Zootopia

MATH & SCIENCE

2016 SUMMER CAMP

hosted by MAST Academy

UTEP and YISD

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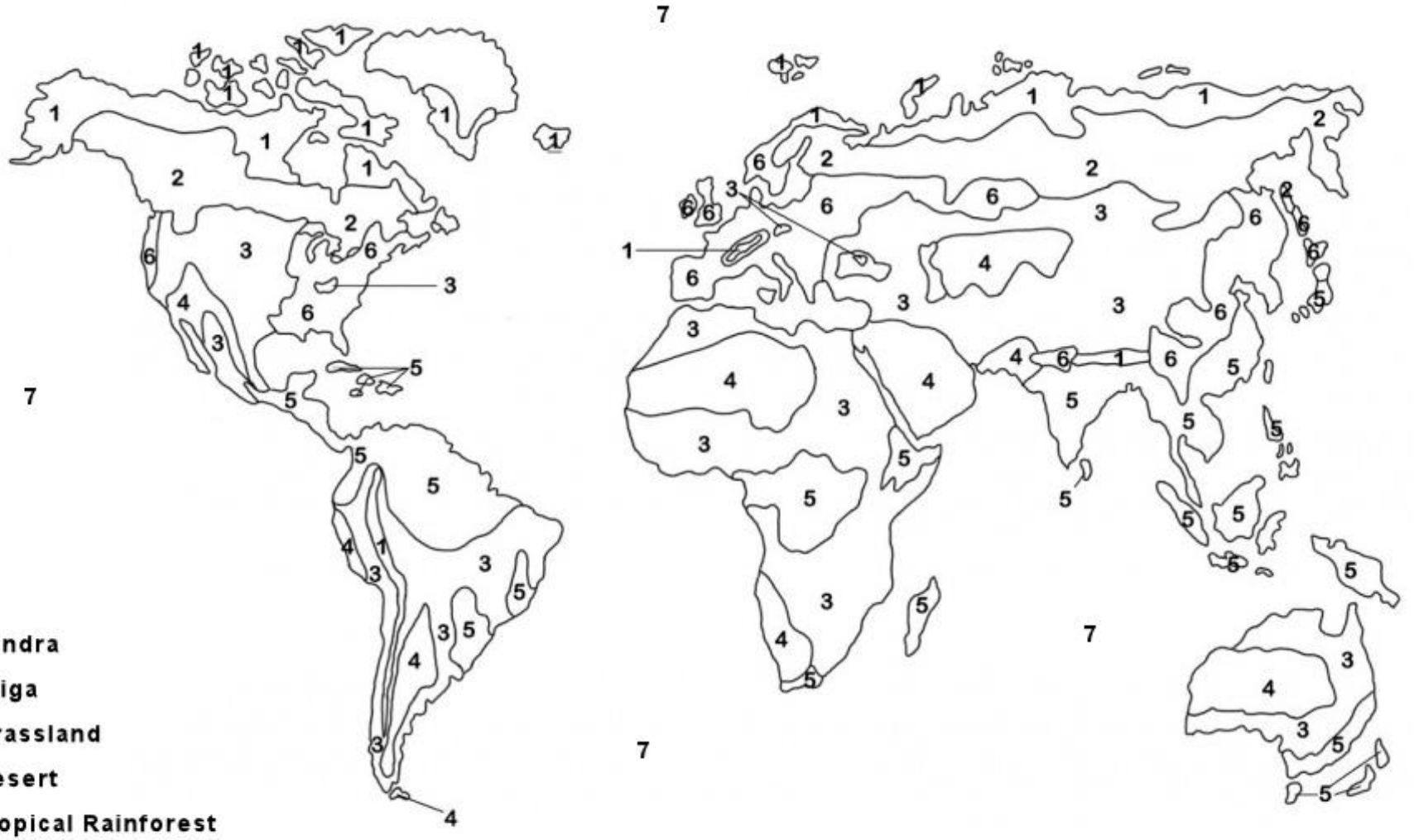
Message: One world, we share it
Every animal has impact, no matter how
Get MAD — "Make A Difference"

MAJOR BIOMES OF THE WORLD



KEY

- ☐ 1 - Tundra
- ☐ 2 - Taiga
- ☐ 3 - Grassland
- ☐ 4 - Desert
- ☐ 5 - Tropical Rainforest
- ☐ 6 - Temperate Deciduous Forest
- ☐ 7 - Marine (Saltwater)

Habitats in Various Biomes/Characteristics

Variations:
Regions around the world are divided into different **biomes** (major communities of organisms that have a characteristic appearance and that are distributed over a wide land area defined largely by regional variations in climate). The variations in climate are mainly due to the amount of available moisture and the temperature. You can predict which biome will be supported in a particular area based on the amount of precipitation and the mean annual temperature.

Productivity/Life Forms
The productivity of an ecosystem is strongly influenced by the amount of precipitation and the mean annual temperature.

<u>Biomes</u>
Grasslands
• Halfway between the equator and the poles
• Once covered much of the interior of North America, and were widespread in Eurasia and South America
• Many of these areas have been converted into agricultural land
• In North America, huge herds of bison and pronghorns once lived on the prairies.

Deserts
• Dry places where less than 25 centimeters (10 inches) of rain falls in a year
• Very little vegetation
• Survival depends on water conservation (adaptations that allow for this)
• Most desert vertebrates live in deep and cool burrows
• Many animals are active only at night
• Some animals, like camels, can drink a lot of water when it is available, and then survive long, dry periods
• In general, in the interior of continents (including the Sahara in Africa, the Gobi in Asia, and the Great Sandy Desert in Australia)

Rainforests
• Receive 140 to 450 centimeters (55 to 177 inches) of rain a year
• Richest ecosystems on earth
• Contain at least half of the earth's species of terrestrial plants and animals (more than 2 million species)
• In South America, Africa, and Southeast Asia

Forests
Temperate Deciduous Forests
• Warm summers and cool winters
• Plentiful rains
• Deer, bears, beavers, and raccoons live in temperate regions
• Eurasia, northeastern United States, eastern Canada

Temperate Evergreen Forests
• Cold winters and a seasonal dry period
• The pine forests of the western United States, the California oak woodlands, and Autralian eucalyptus forests are typical evergreen forests
• Many of these forests are endangered by overlogging (especially in the western U.S.)

Taiga
• Winters are long and cold; most of the limited precipitation falls in the summer
• Northern forests of coniferous trees
• Extends across vast areas of Asia and North America
• One of the largest ecosystems on earth
• Few people live there (growing season is short)
• Many large mammals live here (elk, moose, deer, wolves, bears)
• Fur trapping and logging have been extensive in this region
• Marshes, lakes, and ponds are common
• Most of the trees occur in dense stands of one or a few species

Tundra
• Far north
• Few trees grow
° The grassland (called tundra) is open and windswept
• Covers one-fifth of the earth's land surface
• Very little rain or snow falls
• Large mammals live here (musk-oxen, caribou, wolves, foxes)

<u>Habitats Not Considered "Biomes"</u>
Mountains/Mt. St. Helens/Dwarf plant varieties
• Above a certain elevation, trees no longer grow
• Plant growth is sometimes stunted resulting in "dwarf" varieties that are much shorter than the normal plants
• Resources (food, water, shelter, space) are limited and the plants compete for them.

Oceans/Coral reefs/Marine life
• Salt water
• Animals are adapted to salt water habitat
• 40% of the world's photosynthetic productivity is estimated to occur in the oceans

Wetlands
• Areas of land that have permanent standing water
• Very important as habitat for migrating birds
• Water source for animals

Estuaries
• Wetlands where fresh water and salt water mix
• Plants must be adapted to tolerating salt
• Some plants "sweat" out the salt (salt grass), others shun it to certain parts which then fall off (pickleweed)

Freshwater ponds
• Have three zones where organisms occur (distributed according to the depth of the water and its distance from shore)
• Found where there is permanent standing water
• The water table is just at or just above the surface
• Saturated soil
• Water-loving, non-woody, short, plants
    • Animals rely on ponds and lakes as water sources

Habitat Bingo
Classroom Activity

SYNOPSIS

Students will learn about different habitats (or biomes) and some of the animals that are adapted to live there. Participation in the "Habitat Bingo" game will reinforce the content learned.

OBJECTIVES

Students will be able to:

- state the characteristics of five different habitats/biomes
- identify the habitat/biome in which ten different animals live

VOCABULARY/CONCEPTS

- biome
- grassland
- taiga
- rainforest
- tundra
- temperate evergreen forest
- temperate deciduous forest
- wetland

MATERIALS (all included in this document)

- bingo cards (5 different ones)
- habitat tokens - for students
- habitat tokens - to draw from
- answer key (last page)
- background information
- PowerPoint
-

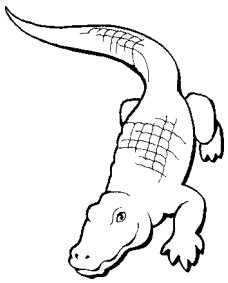
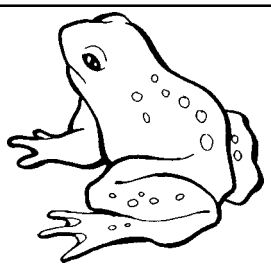
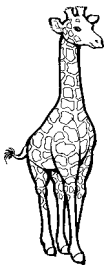
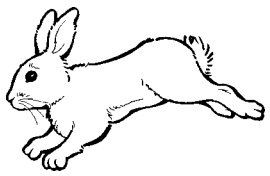
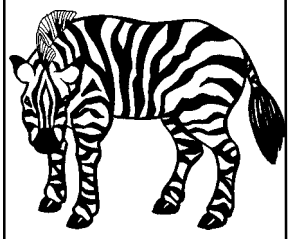
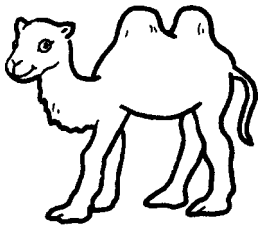
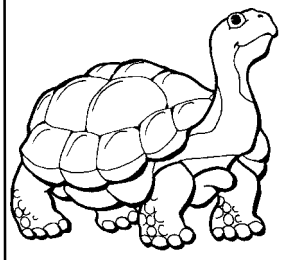
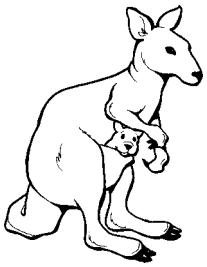
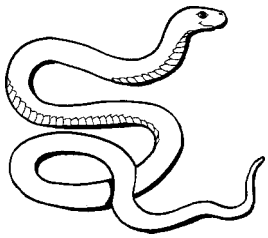
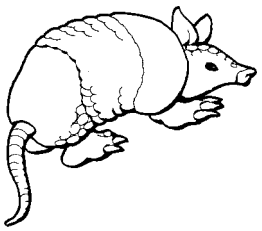
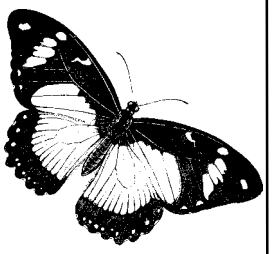
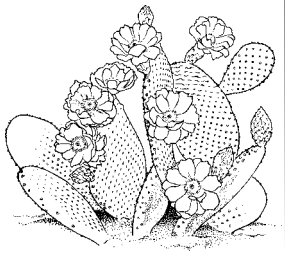
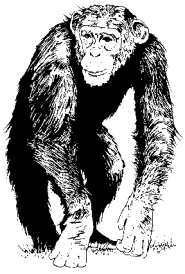
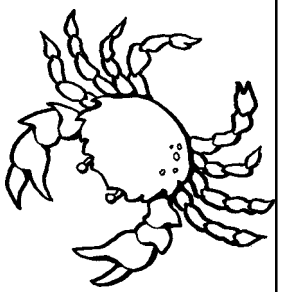
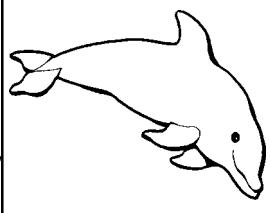
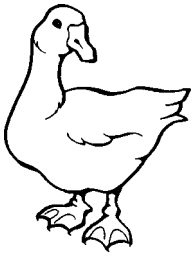
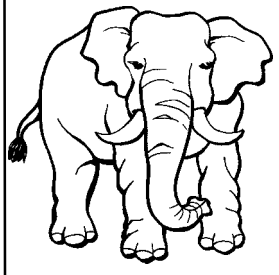
PROCEDURE

1. Depending on the students' academic level, introduce the concept of habitat/ biome (see background information on following pages.)
2. Have the students engage in hands-on activities, language arts lessons, library research, etc., so they can learn about the different habitats/biomes and the animals and plants associated with them.

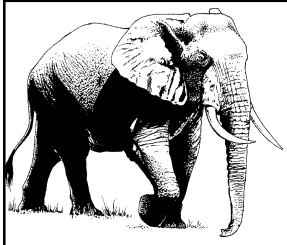
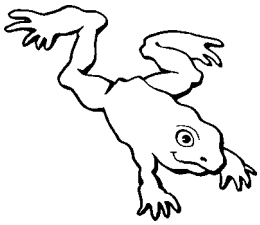
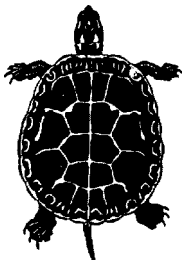
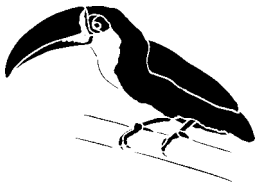
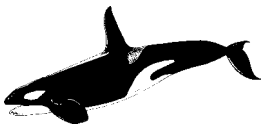
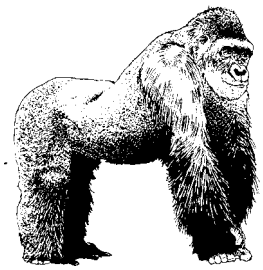
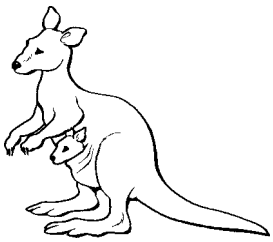
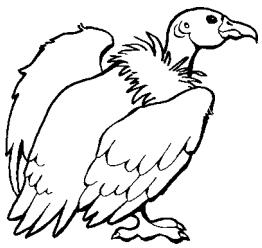
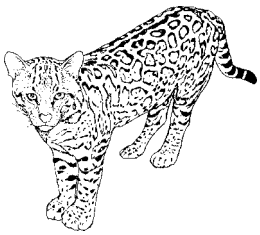
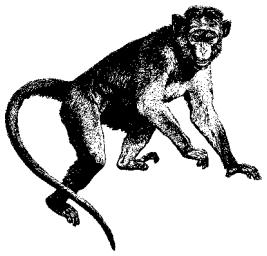
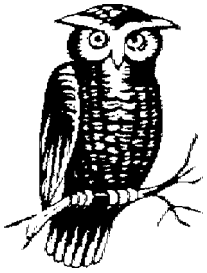
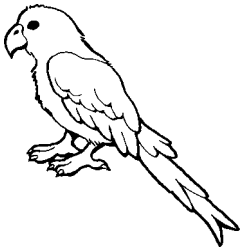
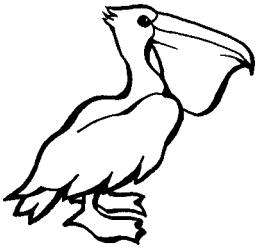
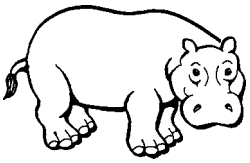
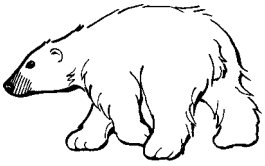
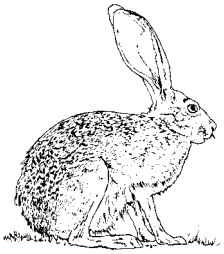
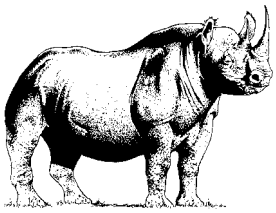
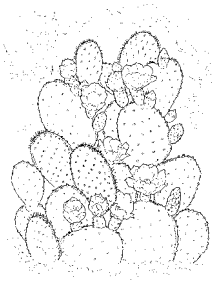
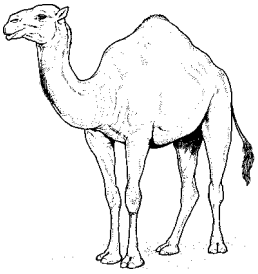
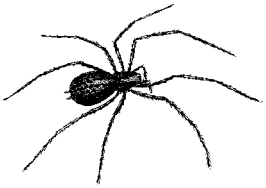
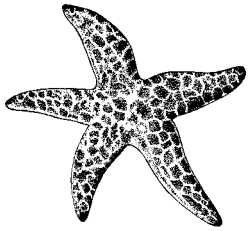
CHECK FOR UNDERSTANDING - BINGO GAME

1. Hand out one bingo card and several of each ecosystem tokens to each student.
2. One at a time, "draw" out a habitat token and hold it up for the students.
3. The students are to take the matching habitat token, find an animal on their bingo card that could live in that habitat, and place their small token on it.
4. The first student that gets 5 across "wins." The student should verbally share the five matches.

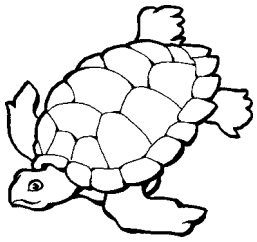
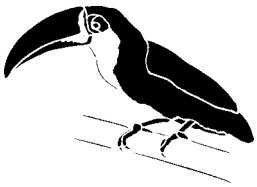
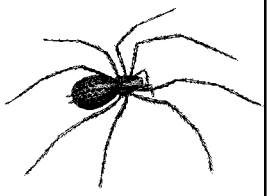
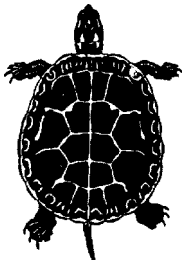
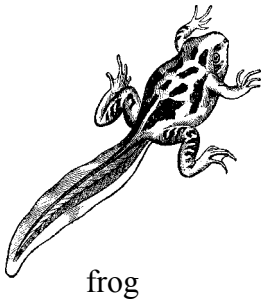
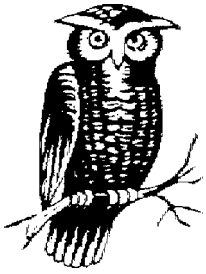
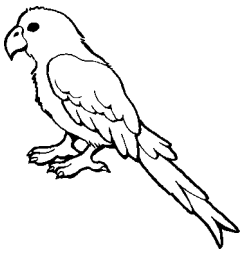
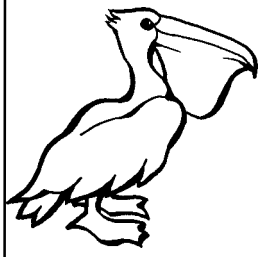
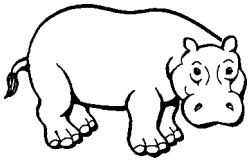
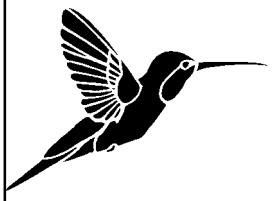
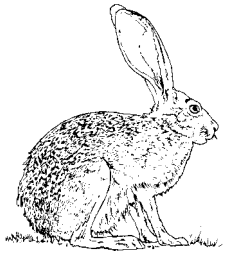
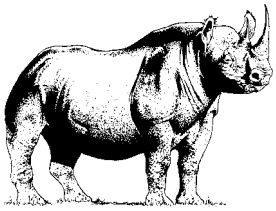
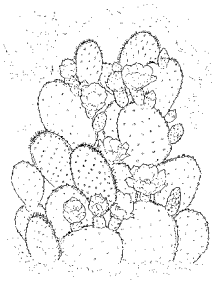
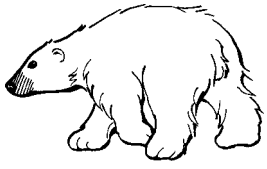
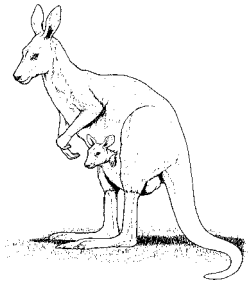
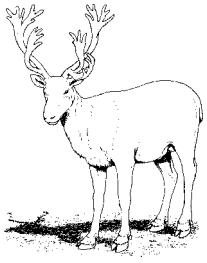
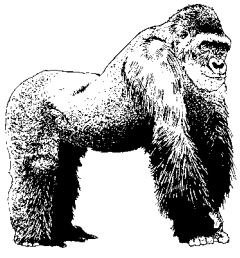
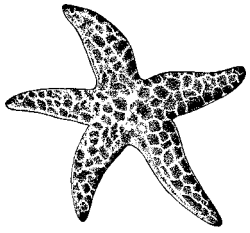
Habitat Bingo #1

 alligator	 squirrel	 frog	 giraffe	 rabbit
 lion	 zebra	 bat	 camel	 turtle
 moose	 kangaroo	 snake	 tiger	 armadillo
 beaver	 butterfly	 cactus	 chimpanzee	 coyote
 crab	 dolphin	 duck	 eagle	 elephant

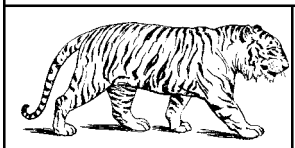
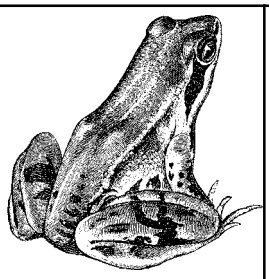
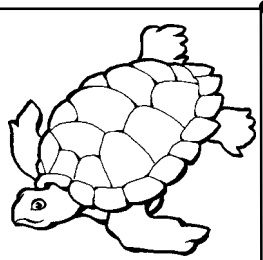
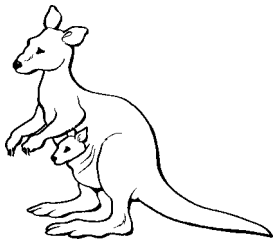
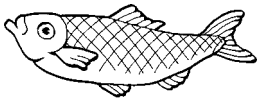
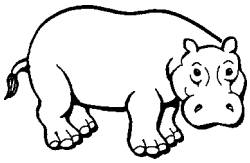
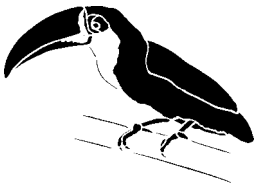
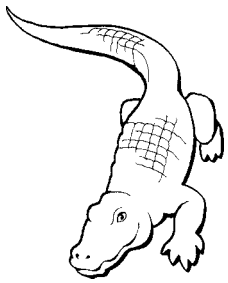
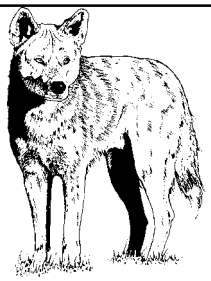
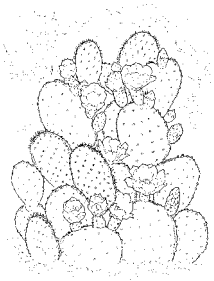
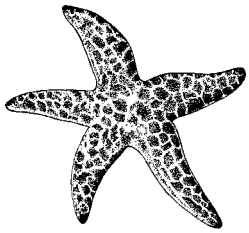
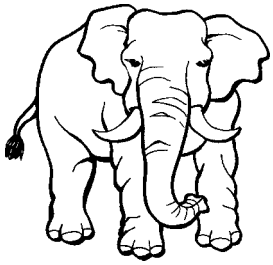
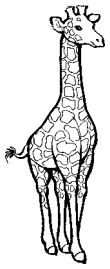
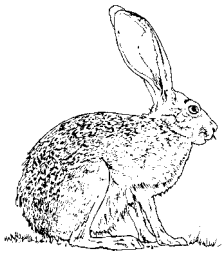
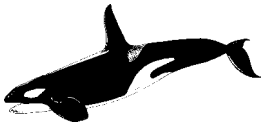
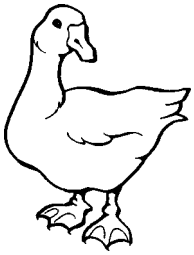
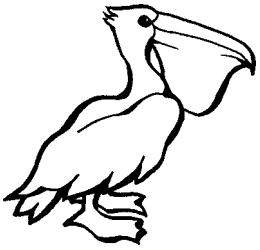
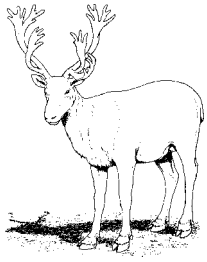
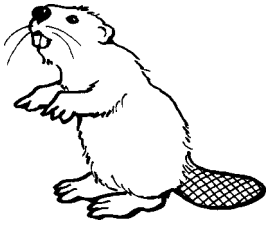
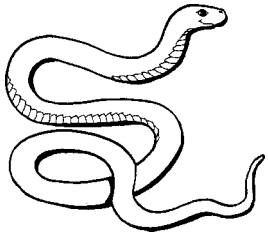
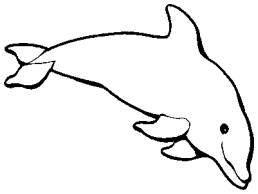
Habitat Bingo #2

 elephant	 frog	 turtle	 toucan	 killer whale
 gorilla	 kangaroo	 vulture	 leopard	 monkey
 owl	 parrot	 pelican	 hippopotamus	 polar bear
 rabbit	 rhinoceros	 sea horse	 cactus	 camel
 deer	 seal	 spider	 squirrel	 sea star

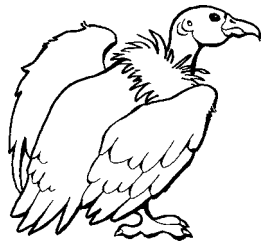
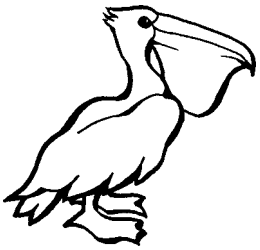
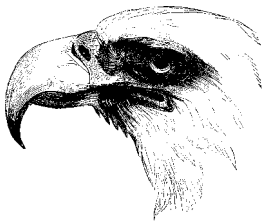
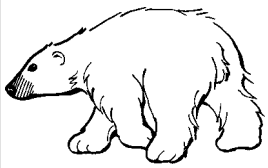
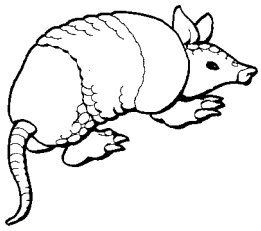
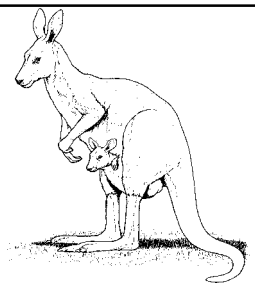
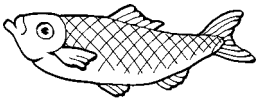
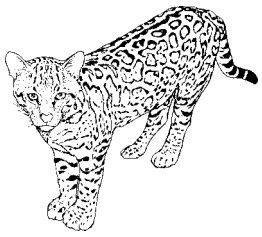
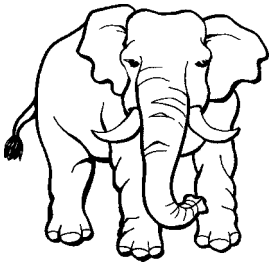
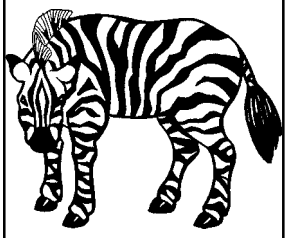
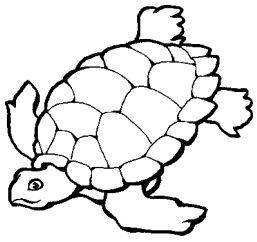
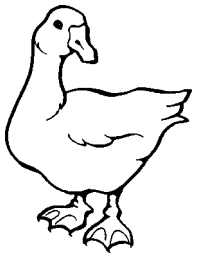
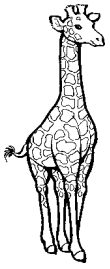
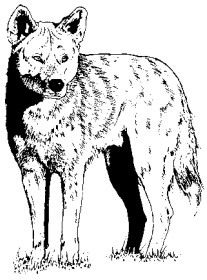
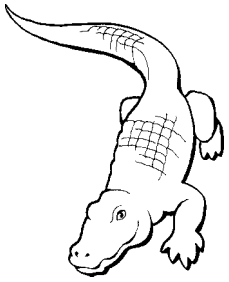
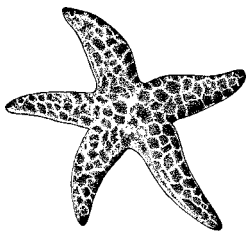
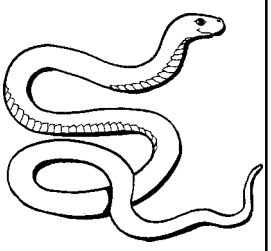
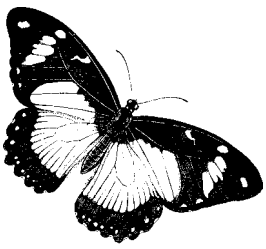
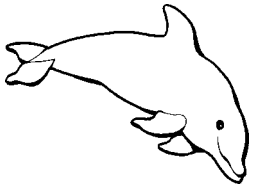
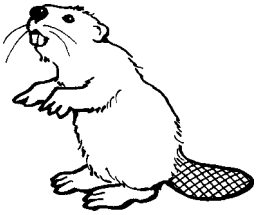
Habitat Bingo #3

 killer whale	 turtle	 toucan	 zebra	 tiger
 spider	 squirrel	 turtle	 frog	 seal
 owl	 parrot	 pelican	 hippopotamus	 hummingbird
 rabbit	 rhinoceros	 sea horse	 cactus	 mushrooms
 polar bear	 kangaroo	 deer	 gorilla	 sea star

Habitat Bingo #4

 tiger	 frog	 turtle	 kangaroo	 fish
 hippopotamus	 toucan	 zebra	 alligator	 coyote
 cactus	 sea horse	 sea star	 elephant	 giraffe
 mushrooms	 rabbit	 killer whale	 seal	 duck
 pelican	 deer	 beaver	 snake	 dolphin

Habitat Bingo #5

 vulture	 pelican	 eagle	 polar bear	 squirrel
 armadillo	 kangaroo	 fish	 tiger	 elephant
 lion	 zebra	 bat	 turtle	 duck
 mushrooms	 giraffe	 frog	 coyote	 alligator
 sea star	 snake	 butterfly	 dolphin	 beaver

mountain forest

mountain forest

river

river

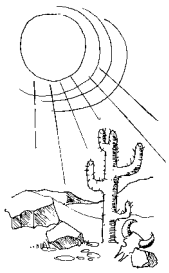
lake/wetland

lake/wetland

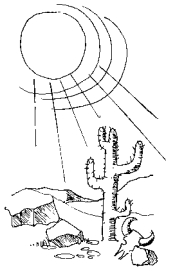
river

mountain forest

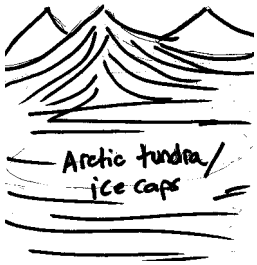
lake/wetland

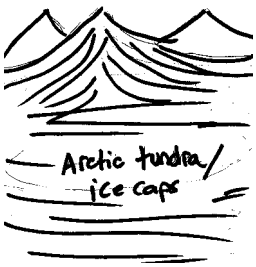


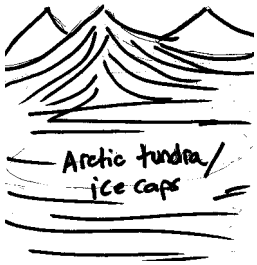
desert

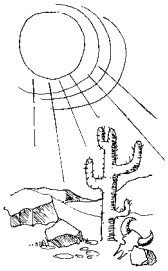


desert

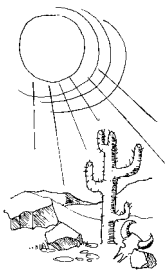




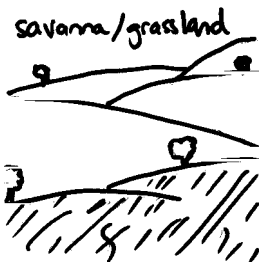


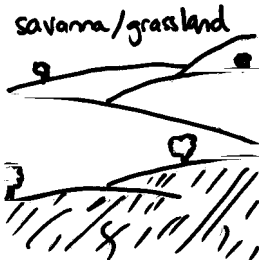


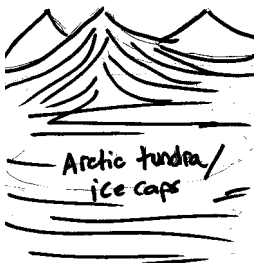
desert

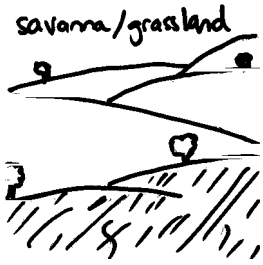


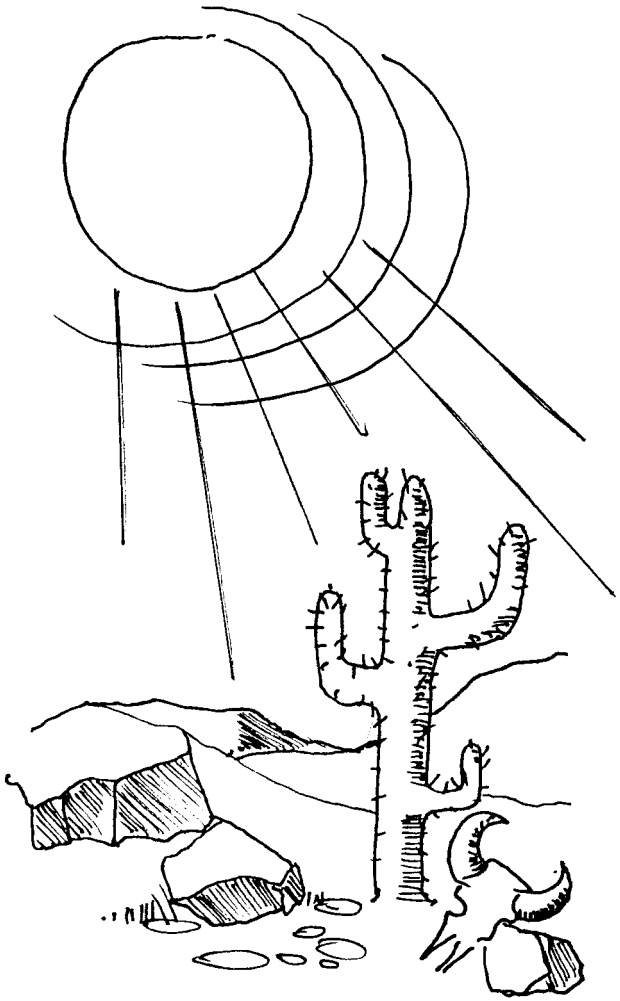
desert







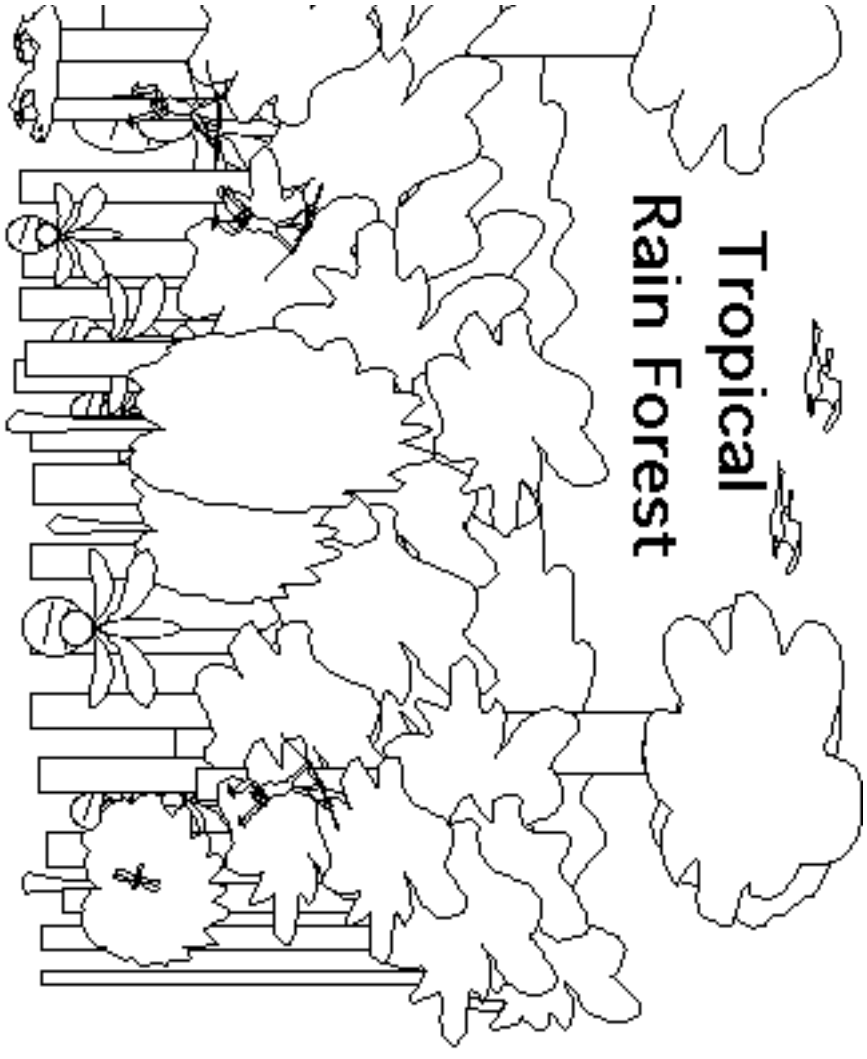




desert

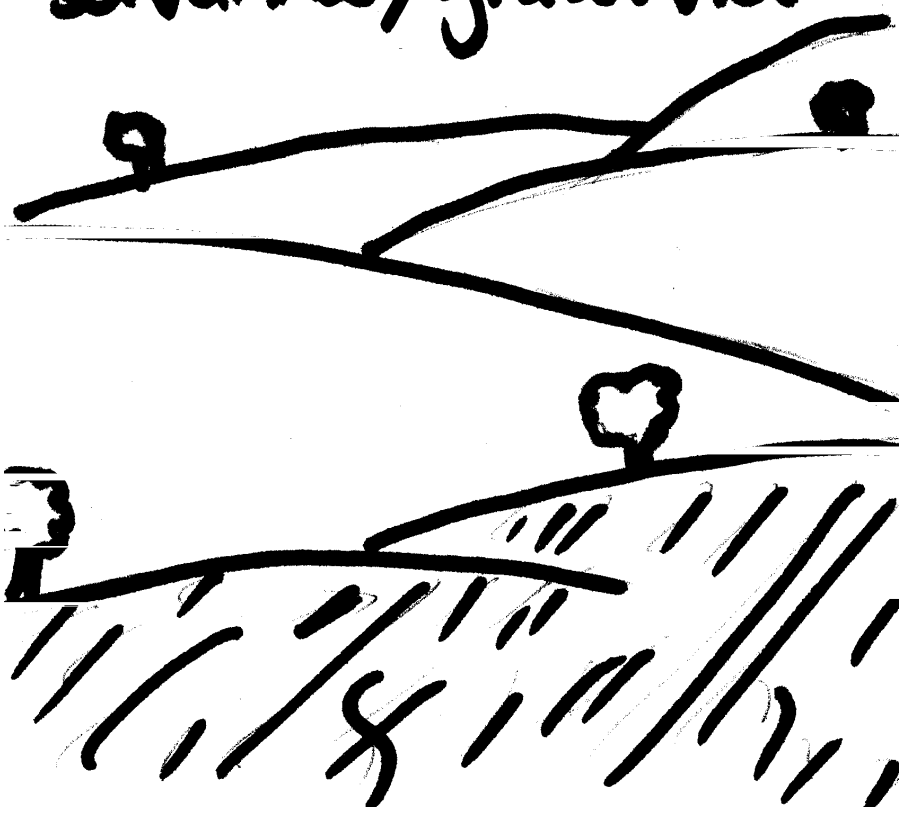
mountain forest

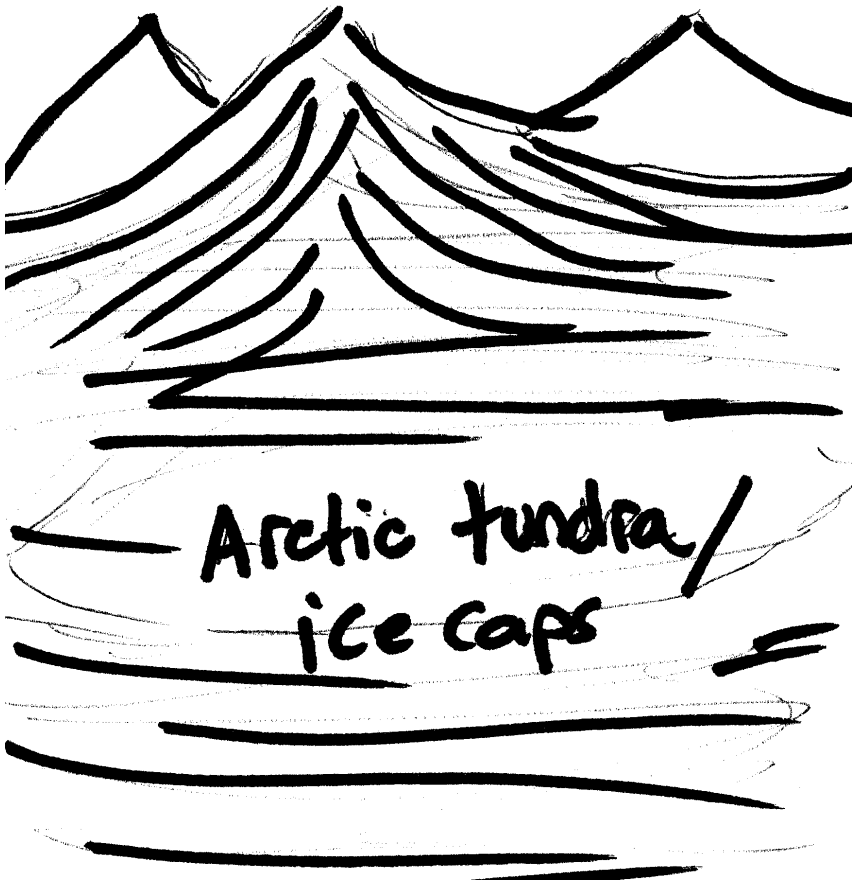
lake/wetland



river

savanna/grassland





FREE

Habitat Bingo Answers

(although there are always exceptions!)

Animal	Ecosystem/Habitat
Alligator	Lake/wetland
Armadillo	Savanna/grassland
Bat	Mountain forest
Beaver	River
Butterfly	Any but desert
Cactus	Desert
Camel	Desert
Chimpanzee	Tropical rainforest
Coyote	Desert
Crab	Ocean
Deer	Mnt. forest, savanna/grassland, desert
Dolphin	Ocean
Duck	River, lake/wetland, ocean
Eagle	Lake/wetland
Elephant	Savanna/grassland
Frog	River, lake/wetland
Giraffe	Savanna/grassland
Gorilla	Tropical rainforest
Hippopotamus	Lake/wetland, river
Hummingbird	Savanna/grassland, river, mountain forest
Kangaroo	Savanna/grassland
Killer whale	Ocean
Leopard	Savanna/grassland, mountain forest
Lion	Savanna/grassland
Monkey	Tropical rainforest
Moose	Tundra
Owl	Mountain forest
Parrot	Tropical rainforest
Pelican	Ocean, lake/wetland
Polar bear	Ice caps
Rabbit	Any but rainforest
Rhinoceros	Savanna/grassland
Sea horse	Ocean
Sea star	Ocean
Seal	Ice caps, ocean
Snake	Any
Spider	Any
Squirrel	Mountain forest
Tiger	Savanna/grassland, mountain forest
Toucan	Tropical rainforest
Turtle	Ocean, lake/wetland, river
Vulture	Savanna/grassland
Zebra	Savanna/grassland

The Deciduous Forest

LOCATION: Most temperate, deciduous (leaf-shedding) forests are located in the eastern United States, Canada, Europe, China, Japan, and parts of Russia. Deciduous forests are broken up into five zones. The firstzone is the tree stratum zone. It is the tallest zone and trees here range from 60 to 100 feet (18 to 30 meters) tall. Maple, elm, and oak trees are just some examples of trees found in this zone. The second zone is the small tree and sapling zone. Younger, shorter trees characterize this zone. The shrub zone is the third zone. Shrubs include mountain laurel, huckleberries, and many others. The fourth zone is the herb zone, and contains short herbal plants, like ferns. The Ground zone is the final zone where plants grow directly near the ground. Some plants that grow here are lichens and mosses.

WEATHER: This biome has four changing seasons including winter, spring, summer, and fall. These seasons happen because of the tilt of the Earth's axis. Throughout the year, rays from the sun hit different parts of the world more directly than others, causing varying temperatures, or seasons. If the Earth were not tilted on an axis, temperatures around the globe would always be the same. Temperate deciduous forests also have quite a wet environment. Following rainforests, temperate deciduous forests are the second-rainiest biome. The average yearly precipitation is 30 - 60 inches (75 - 150 cm). This precipitation falls throughout the year, but in the winter it falls as snow. The average temperature in temperate deciduous forests is 50°F (10°C). Summers are mild, and average about 70°F (21°C), while winter temperatures are often well below freezing.

PLANTS: Trees and plants in deciduous forests have special adaptations to survive in this biome. Deciduous trees are trees with leaves rather than pine needles, and they dominate temperate forests. As the seasons change each year, so do the leaves. Each year deciduous trees loose their leaves, and grow them back. In the summer their broad green leaves capture sunlight and help the trees make food through photosynthesis. As temperatures cool in the fall, the chlorophyll (green pigment in leaves) breaks down, causing the beautiful red, yellow and orange leaf colors of fall. In the cold winter, deciduous trees and plants go into dormancy, kind of like sleep. It is too cold for them to protect their leaves from the damage of freezing in the winter, so they simply loose them and seal up the places where the leaves attach to the branch. The warmer spring days signal to the trees that they can grow new leaves again, and restart the cycle.

ANIMALS:

The black bear is an animal that is well adapted for the temperate deciduous forest biome. It has a heavy coat made of many layers of fur to deal with the winter cold. Black bears have long claws that help them to climb trees.This is an essential adaptation because black bears often live in hollowed trees. Black bears are omnivores, so they eat plants and animals. Most of their diet is composed of plant material, so their long claws are useful to get their food from trees and shrubs. They also hibernate to avoid having to find food in the snowy, frozen winter. Squirrels can also be found here

The Desert

LOCATION: Although few animals and plants are adapted to the extremely dry desert life, the desert is a vital biome. The desert is important because it covers about a fifth of the earth's surface! There are both hot and cold deserts. Antarctica is the largest desert in the world, while the Sahara in Africa is the largest of the hot deserts. There are also deserts close to Santa Barbara, such as the Mojave the Colorado Desert which encompass parts of Southern California. In North America, there are four major hot, dry deserts, including the Mojave and the Great Basin. Outside the U.S. hot, dry deserts are found in the Southern Asian realm, South and Central America, Ethiopia and Australia.

WEATHER: Weather is not the same in all deserts. The seasons in hot and dry deserts are usually very hot during the summer and warm during the rest of the year. During winter these deserts get little rainfall. Rain is often light, or in short concentrated bursts. Most of the time evaporation rates are faster than rainfall rates. Sometimes the rain evaporates before even hitting the ground. This is the reason for the dry characteristic of this type of desert.


Gerald and Buff Corsi © California Academy of Sciences

PLANTS: Deserts plants have many adaptations to survive in such a dry environment. They are good at storing and finding water. Some plants have seeds that can stay dormant in the sand for a long time, until there is enough rain for them to grow. In hot deserts, you'll often find Cacti. Cacti are great at storing water. With their waxy coating, water can't escape and their spines protect them from being desert dinner. Their roots are shallow, and widely spread so that any rain can be absorbed immediately! Some other plants you might find in the hot desert are creosote bush, sagebrush, and ocotillo. Coastal deserts house a variety of plants. These plants must adapt to minimal rainfall by having extensive root systems that come up to the surface to absorb any possible rainfall, and go far down to absorb any water saturated in the ground. These plants also have very thick leaves that can absorb and store water whenever it is available. The plants that live in coastal deserts include salt bush, rice grass, black sage and chrysothamnus.


Glenn and Martha Vargas © California Academy of Sciences

ANIMALS: Some animals that live in the hot desert are cold-blooded, like snakes, insects, and lizards. Mammals that live in the desert are usually small, such as the kangaroo rat and kit fox. Sometimes it's hard to survive in the desert. Some mice build their home out of fallen cactus spines to protect themselves from predators like coyotes and hawks. In the Eritrean coastal desert in Djibouti, Africa, animals like gazelles, skinks, geckos and dikdiks roam the desert.

The Grassland


Helen H. Johnston © California Academy of Sciences

LOCATION: The most important plants in this biome are grasses! Temperate grasslands have some of the darkest, richest soils in the world (not in wealth, but in nutrients). People who live in grassland regions often use these soils for farming. In North America we call temperate grasslands prairies. Major grasslands in North America are the Great Plains of the Midwest, The Palouse Prairie of eastern Washington State, and other grasslands in the southwest.

WEATHER: Temperatures in this biome vary greatly between summer and winter. The summers are hot and the winters are cold! With cold winters, it's surprising how hot the grassland summers can get! Sometimes the temperature is more than 100°F (37.8°C). Rain in the temperate grasslands usually occurs in the late spring and early summer. The yearly average is about 20 - 35 inches (55 - 95 cm), but much of this falls as snow in the winter. Fire is not foreign in temperate grasslands. They are often set by lightning or human activity. Fire regularly swept the plains in earlier times, and to some extent still does today.


Gerald and Buff Corsi © California Academy of Sciences

PLANTS: Grasses dominate temperate grasslands. Trees and large shrubs are rarely found in grassland areas. There are many species of grasses that live in this biome, including, purple needlegrass, wild oats, foxtail, ryegrass, and buffalo grass. Many animals munch on these grasses, but they survive because the growth point on the grasses is very close to the ground. Also, with underground stems and buds, grasses are not easily destroyed by fire. Shrubs and trees that live in temperate grasslands are not as good as grasses at coping with the flames, and often are destroyed by fire. Wildflowers also grow well in temperate grasslands. Popular flowers that you might find growing on grasslands are asters, blazing stars, goldenrods, sunflowers, clovers, and wild indigos.


Gerald and Buff Corsi © California Academy of Sciences

ANIMALS: All grasslands share a lack of shelter from predators, and an abundance of grass for food; therefore, grassland animal populations are similar throughout the world. The dominant vertebrates in grasslands are herbivorous or plant-eating grazers called ungulates. Ungulates are mammals with hoofs, like horses and deer. Their long legs help them run fast to escape grassland predators. The temperate grassland does not have much animal diversity, especially compared to the **Savannah**. Some animals that inhabit temperate grasslands in North America are bison, antelope, birds, gophers, prairie dogs, coyotes, and insects. On the steppes you'll find similar animals to the Great Plains including lynx, antelopes, falcons, and fox

The Rainforest

LOCATION: Tropical rainforests can be found around the world: In Central and South America; in Western Africa, eastern Madagascar, and the Zaire basin; and in Indo-Malaysia along the west coast of India, Assam, Southeast Asia, New Guinea, and Queensland, Australia.

WEATHER: Rainforests are important because they help maintain global weather patterns and rain. Water that evaporates from trees falls in other areas as rain.

Tropical rainforests are lush and warm all year long! Temperatures don't even change much between night and day. The average temperature in tropical rainforests ranges from 70 to 85°F (21 to 30°C). The environment is pretty wet in tropical rainforests, maintaining a high humidity of 77% to 88% year-round. The yearly rainfall ranges from 80 to 400 inches (200 to 1000 cm), and it can rain hard. It can downpour as much as 2 inches (5 cm) in an hour!

PLANTS: One type of plant often found in a rainforest is an epiphyte. Epiphytes are plants that live on the surface of other plants, especially the trunks and branches. They often grow on trees to take advantage of sunlight in the canopy.

Tropical rainforests have a bigger variety of trees, hundreds of species in fact! These trees are mostly broadleaf trees and have a shorter lifespan. They usually live for 50 - 100 years.

Thick, woody vines are found in the canopy. Over 2,500 species of vines grow in the rainforest. Some vines, called lianas, are sometimes as big around as a person! They climb the trees in the canopy to reach for sunlight. Some vines, called lianas, are sometimes as big around as a person!


F. Albert Ellis © California Academy of Sciences

The forest floor is the bottom layer of the rainforest. This is the area where fallen, decomposing plants and trees lay on the ground. Many insects live here.

ANIMALS: Tropical rainforests are home to half the plant and animal species on Earth. A common characteristic found among mammals, birds, reptiles and amphibians, is an adaptation to living in trees. One example is New World monkeys that have prehensile tails that curl around branches allowing the monkey to hold onto the tree with its tail! Other animals are brightly colored, sharply patterned like toucans!

Most of the animals in the tropical rainforest live in the canopy. There is so much food available up there that some animals never go down to explore the forest floor! Birds are important to rainforests because they like to eat seeds and fruit. Their droppings grow into new plants and help rainforests to survive. In turn, tropical rainforests are important to birds because they provide winter grounds as migratory destination. Parrots are not the only type of birds you will see in the rainforest. In fact, about 27% of the bird species in the world live in tropical rainforests. Insects make up the largest single group of animals that live in tropical forests. They include bright beautiful butterflies, menacing mosquitoes, camouflaged stick insects, and colossal colonies of ants.

The Savanna

LOCATION: Savannas are comprised mostly of grasses and a few scattered trees. They cover half the surface of Africa, large areas of Australia, South America, and India. That is a lot of the earth's surface! Savannas can result from climate changes, soil conditions, animal behavior, or agricultural practices. Large animals, like elephants, can turn a forest into a savanna by knocking trees down, stripping the bark from the trees, and tramping on tree seedlings.

WEATHER: An important factor in the savanna is climate. The climate is usually warm and temperatures range from 68° to 86°F (20 to 30°C). Savannas exist in areas where there is a 6 - 8 month wet summer season, and a 4 - 6 month dry winter season. The annual rainfall is from 10 - 30 inches (25 - 75 cm) per year. During the dry season, lightning often strikes the ground, igniting the dry grasses that cover the savanna.

PLANTS: The savanna is dominated by grasses such as Rhodes grass, red oats grass, star grass, lemon grass, and some shrubs. Most savanna grass is coarse and grows in patches with interspersed areas of bare ground. You won't see many trees in the savanna because of little rainfall. Occasionally, you'll find individual trees or small groves of trees. These mostly live near streams and ponds. The Acacia tree is an interesting plant in the savanna. It has an umbrella shape, with branches and leaves high off the ground that giraffes like to eat. Baobab trees also live in the savanna. They deal with dry conditions by storing water between the bark and meat of the tree.

ANIMALS: There are many different types of animals that live in the savanna. The species found in savannas vary by the geographic location of the biome. Animals native to African savannas include African elephants, zebras, horses, and giraffes. Many animals in the savanna are herbivores, which means they eat plants, and there is plenty of grass in the savanna. During the rainy months animals thrive in the savanna, but the rainy season is only half the year. During the dry season, surface water from the rain is quickly absorbed into the ground by thirsty soils. The competition for water during the dry season is so intense that most birds and many of the large mammals migrate elsewhere in search of water. Depending on the severity of the drought, the migration may be to a place nearby, or far away. The dry season is often associated with fires. Many insects with short life spans die in these fires, but the birds and larger animals are usually able to fly or run to safety. Although small burrowing animals probably can't outrun the flames, they often survive the fire by digging deep into the ground and remaining there until the flames are gone. Some birds, such as the Fork-tailed Drongos, don't flee the fires; they actually fly to the fires. For these birds fire means dinner. They eat the fleeing or flame-roasted insects.

The Taiga

LOCATION: Taiga, also known as coniferous or boreal forest, is the largest terrestrial biome on earth. It extends in a broad band across North America, Europe, and Asia to the southern border of the arctic tundra. It is also found at cool, high elevations in the more temperate latitudes, for example, in much of the mountainous western region of North America. Much of the taiga in North America was once covered with glaciers. As the glaciers receded, cuts and depressions were left in the landscape that have since filled with rain creating lakes and bogs.


Charles Webber
© California Academy of Sciences

WEATHER: Long, cold winters, and short, mild, wet summers are typical of this region. In the winter, chilly winds from the arctic cause bitterly cold weather in the taiga. The length of day also varies with the seasons. Winter days are short, while summer days are long because of the tilt of the earth on its axis. Precipitation is relatively high in the taiga and falls as snow during the winter and rain during the summer. The total yearly precipitation in the taiga biome is 10 - 30 inches (25 - 75 cm).

PLANTS: Compared to other biomes, the taiga has less diversity in plant life. The most common type of tree found in the taiga is the conifer, or cone-bearing tree. Conifers, also known as evergreens, include pines, spruces and firs. There may also occasionally be deciduous species present, such as oak, birch, willow, or alder, in a particularly wet or disturbed area. The soil in the taiga is thin, acidic and not very nutrient rich. It also is rocky. Due to these factors, plants in the taiga have different adaptations than the plants we find around Santa Barbara.

The name, evergreen, describes an important adaptation of conifers. Just like Kermit, they are always green! Because they don't drop their leaves in the winter, they don't have to regrow them in the spring. They help the tree absorb the maximum amount of energy from the sun for photosynthesis. Conifers also have that pointy shape for a good reason. The winter snow slides right off of their branches. Without this shape the heavy snow might break or damage the conifer branches.


Gerald and Buff Corsi
© California Academy of Sciences

ANIMALS: The cold climate of the taiga makes it a difficult place for many animals to live. Many have thick coats of fur to insulate against the cold, and some hibernate. Others migrate to warmer areas in the chilly winters. Animal populations are mainly seed-eating squirrels and jays; small mammals like ermine and moles; and larger browsing animals such as deer, moose, elk, and snowshoe hare. The bogs and ponds in the taiga provide a great summertime breeding place for many different insects. Migratory birds often come to the taiga to nest and feed on all these insects. The typical predators for this area are grizzly bears, wolves, lynxes and wolverines. These are pretty ferocious, so their prey must adapt to flourish. Some animals hide from predators by changing color to blend into the different summer and winter habitats. For example, the ermine is dark brown in the summer, but in the winter it turns white. What excellent camouflage!

The Tundra

LOCATION: The tundra biome is the coldest of all biomes. It is also quite big. The tundra covers about one fifth of the land on earth. The word tundra comes from a Finnish word that means treeless plain, which is a good description of the biome. Tundra biome is located in the artic circle, which is a circle that surrounds the north pole, but this is not the only place we can find freezing cold temperatures and a few animals. In Antarctica, and other cold environments, there are areas that can be described as part of a tundra biome as well.

WEATHER: The tundra is the coldest and the driest of all the biomes on Earth. There is very little rainfall in the tundra; it rains less than ten inches a year. Winters here are long, and summers short, sometimes they last for only 6 - 10 weeks. In the winter the temperature can reach -50°F (-45.5°C). Because the tundra is so close to the north pole, summer days are 24 hours long! Summer temperatures rarely get above 50°F (10°C), just enough to thaw the surface of the ground. What a place for a summer vacation! In the summer the soil becomes very soggy from melted snow and rain. The moisture sinks into the ground, which is called permafrost. The permafrost lies six inches below the ground, and is frozen for most of the year. The top layer of the permafrost thaws, but the bottom layer of gravel and finer material stays frozen all year which keeps moisture from rain on the surface of the ground.


Charles Webber © California Academy of Sciences

PLANTS: You would think that plants would never live or survive in this biome, but the answer is quite a surprise. There is low diversity in organisms that live here, but many still flourish. Many lichens, mosses, and small shrubs flourish in the arctic tundra. The plants that live in the harsh permafrost soil usually adapt to the weather by being short and grouped together to resist winds and to be protected. The growing season in the tundra is short and lasts up to 60 days. Tundra plants get their energy from the sun through photosynthesis like all other plants, but have adapted to low temperatures and low light intensities. Compared to plants in other biomes they use a minimal amount of energy.

ANIMALS: You may think that the tundra is too chilly for animals, but guess what - it's not. There are actually animals that live in this harsh biome! You might find lemmings, caribou, and arctic hares in the tundra. These animals seem pretty nice, but can you guess which the largest and most dangerous animal is that lives in the tundra? THE POLAR BEAR. Other predators of the tundra are arctic foxes and wolves. Some migratory birds also live in the tundra during part of the year.


Dr. Lloyd Glenn Ingles © California Academy of Sciences

Many animals hibernate, or sleep during the worst part of winter to minimize energy loss. The food chain in the Arctic Tundra consists of predators such as owls, foxes, wolves, and polar bears at the top of the chain. Predators hunt herbivores, plant eating animals, such as caribou, lemmings, and hares. Mosquitoes, flies, moths, grasshoppers, arctic bumblebees, and other insects are at the bottom of the arctic food chain. Many birds feed on these insects.

Topic: Scavenger hunt by Alejandra Lugo

Teaching strategies that will make this activity fun and exciting. Discussion Teams	Materials: Paper Index cards Mini prices

Team builder 1: **Scavenger hunt** Duration: 30 mins

Description: Students answer riddle, find the animal along with math equation. Answer will go next to the riddle in their paper.

1. Animal names will be scattered along the hallway
2. Index cards will be placed under the animals with equations
3. Students divide in groups of **7**
4. They will be given a paper with riddles that will lead them to the animals
5. They get to the animal and solve the equation
6.

After they're done:
1st: pick two prices
2nd: one price
3rd: one price

Scavenger hunt Riddles

I am colored yellow and brown. A head reaching the heavens and a tail hanging down – giraffe

10-8+(6/3) = 4

I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn – rhinoceros

(22/2)*5-5 = 50

My trunk is very special it is a sort of nose, used for many things; it can be like a hose– elephant

(65-7+8)/2-1 = 32

My shell is where I hide, I move quiet slow but have a powerful bite – tortoise

46-(5*2)+2 = 38

I am the king of the jungle! – lion

6-(8/2)*5 = 10

My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate– bear

(3+1+5)/3 = 3

I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile – alligator

684+25-10/2

Scavenger Hunt

Find the animal name, under it is a math problem you will have to solve. WRITE YOUR TWO ANSWERS NEXT TO THE RIDDLE. As soon as you have all the animal names and correct answers for the problem, go show it to the teacher. First three groups to show up with everything correct win!

- I am colored yellow and brown. A head reaching the heavens and a tail hanging down –
- I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –
- My trunk is very special it is a sort of nose, used for many things; it can be like a hose–
- My shell is where I hide, I move quiet slow but have a powerful bite –
- I am the king of the jungle! –
- My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–
- I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile –

Scavenger Hunt

Find the animal name, under it is a math problem you will have to solve. WRITE YOUR TWO ANSWERS NEXT TO THE RIDDLE. As soon as you have all the animal names and correct answers for the problem, go show it to the teacher. First three groups to show up with everything correct win!

- I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –
- My trunk is very special it is a sort of nose, used for many things; it can be like a hose–
- My shell is where I hide, I move quiet slow but have a powerful bite –
- I am the king of the jungle! –
- My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–
- I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile –
- I am colored yellow and brown. A head reaching the heavens and a tail hanging down –

Scavenger Hunt

Find the animal name, under it is a math problem you will have to solve. WRITE YOUR TWO ANSWERS NEXT TO THE RIDDLE. As soon as you have all the animal names and correct answers for the problem, go show it to the teacher. First three groups to show up with everything correct win!

- ✓ My trunk is very special it is a sort of nose, used for many things; it can be like a hose–
- ✓ My shell is where I hide, I move quiet slow but have a powerful bite –
- ✓ I am the king of the jungle! –
- ✓ My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–
- ✓ I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile –
- ✓ I am colored yellow and brown. A head reaching the heavens and a tail hanging down –
- ✓ I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –

Scavenger Hunt

Find the animal name, under it is a math problem you will have to solve. WRITE YOUR TWO ANSWERS NEXT TO THE RIDDLE. As soon as you have all the animal names and correct answers for the problem, go show it to the teacher. First three groups to show up with everything correct win!

- My shell is where I hide, I move quiet slow but have a powerful bite –
- I am the king of the jungle! –
- My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–
- I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile –
- I am colored yellow and brown. A head reaching the heavens and a tail hanging down –
- I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –
- My trunk is very special it is a sort of nose, used for many things; it can be like a hose–

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- I am the king of the jungle! –
- My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–
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- I am colored yellow and brown. A head reaching the heavens and a tail hanging down –
- I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –
- My trunk is very special it is a sort of nose, used for many things; it can be like a hose–
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- I am colored yellow and brown. A head reaching the heavens and a tail hanging down –
- I have a large pointy horn, my skin is gray and scaly…and I'm not a unicorn –
- My trunk is very special it is a sort of nose, used for many things; it can be like a hose–
- My shell is where I hide, I move quiet slow but have a powerful bite –
- I am the king of the jungle! –

Scavenger Hunt

Read the riddle and find the name of the animal it belongs to somewhere around the classroom. Once you find the animal name, under it is a math problem you will have to solve. As soon as you have all the animal names and correct answers for the problem, go show it to the teacher. First three groups to show up with everything correct win!

- I am green, have sharp teeth but can be gentile as long as you don't call me a crocodile –
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- I am the king of the jungle! –
- My height and strength are very great, I have big paws and thick fur and in dark caves I hibernate–

Scavenger Hunt Answers

- **GIRAFFE, 4**
- **RHINOCEROS 50**
- **ELEPHANT, 32**
- **TORTOISE, 38**
- **LION, 10**
- **BEAR, 3**
- **ALLIGATOR 704**

- **RHINOCEROS 50**
- **ELEPHANT, 32**
- **TORTOISE, 38**
- **LION, 10**
- **BEAR, 3**
- **ALLIGATOR 704**
- **GIRAFFE, 4**

- ✓ **ELEPHANT, 32**
- ✓ **TORTOISE, 38**
- ✓ **LION, 10**
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- ✓ **ALLIGATOR 704**
- ✓ **GIRAFFE, 4**
- ✓ **RHINOCEROS 50**

- ❖ **TORTOISE, 38**
- ❖ **LION, 10**
- ❖ **BEAR, 3**
- ❖ **ALLIGATOR 704**
- ❖ **GIRAFFE, 4**
- ❖
- ❖ **RHINOCEROS 50**
- ❖ **ELEPHANT, 32**

- ♦ **LION, 10**
- ♦ **BEAR, 3**
- ♦ **ALLIGATOR 704**
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- ♦ **ELEPHANT, 32**
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- ♣ **BEAR, 3**
- ♣ **ALLIGATOR 704**
- ♣ **GIRAFFE, 4**
- ♣ **RHINOCEROS 50**
- ♣ **ELEPHANT, 32**
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- ♣ **LION, 10**

~ **ALLIGATOR**
704

~ **GIRAFFE, 4**

~ **RHINOCEROS**
50

~ **ELEPHANT, 32**

~ **TORTOISE, 38**

~ **LION, 10**

~ **BEAR, 3**

Topic: _Scale Factor and Similarity _by April Torres_

TEKS: 7.5.A: Generalize the critical attributes of similarity including ratios within and between similar shapes. 7.5.C: Solve mathematical and real world problems involving similar shapes and scale drawings

My learning objective: Students will learn what scale factor is, how it is used with similar shapes, and how proportions can be used to help solve if shapes are similar and use scale factor.

Teaching strategies that will make this activity fun and exciting.

- Kagan activities
- Kagan Cheers
- Movement
- Communication with peers
- Building models
- Team interaction
- foldables

Materials:

- Index cards
- Give-one-get-one worksheet
- Construction paper
- Masking tape
- Zoo plans
- Rulers
- Paint
- Paint brushes
- Glue
- 1 Tri-fold foldable
- PowerPoint
  - https://mastacademyblog.wordpress.com/2016/07/05/scale-factor

Activity 1: What is a Ratio? **Duration: 10-15 min**

Begin by asking students "What is a ratio?" Students will have an index card and will write/draw what they think a ratio is. Then have the students take out their give-one-get-one sheets and have them do hands up pair up to find a partner. When they have their partner, students will share their definition and will give each other a high five and say "that's brilliant!" After everyone is about done writing (around 2 or 3 minutes), the students will then hands up pair up again and repeat the process until everyone has 3-5 definitions. Now as a class we will form a definition of a ratio, and the definition should be along these lines: a comparison of two numbers, a relationship between two numbers.

Lesson activities: **Duration: 30-45 minutes**

First we will begin with saying what the purpose of this lesson is; to understand how architects use scale factor to build from paper, to a small 3D model, to the real thing. Just like we will be doing when we start building our own zoo exhibits. Next there will be a short power point about scale factor in train models that will be shown to the students so they can get a glimpse of how scale factor is actually used and what the numbers mean. After the power point we will move onto the foldable.

Students will (or the teacher may pre fold for the students) construct a tri-fold foldable by cutting a piece of construction paper in half, hamburger style, and layer on the pieces to make the four sections.

On the very front of their foldable, students will write down the definition of a ratio formed by the class from the first activity.

The first section will be saved for later when the students work on the second activity "Larger than Life" which is explained below.

In the second section we will discuss scale factor. On the inside of second flap students will glue in example 1 for scale factor and we will go through the steps to solve the problem. Then below these notes, the students will glue in example 2 and complete it in groups of 3-4 (given 5 mins). Then there will be a short discussion of the solution with a volunteer to come up and present their groups solution. Then ask the students "what are we using there to find scale factor?" and they should answer "ratios". If they answer with "fractions", ask the students "what is another way to write a fraction?" and then they should answer "ratios". Then label the bottom of the second flap "Scaler Factor: uses ratios"

In the third section we will discuss similar figures. On the top of the third flap, students will glue in example 1 and we will go through the steps to solve. Then underneath this students will glue in example 2 and solve it in groups of 3-4 (5 mins), but be sure to tell the students to leave some room on the bottom to glue in the last two pictures, but if they run out of room they may use the bottom half from the first section. Then there will be a short discussion of the solution with a volunteer to come up and present their groups solution. Now have the students cut out the cat & batman and the cars. Ask the students what they notice about each; how are they the same? How are they different? The main idea you want to approach is to have the students realize that the cars are an example of scale factor and they are mathematically similar, and the cat & batman just look the same but are not actually similar (like the triangles in their second example). Then ask "How did we know when the shapes were similar?" and they should answer something with scale factor involved, then label the bottom of flap 3 as "Similar shapes: sides have same scale factor".

Activity 2: "Larger than Life" **Duration: 20-25 min**

In their teams (4 groups of 4 and 3 groups of 3), students will measure out how tall each group member is. Then, given the team's exhibit animal's standing height, students will calculate the scale factor between their height and their animal's height. This work should be done on the first section of their foldable. If they already used that section, then they will just use the next available section to write down their calculations and results.

Animal Heights: Remember, the animal the groups receive will be their exhibit building animal!
Sea Lion: 126 in. (for group of 3)
Tiger: 96 in. (for group of 3)
Zebra: 51.6 in. (for group of 4)
Elephant: 138 in. (for group of 4)
Horse: 55.2 in. (for group of 4)
Giraffe: 204 in. (for group of 4)
Orangutan (arm length): 96 in. (for group of 3)

Team builder 1: Construction of Zoo Exhibit **Duration: 3 hours**

Description:

In their teams, students will measure out (in centimeters) the sides of their exhibit on the zoo blueprints we will provided. They should try to be as precise with the measurements as possible. Then, with a given scale factor of 5, the students will determine the new dimensions of their model exhibit. Groups will begin construction by first cutting their pieces of construction paper into 4ths (splitting the paper into 5.7 cm increments from the longest edge across) and then measuring and cutting out the lengths needed for their exhibit. Then, the students will tape on popsicle sticks onto their pieces of construction- paper, and after all the pieces have been completed they should be taped together in order to make the placement easier. Then students will tape their exhibit onto a piece of cardboard to either resemble the original exhibits shape, or they may form a new exhibit shape. They may be as detailed as they want and creativity is welcomed!

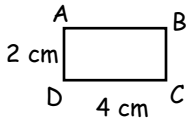
How does this connect to your activity?

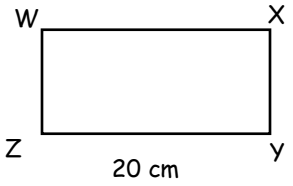
Students will have to compute their model dimensions using what we learned about setting up ratios, proportions, and using a scale factor in order to help build the beginning model of their exhibit.
This goes toward our message of "Get MAD: Make A Difference" because the students will be able to tangibly see whether or not zoo exhibits make optimal homes for zoo animals.

Scale Factor and Similarity
Student Cut outs

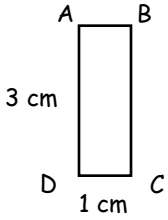
Scale Factor

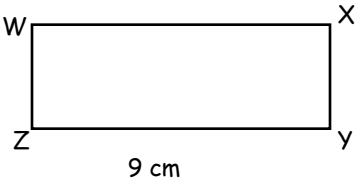
EX 1: Find the scale factor from rectangle ABCD to WXYZ, and from WXYZ to ABCD.





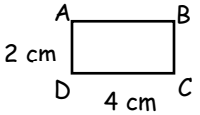
EX 2: Find the scale factor needed to get from rectangle JKLM to rectangle PQRS.

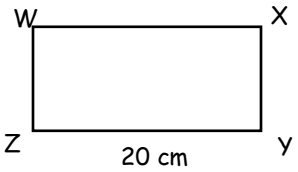




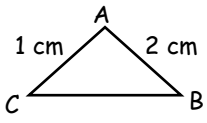
Similar Figures

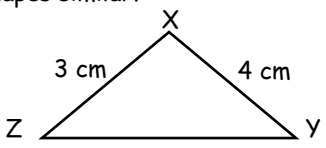
EX 1: Are these shapes similar?





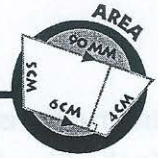
EX 2: Are these shapes similar?





ACTIVITY 3

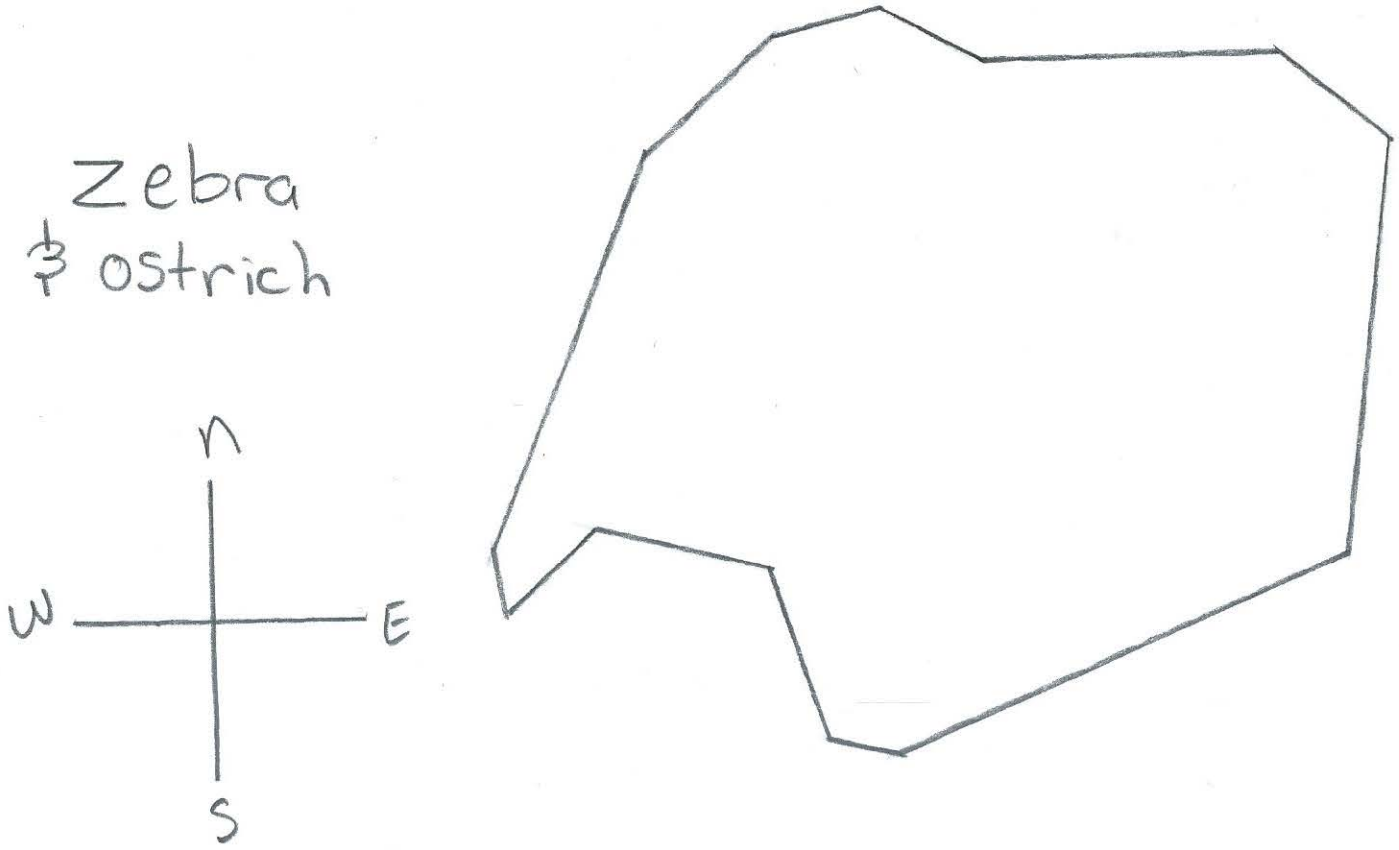
GENERATING APPLICATIONS OF AREA



Structure: Give One, Get One

Give One	Get One

Cooperative Learning and High School Geometry: Becky Bride
Kagan Publishing • 1 (800) WEE CO-OP • www.KaganOnline.com


Zebra
Ostrich
N
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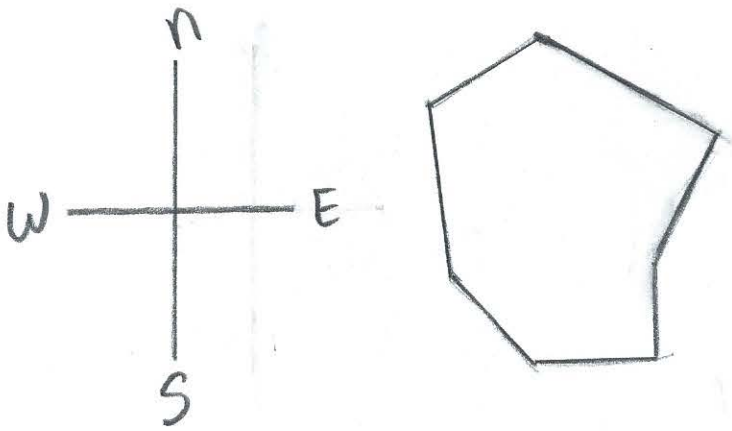
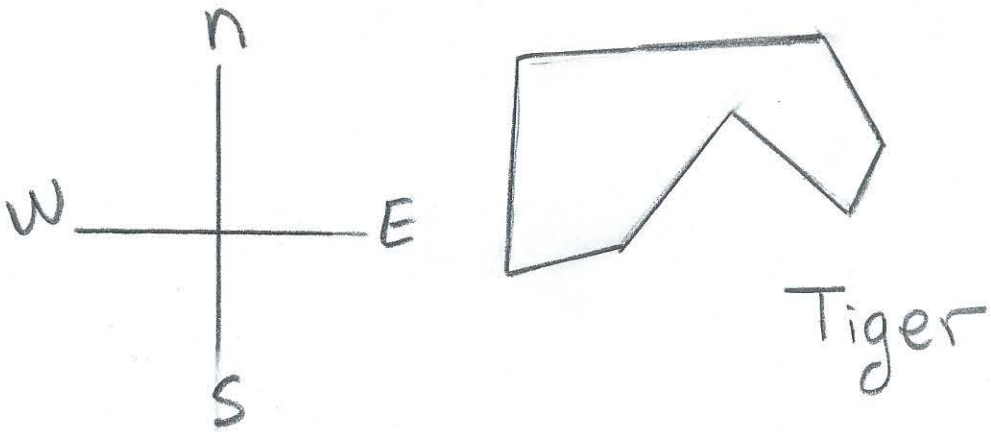
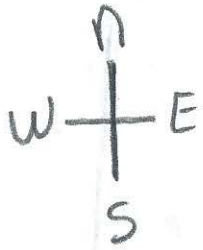
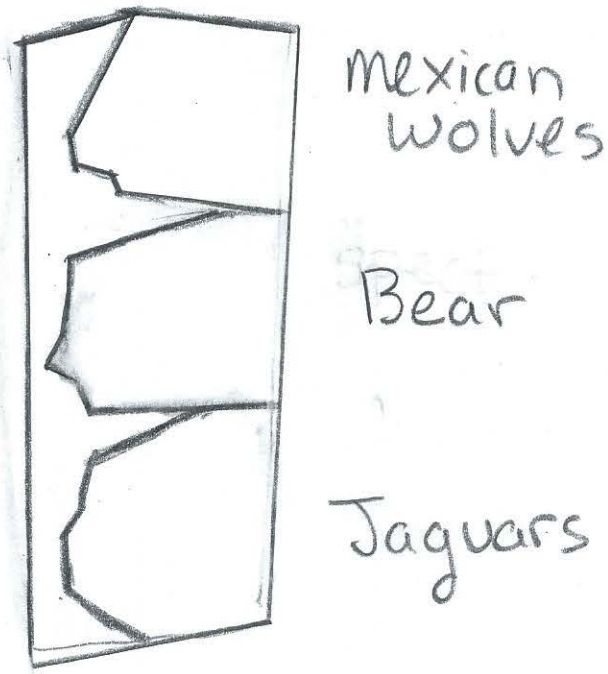


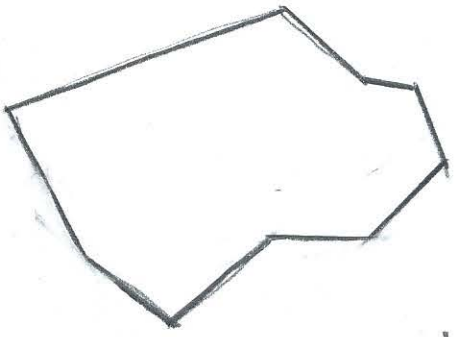
sea Lion



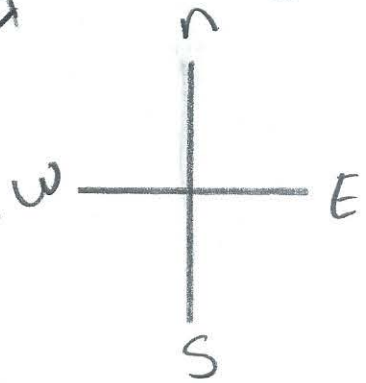
Tiger

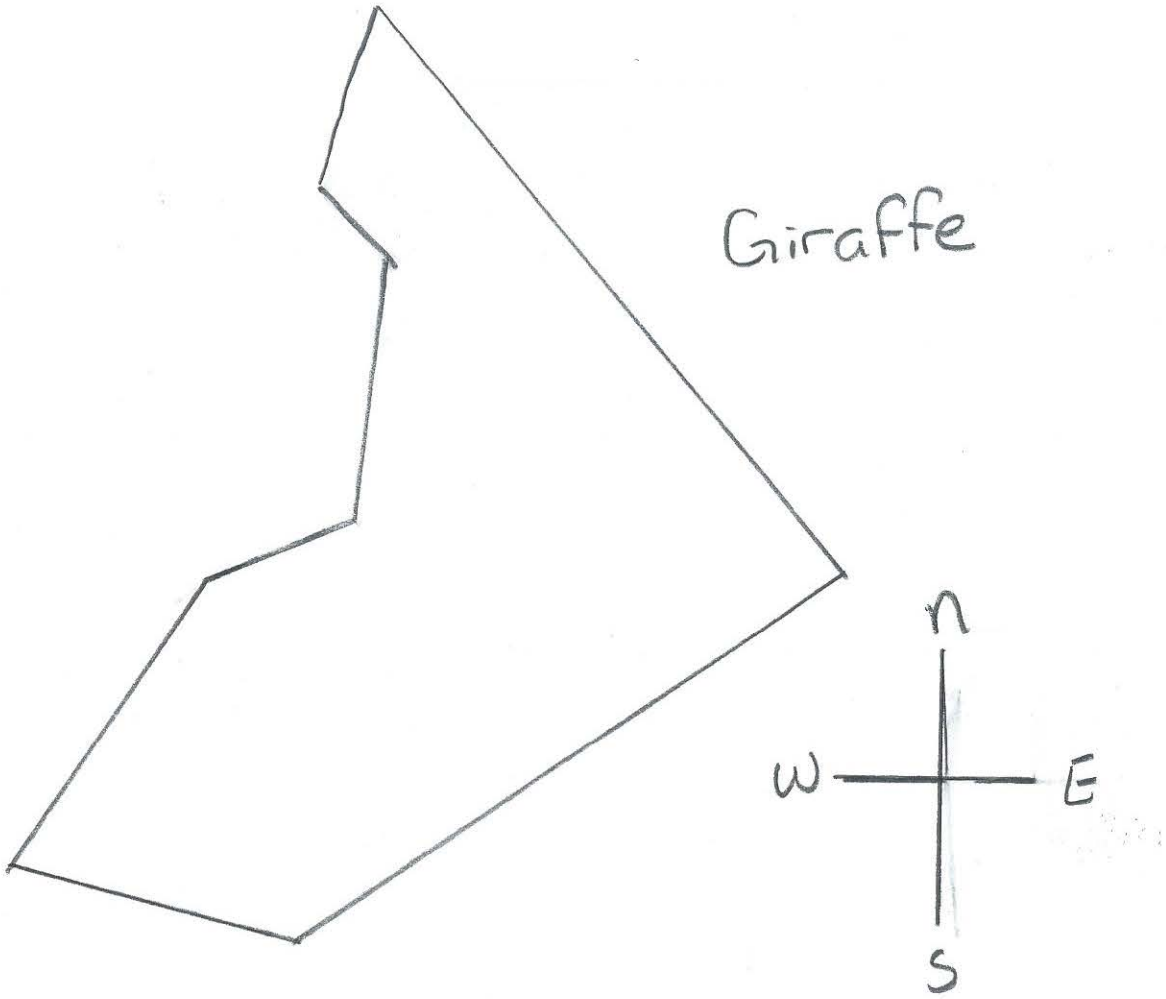






orangutan




Giraffe
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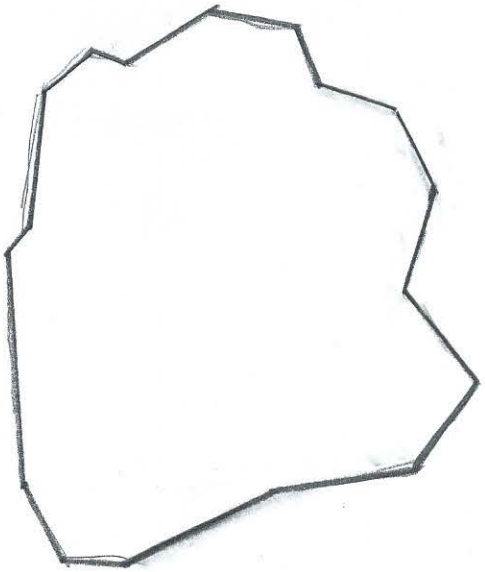
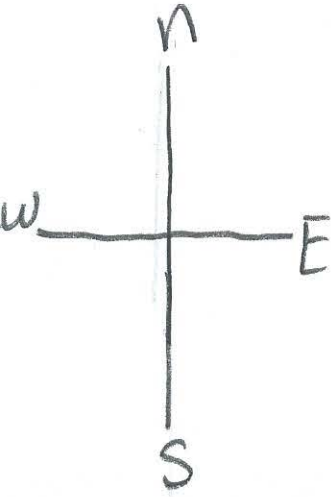
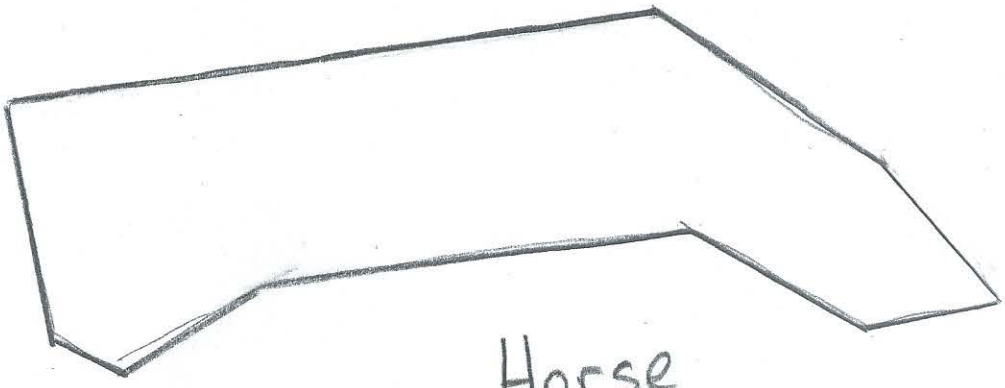


elephant





Horse

Topic: Funding The Zoo by Alejandra Lugo

TEKS: 7.13[B] Personal Finance

My learning objective: Have a budget and manage it efficiently to buy material like done at the zoo.

Teaching strategies that will make this activity fun and exciting. Class participation Group discussions Compare with real life situation	Materials: Paper Popsicle sticks tape Toothpicks playdough Spaghetti glue Straws PowerPoint https://mastacademyblog.wordpress.com/2016/07/05/funding-the-zoo

Team builder: **Spaghetti Tower** Duration: time them for **10** min, clean up 10 mins

Groups will build towers with spaghetti, using different materials to put it together.

Let them know to clean up their desks before the activity

Group 1 & 2 will use tape
Group 3&4 will use playdough
Group 5 will use glue and 3 sheets of paper to serve as an example of how some materials will not work well with everything

Activity 1: Analyzing results Duration: 5 min discussion

Now that the students interacted with each other, they will discuss what happened during the activity:
Who built the tallest structure?
How did they do it?
What happened to the group with the glue? Did they use the paper there? - Obviously it did not work.
Same goes for when the zoo is building things. Wood is put together with nails and screws, not cement.
So you can get an idea of how it works, you will have to build a fence around four animals from the zoo with only

Activity 2: **Zoo budget** Duration: 30 mins to work on problem, 10 mins to clean

Introduce them to the next activity. Show them a slide of what the costs of the actual materials costs but then show them what they will be working with. Let them know that not all the materials have to be used

Fencing material

Wire	$ 1.30 per ft.	toothpicks	$ .50
Wood	$ 9.00 per ft.	popsicle sticks	$ 3.00
Iron	$ 20 per ft.	straws	$ 4.00

1. Divide the class into 7 groups
2. They will be given a budget of $350 and will have to use that to buy their material. (there is three different areas they will work on)
3. Two groups with same exhibit can compare work. One exhibit will be in 3 groups.

Help the students with their structures by having paper with the outline of what they have to fence. Materials can be used for their zoo model later.

- The animal clipart in the handout are the size the students have to build the fence for.

- If the students want to fence something and there is left over of the material, they can break it if they want to, but tell them for example, when you go buy a yard of yarn, you pay for the whole yard, if you don't use it all, you can't get your money back. Same goes for this activity. If you need just a piece of a popsicle stick, you have to buy all of it.

Budget Activity

You have been given $350.00 to fence four animals found at the zoo. The real measurements have been scaled down and are in the back of the page so you can use the materials provided to count how much of each will be needed. Below are the costs of the materials you can use. Keep in mind different animals need different fencing.

toothpicks	$ .50
popsicle sticks	$ 3.00
straws	$ 4.00

Show your work and circle the final amount of money you will use without going over your budget ($350.00).

Asia

Leopard

Malayan

Tiger

Przewalski's
wild horse

Malayan

Tapir

Budget Activity

You have been given $350.00 to fence four animals found at the zoo. The real measurements have been scaled down and are in the back of the page so you can use the materials provided to count how much of each will be needed. Below are the costs of the materials you can use. Keep in mind different animals need different fencing.

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popsicle sticks	$ 3.00
straws	$ 4.00

Show your work and circle the final amount of money you will use without going over your budget ($350.00).

Americas

Alligator

Capybara

(a little bigger than a prairie dog)

Bolson Tortoise

Malayan Tortoise

Budget Activity

You have been given $350.00 to fence four animals found at the zoo. The real measurements have been scaled down and are in the back of the page so you can use the materials provided to count how much of each will be needed. Below are the costs of the materials you can use. Keep in mind different animals need different fencing.

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popsicle sticks	$ 3.00
straws	$ 4.00

Show your work and circle the final amount of money you will use without going over your budget ($350.00).

Africa

Grant's zebra

Egyptian Goose

Lion

Giraffe

Topic: 2D Closures by Christina Garcia

TEKS: 7.9 (C) Determine the area of composite figures containing rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles.

My learning objective:
Using prior knowledge on areas of a rectangle, students will find the maximum area and create a table using dimensions.

Teaching strategies that will make this activity fun and exciting.

- Team Builder
- Kahoot
- Foldable
- Conduct experiment outdoors
- Group Interaction

Materials:

- Large graphing paper
- Markers
- Rulers
- Receipt Paper (Wal-Mart)
- Construction Paper
- Worksheet

Activity 1: The Famous Fencing Problem Duration: 60 minutes

Students will begin with a short Kahoot to test prior knowledge on finding area (KAHOOT). Note: You must create an account to access. We will then start a foldable to include the components of a rectangle and finding area (this foldable will include volume and surface area from another lesson). The students will be challenged to find the maximum area of a 3-sided fence using 36 cm of printer paper. Have students demonstrate how they'd start to solve this with a larger piece of paper. Have a volunteer be the animal, and two other students holding the paper on each side. They will use an existing wall outside or inside (depending on weather) as one side of the rectangular area. They will be split into groups of four and be given the receipt paper, markers, worksheet, chalk and ruler to conduct their experiment. They will be expected to write down the width, length, and areas they come up with. They have to fill the entire table in order to find the maximum area before they can go draw outside. They can first complete the table and conduct the experiment with the receipt paper inside. After filling their table and finding the maximum area (18 x 9), they will draw out how their fence would look using chalk. Have them write out the length and width with chalk and draw their favorite animal inside the fence. They will scale cm to feet.

Team builder 1: All Aboard

Description:
Students will be split into groups and will have the challenge of fitting inside a defined space (using rope). Once the group has achieved this, the size of the area will decrease, becoming smaller and smaller over time.

How does this connect to your activity?
The objective in this lesson plan is to increase their closures to achieve a maximum area. However when they achieve the maximum area, if they continue this pattern the area will become smaller and smaller just like in this Teambuilder.

FENCE PROBLEM CHALLENGE

Today you will enclose a rectangular area for a given animal. The zoo is providing 36 meters of fencing. You will be using an existing wall as one side of the rectangle. In order for your animal to live as comfortably as possible, find the MAXIMUM area.

Part I

a) First make an organized list of all possible lengths, widths, and areas on the table provided or on a separate sheet of paper.
b) Find the maximum area that can be built.
c) After you've found maximum area, draw your fence using chalk and provide dimensions and scale factor.

Table

l	w	Area

Two-dimensional Aerial View

Topic: 3D Enclosures: Volume and Surface Area by Christina Garcia

TEKS:
7.5 (A) Solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids.
7.5(D) Solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net.

My learning objective: Students will apply their knowledge on volume and net areas to create and design their own aquarium for the zoo.

Teaching strategies that will make this activity fun and exciting.

- Foldables
- Kagan strategies
- Team builders
- Gallery walk

Materials:

- Pen/Pencils
- Construction paper
- Scissors
- Colored pencils
- Markers
- Glue
- Tape
- Ruler

Activity 1: 3D Enclosures Power Point and Foldable Duration: 20-30 minutes
Students will begin by brainstorming when asked, "What would need to be different planning an enclosure for a water animal? What measurements could you use to describe a tank to an architect?" They will generate responses using RoundTable where the students take turns passing a paper and pencil, each writing one answer or making a contribution. We will share and compare answers as a class. Get them thinking about what dimensions they'd need to create a fish tank. Show them rectangular prism with fish drawn on. Students will then finish the foldable and fill out definitions and examples for surface area and volume. For surface area, show them the net and the final product when folded.

Activity 2: Aquarium Design Duration: 30 minutes
Students will design a tank for an endangered animal they've come up with. Teacher will demonstrate by cutting out 1 square out of worksheet and fold to make an open faced aquarium. Show that the height is too short for an animal to comfortably live in. Ask the students how they can fix this and cut 2x2 from the square and show how the height has gotten larger. The goal is for the students to find the greatest volume and will need to construct a table that includes length, width, height and volume. Students will also need to create a top after making their final cuts. They will provide surface area by either counting the squares or multiplying lengths and widths. Lastly, they will draw and decorate final product. There will be groups of 4 and each group will have a designated paper (you can draw a smiley face) that indicates who will be creating the table and cutting the final product while the other three students manipulate the square to find the greatest volume. Have extra sheets ready in case student makes a mistake and to provide the top. End lesson by having a gallery walk for students to display their work.

Team builder 1: Back-to-back Drawing (5-10 minutes)

Description:
Students will be split into teams of two and be assigned a picture. Working in pairs, one person must describe the picture without naming it, while their partner must try to draw it. Each teams goal is to get as close to the original picture as possible.

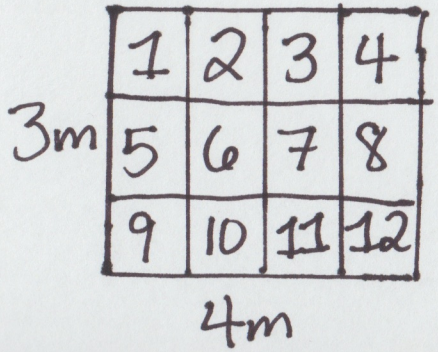
How does this connect to your activity?
This activity focuses on verbal communication and listening skills, but students will also be encouraged to use math terms to describe their drawing such as horizontal, vertical, square, rectangular, etc. Communication is important when it comes to constructing a zoo as well as being able to recognize shapes since this activity focuses on rectangles and rectangular prisms.

Definition: The number of square units in a polygon.

poly: many

Formula: $A = l \times w$

Example:



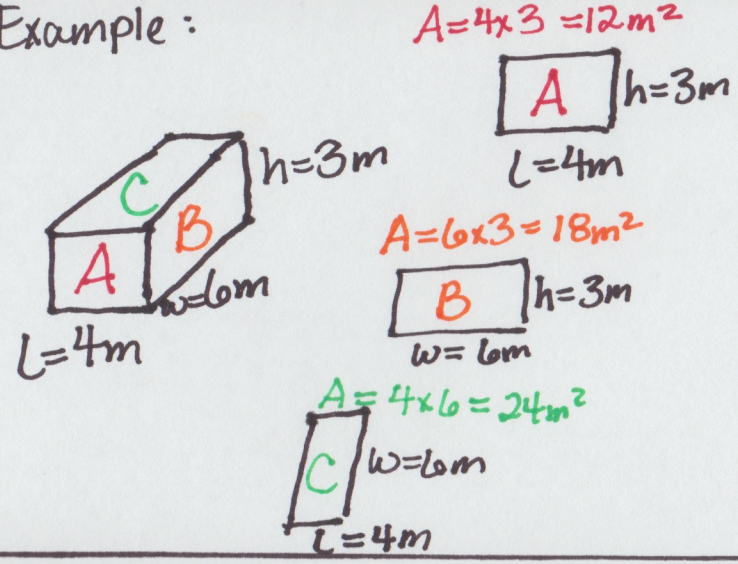
$A = l \times w = ?$

$A = 4m \times 3m = 12m^2$

Definition: Total area of the surface of a 3D object.

Formula: $SA = 2(lh) + 2(wh) + 2(lw)$

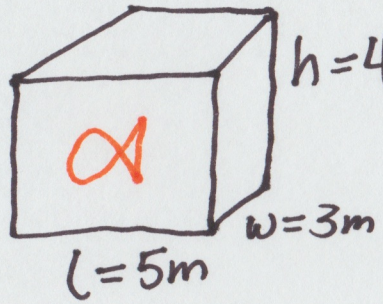
Example:



Volume Definition: The amount of 3D space an object occupies.

Formula: $V = l \times w \times h$

Example:



$V = l \times w \times h$

$V = 5m \times 3m \times 4m$

$= 60m^3$

Area

Surface Area

Volume

Lesson Plans 1

Topic: Applying growth rates to animal population by Julian Gomez

TEKS: 7 and 12c	
My learning objective: Have students compare several species and notice how the growth rate is effected and how they can come they can determine if a species is going extinct.	
Teaching strategies that will make this activity fun and exciting. Going to be using Educaplay, QR codes, Kagan strategies, powerpoint.	bean bag PowerPoint https://mastacademyblog.wordpress.com/2016/07/05/growth-rates
Lesson: Quickly describe what rate is. A way to determine how something is changing such as population of animals. Use pictures from PowerPoint to get the point across of increasing and decreasing growth rate. Just simple comparison. So determining if the rate is decreasing or increase then we can determine if the species is going to go extinct or not. We are also going to have two examples in determining the amount of increase/decrease of the population in total and the amount changed per year. I do not want to get into finding percentages and such we need more time of the scavenger hunt.	
Each group will have one ipad or phone to use for the QR codes and every student will have a worksheet for the scavenger hunt.	

Lesson Plans 1

20mins
The powerpoint will have two examples on how of determine the growth rate per year which is simple subtraction and division of the amount of years. Rules of the scavenger hunt will be on the last slide of the powerpoint to make sure that the students stay on task in this activity.

30mins
QR code/scavenger hunt break down.
Be sure to spread out the QR codes good since there are few students now and more teachers.
I gave you white and orange sheets this was because there was going to be two scavenger hunts going on at the same time to prevent pile up. Since there are fewer students then expected we can just choose one color and one scavenger hunt going on. There is going to be enough help so that we can help out with the distractor stations.

Every team will start with the same QR code(home page) to make sure that the each group understands the concept of scanning. With the worksheet they will have to write down the letter that they are on.

So using the worksheet the students will have to make sure they fill out the worksheet by putting the question number then fill in their response to the question and write the letter they received from that station. After they complete one station they can go on in finding another QR code. Once they find all correct 8 questions they will have 8 letters and they must unscramble them. The letters spell out "we matter". Writing down the question number prevents them from repeating the same station twice.

There will be QR codes everywhere and they will have to find the codes and find all 8 letters. There will be fake codes so this will throw off the students in finding the codes quickly.
Teachers just have to worry about a couple of stations, the bean bag station, and the free response station which all you have to do is check that they wrote something down for Q7. Now since there is not that many students you can have the students give you the response and share with their group members.
There is also a couple of fake/distraction stations:

--When students ask what to do to fly: have them do 10 jumping jacks each. When they're done tell them that there is no letter here and to keep on going.

--If a student comes up and ask for the secret password then you must have them roar like tigers. Then once they are done tell them that there is no letter and to keep on going.

--For the pictures with the wolves and the cat. The students must find this image but there is going to be nothing there so if they ask if there is something they need to find then let them know that there is nothing there and to keep on going.

--Students will come up asking how to find the awesome monkey. This you must tell them they must act like monkeys and dance. Once completed tell them there is no letter here and to move on to the next one.

Q1. Your letter is: W
Q2. Your letter is: E
Q3. Your letter is: M
Q4. Your letter is: A

Lesson Plans 1

Q5—Bean bag toss. Toss the bean bag to the species that affects the Ocelot.

Ocelot is a Leopard who lives in South America whose diet relies on rabbits and mostly on birds and recently there has been allot of deforestation in the region. How would deforestation affect the population rate of the Leopard? What would be the main cause?

Answer: Main reason is that the cause of deforestation will remove birds from the Ocelot's diet. It could make a huge difference for the Ocelot and the population rate causing them to have a decrease in population or slower growth rate.

So because of the deforestation the population of Ocelot's has decreased from 100 to 85. What is the percent decrease of Ocelot's?

Don't use hints unless it is necessary let them think.
Hints: Think of it in terms of a dollar. If you have $1 and now you have 85 cents how much did you lose?
Answer: the population decreased by 15%

Your letter is: T

Q6—

Your Letter is: T

Q7 ****nobody can start on this question**** Q7---- Each group member must say one thing.
What is one thing that you learned today? What is something you can do to help change this?
As a teacher you must check to see if there was feedback response on their paper then give them the letter.
Go to a teacher and tell them you need to save the world.

Your letter is: E

Q8---

Your letter is: R

Home Page

Q1

Q2

Q3

Q4

Q5

Q6

Q7

Q8

toQ1

toQ2

toQ3

toQ4

toQ5

toQ6

toQ7

toQ8

	Scavenger Hunt	
Question #	Response	Letter

Topic: Biotic & Abiotic by Daisy Wilson

TEKS: 6.12 E, 6.12 F, 7.10 A 8. 7(1) .E

My learning objective: We will be able to describe biotic and abiotic components in an ecosystem,

Teaching strategies that will make this activity fun and exciting. Visuals Kinesthetic	Materials: Butcher paper Marker

Activity 1: background knowledge

1. Start class with a discussion about what influences their lives. Ask them what is a population? – a population is a group of individuals. All living things rely on resources to live.. what are the three most important resources? Food, shelter, and water.
2. Explain to them that these resources are vital for their survival and without anyone of them they would die and their population would decrease.

Ask them what affects the way they live,? their family, their house, their school, the food they eat,- slowly steer them to think about how all of the things that surround them are factors that affect their lives. Just like their favorite animals we are influenced by biotic and abiotic factors, that affect how we live and how fast or slow we reproduce.

3. Give them the definition of biotic and abiotic.
4. Give a few examples of biotic (plants, chicken, trees forest, trees, other humans) and abiotic (climate, weather)
5. Finally reinforce the idea by asking them to tell each other what biotic means in their own words -Person A will pair with person B at their table.
6. Repeat the same for abiotic.

Activity 2: Monkey Bussiness Duration: 35 mins

1. Divide the class into two smaller groups; one of monkeys and one of habitat resources.
2. Explain that we are using three elements to define habitat for the purpose of this exercise - food, water, and shelter. I will demonstrate how to make the symbols for each habitat component. For food, they will place both hands over the stomach. For water, they will hold the fingers to the lips. For shelter, touch the hands together over the head.
3. Two horizontal lines will be established about 20-30 feet apart
4. The monkeys and the resources will turn around on the line so that they cannot see one another. Everyone will decide on a habitat resource. The monkeys will be deciding what resource they need or want; the resources are deciding what they are. Each person makes the symbol for his or her chosen component. Once they are ready, count slowly to three, and then allow both lines to turn around.
5. The monkeys must run across to the other line and grab the resource they need. The monkeys that have found the resource they need, will “use” the component and be able to survive and reproduce, so the person who was the component will now become a monkey. (Neither the monkey nor the resource can change symbols once they have decided on one during each round.
6. When a money fails to find its necessary resource it dies and again becomes resource, just like animal and plant energy is recycles throughout the ecosystem.

7. TEACHER ROLE- count the number of monkeys every round and quickly graph it on the butcher paper.
8. We will reinforce topics through guided discussion using the graph. ,how abiotic and biotic factors affect ecosystems, and describe the trends we saw in our monkey populations game, (what factors affected the growth of the monkey population?)

    - After every round we will count the number of monkeys.
    - If any students is reluctant to participate then role of recorder will be assigned.

Abiotic vs Biotic Factors

1. What is the definition of an abiotic factor?

_____

2. What is the definition of a biotic factor?

_____

Think deeply:

3. All of the rocks(Biotic/Abiotic) in a desert ecosystem are removed, what would happen to a population of rock dwelling lizards(Biotic/Abiotic) and in turn the animals(Biotic/Abiotic) who eat them.

_____

4. A ten-mile area of trees is removed from the tropical rainforest. How will this affect the amount of available oxygen? Carbon? Will this affect other ecosystems?

_____

Abiotic vs Biotic Factors

1. What is the definition of an abiotic factor? give example.

_____

2. What is the definition of a biotic factor? give example.

_____

Think deeply:

3. All of the rocks(Biotic/Abiotic) in a desert ecosystem are removed, what would happen to a population of rock dwelling lizards(Biotic/Abiotic) and in turn the animals(Biotic/Abiotic) who eat them.

_____

4. A ten-mile area of trees is removed from the tropical rainforest. How will this affect the amount of available oxygen? Carbon? Will this affect other ecosystems?

Snail	Rain	Oxygen
Tree	Rocks	Dirt
River	Whale	Coral
Sand	Wind	Sunlight
Plastic	Wolves	Ocean
Fish	Temperature	Water
Desert	Grass	Gold

Snail	Rain	Oxygen
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Plastic	Wolves	Ocean
Fish	Temperature	Water
Desert	Grass	Gold

Topic: Analogy Cell by Elizabeth Cardenas

TEK: **7.12(F)**
Recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life.

My learning objective:
Students will familiarize themselves with the functions of each cell organelle through analogies.

Materials

-Poster board (1 per group)
-Foldable (copy 1 per student)
-Scissors (1 per student)
-1 Coffee filter sheet
-1 Cheap phone case
-Markers (a pack per group)
-1 set of station sheets (10 sheets)
-Magazines
-Glue sticks
-1 small battery
-Envelope/letter/mail
-Large zip-lock bags
-1 copy of "A cell is like a high school" picture examples (for teacher)

Teaching strategies that will make this activity fun and exiting.

- Movement across the classroom
- Student Roles
- Discussion/Sharing of ideas
- Cutting and gluing
- Creativity

Activity 1: All systems have roles Duration: 5-10 min.

How to start the activity:

The activity prior to this one has already helped students familiarize themselves with different cell organelles. We can start the lesson by doing a "draw as I say". Students will draw on their paper what the teacher is reading to them. The story will lead students to draw an analogy cell and at the end they will see how an analogy works. Let them know they'll be doing a gallery walk to learn the different roles these organelles perform in the cell and that they too will come up with their own analogies.

Activity 2: Learning Cell Organelle Functions with Stations Duration: 15-20 min.

Students will learn about each organelle function through a gallery walk. They will walk through the hallway where there will be pictures with definitions of organelles on the walls. When students are going through the stations, they're learning the organelle function and creating their own analogy with their group. As they're visiting each station, make sure students are recording all of their information in their foldable.

* If there is time left, let them share their analogies.

"Draw what as I read"

Teacher reads the analogy to the students and students draw the structure.

There is a big circular wall around the city
There is a wall that controls movement of people and items coming in and out of a city through the various ports of entry that are controlled by immigration. **Cell membrane**: The cell membrane controls movement of items in and out of the cell through various pores

There is a castle right at the center of the city. The castle is the control center of the city it regulates all activity in the city. Nucleus: **The nucleus** is the control center of the cell regulating all cell activity.

There is a castle has a wall that protects it. The wall controls movement in and out of the castle through guarded entrances. **The nuclear membrane** controls the movement of substances in and out of the nucleus through pores.

There is a king is found in the castle, he directs all activities in the city including expansion and creation of another kingdom should the city grow too large. The king is like the cell's **DNA**. DNA is found in the nucleus and directs all activities of the cell including growth and reproduction.

There are Roads throughout the city, they are the transport system, which allow materials to be carried throughout the city. The city roads are like the **endoplasmic reticulum**. The ER is a transport system that carries materials throughout the cell.

The machine shops are built along the roads, here they create materials to build the city, instruction is received at the tech school located in the castle. The machine shops are like the cell's **ribosomes**. Ribosomes are attached to the ER, they are protein factories that create the cells building materials. They receive instruction from the nucleolus in the nucleus.

There is a windmill located at a side of the castle. The windmill transforms the raw energy of wind into productive energy for the city. The windmill is like the cell's mitochondria. The **mitochondrion transforms** the raw energy of the sun into productive energy for the cell.

There is a Garden that takes manure, seeds, and sun and transforms them into food for the people and horses. The Garden is like the Cell's Mitochondria. The **chloroplast** produces ATP which is food for the cell allowing it to function.

There is a lagoon in the city and a grocery store is located beside the lagoon. The grocery store and lagoon in the city act like a cell's vacuole, that is where the city stores its food and waste. The **vacuole** stores both the cells waste and food in the cell.

There are wagons that travel around the city collecting peoples garbage and fixing up what needs to be repaired. The horse drawn wagons are like the cell's **lysosomes**. The lysosomes move around the cell cleaning up and doing cell maintenance.

There is a Mail office it collects letters and packages and mails them outside the city. The Mail office is like the Golgi apparatus. The Golgi apparatus modifies and packages proteins for distribution outside the cell.

Topic: Digestive System Lesson Plan: What Happens When I Eat? By Valeria Madrid

TEKS:

- 7. 6 (b) distinguish between physical and chemical changes in matter in the digestive system;
- 7.6 (c) recognize how large molecules are broken down into smaller molecules such as carbohydrates down to sugars.

My learning objective:

Students will be analyzing the digestion process by explaining what happens at each step of the digestion. As they narrate the different stages in digestion they will be able to identify if a chemical or physical change is occurring at that moment. At the end they will be able to recognize how a carbohydrate (a large food particle) was broken down to smaller sugars (M&Ms inside Ziploc bags).

Teaching strategies that will make this activity fun and exiting.

Materials:

- **Foldable (Notes)**
  - Paper
  - Markers
- **Food Particle**
  - 1 Large thin plastic bag
  - Newspaper
  - Paper lunch bags (small)
  - Paper lunch bags (medium)
  - Small Zip-lock bags
  - M&M's candy
- **Food Tube**
  - Masking tape
  - 4 Spray bottles of water (Saliva Group/ Pancreatic Juices Group)
  - 4 Sponges (1 per student; Large Intestine Group)
  - Trash Can

Procedures:

1. Teacher will initiate the class by recapitulating the previous lesson on the body systems. (1-2 min)
2. The teacher will then introduce the activity by asking the class “what happens when we eat?” (1-2 min)
3. The teacher will emphasize that the purpose of eating (digestion) is to break a big particle into smaller particles so our body can obtain the needed nutrients. The teacher will introduce the word “carbohydrate” and “sugars”. (3-4 min)
4. The teacher will then talk about the two main things that are happening while digestion is taking place, physical and chemical changes. The students will take notes on a foldable on these two definitions, to compare and contrast the two changes. The teacher will use visuals/examples so the students can make connections to the vocabulary. The teacher can tear a piece of paper and then burn it. (7-10 min)

5. The teacher will break down the digestion process into seven roles and will be provide the students with a handout per group so the students could discuss the roles in their groups. (Attached is the sheet with the seven roles and the main purpose/description of each, identified as a chemical of physical change). (10-12 min)

OPTIONAL STEP 6: FOOD PARTICLE CONSTRUCTION

6. Students will be grouped into 5 groups of 5 and each will be given a task on the food particle construction. (Guidelines on groups' tasks attached) (7-10 min)
7. Students will be divided into 7 groups and each will be given one of the roles discussed earlier. Students can pick their role or the teacher could randomly give one to them. (1- 2 min)
8. Students will be given instructions on the food tube activity, and will be asked to discuss amongst their group how they will be presenting their role once they are placed in the food tube. (3-5min)
9. The students will perform the digestive system simulation. (7-10 min)
10. To conclude the lesson the teacher will ask again the opening question, "so, what happens when we eat?" (2-3 min)

Activity Overview: Digestive System Simulation

Instructions:

1. FOOD TUBE: Lay out two parallel lines of tape on the floor**, 3'** apart and long enough for half the class to stand shoulder to shoulder on one side of the parallel lines.

2. FOOD PARTICLE: The food particle consists of (1) M&M's placed in small zip-lock bags. These are placed in (2) wadded newspapers in small paper sacks. Place the small sacks in (3) larger sacks with added newspaper. Place all sacks and add newspaper until the (4)large plastic bag is full.(5)This bag is then taped or tied closed to complete the food particle and labeled as "CARBOHYDRATE".

- Construction Groups:
  - Group 1: Place M&Ms in 5 zip-lock bags
  - Group 2: ½ full add wadded newspaper in 5 small paper sacks
  - Group 3: ½ full add wadded newspaper in 5 larger paper sacks
  - Group 4: ¾ full add wadded newspaper in large plastic bag
  - Group 5: In big letters write down "Carbohydrate = Food Particle" and the definition for it.
  - *The teacher will arrange everything together and will close the bag.

3. PERISTALTIC MOVEMENT: Put the food particle to be eaten at one end of the food tube and a large trash can at the other. Have students line up on both sides, facing each other, squeeze the food particle the length of the food tube.

4. DIGESTION: Label and/or instruct the players. As the food comes to a group they should narrate what they are doing and why. They should also say if it is a physical or chemical change that it's occurring.

The Seven Roles within Digestion:

1. **Teeth (Physical)**- tear food apart; the teeth breaks down the food we eat (the carbohydrates) into smaller pieces. Action: the students in this group will tear the plastic bag apart.
2. **Saliva (Chemical)**- The saliva has some chemicals that help break down the food component to create new substances. Action: the students in this group will use spray bottles to moisten food particle (the newspaper in the bag).
3. **Stomach (Physical-Chemical)**- Stomach stores and mixes the food , then the acids (HCl) in the stomach break the particles even more. New and smaller particles are created. Action: the students will tear medium paper bags apart.
4. **Pancreatic juices (Chemical)** –these juices are acids that help break down the smaller particles and create new ones. Action: Generously spray the newspaper with water .
5. **Small Intestine (Chemical)** - Most digestion occurs here, the food particle has become small enough for the nutrients to be extracted, the chemicals in the small intestine help break the last particles down creating new ones (sugars/glucose) so the food could be absorb. Action: The students find the M&Ms bags and the teacher runs through the line of students acting as the blood stream.
6. **Large Intestine (Physical)** - reabsorbs water, the majority of water absorption occurs here. No new substance is created, water is just absorbed. Action: the group of students sponge up water on the floor.

7. **<u>Rectum/Anus (Physical)</u>** - substances that could not be absorbed are held in the process until they are expelled through the anus. No new substance is created. Action: this group of students throws the food particle left overs into the trash can.

Topic: Human (Animal) Body Systems by Adam Lares

TEKS: (12) Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:
(B) Identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems;

My learning objective:
Students will know how to identify organ systems within the human body and be able to understand their functions.

Teaching strategies that will make this activity fun and exiting.	Materials:
Inquiry Cooperative Learning Critical Thinking Creative Thinking Compare and contrast activities Peer assess	Flashcards Butcher Paper Markers Color Pencils

Activity 1: Introduction to main organ systems
The students will work as a team to match using flashcards that show the key term (Body System) with the function (definition) as well as a picture (Image). The students will rotate amongst their group matching first the key term with the image of the body system. Each member must chose one and match it with one and then the next person can proceed on with their matching. Once everyone has matched their term and picture they will now match the definition with both the picture and key term. Once this is complete students will then be given a quick lesson over the body systems covered on the flashcards allowing for the students to gain an understanding of the systems they may have missed. They will then be allowed to go back and change what they may have missed.
Duration: 20 minutes

Activity 2: Human Body System Drawings

Description:
Drawing of a body system diagram through a group, The teams will work together to draw an organ system they are given as well as list three facts about their system. The students will then present their drawings to the classroom and explain the components/facts about their given system.

Duration: 30 minutes

How does this connect to your activity?
The team builder will allow the groups to work collaboratively on designing the organ system. The students will be checked for understanding by the process of showing the classroom their drawing and being able to identify the major functions of the system.

Topic: It's Alive!! Plant Adaptations by Rebecca Padilla

TEKS:

Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. The student is expected to:

(A) investigate how organisms respond to external stimuli found in the environment such as phototropism and fight or flight

My learning objective:

Students will learn about a plant's responses to phototropism and water loss. As a class we will investigate the differences of bean sprouts that have been given sunlight and those that have been away from light. In a lab, students will investigate the "resurrection" of Spelaginella lepidophylla and see an almost completely desiccated plant come back to life. Using a class model, students will witness a plant's phototropic ability

****As a pre-lab preparation, beans are to be planted with enough time to germinate into little bean sprouts. Sprouts should be placed where they get enough sunlight inside their respective maze!!****

Teaching strategies that will make this activity fun and exciting.

Materials:

- Pinto beans
- Plastic cups
- Soil
- Shoe boxes and cardboard
- Tape, scissors
- Bowls
- Resurrection plants (can be purchased for $0.70 at: http://www.banggood.com/Resurrection-Plants-Hydrophile-Jericho-Rose-Plant-p-914817.html
- Water for the resurrection plants

Activities: After watching the 4-minute video on Mimosa pudica (https://www.youtube.com/watch?v=BLTcVNyOhUc), students will break up into groups and discuss various ways plants have come to adapt as a means of survival. The resurrection plants will be given to each group. The students will discuss the nature of the plant. Is it "playing dead" or is the plant really dead? What purpose would this adaptation serve? Does this mean plants can feel pain? Students will be asked to think about this and we will discuss it when we wrap up the lesson.

(This is an interesting video on whether or not plants can feel pain!!) https://www.youtube.com/watch?v=fGLABm7jJ-Y) (*optional*)

Students will set up their resurrection plants in a bowl of water. Then, the students will put the plants aside to let them resurrect. (this will take at the least 2-3 hours)

Students will then observe a plant shoebox maze to get a better understanding of a plant's response to light. Students will then come up with their own definition for phototropism. They will check their mazes periodically to make sure plants are adequately watered. At the end 4 days, they will see how their plants have responded to light.

Lesson Plan Procedures:

1. Students will begin the lesson by watching a video on the Mimosa pudica plant. They should take note and discuss this plant's remarkable characteristics. Below are some guiding questions for the discussion: (10 minutes)
    i. *Why do you think the plant closes its leaves?*
    ii. *Why would it close the leaves at night? Do plants sleep?*
    iii. *How do you respond to touch or to heat? Why?*

iv. *Does this mean that plants like the Mimosa pudica can feel pain? Why or why not do you think that? (I have included the video if the open class discussion should lead up to it. Video is optional but should be mentioned to the students)*

2. BRAINSTORM: The class will then break up into groups of 3-4 students per group. Each group is to then brainstorm different ways that plants have come to adapt in order to survive. In the group, EACH STUDENT must contribute at least one idea to the brainstorming session. (5 -10 minutes)
    i. *How do plants adapt to the hot desert environment? What types of roots would they need? Do they have a lot of leaves?? – Mention desert plant adaptations.*
    ii. *How do you think short plants adapt wherever there may be taller/bigger plants? Can plants move? (mention to students that some plants have adapted the ability to "climb" in order to reach sunlight) – Mention vines of the rainforests!!*
    iii. *Wind can be a very destructive force of nature. What might help a plant survive the wind? – Mention the grasslands and the windstorms they get. Also note that their own habitat gets strong windstorms and there are many types of grasses/weeds that have adapted here.*
    iv. *If you were a plant, which adaptations would you want that you think would help you survive the most? As a group students are to sketch up their plant and quickly present it to the class. (5-10 minutes)*

**** These questions should be written on the board so that the students can read them for reference. Questions can be summarized/shortened as well. It is up to the facilitator to decide what they want to write. My questions serve as a general guideline to drive discussion!!****

3. **In the same groups, each group will then be given a resurrection plant. Students are to observe it and decide if the plant has died or if it is still alive. After brief discussion on the observations they've made for the resurrection plant, the group will set up their plant in a bowl of water. (10 minutes)**
    i. ***What characteristics does this plant lack that suggests it is dead?***
    ii. ***Do you think it can ever have life again?***
    iii. ***Could it "playing dead" be an adaptation that has helped it "live" long?***
    iv. ***What do you think will happen if we put the plant in a bowl of water for a while?***
    v. ***After 3 hours, students should take a minute to check on their resurrection plants and note the change in appearance. – This should be done before lunch time!***
4. Students will then observe a plant shoebox maze that has been allowed to grow in response of searching for light. Students should understand that phototropism is a mechanism that plants use in order to maximize the amount of sunlight they receive. As a class (or in groups), students will come up with their own definition for phototropism. (5-10 minutes)

Team builder 1: Back-to-back Drawing (5-10 minutes)

Description:
Students will be split into teams of two and be assigned a picture. Working in pairs, one person must describe the picture without naming it, while their partner must try to draw it. Each teams goal is to get as close to the original picture as possible.

How does this connect to your activity?
This activity focuses on verbal communication and listening skills, but students will also be encouraged to use math terms to describe their drawing such as horizontal, vertical, square, rectangular, etc. Communication is important when it comes to constructing a zoo as well as being able to recognize shapes since this activity focuses on rectangles and rectangular prisms.

Topic: Photosynthesis Skit by Elizabeth Cardenas

TEKS: **4(B)**
Investigate and explain cellular processes including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules.

My learning objective:
Students will be able to identify the products and reactants of photosynthesis through a skit.

Materials

- 3 Zip-lock bag with character cards
-Construction paper - Yarn
-Markers -Tape
-Scissors -Glue
- Hole puncher
- Photosynthesis play sheet (29 copies per classroom)

Teaching strategies that will make this activity fun and exiting.

- Movement
- Student Roles
- Discussion
- Skit
- Walking around
- Interacting

Activity 1: Discovery of Photosynthesis Duration: 10-15 min.

Prior to this lesson we reviewed cell organelles and their function. Now we will be focusing on a chemical reaction that's occurring in one of the cell organelles. We will now focus on what's occurring in the chloroplast.

Create a class Venn diagram on a huge sticky note or on the white board. On one side of the diagram write plants and on the other side write humans. Have students compare what humans need to live and what plants need to live. Write down their ideas in the class diagram as you discuss. How do these organisms obtain their fuel? Lead the discussion and build on their ideas to introduce photosynthesis. Write the word PHOTOSYNTHESIS on the board and break it down for them. "Photo" means light and "synthesis" means the making of or putting together. We can say photosynthesis is the process through which light helps put things together.

**Photosynthesis:* the process by which plants use chlorophyll to convert sunlight, water and carbon dioxide into sugar and oxygen.

Show them a visual (maybe draw a little picture for them). Let them know water and carbon dioxide in the presence of sunlight and chlorophyll will produce sugar and oxygen. We might need to explain to them what chlorophyll is.

**Chlorophyll*: a green pigment, present in all green plants and in cyanobacteria, responsible for the absorption of light to provide energy for photosynthesis.

Write the formula for them on the board. Explain to them this process.

carbon dioxide + water + sunlight $\longrightarrow$ sugar(glucose) + oxygen

Activity 2: Skit Prep Duration: 15-20 min.

Let students know they will perform a skit on photosynthesis in groups of 8. Give each group the "photosynthesis character cards" and let them pick a character amongst themselves. Have students create their own "costumes" (show them an example of what a "costume" looks like). Tell them they can be as creative as they want within the time given. Each student needs to have a "photosynthesis play sheet". Give them some time to rehearse their roles. Let students know they can tweak things or change up words if they want to get creative or silly.

Activity 3: Skit Duration: 15-20 min.

Students will finally get to do their skits! It is all fun, let them know they can be animated and silly.

Photosynthesis Play Character Cards	
Sun	**Water (H_2O)**
Plant	**Sunlight**
Oxygen (O_2)	**Carbon Dioxide (CO_2)**
Sugar ($C_6H_{12}O_6$)	**Narrator**

R3

Photosynthesis Play

Cast of Characters:
Narrator, Sun, Sunlight, Water (H_2O), Sugar ($C_6H_{12}O_6$), Carbon Dioxide (CO_2), Oxygen (O_2), Norman the Plant

Setting:
A garden (students may pick the specific location)

Narrator: There once was a handsome plant named Norman. He was green and lush. He was a happy plant with many other plant pals. But, one day he got really hungry. (*Sun and sunlight stand together on one side of the room and Norman the plant stands on the other side of the room.*)

Norman: I am starving! My friend Bob the Human and Vanessa the Cat eat with their mouth, but do you see a mouth on this face? Nope!

Narrator: Norman sure was hungry, so he lifted his leaves towards the sun.

Sun: What a beautiful day! Let me shoot my rays of sunlight down upon the Earth.

Sunlight: Here I come! (*The sunlight moves quickly from the sun towards the plant*).

Norman: Mmmmm, sunlight, yummy! (*Sunlight high fives Norman's leaf (his hand).*

Narrator: The sunlight hits Norman's chloroplast and his lunch has begun!

Norman: I have begun to process the sunlight, but I am thirsty, too! Water come here!

Water: I will travel through your roots and up your stem. (*Water comes towards Norman's roots.*)

Norman: I have sunlight and water, now I need to suck in some carbon dioxide through my many stomata. (*Norman opens his mouth for the stomata*).

Carbon Dioxide: Here I come from the atmosphere! (*Carbon Dioxide flows towards Norman*.)

Narrator: The process of photosynthesis is almost complete! Now, the sunlight, water, and carbon dioxide need to perform chemical reactions to produce Norman's lunch. (*Water, Sunlight and Carbon Dioxide link arms and walk in a circle around Norman*.)

Norman: I am feeling a chemical reaction occurring! My lunch! My sugary lunch! (*Water, Sunlight and Carbon Dioxide sit down and out runs Sugar*.)

Sugar: I am lunch! I can feed Norman's cells. Don't I look delicious? (*Norman pretends to eat Sugar*.)

Norman: That was delicious, but now I have to take care of the oxygen I created. (*Oxygen molecule comes and stands next to Norman.*)

Oxygen: Part of me stays in Norman to help him get energy in his cells. But most of me leaves Norman through his stomata. The good news is that I am then valuable to animals and humans. (*Oxygen walks away from Norman into the atmosphere*.)

Narrator: As you can see, plants can make their own food through the process of photosynthesis. Thank you, Norman for demonstrating!

The End!

Topic: Rock Cycle by Daisy Wilson

TEKS: 6.10 B Classify rocks as metamorphic, igneous, or sedimentary, by the process of their formation.
6.12 E

My learning objective:
We will be able to differentiate between rock types.
I will be able to classify rocks based on their process for formation

Teaching strategies that will make this activity fun and exciting.
Kinesthetic
Collaborative

Materials:
Granola bar
Chocolate chips- ½ bag per class
Wax paper
Starburst-3 per student

Activity 1: Duration: 20 mins

1. **ASK IF ANYONE IS ALLERGIC TO ALMONDS!!!!!**
2. Begin by asking students to think of the world around them. what do they see? Do we live around mountains? ocean? All of the things that's surround affect what kind of animals live in the area.
3. Pass out rock cycle flow chart.
4. Have the students work in groups 4 groups of 4 and 3 groups of 3
5. Have the materials manager pick up materials at the front of the desk and distribute it to their group.
    - Cup of granola pre filled
    - Piece of wax paper
    - Spoon
    - 3 different colored star bursts
6. Teacher will walk around and distribute chocolate to the students- place about a quarter sized drop on the students wax paper.
7. The students will watch the chocolate cool and harden
8. Now have the students take their 3 different colored starburst, remove the wrapper, and crush them using their wax paper, until the starburst are mixed. They should be able to see the many color variations in one solid candy piece
9. Finally have the students look at their cup of granola.
10. DON'T tell the students what each one represents let them decide in their group which sample belongs to which type of rock.
11. Finally tell the students:
12. Chocolate is igneous- because it is composed of only one material and melted just like magma
13. Starbursts will be the metamorphic rock- because when the students applied pressure and heat with their hands they combined all three pieces into one with many color variations.
14. Finally, the granola will be sedimentary because it its composed of many individual pieces of material that have been combined together through weathering and erosion, but if manipulated with break of to become separate pieces.

Activity 2: Duration: 10 mins
Eat it!!!

Topic: Plant and Animal Cells by Adam Lares

TEKS: (12) Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:
(D) Differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole

My learning objective:
Students will develop knowledge about the similarities and differences between plant and animal cells. Students will understand key components of each cell type

Teaching strategies that will make this activity fun and exiting.
Inquiry
Problem-Solving
Cooperative Learning
Critical Thinking
Creative Thinking
Compare and contrast activities

Materials:

- Food model supplies
- (Twizzlers, fruit rollups, gummy worms, etc.)
- Beach Ball
- Presentation
- Audio Device
- Poster (butcher paper)
- PowerPoint
    - https://mastacademyblog.wordpress.com/2016/07/05/beach-ball/

Activity 1: Plant and Animal Cell Matching
The students will work in groups to develop their understanding of components of plant and animal cells. The activity will consist of placing the organelles of each cell with its specific picture. Once students think they have all organelles filled in correctly the class will engage in development of what organelles belong where.
Duration: 10 minutes

Activity 2: Plant and Animal Cell Plate Model (Candy)
The students will develop a plate model of either a plant or animal cell using a plate as the base of the cell(Cytoplasm). The students will have to place the correct components onto their models and ensure they label each component correctly. The students will have their choice among the types of candy available (Twizzlers, fruit Rollups, gummy worms, etc.) to use as an organelle of the cell and must be able to identify each component based on the type of candy they used. Once students are finished they will work with a partner who is partner A and Partner B that will allow the students to talk about how they made their cells, what they used for each organelle of the cell, and what type of cell it is they made.
Duration: 30 minutes

Team builder 1: Cells on the Beach
Description:
The instructor will blow up a beach ball and number the ball from numbers 1- 25 The question list will be provided of questions to be asked. Students will sit in a circle and toss a beach ball around to each other while music is being played. (Musical Chairish) The music will stop and the student holding the ball will have to answer a question based on the number located on or near his/her right thumb. The student will have the option of a help line or "Phone a friend" way of seeking help for the question they are asked. They will not have access to notes.

How does this connect to your activity?
This team builder will allow students to apply knowledge about plant and animal cells through the use of this team builder. The students will build a relationship with their peers and overall have fun applying what they learned about plant/animal cells.

Duration: 20 minutes

Topic: Evolution by Wesley Simental

TEKS:
7.11b Explain variation with a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival.

My learning objective: Students will be able to understand the Theory of Evolution. They will learn concepts like natural selection and adaptations.

Pre-Activity
Pre-Activity
The students will be asked questions like:
Does anyone know what Evolution is? Natural Selection? Adaptation?
How does evolution apply to humans?
Show educational video about evolution.
https://youtu.be/BcpB_986wyk
PowerPoint about evolution. (have students read out loud from the power point)

Materials:
- 1 cup per student
- Scissors
- Yarn
- Tape
- 10 plastic spoons
- 10 plastic forks
- 10 foam bowls
- hole puncher
- loose printer paper
- 1 bags of jolly ranchers
- 1 bags of bubble gum
- PowerPoint
- https://mastacademyblog.wordpress.com/2016/07/05/evolution

Activity 1: (Battle of the Birds)
- The first part of this activity will allow students to understand the need for evolution in order to survive.
- Allow the students to adapt their beaks after 2 times, before the second and third rounds. 2 minutes per group.
- Before third round students will make final adaptations. 3-5 minutes

Conclusion: Students will have a verbal quiz:
What kind of relationships exist with animals?
What is Natural selection?
What is an adaptation?
All students get to keep the candy they used.

TIME
Pre-Activity 10 min
Activity 35 min
Conclusion 5 min

Background:

There will be two species of birds that the students will represent. The cups with a dot on the bottom are jolly birds and the cups without the dot are bubbly birds. They are not allowed to use their hands because the cups will be their beaks so they will have to lie on the floor. Remind students to wear proper clothing the day before this activity. If a jolly bird eats a bubble gum they die and vice versa. If they do not eat any they die as well. After some time, they can adapt their beaks to give them a better chance to survive.

Pre-activity procedures:

1. Draw a small dot on the bottom of half of the cups, separate materials away from everyone.
2. Separate candies for each group.

Activity Procedures:

1. Power point lecture style based on Charles Darwin's Natural selection. (vocabulary and concepts included)
2. Separate class into groups of four. (one group will have 5)
3. Let them pick their own cups randomly, cups with a dot on the bottom will be jolly birds, without are bubbly birds.
4. Explain and emphasize that they cannot use their hands.
5. They will drop the candies on the floor or on a table mixed together.
6. When instructed to begin they will have 2 minutes to get as much food (candies) with their beaks. They are going to have to lay on the floor or bend over a table.
7. After two minutes, each group will be allowed another two minutes to go to the materials table to evolve (modify) their beaks to help with getting food.
8. Once each group has evolved, repeat steps 4 and 5.
9. After this the whole class will have 3-5 minutes to evolve again.

Conclusion:
Open discussion time:
What is an Adaptation?
What is Natural Selection?
What is Mutualism?
What is Competition?

Topic: Ecology by Wesley Simental

TEKS:
7.5c: Diagram the flow of energy through loving systems, including food chains, food webs and energy pyramids.

My learning objective: Students will be able to understand the flow of energy by being able to properly read food webs, food chains and energy pyramids. Students will also understand the order of which animals eat other animals.

Pre-Activity	Materials:
Questions to find out student's prior knowledge with this topic (vocab): What is an Herbivore? Carnivore? What is a producer? Decomposer? Power point with vocabulary and illustrations showing different forms of food webs, food chains and energy pyramids.	• Paper cut outs with animals one them from different ecosystems and different trophic levels from the perspective of food chains, food webs and energy pyramids. 2 copies of each per class. • PowerPoint • https://mastacademyblog.wordpress.com/2016/07/05/ecology

Activities

- Animals need energy
- Split class into two groups. Within those two groups make three more groups. (organization)
- Each group will be separated and at their own station organizing their food diagram.
- Students will be able to take turns organizing a food web, food chain and energy pyramid.
- Students will rotate between each of the 3 diagrams.

Conclusion

Conclusion
Teacher and students will have an open discussion about what are and definitions of a producer, consumer, decomposer. Also would like for a student to describe what a food chain, food web, and energy pyramids are.

Time
Pre-activity 10 min
Activity 20 min
Conclusion 15 min

Pre-Activity Procedures

Ask the given questions and explain the power point. Have students read out loud from power point. Have the copies of each of the food diagrams on separate tables.

Activity Procedures

1. Divide class into 2 groups. About 12 students each group.
2. Divide those groups into groups of 4.
3. The students will then go to a diagram and attempt to organize the food diagram.
4. Once every group is done they will rotate with another group that was at a different diagram. (about 5 min at each station)
5. Once they have all rotated have the students return to their original seats.
6. Open discussion time:
    a. Examples and definitions of vocabulary
        i. Producer
        ii. Consumer
        iii. Decomposer
        iv. Differences between consumers.
        v. Herbivore
        vi. Carnivore
    b. Description of:
        i. Food chain
        ii. Food web
        iii. Energy Pyramid.

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