child will need a butterfly pattern copied onto construction paper, tissue paper in many colors, wax paper, liquid starch, paintbrushes and scissors.

1. Give each child a butterfly pattern and have them cut out the center part on each side.
2. Tear colored tissue paper into differently shaped pieces.
3. Place wax paper over the butterfly outline. Use the liquid starch and paint brushes to adhere the tissue pieces onto the wax paper, filling the outline of the butterfly with a mosaic of different colors.
4. Let it dry and then cut off the excess wax paper.

Activity #4: Butterfly Book

Give each child a copy of the *Butterfly Book*. Have them cut the pages apart, put them in order and then staple. The master for this is located in this lesson binder.

Activity #5: Camo Caterpillars- outside game

You will need the package of 3 color pasta, cups and a grassy area.

Caterpillars have several means for protecting themselves. Some are colored to blend in with their environment while others look like bird droppings.

The challenge: Divide the children into teams and have them line up single file.

1. Tell the children that they are hungry birds looking for juicy caterpillars. Show them one of the caterpillars (colored pasta) and tell them that their job is to search the habitat (game area) for a caterpillar. Once they find a caterpillar (any color), they will need to run back to the group and tag the next person. When the race is over, have the children place each particular color into a cup and compare the number of each color found. Dump the found caterpillars into a large container- do not throw them back into the game area.
2. For the second round, tell the children that they will be looking for the most nutritious caterpillars, which are the green ones. They must find 1 green caterpillar or they may find 2 orange or 3 tan ones before they can return to the line and tag the next person. When the race is over, have the students place their caterpillars into the correct cups and compare the number of each color found. Dump the found caterpillars into a larger container- do not throw them back into the game area.

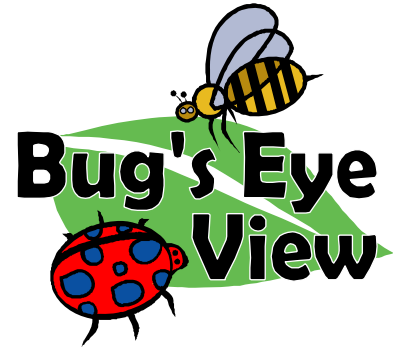
3. For the third and final round, inform the children that tan and orange caterpillars have begun eating a plant that makes them taste yucky and any bird that eats them gets sick. Allow the children to “eat” only green caterpillars for this round and must find one before they can return to the line to tag the next person.
4. Ask the children to predict how many caterpillars (each color) are left in the game area. Allow time for the teams to search the game area for leftover caterpillars of any color. Have the children place their caterpillars into the correct cups and compare the number of each color that found. Discuss the results and compare their predictions.

Extra Resources:

- Bugs Floor Puzzle
- Bugs, Bugs, Bugs* book



Primary KIT: Lesson #3
Ch'i Pai Shih, Bees, Cricket & Grasshoppers



Materials Provided:

- Ch'i Pai Shih art cards & scripts (4)
- Ace Lacewing*- book
- Large honeybee poster
- Large rubber bee
- Tiara
- Feather dusters (3)
- Packing peanuts
- Red pom- poms
- Cups
- Simple Metamorphosis Timeline master
- Spray of artificial flowers
- Grasshopper poster
- Build a grasshopper Puzzle copy master
- Clothespin grasshopper instructions

Materials you supply: (depending on the activities chosen)

- Scissors
- Glue
- White paper
- Clothespins
- Green or brown paint
- Green craft wire or pipe cleaners
- Wiggly eyes
- Corsage or hat pins

Core Learning Concepts:

1. Ch'i Pai Shih was a Chinese artist who painted insects from real life instead of from a model.
2. Nature is an important part of Asian art.
3. Honeybees are insects that live in a hive.
4. Honeybees have 3 body parts a head, a thorax and an abdomen.
5. Crickets and grasshoppers go through a process called simple metamorphosis as they grow.

Activity #1: Ch'i Pai Shih

Display the 4 Ch'i Pai Shih (pronounced She Bye Shou (ld)) art cards and read the accompanying script on the backs.

Activity #2: Ace Lacewing

Read, *Ace Lacewing*, a book about a detective that is trying to find a queen bee.

Activity #3: Honeybees

Display the honeybee poster and the large rubber bee and point out the body parts. Explain that honeybees, like all insects, have 3 body parts: the head, thorax and abdomen. Instead of an internal skeleton like humans, honeybees and other insects have an exoskeleton that maintains body shape. Attached to the honeybee's head is a single pair of antennae. These are the scent mechanisms. Honeybees also have 5 eyes. Two of these are compound eyes that detect color and shape. The remaining 3 eyes are simple eyes that only detect light and dark. Honeybees have 4 wings attached to their thorax that beat very rapidly, giving them their distinctive "buzz". Honeybees can fly as fast as 15 miles per hour! Also attached to the thorax are 6 legs. The back legs have thin sacks called pollen baskets, which transport pollen back to the hive to be used for food. On the end of the female's abdomen is the ovipositor (stinger). The ovipositor is barbed so that it remains imbedded into whatever the honeybee stings. For this reason, the honeybee can only sting once and then it will die because the end of her abdomen is pulled off as she flies away.

There are 3 types of bees inside the hive: the queen, the male drones and the worker bees. The queen is the most important and she is much larger and longer than the other bees because she needs a long abdomen for laying eggs. She can lay up to 2000 eggs in one day. There is only one queen in each hive.

Male honeybees are drones. Drone bees are large and have no stinger. They are important because they mate with the queen. There are usually only 300 drones in a hive.

The final type of bee is the worker bee. These small, female bees that clean the hive, care for the young bees, make honeycomb for storing honey, guard the hive and forage for nectar and pollen. Worker bees usually only live about 40 days and there are usually 60,000 to 80,000 worker bees in a hive.

Activity #4: Role-Play a Honeybee Hive

You will need the tiara, 3 feather dusters, cups, packing peanuts and yarn pom-poms. Split the children into groups representing the 3 different types of honeybees inside the hive.

1. Choose one girl to be the queen, a few boys for drones and designate the remaining children as workers. The queen gets to wear a tiara and sits on a chair at the front or center of the room. The drones sit on the floor to one side. The workers are then split into several smaller groups.
2. Choose several workers to be the queen's attendants (form a circle around the queen), some to be nurse bees- to give food to the young, some to be housekeepers (these 3 get

the feather dusters), a few to be wax makers and 2 to be guard bees. You should have several children left to be field bees.

3. Wax bees can “build” honeycomb by arranging the cups in neat rows. Designate one area of cups as young bees and another area as food storage.
4. Spread pollen (packing peanuts) and nectar (red pom-poms) around the room for the field bees to collect and bring back and store in the honeycomb. They can only carry 2 pieces of nectar and 2 pieces of pollen at a time. The field bees must enter and exit the hive through the designated area where the guard bees are.
5. The queen’s attendants should bring the queen food every 30 seconds.
6. The guard bees stand guard over the entrance, keeping the field bees moving in and out in an organized fashion.
7. The field bees should make several collection trips to bring nectar and pollen back to the hive. These should be placed into the “honeycomb”.
8. The nurse bees can take pollen from the food stores and “feed” it to the young bees.
9. The housekeepers are busy dusting and cleaning. They clean any food that gets dropped on the floor of the hive but are careful not to get in the way of the other bees.

Remind the children that in order for the hive to survive, everyone needs to do their job.

Activity #5: Demonstrating the Waggle Dance

Honeybees have specific dances that they use to “talk” to other bees. When a field worker finds a source of nectar (spray of artificial flowers that has been placed somewhere in your room), they return to the hive and do a waggle dance to let the others know where the nectar is. To perform this dance, a bee will waggle her body back and forth very quickly and move forward in a straight line. The direction of this line tells the other bees the direction of the nectar source in relation to the sun. (So if the spray of flowers- the nectar source- is in the northeast corner of your room, then the bee would do the waggle dance in a line pointing to the northeast corner of your room.) At the end of her waggle dance (line) she will walk in a half circle back to where she started the waggle. During this time, the other bees will use their antennae to “smell” her because she carries the scent of the flowers they need to find. Now the other honeybees know the direction of the nectar source.

Move the location of the spray of flowers and choose a new field worker to do the waggle dance.

Activity #6: Ch'i Pai Shih also painted crickets.

Crickets and grasshoppers go through an incomplete or simple metamorphosis. (Display the simple metamorphosis “timeline”.) A young grasshopper hatches out of an egg and is called a nymph. It looks a lot like a mature grasshopper, except it is smaller and has short wing stubs. It eats and eats. When it gets too big for its skin, it molts, leaving the old skin behind. The wings develop a bit more with each molt. After about 6 molts, it is an adult. Show the grasshopper poster.

Activity #6: Build a Grasshopper

Give the children a copy of the Build a Grasshopper worksheet, which is enclosed), some scissors, glue and a blank sheet of paper. Have them cut apart the parts of the grasshopper puzzle and put it together on the blank sheet. When they have all of the pieces in the correct place, they can glue the pieces on the paper.

Art Project #1: Make a clothespin grasshopper or cricket

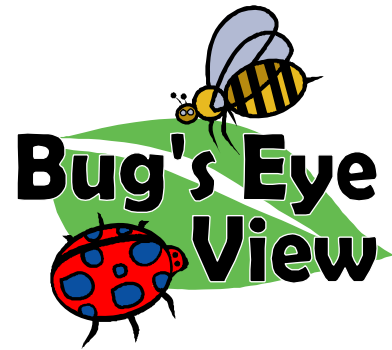
Each child will need a wooden clothespin. Paint it either green for a grasshopper or brown for a cricket. (They might have to be painted a day ahead of time so that they will be dry.) Cut either green craft wire or pipe cleaners to be bent into legs. Glue on wiggly eyes. Hat or corsage pins can be put on as antennae. (See the enclosed instructions.)

Extra Resources:

- Bugs Floor Puzzle
- Bugs, Bugs, Bugs*, book



Primary KIT: Lesson #4 Loy Allen, Seaguy and Beetles



Materials Provided:

- Loy Allen art cards & the accompanying scripts
- Loy Allen glass beetle sculpture
- Beetles- book
- Crickwing- book
- Bug Projector & instructions
- Box of 5 Carolina insect slides
- Seaguy art card & script
- How to Draw Bugs- book
- How to draw bugs diagram cards (5)
- Ladybug puppet
- pages of ladybug photos (3)

Materials you supply: depending on the activities chosen)

- | | |
|---|--|
| <input type="checkbox"/> Black markers | <input type="checkbox"/> Red & black paint |
| <input type="checkbox"/> Wiggly eyes | <input type="checkbox"/> Markers/ crayons |
| <input type="checkbox"/> White paper | <input type="checkbox"/> Pipe cleaners |
| <input type="checkbox"/> Black construction paper | <input type="checkbox"/> Hole punch |
| <input type="checkbox"/> Scissors | <input type="checkbox"/> Pencils |
| <input type="checkbox"/> Stapler or tape | |

Core Learning Concepts:

1. Loy Allen is a South Dakota artist who makes works of art out of glass.
2. Roaches are amazing insects.
3. Seaguy was a British illustrator who drew realistic looking insects.
4. Ladybugs are insects in the beetle family.

Activity #1: Loy Allen

Display the Loy Allen sculpture of a beetle and read the accompanying script.

Activity #2: Beetles

Flip through the Beetles book and discuss some of the beetles shown.

Activity #3: Crickwing

Read the book, *Crickwing*, a story about the relative of the beetles- the cockroach.

After the story, tell the children that roaches are insects and there are more than 4,000 different kinds of roaches. They have a hard exoskeleton and that is why they crunch when you step on them. Most roaches are a flat, brown oval with skinny legs. The legs are covered with hairs and spines and the feet have 2 claws each. They have tiny suction cups between their claws that help them hold onto most surfaces, even ceilings. Their antennae pick up tastes, smells and movement. They are amazing creatures. A roach can live for 9 days without its head and can go for 3 months without any food, as long as it has water.

Activity#4: Bug Projector

Use the bug projector and project the slide of the roach's head, that is in the blue Carolina slide box, along with 4 others. (You can also catch live insects and project them. Just make sure to let them go afterwards.)

Activity #5: Illustrating Insects:

Display the Seaguy art card and read the accompanying script. Then pass out drawing paper and pencils, along with the 4 copies of insect illustration sheets. Give the children a chance to try following the steps for illustrating bugs. You can also let them use the book, *How to Draw Bugs*, and choose what insects they want to draw.

Activity #6: Ladybugs:

Take out the ladybug puppet. Explain that ladybugs are a kind of beetle that is an insect. They are usually less than ¼" long and have oval bodies. The female ladybug is usually larger than the male. Most of them have red, orange or yellow elytra (wing covers) and black spots. The number of spots helps to identify the kind of ladybug it is. (When an adult ladybug emerges from the pupa stage, they don't have any spots for the first 23 hours. So if you catch one without any spots, you may have found a brand new adult.) There are special organs on their feet that help them to smell. The ladybug uses its antennae to touch, smell and taste. Ladybugs produce a special kind of chemical that makes them taste yucky to birds and other predators. Share the 3 pages of photos of different kinds of ladybugs and discuss their differences.

Art Project #1: Paper Plate Ladybugs

You will need 2 paper plates for each ladybug, black construction paper, scissors, stapler or tape, red and black paint, markers or crayons, pipe cleaner, a hole-punch & optional wiggly eyes.

1. Cut out the ladybug's legs on the black construction paper. (Cut 2 sets of three legs.)
2. Staple or tape 2 paper plates together (put the eating surfaces of the plates on the inside) - make sure to staple the legs between the plate. Do not staple the plates all the way around- leave one end of the ladybug unstapled.
3. Cut off the rims of the plates where they are not stapled (or taped)- this is where you will put your hand to move the ladybug.
4. Paint the top of the ladybug red (except the head, which is black). Paint the bottom of the ladybug black. Either paint some black dots on the ladybug or glue some black circles on its back. Either paint eyes or glue on wiggly eyes.
5. Punch 2 holes at the top for antennae. Thread a pipe cleaner through the holes.



You now have a very cute ladybug puppet.

Alternate Art Project:

Get large dried lima beans and paint them red. Use a black marker pen to draw on spots.

Extra Resources:

- Bugs Floor Puzzle
- Bugs, Bugs, Bugs*, book



Intermediate KIT: Materials

Art Cards & Scripts: (In the Binder)

- MC Escher art cards & the accompanying scripts (4)
- Loy Allen art cards and accompanying scripts
- Aboriginal art cards & the accompanying scripts (5)
- Ch'i Pai Shih art cards and the accompanying scripts (4)

Books:

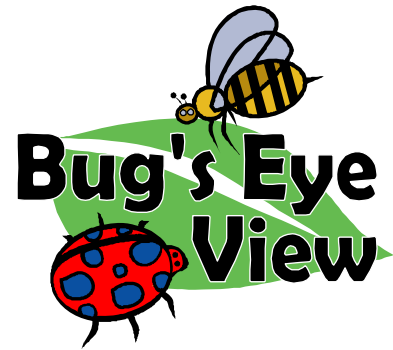
- Creepy Crawlers*
- Eyewitness Insects*
- Dreamings*
- Fun Fact Book- Bugs and Insects*
- Insects in Danger*
- Bundle at Blackthorpe Heath*
- The Magic of MC Escher*
- MC Escher Coloring Book*

Activity Masters: (In the Binder)

- Wing pattern copy master
- Origami butterfly copy master
- Spider rap copy master
- World of Insectivores master
- Sample web design copy master
- Insect Vision copy masters (2)
- Visual Spectrum diagram
- Complete metamorphosis of a butterfly
- Grasshopper diagram

Manipulatives:

- Fly copters (12)
- Magnifying Glass



- plastic combs (12)
- plastic rulers (6)
- Pencils
- Magnetic Drawings Kit, along with the small magnetic board
- Remote control Tarantula & Batteries

Photos & Posters:

- Large Escher rolled up Metamorphose poster
- Bugs Eye View photos (4)
- Magnetic Dreamings Poster
- Honeybee poster
- Flowers seen in ultraviolet light photo- a bee's-eye view(In the Binder)
- Large fly photo
- Spider photo(In the Binder)

Video:

- Eyewitness Video Insects

Other:

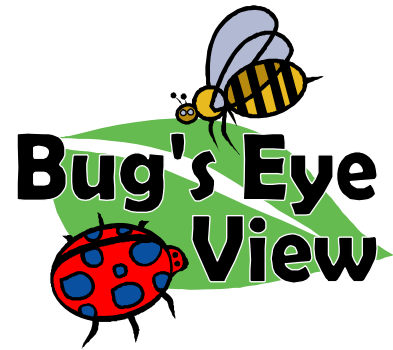
- Loy Allen glass grasshopper sculpture
- SD Bug Rug art card, script & instructions
You will also need the S.D. Bug Rug Tote



Intermediate KIT: Lesson #1 Escher and Metamorphosis

Materials Provided:

- MC Escher art cards & the accompanying scripts (4)
- Large Escher rolled up Metamorphose poster
- Butterfly metamorphosis cycle
- Creepy Crawlers- book
- Wing pattern copy master
- Fly copters (12)
- Origami butterfly copy master
- The Magic of MC Escher- book
- MC Escher Coloring Book



Materials you supply:

(Depending on the activities that are chosen)

- Pencils
- Scissors
- White paper
- Crayons/ markers

Core Learning Concepts:

1. MC Escher was an artist who used tessellations, i.e., repeating patterns.
2. Butterflies and moths grow through a process called complete metamorphosis.
3. Butterflies travel long distances by catching rides on thermals.
4. Butterflies maybe divided into hidiers, advertisers and tricksters.

Activity #1: MC Escher

Share the 4 MC Escher art cards, along with the accompanying scripts. Also, share the large Metamorphose poster.

Activity #2: Share the Creepy Crawlers book.**Activity #3: Complete Metamorphosis**

Butterflies and moths go through a life cycle known as complete metamorphosis. The stages of their life cycle include, egg, larva, pupa and adult. (The word pupa comes from Latin meaning “little doll”.) Every butterfly begins its life as an egg. Female butterflies are very picky about where they lay their eggs. This is because caterpillars are very fussy about what they will eat. Each species of butterfly will only eat a single plant (or group of closely related plants) as caterpillars. This particular plant that a caterpillar must have is called its host plant for that species of butterfly or moth.

When a butterfly or moth larva (also known as a caterpillar) first hatches from its egg, it is very small. This young caterpillar is a first instar caterpillar. A caterpillar has only one job: eat!! Many species of caterpillars begin their feast by eating their eggshell, which contains plenty of nutrients. Other species of caterpillars immediately begin eating the tender, small parts of leaves.

Caterpillars (and all insects) face a challenge as they grow. Unfortunately, their skin cannot grow with them. In order for a caterpillar to grow larger than the skin it had when it hatched, it must make a new, larger skin. Then, when it is ready, it sheds the old skin and the newer, larger skin underneath is exposed. This process is molting. After the caterpillar has molted for the first time, it is referred to as a second instar and it has some room to grow. As it grows again, it molts and becomes a third instar caterpillar.

The third instar caterpillar also eats and grows until it is too big for its skin. It molts again, and the caterpillar with its new skin is referred to as a fourth instar caterpillar. Show the copy of the butterfly metamorphosis cycle.

Later on, the fifth instar caterpillar will molt one more time. The new skin underneath forms the outer shell of the chrysalis.

The chrysalis or pupa is not a resting stage as many people think. Quite a lot is happening to the pupa! The body of the caterpillar is transforming into an adult butterfly. Wings are fully formed (the beginnings of the wings were actually forming underneath the caterpillar's skin before the last molt) in the chrysalis.

After approximately 10 to 14 days as a chrysalis, the butterfly is ready to emerge. Its wings are wet and the butterfly cannot fly yet. The butterfly must pump fluids from its abdomen through the veins in its wings, which causes the wings to expand to their full size. Next the wings must dry and the butterfly must exercise flight muscles before it can fly. Once it flies off, it has only one job...to lay eggs.

Activity#4: How Butterflies Travel Far

Many butterflies that travel long distances conserve their energy by gliding up and down, using invisible warm air bubbles, called thermals. When the sun shines on a dark parking lot surrounded by trees, the air over the parking lot gets much warmer than the air around the trees. Warm air is lighter than cooler air, so the warm air rises as a thermal. If a broad-winged butterfly flies by, it can stretch its wings and let the thermal carry it high in the sky, then glide down a long distance with just an occasional flap of its wings.

Pass out copies of the wing pattern, pencils and scissors. Have the children cut out the wing pattern on the solid line. Fold the paper along the dashed line to make a crease, and then open it back up. Grab the pencil about halfway down in one hand. Use your other hand to balance the paper on the pencil tip. Hold steady for at least one minute and watch what happens. You could also have the children trace the wing on tissue paper or on an index card and see if it has the same effect. If permissible, the children could also stand on a chair and drop the wing pattern, noting what happens as it falls.

What made the wing move? Your body makes heat. The heat from your hand created a mini-thermal that went up, hit the paper, and made it spin. When you dropped the paper, it likely twirled around as it fell, looking more like a helicopter than a gliding butterfly. One reason is that butterflies have 4 wings, not just 2. The wings act together to control upward and downward motion, just like the flaps on a glider's wings.

Activity #5: Fly Copters

We can imitate the way a fly flies also. Flies have 2 wings like our fly copters. As the propeller spins, air passes across the blades at different speeds. This difference in speeds creates a lifting force necessary for flight.

Demonstrate how to "fly" the copter by holding the stem in between both hands and quickly sliding the hands in the opposite directions to create enough force for the toy to take flight.

The children must spread far apart while practicing and take care not to launch it towards anyone.

Pass out the copters and allow a few minutes to practice flying the flies.

You could have competitions to see who can make their fly copter go the farthest distance. Or you could see who can make their fly copter stay in the air for the longest time.

Activity #6: Butterfly Trickery

How butterflies avoid becoming a meal. Butterflies fall into 3 categories when it comes to avoiding being eaten. There are hiders, advertisers and tricksters.

Hiders have colored wings that blend in with flowers, leaves and bark, making them hard to see.

Advertisers have bright colors like red, orange and black to warn animals that they taste bad. A common example of this is Monarch butterflies. Tricksters have markings that frighten or fool other animals. For example, some brightly colored butterflies fool animals into thinking that they taste bad but it is just a trick. Other tricksters have bright spots on their wings that look like the eyes of a larger animal.

Have the students go on a tricky butterfly hunt.

1. Divide the children up into 2 teams.
2. Each team makes the same number of butterflies that will blend in with the walls or floor of your room. These are the hidiers.
3. Make brightly colored butterflies; these will be the advertisers.
4. Make other brightly colored butterflies and write the letter T on the bottom; these are the tricksters.
5. Teams take turns being the butterflies or the hunters. When their team is the butterflies, the hunters go out of the room. Then the butterflies tape their butterflies to the wall, bookcases, floors, etc.
6. When the hunters return, they must find as many butterflies as they can in 2 minutes. For each hider and trickster they pick up, they get one point. For every advertiser they pick up, they lose one point.
7. When the time is up, the 2 teams switch.

Art Project #1: Origami butterflies

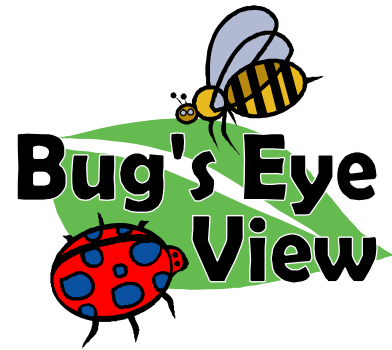
Follow the instructions on the origami sheet located in the binder.

Extra Resources:

1. Eye Witness video Insects
2. *Insects in Danger* book
3. *The Bundle at Blackthorpe Heath* book a story about a birthday spyglass & the world of insects



Intermediate KIT: Lesson #2 ***Loy Allen, Grasshoppers and Crickets***



Materials Provided:

- Loy Allen art cards and accompanying scripts
- Loy Allen glass grasshopper sculpture
- Eyewitness Insects*- book
- plastic combs (12)
- plastic rulers (6)
- Bugs Eye View photos (4)
- Pencils
- Grasshopper diagram

Materials you Supply:

- White paper

Core Learning Ideas:

1. Loy Allen is a South Dakota artist who makes works of art out of glass.
2. Grasshoppers and crickets go through a process called incomplete or simple metamorphosis.
3. Grasshoppers and crickets make music by rubbing their wings or legs together.
4. Insect wings vibrate and make noise.

Activity #1: Loy Allen

Display Loy Allen's glass sculpture of the grasshopper and use the accompanying script to discuss it.

Activity #2: Eyewitness Insects

Share the book *Eyewitness Insects*. Zero in on the pages that feature grasshoppers and crickets.

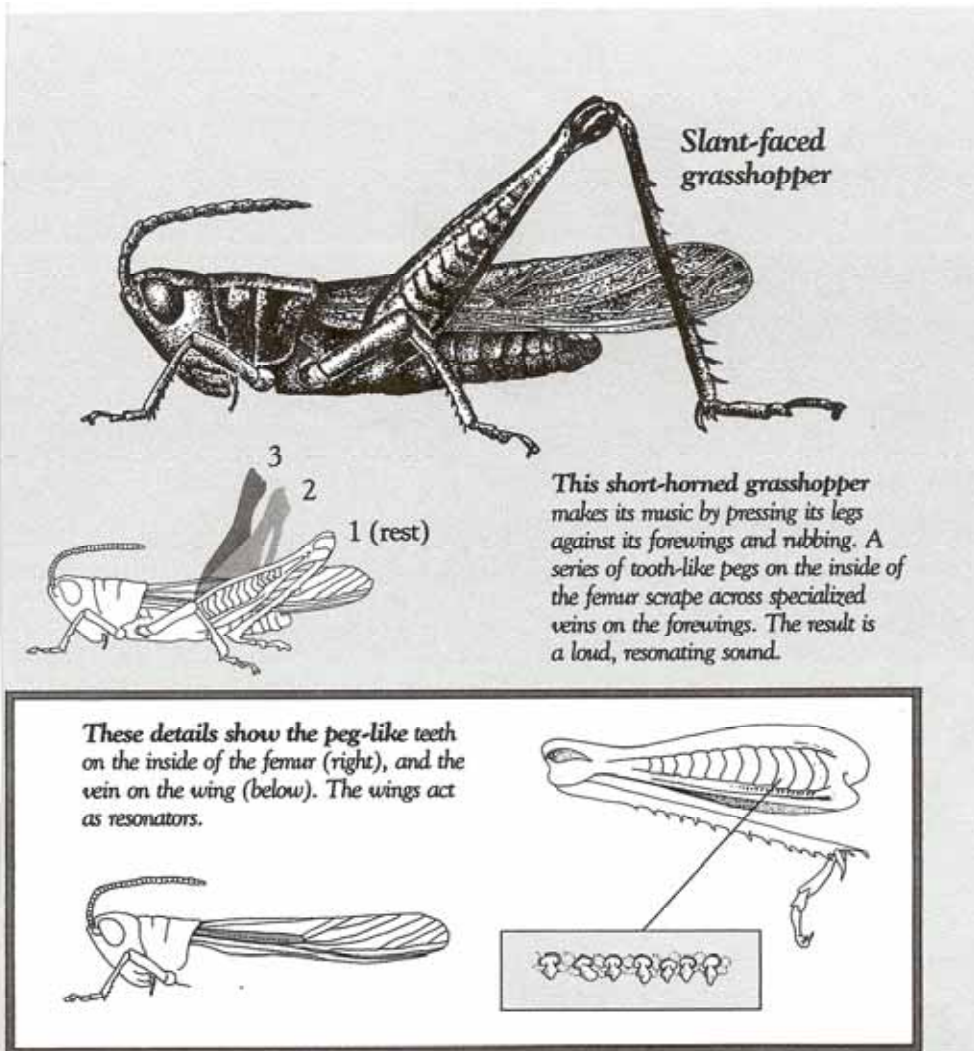
Activity #3: Incomplete or Simple Metamorphosis

Grasshoppers and crickets go through a simple or incomplete metamorphosis. Insects that undergo incomplete metamorphosis are hemimetabolous. A young grasshopper or cricket hatches out of an egg and is a nymph. It looks a lot like a mature grasshopper or cricket, except it is smaller and has short wing stubs. It eats and eats and eats. When it gets too big for its skin, it molts, leaving the old skin behind. The wings develop a bit more with each molt. After about six molts, it is an adult. It cannot grow or shed its skin anymore, but it continues to eat the same plant food and lives in the same habitat.

Ask the children what the difference is between complete metamorphosis, like the butterflies and incomplete or simple metamorphosis, like the grasshoppers.

Show the diagram of the grasshopper.

Activity #4: Insect Singing.



Most of our summertime musicians (crickets, grasshoppers and katydids) are fiddlers. They do it to attract females or to warn off other males. This music-making process is stridulation and has been compared to the sound made by running your finger over a comb. Short-horned grasshoppers make their music by pressing their legs against their forewings and rubbing a series of tooth-like pegs on the inside of the femur across specialized veins on the forewings. It is almost like the sound of running a stick along a fence. The result is a loud, resonating sound. Many people consider the sound mechanical and pitch less.

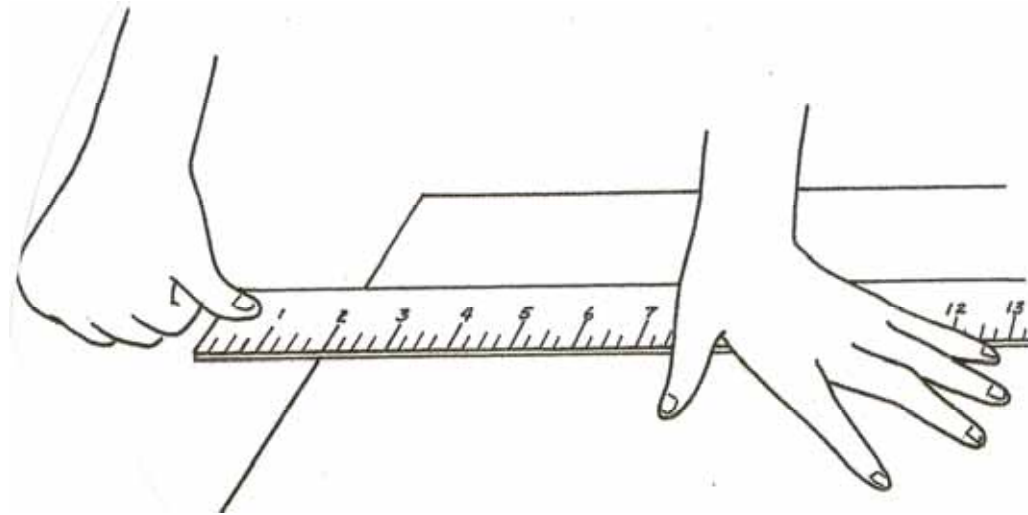
Crickets and katydids rub one wing, which has sharp scraper-type, edge over the other wing, which has a file or comb-like edge, while vibrating the wing membrane. Picture a cricket playing a violin. Cricket songs are a more musical, chirping sound. Cricket song is regulated by temperature – the warmer it is the faster they chirp. In fact, if you add the number 39 to the number of times a snowy tree cricket chirps in 15 seconds that will tell you what the temperature is in Fahrenheit.

Give the children a small plastic comb and have them imitate the sounds made by some insects.

Activity #5: Wing Waves

Imagine it is late at night and both an Asian vampire moth and a female mosquito are in your room, looking for a meal of blood. Which one are you going to hear and have a chance to swat before you become its dinner?

You will need a plastic ruler and a table to do this activity. Place the plastic ruler on the table with just a couple of inches hanging over the edge. Hold the remaining length of stick firmly on the table with one hand. Watch and listen to what happens as you push the thumb on your free hand down and off the hanging edge. Then increase the part of the ruler that hangs over the edge to 4" and repeat the experiment. Continue the activity increasing the part that hangs over the edge.



Demo this for the children, then pass out rulers, and let them try it also.

1. As the hanging edge gets longer; does the sound get higher or lower?
2. Does the hanging edge move faster or slower?
3. Does the sound get louder or softer?

Explanation: The 2" piece of ruler does not have much length to move, making its wavelength short, giving it a high frequency and a high-pitched sound. The 10" piece has a greater length to travel, producing a longer, slower sound wave with a lower pitch. What this means is that the mosquito with a wingspan of around $\frac{1}{2}$ " produces a high-pitched whine, while you never hear the vampire moths that have wingspans several inches wide.

Activity #6: Bug's Eye View

Display the photos of how things would look to a cricket or a grasshopper.

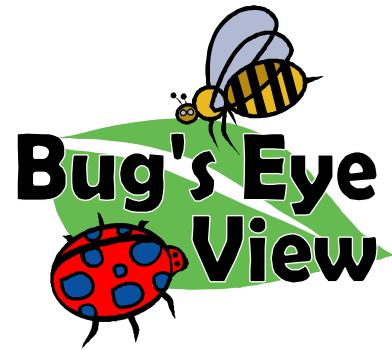
Let the children try to imagine how things would look if they were bugs. Pass out the pencils and paper and have them draw their own bug's eye view. Ask any that have their own camera to take some pictures from a bug's view and then bring them back to show you. Perhaps they will become part of the exhibit.

Extra Resources:

- Eye Witness video- Insects
- Insects in Danger* book
- The Bundle at Blackthorpe Heath* book- a story about a birthday spyglass and the world of insects that it opened up



Intermediate KIT: Lesson #3 Aborigines and Bug Food



Materials Provided:

- Aboriginal art cards & the accompanying scripts (5)
- Dreamings- art book
- Magnetic Dreamings Poster
- Magnetic Drawings Kit, along with the small magnetic board
- Remote control Tarantula
- Spider photo
- Spider rap copy master
- World of Insectivores master
- Sample web design copy master

Materials you supply: (depending on the activities that are chosen)

Spider webs:

- colored string
- construction paper (idea 1)
- glue (idea 1)
- cardboard (idea 2)
- thumbtacks (idea 2)
- wood (idea 3)
- nails (idea 3)

Ants on a stick:

- wooden skewers
- toothpicks
- assorted candy

Coloring w/natural materials:

- white paper
- natural materials, such as bark nuggets, leaves, flowers



Core Learning Ideas:

1. Aborigines live in Australia.
2. Aborigines have made art for thousands of years.
3. Aborigines use bugs in their art and as food.
4. Spiders are arachnids and have 2 body segments; insects have 3 segments.
5. Many cultures use insects for food.

Activity #1: Aboriginal Art

Share the 5 Aboriginal art cards and the accompanying scripts. Have the *Dreamings* art book available, in case there is any added interest.

Art Project #1: Magnetic Dreamings dot kit

Take out the Magnetic Dreamings poster and cylinder and have the children work in groups to make some drawings like the Aborigines did, using the small circles. There is only one magnetic board in the kit. The others could either use a marker board if it is available, or just arrange them on a piece of paper.

Activity #2: Insect Snacks

We heard how the Aborigines loved to eat the honey ants by popping off the abdomen that was full of honey and eating it. Aborigines have eaten many different insects throughout history. Hundreds of Aborigines would come together at the Bogong mountains to feast on the Bogong moths. These moths would gather in large numbers on the cave floors and in rock crevices. They were harvested, cooked in sand and stirred in hot ashes. This would burn off the wings and legs. The moths were then sifted through a net to remove their heads before they were eaten by the Aborigines. Some of the moths were ground into paste and made into cakes.

Another important insect in the Aboriginal diet was witchety grub. This was a moth larva that lived in the roots of the acacia bush, also known as the witchety bush. The grubs were eaten raw or cooked in ashes. Cooked grubs taste like almonds. The grubs were a valued food source in the Australian desert, especially to women and children.

The honey bag bee, a stingless native bee, also provided sweet treats for the Aborigines. The honey bag was actually the bees' hive. In order to find the honey bag, the Aborigines would catch a bee that was feeding on nectar, use sticky plant juice to stick a leaf or flower petal to it, and set it loose. The bee would fly straight home. The attached leaf or petal would slow down the bee and make it easier to see and follow.

Ask the children if they have ever eaten chocolate covered grasshoppers or lollipops that have crickets inside, or any other kind of insect. If the children are still interested (which they usually are), you can share some quick insect eating facts from the World of Insectivores sheet, which is enclosed.

Activity #3: Spiders/ Tarantulas

People in New Guinea eat wood spiders. When roasted, they are said to taste something like peanut butter but not as thick a consistency. Spiders are not insects, but are related to insects. They are arachnids. Both insects and arachnids are in the arthropod class of invertebrates, meaning that they have jointed legs and a hard exoskeleton. Insects have 3 body segments but spiders only have 2. Insects have 6 legs, but spiders have 8 legs. Insects usually have wings and spiders do not. Spiders have no antennae but insects do. Spiders usually have 8 eyes. Show the spider photo.

Many Native American cultures revere spiders and consider them as signs of good luck. Some believe that spiders have curative powers and carry them in necklaces to ward off illness.

The largest spider is the hairy body spider, also known as the tarantula. Spiders have such a unique way of eating. They inject their prey with venom from their fangs. The venom turns the insides of the prey into goo. Then the spider sucks out its supper. Take out the remote control tarantula. Let the children take turns making the tarantula move. Be careful not to have anyone step on it. Real spiders can grow another leg if one is lost, but our remote controlled one cannot grow a new leg.

Activity #4: Spider Rap

Make some copies of the spider rap. Ask for any volunteers who would like to rap the song for the group.

Art Project #2: Webs (Try any of the following ideas)

1. Create a webbed pattern on a piece of construction paper, using contrasting thread dipped in clear glue.
2. On a piece of cardboard, place thumbtacks in preselected locations on the cardboard. Then make a webbed design pulling the string securely around the tacks until you have completed the design. To tie securely, pull the thread through the cardboard and knot securely.
3. Alternatively, build the web using a piece of wood and hammered nails to secure the intersecting threads.

Activity #5: Ants on a stick

This is an edible art project. You will need wooden skewers, toothpicks and an assortment of candy, like marshmallows, licorice, jellybeans, gumdrops and pretzels. Have the children make an anatomically correct ant, making sure it has 3 body segments (head, thorax and abdomen), six legs, and antennae.

Art Project #3: Coloring with natural materials

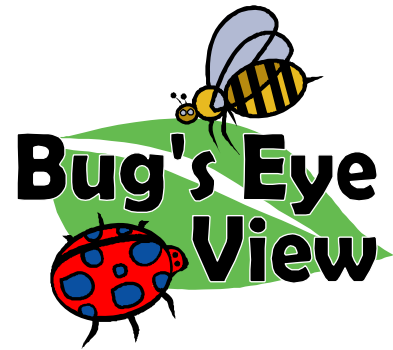
When we heard about the Aborigines, we learned that they sometimes ground up insects and other natural products to make their paintings. We do not have to ground up any insects but we can make drawings with simple materials from outside. Have some leaves, pieces of bark and perhaps some flowers available. Using a white piece of paper, the children can take the piece of bark and draw the trunk of a tree. (You will be amazed at how easy it is to do.) Take some leaves, squish them between your fingers and you can draw with a green color. Dandelion heads will paint with a yellow color. Challenge the children to find some natural materials outside to create other colors.

Extra Resources:

- Eye Witness video- Insects
- Insects in Danger* book
- The Bundle at Blackthorpe Heath- a book about a birthday spyglass and the world of insects that it opened up.



Intermediate KIT: Lesson #4 ***Ch'i Pai Shih, Bees and Insect Vision***



Materials Provided:

- Ch'i Pai Shih art cards and the accompanying scripts (4)
- Fun Fact Book- Bugs and Insects
- Insect Vision copy masters (2)
- Honeybee poster
- Visual Spectrum diagram
- Flowers seen in ultraviolet light photo--a bee's-eye view
- Large fly poster
- SD Bug Rug Tote: with art card, script & instructions

Materials you supply:

- Safety pins
- Seed Beads

Core Learning Ideas:

1. Ch'i Pai Shih was a Chinese artist who painted insects from real life instead of models.
2. Nature is an important part of Oriental art.
3. Honeybees have 5 eyes; 2 of which are compound eyes.
4. Honeybees see ultraviolet light.
5. Insects have blurry vision.

Activity #1: Ch'i Pai Shih

Share the 4 art cards of Ch'i Pai Shih (pronounced She Bye Shou(ld)) and the accompanying scripts.

Activity#2: Bees and ultraviolet light.

Now that you have seen how Ch'i Pai Shih liked to paint bees, let's learn some interesting facts about the bees.

Honeybees have to make about 10 million trips to collect enough nectar to produce 1 pound of honey.

While looking for food, bees may fly up to 60 miles a day.

The term "honeymoon" comes from the middle Ages when a newly married couple was provided with enough honey wine to last for the first month of their married life.

Share pg. 16 in the Fun Fact Book- Bugs and Insects, which shows the life cycle of a honeybee.

Worker honeybees have eyes that are divided into 2 great ellipses on opposite sides of the head. Each compound eye is made up of about 6,000 individual facets, packed tightly together as hexagons and known as ommatidia. Each ommatidia is able to capture light rays from a small angle of view. Show the large poster of a fly's eyes; the bees' compound eyes are similar.

How many eyes do you think a bee has? Actually, bees have 5 eyes in all. On top of their heads are 3 simple eyes, known as ocelli, arranged in a triangular pattern. These simple eyes with a single lens are best for informing the bee of changes in light intensity. These ocelli help them navigate around flowers and getting to and from the hive at dusk and dawn.

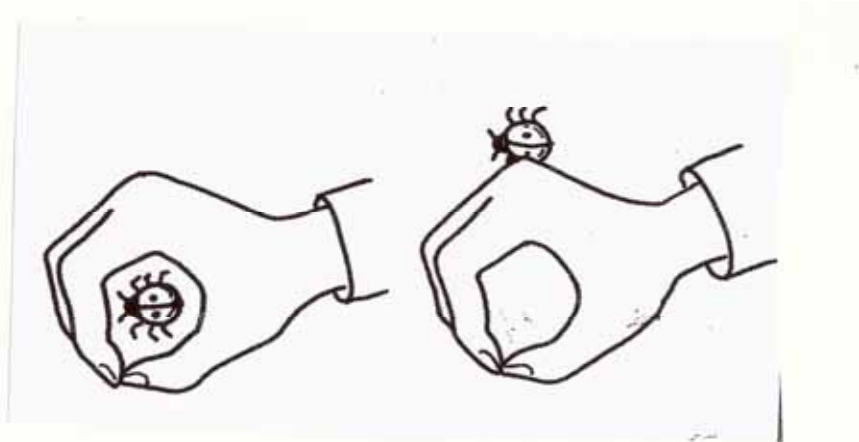
Many of you have probably used the little prism kaleidoscope glasses that let you see the same way that the insects see, but those are not accurate. Insects do not see a kaleidoscope of multiple images when they view something through their compound eyes. Each facet or ommatidium sees part of an image. Thus, they see a mosaic of whatever they are looking at. (Pass around the 2 illustrations of insect vision compared to human vision and the Hollywood version of insect vision. Movies often portray the way insects see as thousands of pictures of the same image, e.g. in the movie *The Fly*) Discuss what it must be like for insects to see that way all blurry. Which way would be better? Insects do not need to see small details. What they really need to see is motion. Your 2 eyes can only look in one direction at a time. So insects with big eyes and many lenses can see almost all the way around their bodies, which is why it is so hard to sneak up on them.

Although both honeybees and people have a visual system based upon 3 colors, the limits of this color sensitivity are very different. People cannot see very far into the ultraviolet region of the electromagnetic visual spectrum. (Display the diagram of the visual spectrum.)

Bees can see rays of light that are invisible to humans: ultraviolet light. This ultraviolet light uncovers colors and patterns that draw the bees to the source of pollen and nectar almost like a landing strip directing the bees to the flowers. (At this point, pass around the images of flowers that show the flowers in natural light on the left and in ultraviolet light on the right a bee's-eye view)

Activity #3: Point of View

With 2 working eyes, you have 2 lenses that are about 2.5 cm. apart at the pupils. This small distance means that each eye sees things just a little bit differently. The difference is enough to give you depth perception, that is, visual clues as to how close or distant an object is and how fast it is moving.



To see how this works, make your hand into the shape of an “o”. Stretch your arm out, and with both eyes open, look through the “o” at something in the distance. Without moving your hand, close one eye. Is the target still visible? Now open that eye and close the other eye. Is the target still visible?

The eye that saw the target through your “o” is your dominant eye.

Art Project #1: Bumble Bee Beaded Safety Pin

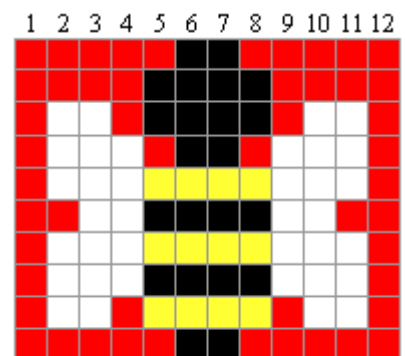
For this project, you will need a large safety pin, smaller safety pins and seed beads for each child. It is helpful, but not necessary to have a needle-nose pliers and a small, flat-head screwdriver.

Materials Needed:

- 12 - 1 1/16 inches Safety Pins
- 1 - 1 3/4 inch Safety Pin
- Seed Beads (see picture for colors needed)

Follow this pattern and the basic directions to complete this project.

Each number column represents a pin; for example, your first pin will have 10 red beads. Your second pin will have 2 red beads, 3 white beads, 1 red bead, 3 white beads, and then 1 red bead. When you thread these beaded pins onto your larger pin, start with pin number 1.



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General directions:

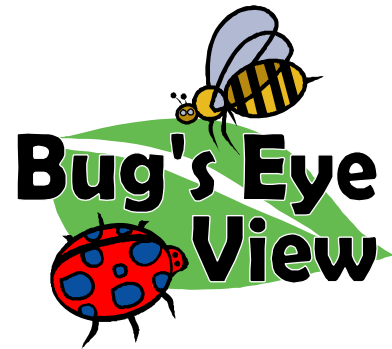
1. Open one of the small safety pins up, slip the seed beads onto the end of it. Close the safety pin. You may want to use the needle-nose pliers to pinch the end of the safety pin so it will not pop open later. Repeat this step until all of the safety pins are beaded.
2. Now you are ready to put all of the beaded pins onto a larger safety pin. Open the safety pin. Use the flat-head screwdriver to slightly pry apart the coils at the end of the large pin. Slip the loop of the first beaded safety pin onto the larger one. Pull it down to the loop at the base of the large pin. Pull it around the loop and up the backside of the pin.

Activity #4: South Dakota Bug Rug

Get the SD Bug Rug tote. Inside you will find the materials to make a latch hook rug that is traveling all over the state, and a script to use with the children.

Extra Resources:

- Eye Witness video-*Insects*
- Insects in Danger*
- The Bundle at Blackthorpe Heath* book



SD Bug Rug

Tub Inventory

- Laminated Direction Sheets (2)
- One plastic box with dividers containing:
 - Bug Rug canvas with 2 clips
 - latch hook tools (2)
 - dark blue yarn (2 bags)
 - bags light blue yarn (2 bags)
 - bags aqua yarn (2 bags)
 - bag dark green yarn (1 bag)
 - bag light green yarn (1 bag)
 - bag red yarn (1 bag)
 - bag orange yarn (1 bag)
 - bags brown yarn (2 bags)
 - bags yellow yarn (2 bags)

Directions

1. Set up the easel on a sturdy surface and adjust to full height
2. Clip the top of the bug rug to the top of the easel so it is displayed and easy to reach.
3. Pick a section of the rug to work on with students. It is easiest to work from top to bottom. The colors on the rug correspond to the colors of yarn.
4. When done, please put yarn and latch hooks away neatly. Re-clip the rug on the display for the next group.

Discuss the following with students:

This project is a "latch hook" rug. It is a very simple form of rug making. With a latch hook rug, we knot threads of yarn into the rug to make an overall picture. The back of the rug is a "rug canvas". The earliest forms of hook rugs were fashioned over two hundred years ago in England and the craft spread to America in New England. Many people without a lot of money would save scraps of yarn from the mills that they worked in and then make rugs and designs for their homes.

Today we are going to have a chance to help make a rug together. It is traveling all over the state, and each location will help us make part of it! The bugs featured in this rug are native in South Dakota.