



iExplore

Biodiversity Curriculum Guide

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iExplore

The Houston Museum of Natural Science iExpore program sponsored by Aramco provides STEM education opportunities for students and educators. Aramco supports STEM education globally.

Museum Behavior Expectations



Keep a safe distance from displays and objects.



Stay with your adult helper.



Turn off your cell phone.



Use a quiet voice to respect other visitors.



Keep your hands and feet to yourself.



Walk, don't run in the Museum halls.

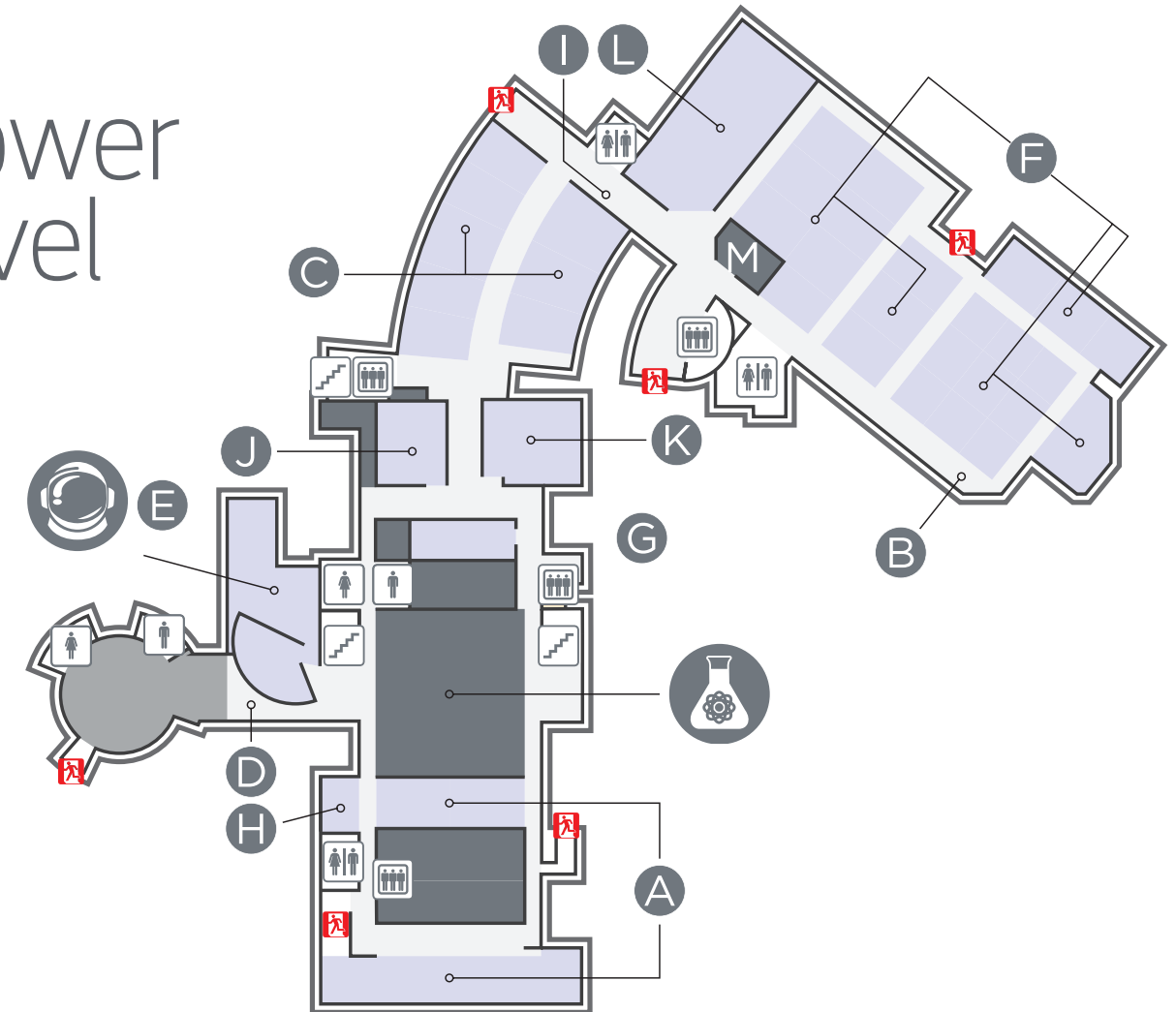


Do not eat, drink or chew gum in the Museum halls.

Museum Map

- | | |
|---|--|
|  Welch Hall of Chemistry |  Expedition Center |
|  A Albert and Margaret Alkek Education Center |  H Scout Office |
|  B Animal Alcove |  I Vintage Texas Wildlife Dioramas |
|  C Education Classrooms |  J Volunteer Library |
|  D Evelyn and Herbert J. Frensey Hall of Astronomy |  K Volunteer Office |
|  E Expedition Center |  L The W. T. And Louise J. Moran Lecture Hall |
|  F Hall of Science Exploration Education Classrooms |  M Youth Education Office |
|  G Lower Level Conference Room | |

Lower level



Museum Map



Morian Hall of Paleontology



Albert & Ethel Herzstein Foucault Pendulum



Alfred C. Glassel, Jr. Hall



Museum Services



Hall of Special Exhibitions
Brown Gallery
Fondren Gallery
Hamill Gallery
Jones Gallery



restrooms



garage parking



elevators



garage elevators



stairwells



garage stairwell



food

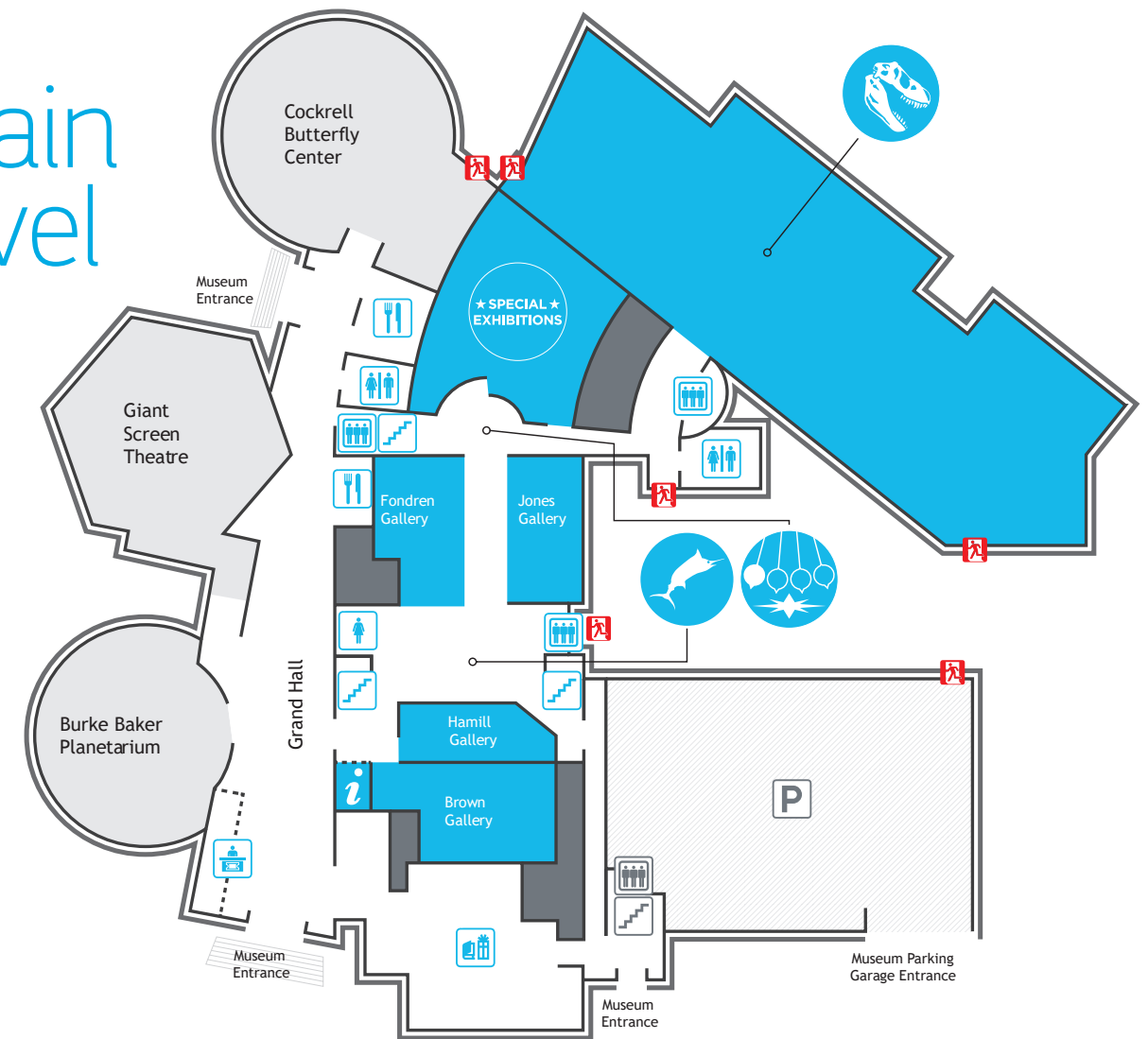


emergency exit



box office

Main level



Museum Map



Cullen Hall of Gems and Minerals



Lester and Sue Smith Gem Vault



Dorothy and Artie Mcferrin Gallery



Strake Hall of Malacology



Cabinet of Curiosities



Evelyn and Herbert Frensley Hall of African Wildlife Graham Family Presentation of Ecology and Conservation Biomes



Hamman Hall of Texas Coastal Ecology

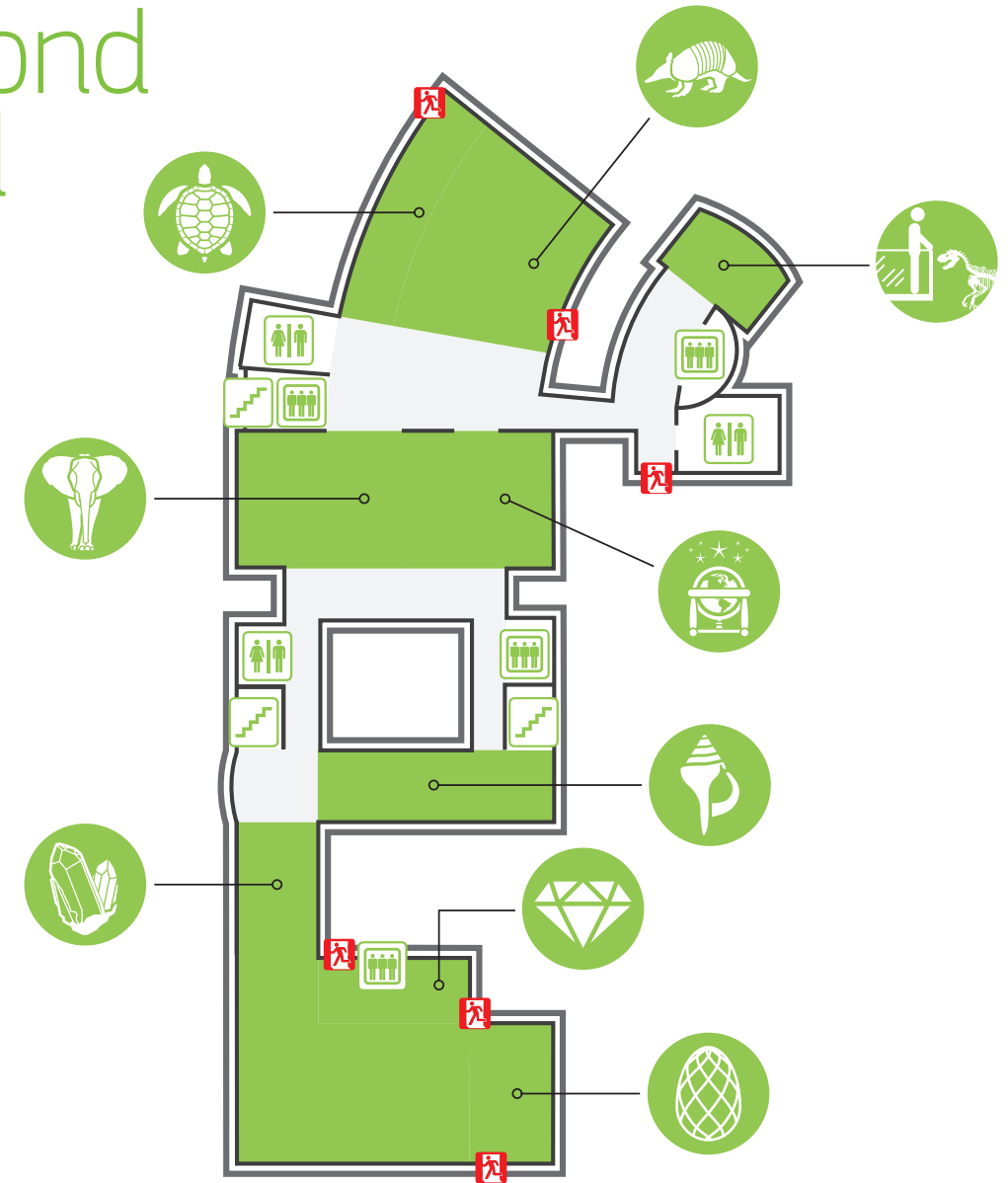


Farish Hall of Texas Wildlife



Morian Overlook

Second level



Vocabulary

Abiotic

Things in nature that are not alive, like rocks, water, sunlight, and temperature.

Adaptation

A special body part or behavior that helps an animal or plant survive.

Biodiversity

Having many different kinds of plants and animals in one place.

Biotic

All the living things in nature, like plants, animals, and bacteria.

Carrion

The decaying flesh of dead animals that serves as food for scavengers and decomposers.

Consumer

An animal that gets energy by eating other living things.

Decomposer

Living things like mushrooms and bacteria that break down dead plants and animals.

Detrivore

Animals that eat dead and decaying plant and animal material (detritus) to help break down organic matter.

Ecosystem

A place where living and non-living things work together.

Energy Flow

How energy moves from the sun to plants, then to animals that eat plants, then to animals that eat other animals.

Food Chain

A simple line showing what eats what in nature.

Food Web

Many food chains connected together, showing how all living things depend on each other.

Herbivore

Animals that only eat plants.

Inherited Traits

Features that animals and plants get from their parents, like eye color or fur color.

Limiting Factor

A resource or environmental condition (e.g., water, space, temperature) that restricts population size.

Matter Cycling

How important materials like water and nutrients move around in nature and get used over and over.

Mimicry

When one animal looks or acts like another animal to stay safe or catch food.

Niche

The special job or role that each living thing has in its home.

Photosynthesis

How plants use sunlight, water, and air to make their own food.

Primary Consumer

An animal that eats plants (like rabbits or deer).

Producer

Living things (usually plants) that make their own food from sunlight.

Secondary Consumer

An animal that eats other animals (like hawks or snakes).

Structural Adaptation

A physical feature of an organism's body that helps it survive (e.g., beak shape, camouflage, thick fur).

Tertiary Consumer

Animals at the top of the food chain that eat other meat-eating animals.

Trophic Level

The different levels in a food chain, like plants, plant-eaters, and meat-eaters.

Frensley/Graham Hall of African Wildlife

Find this hall on the second level next to the
Hamman Hall of Coastal Ecology.



**FUN
FACT**

The African grasslands have wet and dry seasons that make huge groups of animals move around, like the Great Migration of wildebeest and zebras.



Frensley/Graham Hall of African Wildlife

How the Ecosystem Works

Find the Lowveld display and read the panel with the title, "What is an Ecosystem".

Look at the food web. Label each animal with its trophic level: Producer, Primary Consumer, Secondary Consumer, and Detritivore.

Zebra: _____

Lion: _____

Gazelle: _____

Grasses: _____

Vulture: _____



Look at how animals and plants in this ecosystem work with both biotic and abiotic things to stay alive and choose the correct answer to each question.

Biotic things working together (Choose one):

- A) A vulture eating carrion from a lion's kill
- B) Rocks breaking down into dirt
- C) Sunlight warming the ground

Biotic & Abiotic working together (True/False):

Shade from trees helps animals stay cool.

- A) True
- B) False

Abiotic things helping animals (Choose one):

- A) Termites building a hill
- B) Rain helping grass grow
- C) Lions hunting zebras

Remember: Biotic = living things, Abiotic = non-living things

Secret Message Clue #1: If you chose A as the answer to the first question, your first letter is R, if you chose another answer, the letter is D.

Biodiversity & Animal Niches

Find the Ethiopian area and read “*Living Together in Harmony.*” Then find the West African Forest display.

Compare the biodiversity in the Ethiopian area with the West African Forest.

Circle TWO differences and TWO similarities:

Differences:

- A) More rain in the forest affects which animals can live there
- B) Fewer tree animals in Ethiopian area because of different habitat
- C) Different temperatures create different limiting factors
- D) Same predators in both places

Similarities:

- E) Producers make food through photosynthesis in both places
- F) Herbivores live in both places
- G) Both have seasons that affect matter cycling
- H) Both have the same abiotic conditions



How do different animals have different niches in the same place?

- A) They all compete for exactly the same food source
- B) They eat different foods or use different feeding strategies to reduce competition.
- C) They don't eat at all

Hint: Look for animals that use different structural adaptations to get food.



Why is biodiversity important for an ecosystem?

Use what you see in both displays to explain:

Farish Hall of Texas Wildlife

Find this hall on the second level of the Museum.



**FUN
FACT**

Texas has four main ecosystems: forests, grasslands, deserts, and coasts. Each area has different plants and animals with special adaptations.



Farish Hall of Texas Wildlife

Texas Ecosystems

Pick one Texas ecosystem shown in the hall.

Ecosystem Name: _____

Biotic Factors	How Animals Use Them
1.	1.
2.	2.
3.	3.



Abiotic Factors	How Animals Use Them
1.	1.
2.	2.
3.	3.



How might animals respond if temperature became much hotter?

A) Some animals would change their habitat or develop new adaptations

B) Nothing would change in the ecosystem

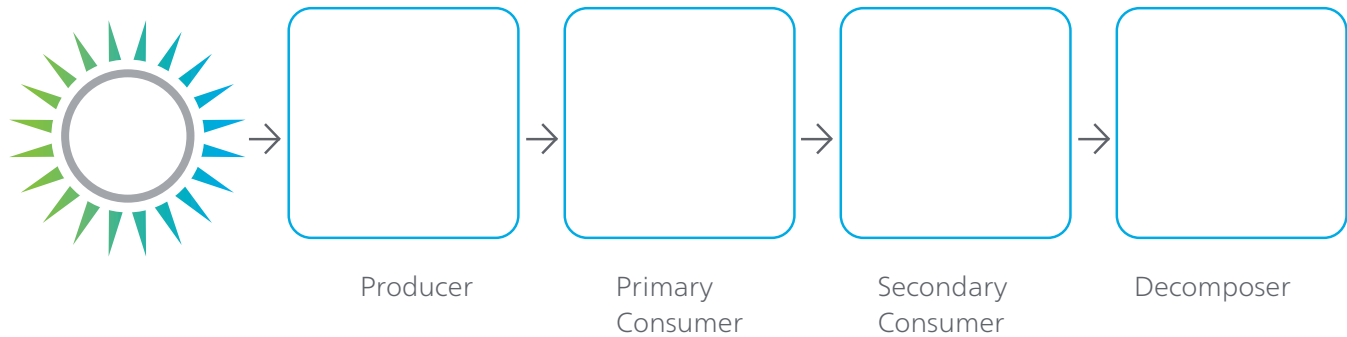
C) All animals would become extinct right away

Explain your choice:

Energy Flow in Food Chains

Using animals you see, make a food chain that shows energy flow.

Fill in the food chain showing different trophic levels:



The arrows show energy flow. What do the arrows mean?

- A) Which animal is bigger
- B) Energy moving from prey to the predator that eats it
- C) Which animals are friends

Hint: Energy flow starts with the sun and goes to producers first through photosynthesis.

Secret Message Clue #2: Look at your food chain. If it shows interdependence between different trophic levels, your second letter is "I". If not, your letter is "N".

Structural Adaptations for Survival

Find these animals and look at their structural adaptations.

Animal	Draw Teeth/Beak	What It Does	How This Adaptation Helps
American Alligator		A. Grinding plants B. Grabbing prey C. Filtering tiny food	
Bald Eagle		A. Tearing meat from prey B. Cracking seeds C. Drinking nectar with proboscis	
Pronghorn		A. Chewing plants B. Stabbing prey C. Crushing shells	
Mottled Duck		A. Filtering food from water B. Drilling wood C. Chewing bones	

Pick two animals that have different structural adaptations to solve the same survival problem.

Problem: _____

Animal 1: _____ Adaptation: _____

Animal 2: _____ Adaptation: _____

Hamman Hall of Texas Coastal Ecology

This hall is connected to the Texas Wildlife Hall.



**FUN
FACT**

Coastal wetlands can reduce storm damage by up to 70%,
protecting us from hurricanes naturally.



Hamman Hall of Texas Coastal Ecology

Houston's Coastal Ecosystem

Find Houston on the Texas map on the wall.

Mark Houston on the map and
describe the coastal ecosystem
around Houston.



Choose 3 abiotic and biotic factors that
describe Houston's coast:

- Wetlands (habitat for many animals)
- Barrier islands
- Grasslands ecosystem
- Mountains
- Coral reefs
- Bays and rivers meeting the ocean (affects salinity)
- Tropical rainforest ecosystem

Ecosystem Description: Write one sentence
describing Houston's coastal ecosystem.

Why is this coastal ecosystem important to
Houston? (Circle one from each group)

Economic reasons:

- Fishing and seafood (consumers in food webs)
- Tourism and fun activities
- Oil and gas (affects abiotic factors)
- None of these

Environmental reasons:

- Storm protection (ecosystem service)
- Cleaning water
- Habitat for animals
- None of these

Cultural reasons:

- Fun activities
- Our culture and history
- Learning about biodiversity
- None of these

Changes in Ecosystems

Study the oyster reef ecosystem.



Sort these parts of the oyster reef ecosystem into biotic or abiotic.

Components: oysters, fish, crabs, algae, salinity, water temperature, dissolved oxygen, substrate

Biotic Factors	Abiotic Factors

What would happen to energy flow and matter cycling if these changes occurred?

Hurricane damage to the reef:

Energy flow:

- A) Less energy flow from damaged producers
- B) More energy everywhere
- C) No change in energy flow

Pollution in the water:

Matter cycling:

- A) Pollution disrupts matter cycling
- B) Makes perfect matter cycling
- C) No effect on matter cycling

Secret Message Clue #3: If you chose "A" for pollution effects on matter cycling, your next letter is "V". If different, your letter is "T".

Morian Hall of Paleontology

This hall is on the main level next to the elevators.



**FUN
FACT**

Trilobites were very successful animals that lived for over 270 million years and had some of the first complex eyes.



Morian Hall of Paleontology



Fossil Evidence of Extinct Animals

Look at the Trilobite Timeline.

Check the three inherited traits that ALL trilobites had:

- ☐ Body made of many ring-like sections
- ☐ Hard outer shell
- ☐ Three body parts: head, middle, and tail
- ☐ Smooth, soft skin
- ☐ Only two body parts
- ☐ Backbone made of bones

How are fossils of extinct animals made?
Circle the right answer:

- A) All dead things immediately turn to stone
- B) Quick burial in mud, then minerals replace the body over millions of years
- C) Freezing makes all fossils
- D) Fossils only form in volcanoes

Hint: Think about how the substrate (mud), pressure, and minerals work over millions of years.
Secret Message Clue #4: If you answered “B”, your next letter is “E”. Any other answer gives you “S”.

Ancient Animal Structural Adaptations

Find four different dinosaurs and look at their structural adaptations for survival.

Structural adaptations:
Armor plates, long neck, sharp claws, tail club, spikes, horns

Functions:
Protection from predators, reaching high producers, hunting prey, defense, moving, eating

Animal	Structural Adaptation	What It Did	Modern Animal with Similar Adaptation
<i>Stegosaurus</i>	<i>Spiked tail (example)</i>	<i>Protection from predators</i>	<i>Porcupine quills</i>
Diplodocus			
Triceratops			
Ankylosaurus			
T. Rex			

Which structural adaptation would be most helpful for animals in today’s ecosystems?

Best adaptation: _____

Why it would help in modern habitats: _____

Cockrell Butterfly Center

The Butterfly Center is located at the far end of the Grand Hall



**FUN
FACT**

Many butterflies use mimicry to copy the colors of butterflies that are harmful to eat and trick predators.



Cockrell Butterfly Center

Watch the animals and plants as you explore. Notice their structural adaptations, how they work together in food webs, and how they use biotic and abiotic factors around them.

Things to Look For (Circle when you see them):

- Animals using mimicry or camouflage adaptations
- Plants and insects working together (like producers and consumers)
- Structural adaptations
- Animals finding their niche in the ecosystem



Secret Message Clue #5: Find a butterfly with orange and black colors (this might be mimicry!). If you see one, your next letter is "R". If not, your letter is "Q".

Putting It All Together, Classroom Activities

Secret Message Challenge

Use your clues to decode the nature message!

Clue #1 (African Wildlife): _____

Clue #2 (Texas Wildlife): _____

Clue #3 (Coastal Ecology): _____

Clue #4 (Paleontology): _____

Clue #5 (Butterfly Center): _____

Secret Word: _____

Use this word in a sentence about ecosystems and biodiversity.

Healthy Ecosystems

Based on what you saw at the Museum, describe what makes an ecosystem healthy. Include both biotic and abiotic factors.

Conservation Design

Design a way to help protect biodiversity in Texas ecosystems. Think about what you learned about limiting factors and human effects on habitats. Include the following information in your plan.

- Problem to solve
- Your solution
- How it protects biodiversity
- How it helps energy flow and matter cycling

Predicting Changes in Food Webs

Draw a food web using: eagle (Secondary or tertiary consumer depending on prey), butterfly (primary consumer), plant (producer), sun (energy source), lizard (secondary consumer), decomposer (mushrooms). Don't forget arrows showing energy flow!

What would happen to the food web if:

All butterflies became extinct from bug spray:

Prediction: _____

A drought killed many producers:

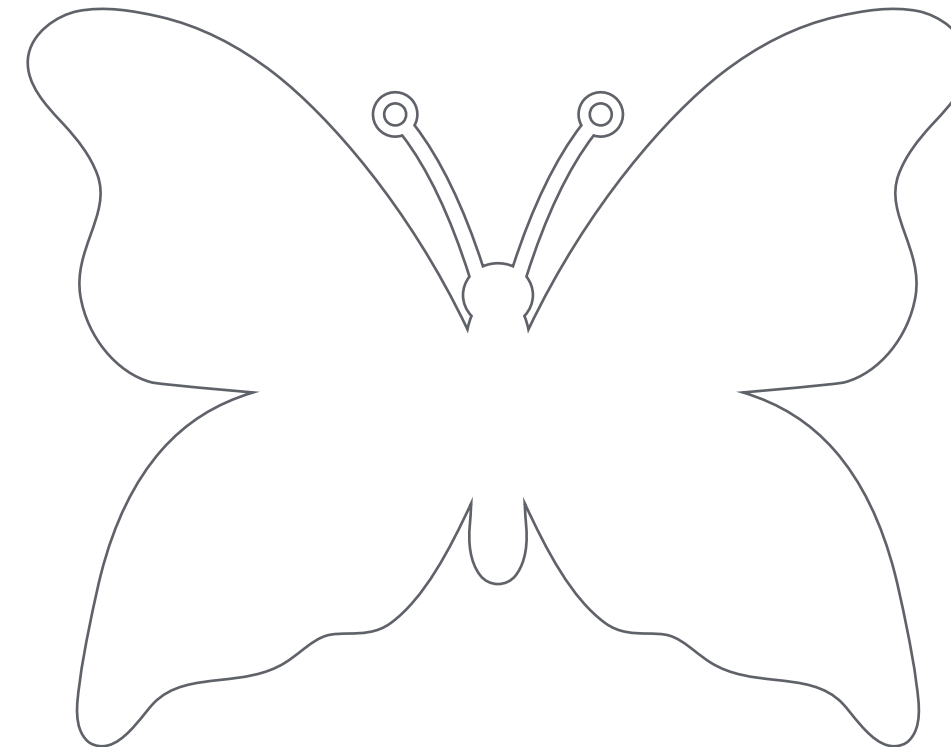
Prediction: _____

Create a Butterfly with Adaptations

Design a butterfly that would be hard for predators to see on a tree.

This structural adaptation could include mimicry. Color your butterfly, then explain your choices.

Why I chose these adaptations:



Think About It: Questions for the Classroom

What was the most surprising thing you learned about how adaptations help animals and plants survive in their ecosystems?

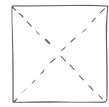


How do the structural adaptations and behaviors you saw help you understand why biodiversity is important for ecosystem health?

What is one thing you can do to help protect habitats and prevent animals from becoming extinct in your community?

Food chains

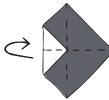
how to make



1. Carefully cut along the outline of the square. Fold and unfold the square in half diagonally in both directions to make two creases that form an X.



2. Place the paper face down, and. Then fold each of the four corners in so that their points touch the center.



3. Turn the paper over so the flaps are face down. Again, fold each of the four corners in so their points touch the center.



4. Fold the square in half, making a rectangle. Unfold and fold in half in the opposite direction, making a rectangle.



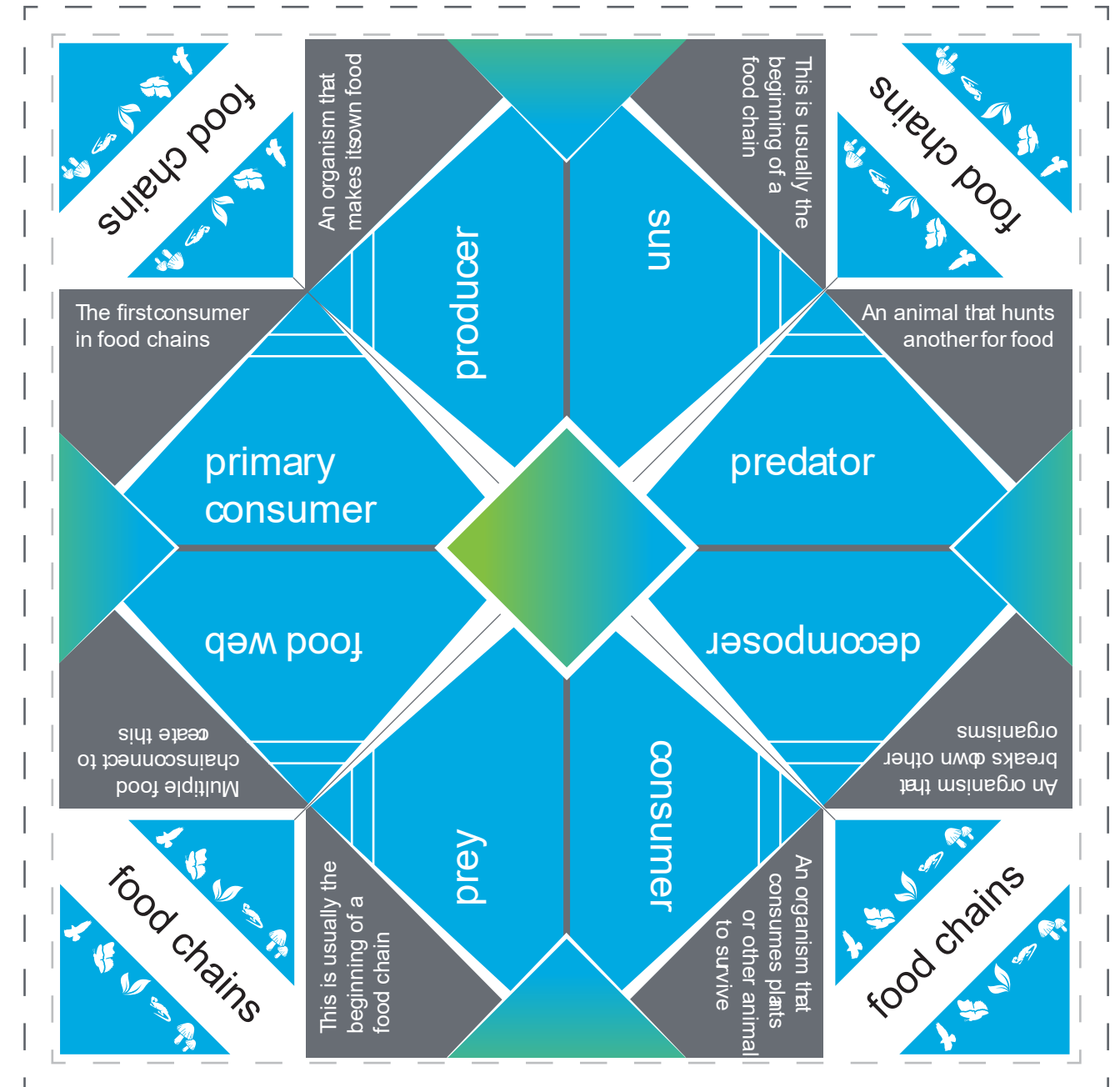
5. Slide both index fingers and thumbs under the four flaps.

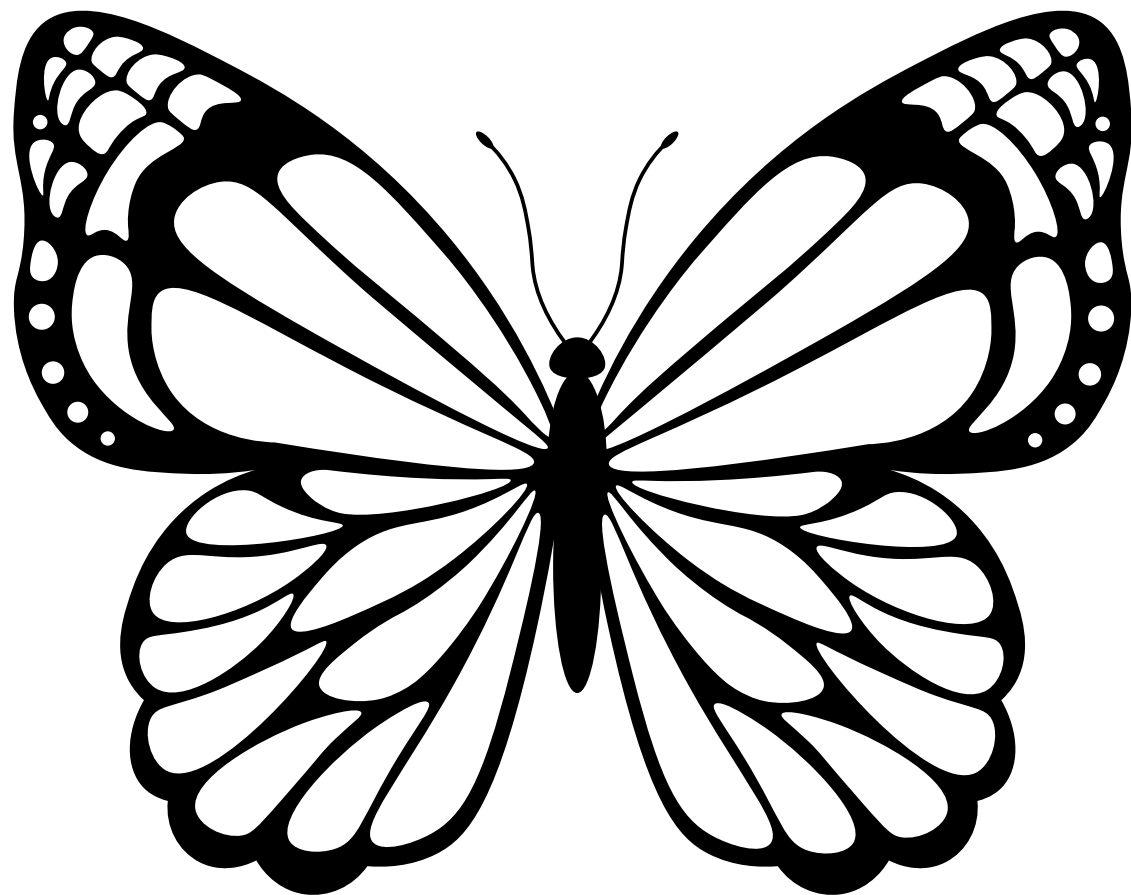


6. Use your thumbs and index fingers to pinch the top corners together and form a point. You are ready to play.

how to play

1. Choose a number from one to five.
2. Open and close the cootie catcher (front to back and then sideways) as many times as the number selected.
3. Choose one of the four questions shown inside and answer it.
4. Lift the flap on which the question is written and check the answer.
5. Continue playing in the same way until all eight questions have been answered.





Color and return to your teacher.
Your artwork will be sent to the
Houston Museum of Natural
Science.

Name _____

School _____

Grade _____

What I liked
best about the
Museum...

Sincerely, _____

(Print your name on the line)

Notes

