## Activity: Zoo Bingo! <br> Pre-Zoo Post-Zoo

You might use animal adaptations, categories (frugivore, producers, consumers, precocial, altricial), animal structures, or biomes. For a mid-game switcheroo, have the students trade cards with their neighbor!

## Activity: The Wonder of Webs <br> Pre-Zoo <br> Post-Zoo

By representing an organism and forming a circle, students will connect themselves using string or yarn to visually represent how they depend on one another (a food/energy web).

## Activity and Worksheet: Thumbs Up!

Pre-Zoo
Роst-Zoo
The Thumbs Up! activity and worksheet will help your students conceptualize the importance of a certain advantageous anatomical primate structure- the opposable thumb!

## Activity and Worksheet: Ethology Packet <br> Pre-Zoo <br> Роst-Zoo <br> Zoo-Do!

This packet of resources is designed to guide your students in learning the study of animal behavior. It includes an 'Introduction to Ethology' worksheet, an ethogram data sheet, and a conclusion worksheet and activity.

## Activity: Who Are You?

Pre-Zoo
POST-ZOO ZOo-Do!

This activity would be great to do in one of the Zoo's open space areas (Patas Lawn, Playfield Lawn, or Nature Exploration Area), but can just as easily be played in your classroom!

## Worksheet: Insect Zoo Word Search



Zoo-Do!
Complete the worksheet before or after your Zoo visit, or have them work on the word search while navigating the invertebrates in the Insect Zoo!

## Worksheet: Animath

 Post-Zoo

Zoo-Do!
These addition/subtraction and multiplication/division worksheets are filled with word problems rooted in Zoo Fun Facts.
Pre-Zoo Post-Zoo

To adapt these bingo sheets to your grade level, call out different types of information and animal descriptions to get your students thinking critically about the animals they see on the card in front of them.

For Kindergartners, you might use patterns, colors, and textures, animal names, or general animal categories (mammal, insect, amphibian, four legs, two legs, has wings, lays eggs, etc.). Some other general animal groupings to call out: animals that fly, dig, crawl, hunt, hop/jump, climb, swim, animals that are fast, slow, etc.

For First and Second graders, you might use general animal categories (bird, mammal, carnivore, solitary, social, predator, prey, lays eggs, etc.), or the habitats or continents where animals exist.

For Third, Fourth, and Fifth graders, you might use animal adaptations, categories (frugivore, producers, consumers, precocial, altricial), animal structures, or biomes.

For a mid-game switcheroo, have the students trade cards with their neighbor!

Use Zoo Bingo as a warm-up to your Zoo visit in order to familiarize your students with the animals, or you can use them once you've returned to your classroom to review the animals you experienced at the Zoo!

## ZOO BINGO!

Name:


When you get 5 in a row, be sure to call out "Bingo"!


## Name:



When you get 5 in a row, be sure to call out "Bingo"!


Name:


When you get 5 in a row, be sure to call out "Bingo"!


Name:


When you get 5 in a row, be sure to call out "Bingo"!


## ZOO BINGO! 留荡

## Name:



When you get 5 in a row, be sure to call out "Bingo"!


## ZOO BINGO! 装

## Name:



When you get 5 in a row, be sure to call out "Bingo"!

Animals found on the Zoo Bingo sheets with the GREEN header are:

- Reticulated giraffe (Giraffa camelopardalis reticulata)*
- Green-winged macaw (Ara chloropterus)*
- Polar bear (Ursus maritimus)*
- Honey bees (Apis mellifera)*
- Western lowland gorilla (Gorilla gorilla gorilla)
- Snow leopard (Uncia uncia)*
- Black rhino (Diceros bicornis)*
- Koala (Phascolarctus cinereus adustus)*
- Red-ruffed lemur (Varecia variegata rubra)*
- Domestic turkey (Meleagris gallopavo)
- Nile hippopotamus (Hippopotamus amphibious)*
- Sumatran tiger (Panthera tigris sumatrae)*
- Bald eagle (Haliaeetus leucocephalus)
- Giant anteater (Myrmecophaga tridactyla)*
- Grizzly bear (Ursus arctos)*
- Chimpanzee (Pan troglodytes)*
- California sea lion (Zalophus californianus)*
- Chilean flamingo (Phoenicopterus chilensis)
- Grant's Zebra (Equus quagga boehmi)*
- North American river otter (Lutra canadensis)
- Poison dart frog (Dendrobatidae)*
- Magellanic penguin (Spheniscus magellanicus)*
- African lion (Panthera leo)
- Slender-tailed meerkat (Suricata suricatta) ${ }^{+}$

> * This species is found on all three bingo cards. + This species is unique to this card.

PROGRAMS

# Zoo BINGO! Teacher Key 

Animals found on the Zoo Bingo sheets with the PURPLE header are:

- Eurasian eagle owl (Bubo bubo)+
- Capybara (Hydrochoerus hydrochaeris)+
- Reticulated giraffe (Giraffa camelopardalis reticulata)*
- Green-winged macaw (Ara chloropterus)*
- Polar bear (Ursus maritimus)*
- Honey bees (Apis mellifera)*
- Snow leopard (Uncia uncia)*
- Black rhino (Diceros bicornis)*
- Koala (Phascolarctus cinereus adustus)*
- Red-ruffed lemur (Varecia variegata rubra)*
- Domestic turkey (Meleagris gallopavo)
- Nile hippopotamus (Hippopotamus amphibious)*
- Sumatran tiger (Panthera tigris sumatrae)*
- Bald eagle (Haliaeetus leucocephalus)
- Giant anteater (Myrmecophaga tridactyla)*
- Grizzly bear (Ursus arctos)*
- Chimpanzee (Pan troglodytes)*
- California sea lion (Zalophus californianus)*
- Grant's Zebra (Equus quagga boehmi)*
- Poison dart frog (Dendrobatidae)*
- Magellanic penguin (Spheniscus magellanicus)*
- African lion (Panthera leo)
- Black-tailed prairie dog (Cynomys ludovicianus)
- Western lowland gorilla (Gorilla gorilla gorilla)
* This species is found on all three bingo cards. ${ }^{+}$This species is unique to this card. <br> \title{
Zoo BINGO! <br> \title{
Zoo BINGO! Teacher Key
} Teacher Key
}

Animals found on the Zoo Bingo sheets with the BLUE header are:

- Black rhino (Diceros bicornis)*
- Chimpanzee (Pan troglodytes)*
- Koala (Phascolarctus cinereus adustus)*
- California sea lion (Zalophus californianus)*
- Giant anteater (Myrmecophaga tridactyla)*
- Chilean flamingo (Phoenicopterus chilensis)
- Reticulated giraffe (Giraffa camelopardalis reticulata)*
- Magellanic penguin (Spheniscus magellanicus)*
- Black-tailed prairie dog (Cynomys ludovicianus)
- Snow leopard (Uncia uncia)*
- Red-ruffed lemur (Varecia variegata rubra)*
- Nile hippopotamus (Hippopotamus amphibious)*
- Sumatran tiger (Panthera tigris sumatrae)*
- Grizzly bear (Ursus arctos)*
- Grant's Zebra (Equus quagga boehmi)*
- North American river otter (Lutra canadensis)
- Poison dart frog (Dendrobatidae)*
- Green-winged macaw (Ara chloropterus)*
- Polar bear (Ursus maritimus)*
- Honey bees (Apis mellifera)*
- Komodo dragon (Varanus komodoensis) ${ }^{+}$
- South American coati (Nasua nasua) ${ }^{+}$
- Greater kudu (Tragelaphus strepsiceros)+
- Squirrel monkey (Saimiri sciureus) ${ }^{+}$
*This species is found on all three bingo cards. ${ }^{+}$This species is unique to this card.


## The Wonder of Webs Lesson Plan

EDUCATION PROGRAMS

## Activity: The Wonder of Webs Pre-Zoo Post-Zoo

By representing an organism and forming a circle, students will connect themselves using string or yarn to represent how they depend on one another, eventually creating a complete food/energy web.

## Time:

30 minutes - 1 hour

## Materials needed:

- plant and animal cards (10 African Savanna cards attached)
- large ball of yarn or string


## Procedure:

Assign each student or group of students an identity by giving each student a plant or animal card. It may be helpful to have a few facts on the back to help them familiarize with their organism. Stand in a circle. To start the web, the facilitator represents the sun. Model the game by saying that you are the sun passing the string to (choose a plant/producer) because you give the organism energy to grow. You hold onto the string and pass the ball to the student. That student is now responsible for making a reasoned energy transfer connection. This continues until everyone is holding the string. While sitting still, gently tug on the string, asking students to gently tug when they feel the tug. Watch the web wiggle- we're all connected! Discuss potential impacts to the web. What would happen if...no rain fell for months? A storm blew down trees? There is a fire? A foreign species entered the habitat? Identify one plant/animal that an invasive species will replace and watch how that affects the web's structure. An alternate web-creation option: Have many small food chains within the circle by cutting the end of the thread when it reaches a top carnivore or a decomposer. Then, start over again with the sun passing the thread to another producer.
http://studyiams.scholastic.com/studyiams/iams/science/ecosystems/food-webs.htm http://education.nationalgeographic.com/education/encyclopedia/food-web/?ar a=1
-马u!dəәןs pue suḷsəд quәds









African lion
Panthera leo
-sıołepard pue słeәлчъ


犭э્ણ
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Grant's zebra
Equus quagga boehmi


 sunp łsow ‘ł!






Dung beetle
Scarabaeidae










Marabou stork
Leptoptilos crumeniferus



'sәұелqәұдли! чэұеэ от pnu ч8подч7 syеәq





Hamerkop
Scopus umbretta
-גəұем ұпOчł! М



-səəฝł ł0כ!ude pue






Reticulated giraffe
Giraffa camelopardalis reticulata












Slender-tailed meerkat
-р!!м әчł и! ұЈи!ұхә




'sуәәм мәғ Кләлә дәұем уи!ир оұ әлеч Кןио Кәчұ рие 'ви!ұеәмs





Scimitar-horned oryx
Oryx dammah









Acacia senegal
Senegalia senegal




-8u!̣еәч ґо әsuәs иәәу е әлеч pue sıəшш!мs

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Greater Kudu
Tragelaphus strepsiceros

PROGRAMS

## Thumbs Up! <br> Lesson Plan

## Activity \& Worksheet: Thumbs Up!

## Pre-Zoo

Post-Zoo

## Materials:

- light duty tape (masking or painter's tape)
- stop watches or timers (one per group)
- Thumbs Up! student worksheet
- images of primates and primate hands (some included)


## Procedure:

Have students view the hands of several primates and describe as many similarities and differences as possible. Many primates also have 'opposable toes' that are especially useful in tree climbing. Helping them to grip branches and climb, opossums have specialized toes on their hind feet. Also, a portion of a giant panda's wrist bone aids them in grasping bamboo.

Help students conceptualize how useful an opposable thumb is for humans by gently taping down students' thumbs and having them try to complete a variety of timed tasks. Some 'task' examples: write their name, open a door using a knob, button a button, tie a shoelace, seal a plastic bag, pull up a zipper, unscrew a bottle cap, pick a coin up off of a flat surface, open a jar.

Divide the class into groups. Each student will then take turns timing, attempting activities, and recording their own data. Each task should be completed first with the use of their thumbs (control time). Next, create 'partial' thumbs by taping the lower part of their thumbs to the side of their hands so that only the top joint of the thumbs can move; this represents chimpanzees- opposable thumbs with limited flexibility. Lastly, they should complete the tasks with their entire thumb taped to the side of their hand.

On their data sheet, they should have three times written for each activity. After they have had some time to reflect on these different times, students can discuss a variety of ideas.

- How did my hypotheses stand up to the tests?
- How does having an opposable thumb help humans?
- How do my opposable thumbs help me use tools?



## Western lowland gorilla Gorilla gorilla gorilla



## Western lowland gorilla <br> Gorilla gorilla gorilla



## Western lowland gorilla Gorilla gorilla gorilla



## Red ruffed lemur Verecia rubra



## Red ruffed lemur Verecia rubra




## Red-fronted brown lemur Eulemur rufifrons

## Black and white ruffed lemur Verecia variegata



## Chimpanzee

## Pan troglodytes



## Chimpanzee Pan troglodytes



## Chimpanzee <br> Pan troglodytes



## Emperor tamarin <br> Saguinus imperator



## Emperor tamarin <br> Saguinus imperator



## Pied tamarin <br> Saguinus bicolor



## South American squirrel monkey <br> Saimiri sciureus



## Siamang

Symphalangus syndactylus


François' langur Trachypithecus francoisi




Siamang


Human


Orangutan

© http://pubpages.unh.edu/~jel/512/512-06F_dailynotes.htm

Human thumb bones actually correspond to the sixth finger on the panda hand.


Human hand


Panda hand
© http://evolution.berkeley.edu/evolibrary/article/analogy_06

Human thumb bones actually correspond to the sixth finger on the panda hand.


Human hand


Panda hand
© http://evolution.berkeley.edu/evolibrary/article/analogy_06

## Thumbs Up! Student Worksheet

PROGRAMS
Just how useful are our thumbs? Challenge: complete a variety of activities without them and see how much your use of thumb impacts your time!

Without your thumbs, which activity do you hypothesize will take you the longest to complete? Which activity do you think will take the least time?

Fill out the tables below. First, do all of the activities with use of your thumb. Next, do all of the activities with your 'partial' thumb. Lastly, do all the of the activities with no thumb.

Activity 1:

|  | Time to Complete Activity |
| :--- | :--- |
| With thumb |  |
| With partial thumb |  |
| With no thumb |  |

Activity 2:

|  | Time to Complete Activity |
| :--- | :--- |
| With thumb |  |
| With partial thumb |  |
| With no thumb |  |

Activity 3 :

|  | Time to Complete Activity |
| :--- | :--- |
| With thumb |  |
| With partial thumb |  |
| With no thumb |  |

# ETHOGRAM DATA SHEET Teacher Resource 



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## What "Habitat" Do Students Prefer?

Pre-Zoo
In order to familiarize students with the study of ethology, have students observe other students and notice where they tend to congregate before school, during lunch period, or after school. Ask students to keep observational notes about where the other students gather and some of the behaviors they exhibit at these gathering points. After several days of determining the favorite habitats (maybe have a large class do shifts of days as opposed to all on one day and compile data after a week or so), have your students survey their fellow students in an attempt to find out why they gather where they do. Make sure your students understand that the privacy of all individuals must be maintained, that only willing volunteers should be surveyed, and that all notes and data should be kept confidential.

## Worksheet: Introduction to Ethology Pre-Zoo

## Worksheet: Ethogram Data Sheet

## Zoo-Do!

## Worksheet: Ethology Data Conclusions

## Роst-Zoo

## Species Behavior Compilation Post-Zoo

Have students compile their data from the ethogram data sheet they completed while at the Zoo. Working in groups or individually, students may compile data, calculate percentages, and make graphs. The students may also create additional hypotheses about how they think animal behavior might fluctuate depending on time of day, season, weather, etc.

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## INTRODUCTION TO ETHOLOGY

PRURAM
Name: $\qquad$
Ethology is the study of animal behavior. Studying animal behavior is a way that scientists gain insight to certain species' lives. Scientists use ethograms to help gather data. The data scientists collect can be very helpful in creating effective conservation efforts.

The species I will be studying while spending time at the Zoo:
Common name: $\qquad$

Scientific name: $\qquad$
Some facts about this species that I find interesting: $\qquad$
$\qquad$
$\qquad$

What do you predict will be more or less common behaviors of this species? More: $\qquad$ Less: $\qquad$

Name a reason you are looking forward to observing this species: $\qquad$

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PROGRAMS

## ETHOGRAM DATA SHEET

Name: $\qquad$
Species I am observing: $\qquad$

Behavior Codes:
Grooming The animal is grooming or caring for itself in some way.

Feeding The animal is eating or drinking (includes chewing).
Social The animal is interacting with another animal.
Active $\quad$ A behavior that the animals does on its own, like playing, running, flying, walking, etc.

Inactive When the animal is sleeping, relaxing, being still, or not doing any other behavior you can see.

Not You can no longer see the animal or it is no longer on
Visible
Other You can see a behavior that is not listed above.

Choose one individual animal to observe for a 3 minute period. Every 15 seconds, take note of the behavior that individual is demonstrating at that second. Mark that behavior with an $\mathbf{X}$ or $\checkmark$ into the data sheet below. Even if the animal was jumping at $0: 13$, if it is resting at $0: 15$, mark the box for inactive. By logging the behavior at specified time intervals, you are interval sampling.

Start time: $\qquad$ End time: $\qquad$

| Time elapsed | Grooming | Social | Feeding | Active | Inactive | Not Visible | Other |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $0: 15$ |  |  |  |  |  |  |  |
| $0: 30$ |  |  |  |  |  |  |  |
| $0: 45$ |  |  |  |  |  |  |  |
| $1: 00$ |  |  |  |  |  |  |  |
| $1: 15$ |  |  |  |  |  |  |  |
| $1: 30$ |  |  |  |  |  |  |  |
| $1: 45$ |  |  |  |  |  |  |  |
| $2: 00$ |  |  |  |  |  |  |  |
| $2: 15$ |  |  |  |  |  |  |  |
| $2: 30$ |  |  |  |  |  |  |  |
| $2: 45$ |  |  |  |  |  |  |  |
| $3: 00$ |  |  |  |  |  |  |  |
| Total marks: |  |  |  |  |  |  |  |

Name: $\qquad$
What behaviors occurred most often and least often? Is this different than what you predicted? $\qquad$
$\qquad$
$\qquad$
$\qquad$

Did any behavior surprise you? Why or why not? $\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

How do you think the raw data you gathered about this species' behavior can help aid conservation efforts? $\qquad$
$P R O G R A M S$

## Activity: Who Are You?

Pre-Zoo Post-Zoo Zoo-Do!
This activity would be great to do in one of the Zoo's open space areas (Patas Lawn, Playfield Lawn, or Nature Exploration Area), but can just as easily be played in your classroom!

## Materials:

- Optional: index cards or labels with animals written on them (1 per student)


## Procedure:

As a class, one student thinks of an animal (or plant or fungi) and the other students have twenty questions to try and figure out what the organism is. The student who successfully guesses the animal gets to 'brainstorm' during the next round.
A variation: Pre-make sheets of labels/cards with animals written on them. When the students are ready to play, a label is put on each student's back (or a card is held up to their forehead so they are unable to see which animal they have been assigned). To encourage mingling, each student can only ask one question per classmate. This will keep students moving and will require them to shape their questions based on the answers they have received previously.

INSECT ZOO WORD SEARCH

Name:
T PL L B D R Q R RN VB S B
AN E GT L H K BM X M G FA
CC AC F X A NMKQUQDR
PW FR WB X C LA B I U CC
AD I WE I E F K R B NP A T
V W N K GT UM E W GM K D I
F G S ON S ST X B I CP OM
GU EX U K A E E DU D X ER
W R C C G W Y E V R R Z OM E
G WT D T C T F OR E O E W H
U OP N V L X K X VA LI ND
VC A E E B Y EN OH H T LN
RI UT LA G NA Z WV DX A
G F OO O DG I A O Y R X E L
D AR K L I N G B E E T LE R

| RED HARVESTER ANT | DUNG BEETLE | BLACK WIDOW |
| :--- | :--- | :--- |
| LAND HERMIT CRAB | HONEY BEE | DARKLING BEETLE |
| GIANT WATER BUGS | LEAF INSECT |  |

## ANIMATH Addition and Subtraction

Name:

## RAPID READERS

Our chimpanzees are handed a stack of 12 magazines. In an hour, they have finished looking at 3 magazines. How many do they have left to look through? By the end of the day, they have looked through 8 more magazines. How many do they have left over?

My work and answer:

## HOP ABOUT

The Australian WalkAbout is full of different species! You see 9 red kangaroos, 1 gray kangaroo, 3 wallabys, 2 wallaroos, and 1 emu. How many total animals do you see in the WalkAbout?

My work and answer:


BIG DADDY
At 2 years old, our Komodo Dragon had a 24inch body. If his total length was 47 inches, how long was his tail?

My work and answer:


## WIDE WINGS

If a bald eagle has a wingspan of 80 inches and a turkey vulture has a wingspan of 65 inches, what is the difference of their wingspans?


My work and answer:

## ANIMATH Addition and Subtraction

Name:

## PRAIRIE DOG SNACK

There are 42 prairie dogs enjoying an afternoon yam snack when a gull flies overhead and scares 39 of them into burrows. How many prairie dogs stayed above ground?

My work and answer:


## AFRICAN ADVENTURE

In the three-acre African Savanna, you see 4 Reticulated giraffes, 4 Greater kudus,
2 Scimitar-horned oryx,
3 Grant's Zebras,
5 Yellow-backed duikers, 5 Ostriches,
2 Eastern African crowned cranes, and 4 Marabou storks. How many total animals do you see in the African Savanna?

## BUSY BEES

35 honey bees are very busy pollinating the cardoon flowers in Greenie's
Conservation Corner. As you walk by, 18 honey bees fly away. How many honey bees are left at Greenie's?

My work and answer:


## MARCHING PENGUINS

If there are 52 adult penguins on Penguin Island and 5 new chicks join them after March of the Penguins, how many penguins are now on Penguin Island?

My work and answer:

## ANIMATH Multiplication and Division

Name:

## TAIL PRIDE

African Lion's tails are around 3.5 feet long. If there are 3 lions in the Zoo's pride, how many inches of African Lion tail are swishing at the Zoo?

My work and answer:

## LOTS OF LEGS

Australian walking sticks have 6 legs. In the Insect Zoo, you can find 6 walking sticks. How many walking stick legs are crawling in the Insect Zoo?

My work and answer:

My work and answer:

## LEAPING LEMURS

Ring-tailed, black, red ruffed, black and white ruffed, blueeyed black, and redfronted brown lemurs all live in Lipman Family Lemur Forest. If there are 6 of each type of lemur, how many lemurs live at the San Francisco Zoo?

## SPECIAL DELIVERY

Each morning, 3654 pounds of food leave the commissary for our hoofed animals. If each exhibit receives 203 pounds of food, how many hoofed animal exhibits are there?

My work and answer:



## ANIMATH Multiplication and Division

## Name:



Very hungry koalas can eat up to 160 branches of eucalyptus every day. If the Zoo has 5 koalas, how many branches of eucalyptus are they fed on a daily basis? If each branch is 4 feet long, how many feet of branches do the keepers feed the koalas every day?

My work and answer:

## GULPING GORILLA

A baby gorilla drinks 150 g of milk every day. How many days would it take her to finish this bottle?


My work and answer:

## ${ }_{-}^{600} \mathrm{~g}$



GOODNIGHT GOATS
If there are 15 goats in
the Fisher Family Farm and at night they sleep 3 per stall, how many stalls must there be in the barn?

My work and answer:

## JUMP FOR JOY

If a snow leopard can jump 20 feet in a single leap, how many times would it need to jump to reach

