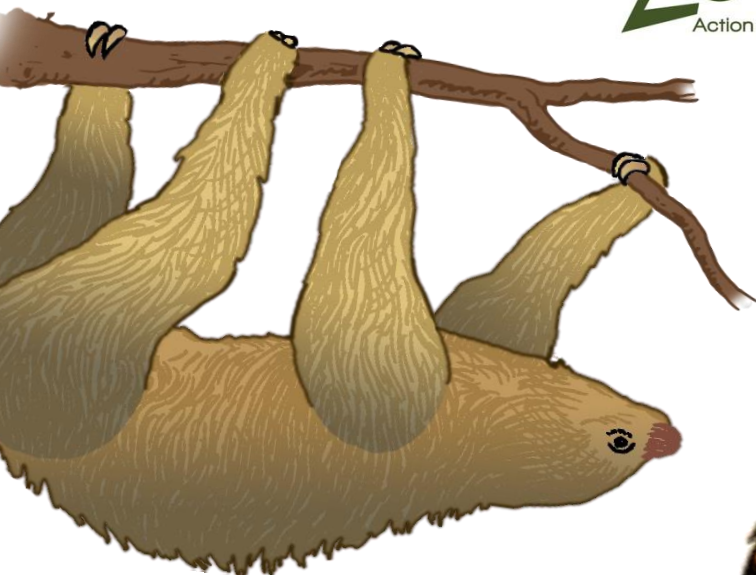




Activity Pack: Animal Adaptations

This pack is designed to provide teachers with information to help you lead a trip to Colchester Zoo focusing on Animal Adaptations.

KS 3/4



How to Use this Pack:

This Animal Adaptations Tour Guide pack was designed to help your students learn about adaptations of animals and prepare for a trip to Colchester Zoo.

The pack starts with suggested animals with unique adaptations to visit at Colchester Zoo including a map of where to see them and which encounters/feeds to attend. The next section contains fact sheets about these animals. This includes general information about the type of animal (e.g. what their adaptations are, where they live, what they eat) and specific information about individuals at Colchester Zoo (e.g. their names, how to tell them apart). This information will help you plan your day, and your route around the zoo to see the most unique and amazing adaptations. We recommend all teachers read through this, and give copies to adult helpers attending your school trip.

The rest of the pack is broken into: pre-trip, at the zoo, and post-trip. Each of these sections starts with ideas to help teachers think of ways to relate animal adaptations to other topics. Then there are a variety of pre-made activities and worksheets. Activities are typically hands on 'games' that introduce and reinforce concepts. Worksheets are typically paper hand-outs teachers can photocopy and have pupils complete independently. Teachers can pick and choose which they want to use since all the activities/worksheets can be used independently (you can just use one worksheet if you wish; you don't need to complete the others).

The activities and worksheets included in this pack are for KS3 and KS4 students. Feel free to use the activities and worksheets for students of all ages.

We suggest using the pre-trip activities/worksheets prior to your trip to familiarise your pupils with vocabulary, context, and the animals they will see during your trip. The at the zoo activities/worksheets typically require information your pupils can gather while they are at Colchester Zoo and are designed for completion during your school trip. The post-trip activities/worksheets are designed to be used after your visit to help consolidate learning and build on information gathered during your school trip. Within these sections, the activities/worksheets can be used in any order.

If you would like any more guidance, or have any questions about any of the information contained within this pack, please contact our education department at education@colchesterzoo.org

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Map KEYS









-  First Aid
-  Information
-  Gift Shop
-  Picnic Area
-  Play Area
-  Toilets
-  Fire Assembly Point
-  Face Painting



Animals Adaptations to See at Colchester Zoo:

Download a more detailed map from our website:
www.colchesterzoo.org

Animal Adaptations to See:

1.  Worlds Apart: visit the **sloths**, at the exit continue towards the orangutans and stop at Penguin Shores or Inca Trail to see the **Humboldt penguins**.
2.  Walk through the **sea lion** tunnel and visit the **orangutans**.
3.  **Amur leopards** and **spider monkeys**
4.  Turning down the hill next to Wild's of Asia or walking through the leopard tunnel to the **giant anteater** and the **binturong**
5.  Passed the flamingos you'll see our family of **smooth coated otters**.
6.  Across from the lions, see the **meerkats**. Inside the lion indoor area is the **fennec foxes**.
7.  Africa paddocks, **elephants** and **giraffes**.
8.  Underneath the giraffe building (entrance by lake), the **aardvarks**.
9.  Familiar Friends, at the farm, **wallabies**.

Sloth

Amazing Adaptation: Living upside-down

Habitat: Tropical rainforests

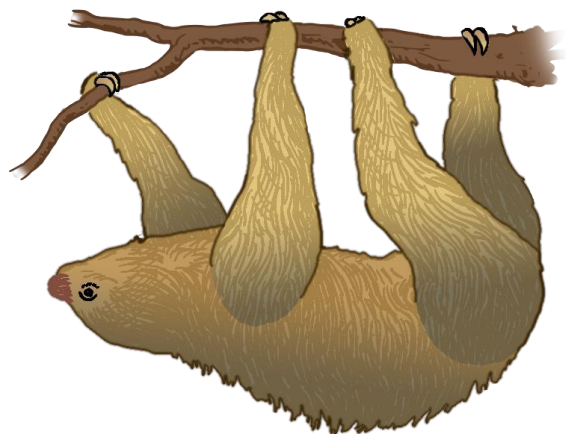
Rainforest Layer: Canopy and understory

Distribution: Northern South America

Diet: Leaves, fruits, and occasional insects

Longevity: Over 30 years in captivity

Status: Varies by species



This unusual leaf-eating animal spends most of its solitary life hanging upside down in the forest canopy. It carries out the majority of its activities in this position such as eating, sleeping and even giving birth! It rarely comes down from the trees only to defecate (go to toilet). It only does this once a week, and digs a hole to bury it so that predators can't find the sloth by smell. They have many adaptations that help them live upside down, including **upside-down organs**, **long gripping claws**, and **backwards fur (that grows from their belly towards their back)**. Their fur also has special grooves in it that algae grows in. This helps camouflage the sloth by making them green in colour, and also provides a handy snack if they get hungry.

Sloths are one of the slowest animals in world, moving at an average speed of 0.5km per hour, but they are capable of moving at about 1.6km per hour. Sloths are also remarkably good swimmers, this is an adaptation to deal with the annual flooding of the rainforest.

There are six different species of sloth. Some of them are widespread and others are critically endangered with very few left. Habitat loss is the biggest threat for all species of sloth. Some are also captured for the pet trade.

Colchester Zoo has Linnaeus Two-toed Sloths (*Choloepus didactylus*) and are native to South America. The sloths live in two pairs. Tucurui (male) and Gallina (female) live in the World's Apart Enclosure. The other pair, Calypso (male) and Carmen (female) live in the Rainforest Walkthrough Enclosure.

Meerkats

Habitat: Desert and savannahs

Distribution: Southern Africa, including Namibia, and South Africa

Diet: Varied include insects, scorpions, small mammals, eggs and lizards

Longevity: About 10 years in wild, up to 17 in captivity

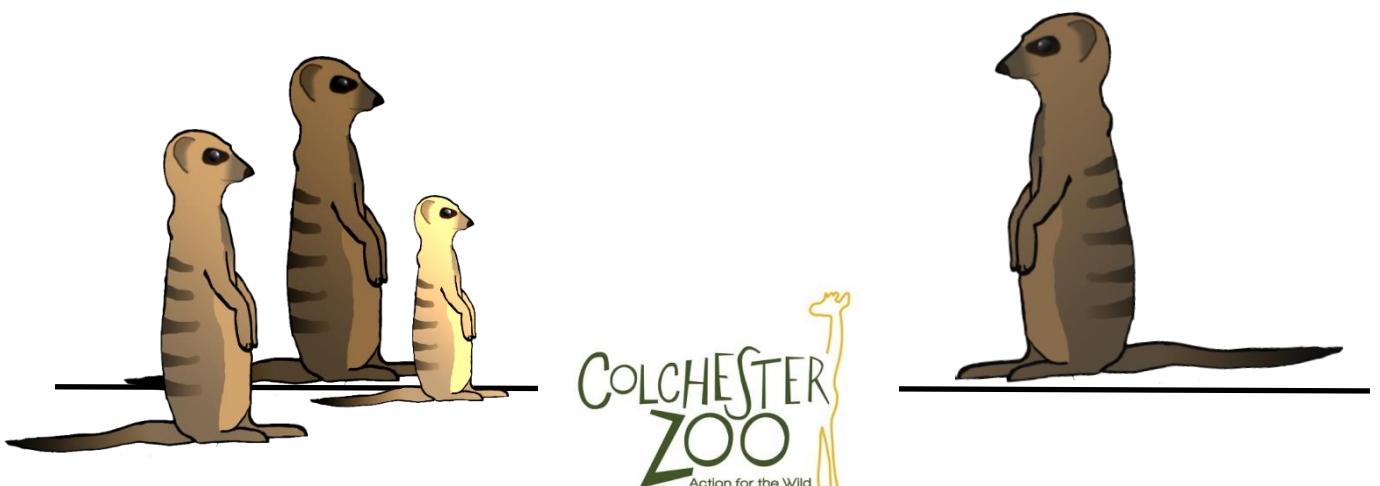
Status: Not threatened (IUCN Red List)

Meerkats are mainly tan colour to help them camouflage. They also have broken dark brown stripes across their back and sides, and a black tip to their tail. Their black eye rings help them reduce glare and see further when they are watching for predators. When fully grown they are about 50cm long from nose to tail tip and weigh only 0.9kg.

Meerkats are a type of mongoose. Meerkats live in social groups called mobs of up to 20 members. Living in mobs helps them survive in their harsh desert and savannah habitats. Each individual has clearly defined jobs (e.g. sentry, baby-sitter, hunter, or teacher). Sentries stand upright, usually at the highest point (look on top of the logs in their enclosure), and watch the skies and all around for danger. If danger threatens, they let out a loud warning bark and the whole group disappears to hide in their burrows underground.

Colchester Zoo has one mob of Meerkats. The number of individuals change as new pups are born and older pups are moved to other zoos. Meerkats live in a female dominated society and the alpha female is in charge over the whole mob. She is the only female that is allowed to breed; she also chooses who the dominate male will be, and these two are they only ones to breed.

The Meerkats are fed mealworms (and other insects), fish, raw eggs, fruit and vegetables. These items are scattered around the enclosures and hidden in crevices, or under stones, so the meerkats have to search for them to encourage their natural foraging behaviour.



Elephants

Habitat: Savannahs (bush elephant) or rainforests (forest elephant)

Distribution: Africa south of the Sahara, mainly in reserves

Diet: Grass, leaves, woody plants, shrubs, bark, flowers and fruits.

Longevity: Up to 60 years, longer in captivity

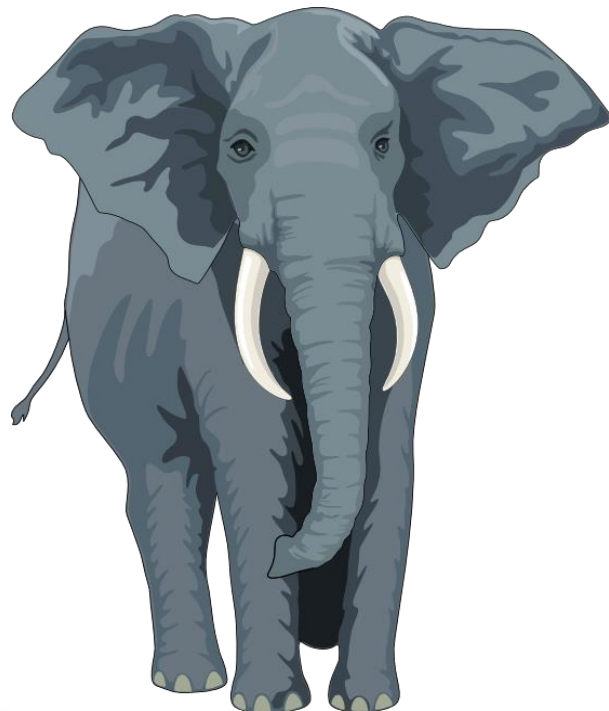
Status: Vulnerable (IUCN Red List)

Elephants are the largest land mammal on Earth. They weigh up to 6 metric tons, are up to 7.5m long and over 3m high. Males are larger than females. Their tusks are made of ivory and are modified front teeth. Elephants use their tusks to dig in the ground, knock bark off trees, and scare away predators. An elephant's trunk is a modified nose and upper lip. Elephants use their trunks for many purposes including drinking, squirting water, picking things up, breathing, and making noise (trumpeting). Because the trunk is their nose, they do not have any bones or teeth in it, but it does have 40,000 muscles!

Elephants live in complex social herds. Females form groups of closely related individuals led by the dominant female, called the matriarch. Males are sometimes solitary, or form groups with other males. Living in groups helps the elephants avoid predators. The only predator of adult elephants is humans, but baby elephants may be hunted by other predators, such as lions.

Elephants are vulnerable, with very few living outside of protected areas. One of the major threats elephants face is poaching and hunting for the ivory trade. Humans kill elephants and carve the tusks into statues, bracelets, and other souvenirs and trinkets.

Colchester Zoo has two elephant paddocks. One can be viewed from the Elephant Bush Walk And the second paddock is next to the Giraffe paddock.



Giraffes

Habitat: Savannah

Distribution: Eastern Africa, including Tanzania, Kenya, and Botswana

Diet: Feeds on leaves and shoots of trees and shrubs

Longevity: 25 years in the wild, longer in captivity

Status: Vulnerable (IUCN Red List)

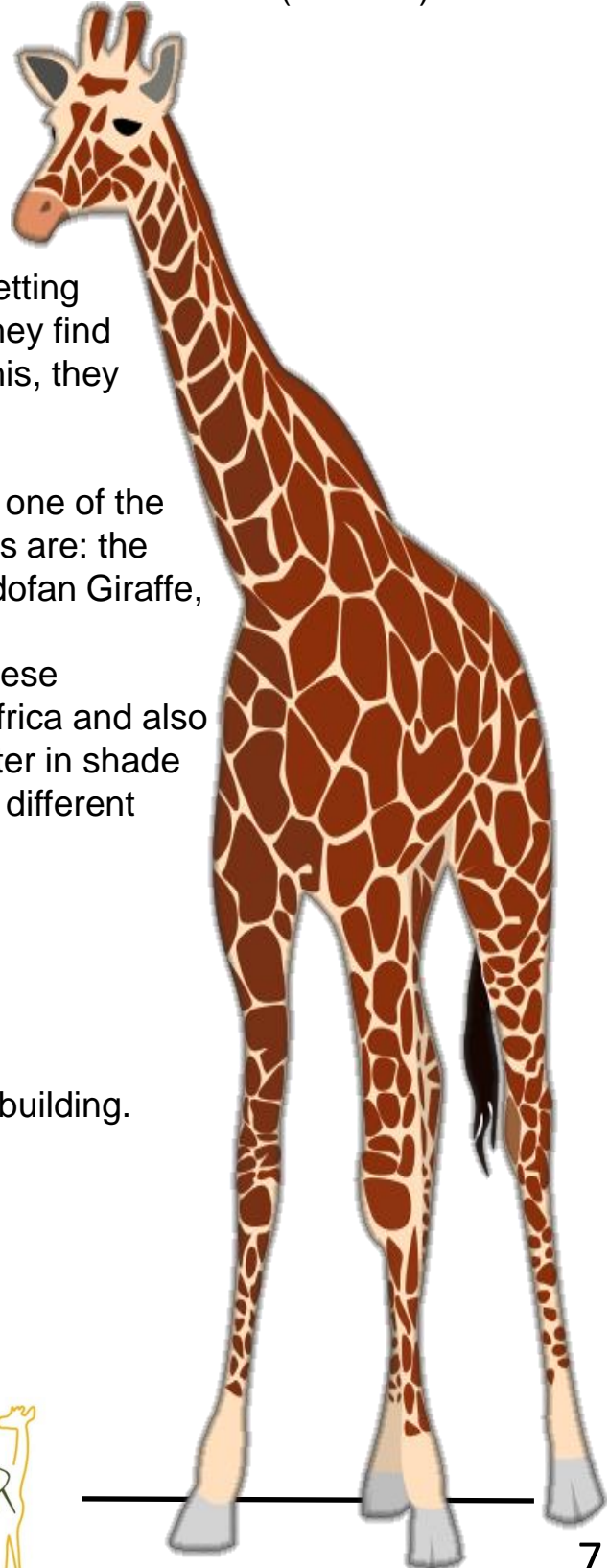
Giraffes are the tallest animals in the world, up to 5.3m tall!

Giraffes have the same number of bones in their necks as humans (7 bones).

The bones in the giraffe's neck are extra long, which is what makes their necks so long. Their long necks, and their 40cm long tongues are adaptations to help the giraffes reach food high up in trees that other animals can't reach. Their tongues are purple-black in colour ; this acts as a natural sunblock and prevents the giraffes from getting a sunburnt tongue. Because giraffes are so tall, they find it hard to lie down and stand up quickly. Due to this, they only sleep for about 20 minutes a day.

Colchester Zoo have reticulated giraffes, which is one of the eight sub-species of giraffe. The other sub-species are: the Rothschild's Giraffe, the Angolan Giraffe, the Kordofan Giraffe, the Nubian Giraffe, the West African Giraffe, the Thornicroft's Giraffe and the Masai Giraffe. These sub-species are often found in different parts of Africa and also have different coat patterns, with some being lighter in shade whereas other are much darker as well as having different sized patches.

In dry weather the giraffes are often outside in the mixed paddock where they live with the rhino, zebra, kudu and ostrich. If it's too slippery and muddy they can be seen in their house. To see them in their stalls go up the ramp and inside the building.



Humboldt Penguin

Amazing Adaptation: Thick feathers and flippers

Habitat: Cold coastal waters and sandy/scrubby shorelines

Distribution: Peru, Chiles and islands off the west of South America

Diet: Crustaceans, krill, squid, and fish

Longevity: About 30 years

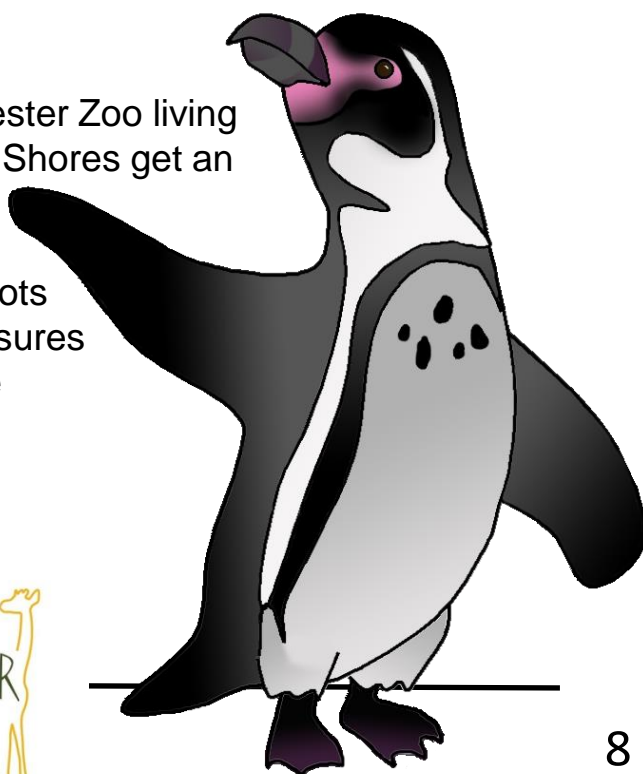
Humboldt penguins are a medium sized penguin, about 65cm tall and weight about 4.2kg. The feathers are black on the upper parts, light on the lower section and have a black stripe across their chest. Like all penguins they are flightless, since their wings have lost the flexibility at the elbows and become more like flippers.

These 'flippers' allow them to swim up to 25 km/h 'flying' underwater, essential for catching fish and escaping predators. Humboldt penguins live in a climate much like that of the U.K. however the seas they fish in are cold and thus they have a layer of **insulating fat** to protect them from the cold when swimming, they also have **waterproof tips to their feathers** which keeps their skin and fluffy under feathers dry. Humboldt penguins have shorter plumage than other penguin species.

Humboldt penguins excavate burrows to nest in, usually about 3 metres in length. At the end is a small chamber which they line with sticks, mosses and lichen. Incubation of the two eggs is shared between both sexes, they often pair for life and stay with their mate.

The primary threats for this species is accidental capture in fishing nets (resulting in drowning), illegal hunting for food, and illegal capture for the pet trade. Historically, populations declined due to over-exploitation of guano (which the penguins require for their nests). It is still harvested in some parts of their range, but no longer a major threat.

There are lots of Humboldt penguins at Colchester Zoo living in two separate breeding colonies. At Penguin Shores get an underwater view of them swimming, or at Inca Trail view the penguins from above. The penguins all have unique markings of black spots on their bellies. Look for the signs at the enclosures and see if you can identify the names of all the penguins!



Patagonian (Southern) Sea Lion

Amazing Adaptation: Flippers, waterproof fur and built in goggles

Habitat: Costal offshore rocks and islands

Distribution: South American coastline

Diet: Fish, squid, lobsters, krill and crustaceans

Longevity: Up to 25 years

Like many mammals the male sea lions are larger than the females reaching weights of 340kg and lengths of 2½m. The females may reach 144kg and 2m in length. The males compete over territory on the beaches where multiple females lives.

Sea lions are agile hunters, feeding on fish, crustaceans and squid. They also hunt penguins in the wild. The main predators of sea lions are large sharks such as the great white and killer whales. They have many adaptations to help them swim, catch their food, and avoid predators. They are estimated to swim at up to 13.4mph (21.6km/h) but are usually much slower. They can hold **their breath for over 10 minutes**. They have many adaptations to help them hold their breath, including: **slow heart rate**, higher blood volume than land animals and higher content of oxygen-binding proteins. Because their water is very cold they have a thick **layer of blubber under their skin** to keep them warm and streamline their body.

Unlike seals, sea lions use their front and hind flippers for 'walking' on land. Seals rely on only their front flippers to move on land and are often very awkward. In contrast, sea lions are very mobile and can travel kilometres away from the beaches. However, sea lions are mainly found near the shore since it helps them escape predators. If land predators appear they hide in the water, and if water predators appear, they move onto the land.

Colchester Zoo has five female sea lions.. They spend a lot of time training and know many commands such as lifting their flippers and being touched all over their body. This allows the keepers to check them for injuries and medication to be given to them.



Bornean Orangutan

Amazing Adaptation: Really long arms

Habitat: Tropical rainforest

Distribution: Borneo and Sumatra

Diet: Mainly fruit, also leaves, bark, nuts, eggs and small vertebrates

Longevity: Up to 35 in the wild, and 50 in captivity

Status: Endangered (IUCN red list)

The name orangutan means 'man of the woods' from the Malay words: *orang* meaning 'man' and *utan* meaning 'forest'. They are very well adapted to life in the rainforest. Their long **red-orange fur helps camouflage** them (red is hard to see in rainforests, because red light is absorbed by the green leaves). They have **long arms** (almost twice the length of their legs), perfect for swinging through the forest. **Their hands and feet are large and curved**, providing them with excellent grip. Adult males have facial flanges and a large throat pouch. These are used to make them extra loud when they make noise and communicate with other orangutans far away in the forest. This communication is usually about territory, since orangutans are usually solitary (unlike the other great apes: chimpanzees and gorillas). They are highly intelligent, using leaves as umbrellas and sticks to catch fish.

Orangutans are classed as endangered, particularly since they only live on the islands of Borneo and Sumatra. The main reason is that their rainforest home is being cut down to create palm oil plantations. This is a very high profit crop and it is thought that 10% of all supermarket products contain it. This is causing severe habitat loss, which means the orangutans don't have anywhere to live.



Spider Monkey

Amazing Adaptation: Four fingers, prehensile tail

Habitat: Rainforests

Distribution: Columbia, Ecuador and Panama

Diet: Fruit, nuts, leaves and sometimes eggs, insects or flowers

Longevity: Up to 25 years

Status: Critically Endangered (IUCN red list)

Spider monkeys have exceptionally **long limbs and a prehensile (gripping) tail**. On their hands they only have four fingers and a very tiny nub for a thumb. This makes it **easier for them to swing between trees since their thumb doesn't get in the way**. They can also use their tail just like a hand to grab on. Their tail doesn't have any fur on the bottom near the tip to give it better grip. **Their tails can support their entire weight**. Spider monkeys move around the branches with an agility only bettered by the gibbons - they tend to run on all fours along branches and also swing between them, hand over hand. On the ground they may walk upright on their hind legs. They live in groups of around 20 individuals, although it is rare for all of them to meet at the same time since they move between changeable groups of 2-8. Females can be slightly larger than the males, reaching 57cm in body length as opposed to the male's 48cm, although they tend to be lighter; 8.8kg rather than 9.5kg.

In the wild, the Columbian black spider monkey is critically endangered. It's biggest threat is habitat loss as it's rainforests are cut down.

There are lots of spider monkeys at Colchester Zoo and can be found across from the Amur leopards on the steep hill.



Amur Leopard

Amazing Adaptation: Camouflaged ambush predator

Habitat: Deciduous (woodland) forest, and conifer forests

Distribution: Far eastern Russia along the Russia-China border

Diet: Deer, hares, badgers and other small mammals

Longevity: 10-15 years in the wild and up to 20 years in captivity

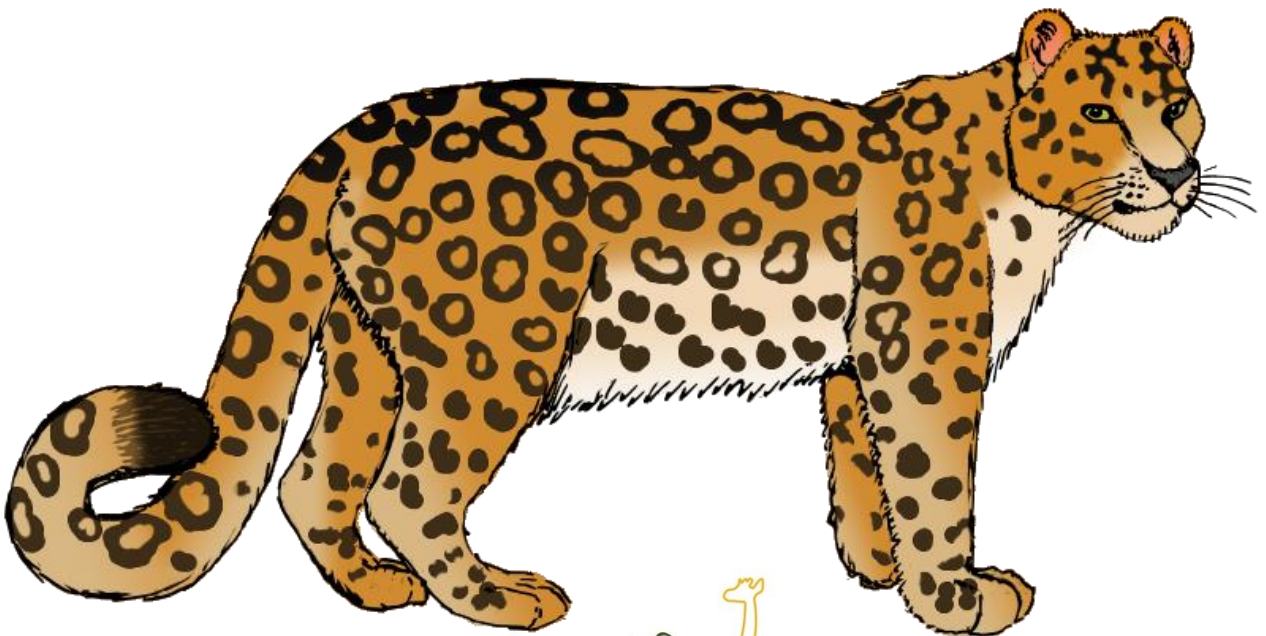
Status: Critically Endangered (IUCN red list)

The Amur leopard has the most distinctive markings of any of the leopard subspecies. The **fur changes** from pale cream in the winter to reddish-brown in the summer. The body and sides are covered in widely spaced, large rosettes (open spots) with a thick unbroken border and darkened centres. The head is covered in many small spots, which become larger on the legs and stomach.

Their range is further north than the snow leopard, where it is very cold and snowy. To keep them warm they have **very thick fur**. They also have very large, **furry paws** which prevents them from sinking in deep snow. They are solitary and hunt mostly at night, using a stalk and ambush technique. Amur leopards are strong climbers and may even take their prey up into the trees

Amur leopards face a number of threats. They are hunted for their fur and for use in traditional Chinese medicines. Their habitat is also being destroyed causing depletion in their prey. Their small population size also puts them at risk from catastrophes such as fire, disease and inbreeding problems.

There are two Amur leopards at Colchester Zoo. This male and female pair are housed separately in adjoining enclosures to mimic their solitary behaviour in the wild. Check the enclosure signs to see who you're looking at. The male is named Sayan and the female is called Milena.



Giant Anteater

Amazing Adaptation: Long tongue, strong claws

Habitat: Grasslands, woodlands and rainforest

Distribution: Southern Mexico to Uruguay and Argentina

Diet: Ants, termites and occasionally other insects

Longevity: Unknown in the wild and up to 26 years in captivity

Status: Vulnerable (IUCN red list)

The giant anteater's large body is covered in long, coarse fur. Their head is long and has a tube-like mouth and nose. Giant anteaters do not have teeth, instead they have a very long tongue covered in tiny backwards pointing spines. **Their tongues can be longer than 60cm (2foot)**. They stick this tongue into ant/termite nests to fish out their food. One giant anteater can eat up to 35,000 ants and termites in one day! As well as their tongue, they are also armed with **huge claws on their front feet, which are used to rip open termite mounds**. While walking, these claws are folded back into the anteater's palms to stop them from breaking, forcing the anteater to walk on its knuckles.

Giant anteaters also have large, thick tails. They use this **thick tail for balance** when they stand up on their hind feet (like a kangaroo), to reach the higher parts of the termite mounds.



Binturong

Amazing Adaptation: Prehensile tail, climbing claws

Habitat: Tropical rainforests and sub-tropical forests

Distribution: Thailand, Malaysia, Indonesia and north east India

Diet: Leaves, fruit, birds, fish and small mammals

Longevity: Up to 18 years in the wild, and 20 in captivity.

Status: Vulnerable (IUCN red list)

Also known as the bearcat, the binturong is related to the mongoose (and meerkats). They look a bit like a funny badger with a long tail up in a tree. Binturong tails can be as long as their body. They are also one of **the only non-primates that have a prehensile (gripping) tail**, meaning they can use their tail to hang on. They have very sharp claws on their feet to help them climb. Their short legs help them balance. They **can turn their feet almost backwards**, which helps them climb down trees face-first.

They are mainly nocturnal, using their **good night vision, sensitive hearing and excellent sense of smell** to move around skilfully in the trees. Their very long white whiskers also help them sense their way in the dark. They are less agile on the ground but can swim and dive well, a bit like an otter. Binturongs live in small family groups consisting of parents and one or two young. Both the parents care for the young and teach them how to use their tail for balancing and gripping. They mark their territory with a scent which smells like popcorn.



Otter

Amazing Adaptation: Rudder like tail, webbed feet, goggles and ear plugs

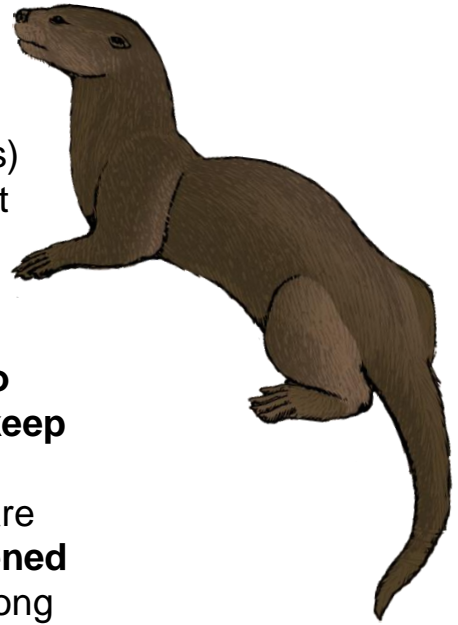
Habitat: Shallow wetlands and rivers in rainforests and woodlands

Distribution: Southern and Southeast Asia, India and China

Diet: Mainly fish, but also frogs, crabs, insects, rats and birds

Longevity: Approximately 10 years in the wild, up to 20 in captivity

Otters are excellent divers and swimmers. They can **hold their breath for up to 20 minutes** when swimming underwater. **They close their ears and nostrils** when underwater to prevent water going up their nose. **They have a third clear eyelid** (called a nictitating membranes) which covers their eyes when swimming and prevents dirt getting in (built in goggles). They use their **sensitive whiskers** to find prey underwater. Otters are very skinny and rely on their **fur (instead of a layer of fat) to keep them warm**. Their fur has a **thick dense bottom layer to keep them warm, and a long waterproof top layer to keep them dry**. When swimming slowly, they paddle with their **webbed paws**. When swimming quickly, the front limbs are kept close to the body while the back legs and their **flattened tail propels them forward**. Their tails are powerful and long and can make up 60% of their body length!



Otters are very playful and are among the few mammals that play as adults and is an important social activity. They are often seen in large family groups, playing in the water. They live in burrows near the water's edge. Smooth-coated otters are the largest otters in Southeast Asia. They get their name from their shorter, smoother coats which appears velvety and shining. The Asian Short-clawed Otter is the smallest of the 12 species of otter.

Colchester Zoo has two different types of otter. The **Asian short-clawed otters** live in the same enclosure as the binturongs. The **smooth-coated otters** are on the other side of the over-head walkway (next to the flamingos).

Fennec Fox

Amazing Adaptation: Giant ears, fuzzy feet

Habitat: Desert

Distribution: North Africa through the Sahara desert

Diet: Small rodents, invertebrates, birds and anything else they catch

Longevity: 6 years in the wild, 12-16 years in captivity

Status: Least Concern (IUCN red list)

The smallest of all the foxes the fennec fox is easily recognisable due to its large ears, dainty white face and sandy coloured fur. A fully grown fennec fox weighs about 1.5kg and is between 24 and 41cm long, compared to the British Red Fox which weighs around 5kg!

Their **unusually large ears**, which can be up to 15cm long, are an adaptation to help them lose heat in the baking hot deserts where they live - **they are full of blood vessels which allow the blood to lose heat so cooling the animal.** Another adaptation to the heat are the soles of their feet which are covered in fur to protect them from the hot sand.

They dig burrows in the ground where they sleep during the hot day. They are nocturnal, only venturing out of their burrows at night time. At night, their thick fur helps keep them warm (deserts are very cold at night). Their burrows also create dew which the foxes drink. The dew in their underground burrows and the food they eat is the only water the fox gets. They have **special adaptations in their kidneys to prevent water loss (which means they rarely need to pee!).**



Aardvark

Amazing Adaptation: Digging paws, long tongue, nocturnal

Habitat: Grassland and deserts

Distribution: Southern Egypt to South Africa

Diet: Ants and termites primarily; some other fruit and insects

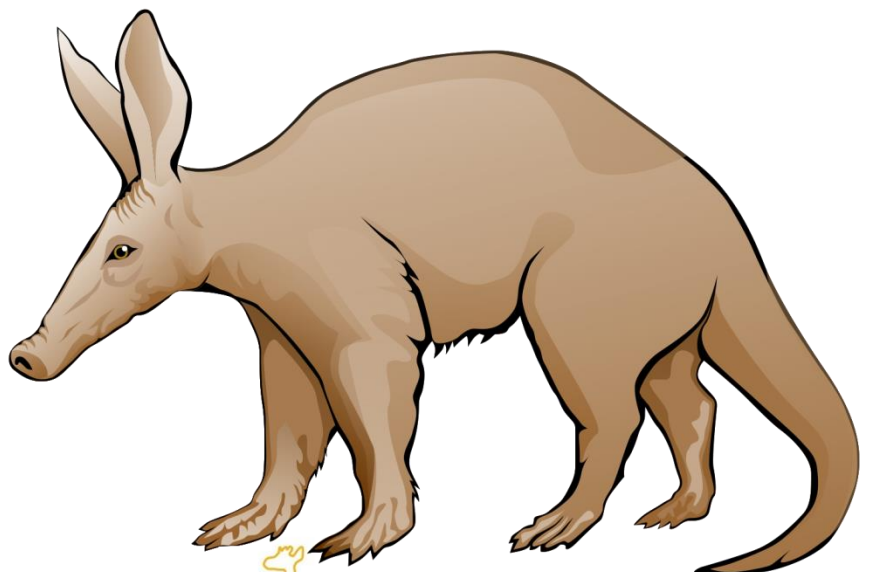
Longevity: 10 years in the wild and longer in captivity

Status: Least Concern (IUCN red list)

The Aardvark is a unique animal which is only found in Africa. They can grow to body lengths of 150cm and can be 60cm tall at the shoulders. Aardvarks have a **muscular body** and the back is humped with short, powerful hind limbs. **The claws are long and spoon shaped with sharp edges**, which are ideally adapted for burrowing into the ground or termite mounds at great speed. The skin is thick, sparsely covered by hairs and varies in colour from brownish grey to pale sandy. The tail of the Aardvark is very thick at the base and tapers gradually. It can be used to **defend itself against attack or to support the Aardvark** when it is standing upright on its hind quarters. The greatly elongated head is set on a short thick neck and at the extremity of the blunt snout are circular nostrils. While digging or burrowing, **hairs on the nostrils combined with folds of skin protect the nose from dirt clogs and insect attack**. The mouth is small and tubular and contains a long tongue, which is thin and sticky.

The Aardvark has fully developed grinding teeth and incisors but lacks all other front teeth. The teeth themselves are remarkable in that they continuously grow and yet lack roots! Aardvarks are almost exclusively nocturnal and sleep during the day curled in a tight circle in the burrow.

Visit them in the Aardvark Burrow (underneath the Giraffe House, with an entrance by the lake) where they sleep inside on most days!



Bennett's Wallaby

Amazing Adaptation: Jumping legs, balancing tail

Habitat: Scrub grassland, woodland, and open grasslands

Distribution: Australia including Tasmania

Diet: Grasses, leaves and other plants

Longevity: Approximately 12 years

Status: Not threatened in wild (IUCN red list)

The wallaby's **back legs are very muscular and the strong tail is used for balance when leaping**, or as a prop when sitting. The wallaby's colouration provides **excellent camouflage** amongst woodland undergrowth, and its relatively **dense fur** gives it the added insulation needed to survive in the cool Tasmanian climate. These same features have enabled escaped wallabies to survive and breed in parts of Britain. Bennett's wallaby's are usually solitary animals, staying together only for the duration of mating.

Gestation (the period when a baby is developing inside the mother's womb) is usually 30 days, but when environmental conditions are unfavourable, or if the female already has a baby in her pouch, this can be delayed – the development of the embryo is halted until the conditions improve. When the baby is born, usually during the rainy season, it closely resembles a baked bean in size and shape! This tiny, barely formed creature, unable to see or hear, hauls itself up its mother's belly, hanging on by its front legs (its back legs are less developed) and makes its way into the pouch. Once inside, it attaches to one of the four teats and remains there for nearly 7 months, venturing out occasionally as it gets bigger. Even after leaving the pouch for the last time, the young wallaby may continue to suckle.

With their taste for eucalyptus trees and other crops, they have long been regarded as pests. Their meat has been used for human and pet food and their skins have also been used for leather and fur in the past. Fortunately, hunting is now regulated and wallaby numbers are high.

They can be found at Familiar Friends in their brand new walk-through enclosure – Wallaby Walkthrough, where you can walk right next to these awesome animals.



Pre-Trip Classroom Ideas:

These are ideas to get teachers thinking about how to introduce the concept of animal adaptations. Use these ideas as a starting point with or without the pre-made activities and worksheets on the next pages.

1. Discuss the term 'adaptation', have pupils come up with their own definition.
2. Discuss animals that have extreme adaptations, with the question; Are they too specialised? Example animals include the giant anteater and the giraffe's long neck.
3. Cut pictures from magazines, or find pictures online and make a class collage of animals they want to see at the zoo. The collage could focus on animals with similar adaptations, animals that live in the same habitat etc.
4. Have students imagine life without an important human adaptation (e.g. opposable thumbs). Have them write a story about how they would make up for this loss.
5. Collect pictures of animals and divided them into groups: predator/prey; carnivore/ omnivore/herbivore; hot/cold; etc. based on their appearance.
6. Discuss the differences between hibernation and migration and look at the animals that stay active all winter do to stay warm and find food.
7. Build habitat dioramas representing hot habitats (e.g. desert, rainforest, savannah) and cold habitats (e.g. polar, sea, mountains). Place plastic animals, plush animals, or pictures of animals in the correct habitat based on their adaptations.
8. Compare similar animals that live in different habitats (e.g. polar bears and sun bears; Amur tiger and Bengal tiger). Create Venn Diagrams showing the similarities and differences between them.
9. Discuss if an animal that is adapted to live in one type of environment could survive an extreme change such as climate change.
10. Before the trip have students choose a specific animal and have them create a list of questions to ask themselves whilst at the zoo. This task will link into number 1. On the post zoo trip classroom ideas page.

Pre-Trip Classroom Ideas:

Vocabulary Words:

Adaptation:	A feature of an animal (or plant) that helps it survive in a specific habitat or lifestyle (predator, scavenger, etc.)
Behavioural Adaptation:	A behaviour that helps and animal survive (e.g. penguins huddling together for warmth)
Camouflage:	Colours and patterns that help an animal blend into its surroundings
Carnivore:	An animal that mainly eats meat
Community:	All of the plants and animals that live in a specific area
Consumer:	Any animal (because they must all eat food to get energy)
Ecosystem:	The complex community of interacting plants and animals in a specific habitat
Habitat:	The type of place an animal lives (e.g. savannah, rainforest, etc.)
Herbivore:	An animal that mainly eats plants
Niche:	The specific role ("job") of an organism within a community
Omnivore:	An animal that eats plants and meat
Physiological Adaptation:	An internal change that helps an animal survive (e.g. giraffe's specialised veins and arteries to get blood to their heads)
Predator:	An animal that hunts and eats other animals
Prey:	An animal that is eaten by other animals
Producer:	Most of the green plants (because they can produce their own food)
Scavenger:	An animal that feeds on dead animals
Species:	A group of animals that have similar characteristics and can produce offspring.
Structural Adaptation:	A physical external change that helps an animal survive (e.g. spines on a hedgehog)

Pre-Trip Classroom Activities:

Animal Mixer

How do animals communicate with each other? What makes animals unique and different from other animals? Pupils will think about this when they work to communicate without speaking

Time: 15 minutes

Subjects: Drama, Physical Education, Science

Materials Required: Animal pictures, one per pupil

Start with a discussion of how animals communicate, and how the pupils would communicate if they were animals. For younger pupils it's a good idea to give examples (e.g. elephants trumpet, lions roar, etc.). They discuss how animals that don't make noise communicate. Do they twitch their whiskers, or stand in funny positions, or swish their tail? Once the students have all thought about how animals communicate, explain that they are going to become animals.

Many animals live in groups (can tie this into a discussion of hunting in packs or herd of zebra, etc.). Once they have all assumed their animal identities, the pupils need to find the rest of their animal group. However, they can't speak, so to find each other they must communicate like animals!

Explain that they will be given a picture of an animal they need to act like. When the pictures are handed out they should look at it, but they need to keep it secret and not tell anyone what it is. After everyone has a picture, have them get started and try to find the other pupils in their group by making the appropriate animal action/sound. Once they find someone in their group, stay with them and try and find more. Continue until all the animals are in their group. As a conclusion go through the groups and have each demonstrate how they managed to find each other.

* To make it easier, hand out the same number of pictures of each animal, e.g. in a class of 30 hand out 6 pictures of 5 different types of animals (6 elephants, 6 giraffes, etc.). To make it harder, have uneven groups of animals, e.g. 3 elephants, 9 rhinos, etc. Ensure you tell the pupils if the groups are uneven or they may be confused.

Pre-Trip Classroom Activities:

Food Chain Go Fish

This card game is a fun way for pupils to learn about food chains and the concept of predator and prey animals.

Time: 30 minutes

Subjects: Science, art

Materials Required: A4 paper, scissors

Have your pupils work in pairs. Explain that they will be designing their own card game, a little bit like go fish. Each group now needs to brainstorm five different food chains of three plants/animals. If this is a new topic, go over some examples with the group, for older pupils, have them create their own. Remind them that all five need to be different. Potential food chain examples are:

Seaweed—sea turtle—shark

Grass—mouse—snake

Pond algae—fish—alligator

Acacia tree—giraffe—lion

Rotten log—termite—sun bear

Give each pair 2 pieces of A4 paper. Each pair should cut their pieces of paper into 8 (so at the end they have 16 smaller pieces of paper). They should now label all of their cut out pieces of paper with each of the animals/plants on their food chain lists. The extra piece of paper can be used to create a label or instruction card for their game. Encourage the pupils to colour and decorate each card, have them draw the animal or plant.

After their cards are done, pupils can play a game of Go-Fish. Each person starts off with four cards, and a draw pile. They then ask their opponent for an item that would complete one of the food chains (e.g. do you have the shark?). If they do, the opponent hands it over, if not they say “go fish” and they pick up a card from the draw pile. The first person to complete two accurate food chains wins the game.

For a more complicated, or longer game, have pupils make 10 different food chains (with 4 pieces of paper, and 32 cards), or put two groups together so that four pupils are playing with two decks.

Pre-Trip Classroom Activities:

Rhino Ears

Rhinos have excellent hearing but a very poor sense of sight. What would it be like to be a rhino? Can they hear the predator coming?

Time: 15 minutes or more

Subjects: Physical Education, Science

Materials Required: Blindfold, something that makes noise (bells, set of keys, etc.)

First discuss how animals rely on their sense of hearing to stay alive. Hearing allows many animals to avoid being eaten by predators and allows other animals to find their prey. Rhinos don't have many predators, but baby rhinos have a lot of predators. Rhino mothers protect their babies by listening for predators. Discuss predators of rhinos such as lions, hyenas or African hunting dogs.

Get the class to form a large circle and put one pupil in the middle. The child in the middle is the mother rhino, and the rest of the class are predators. Place the noise maker (set of jingly keys, bells, etc.) at the rhinos feet and explain that the noise maker is the baby rhino. Blindfold the rhino and tell him/her to listen carefully for any approaching predators.

The teacher should choose one predator silently (walk around the circle and touch on shoulder, point at pupils, etc.). The predators job is to sneak very slowly and carefully and try and grab the baby rhino and make it back to the outside of the circle. It is sometimes useful (especially with younger groups) to have everyone practice sneaking quietly like predators before the game begins.

The rhino must listen for the approach of the predators. When the rhino hears a predator they point at them. If the predator has been pointed at, they have lost the element of surprise and go back to the outside of the circle. Select a new predator to sneak forward. All the other pupils in the circle must be quiet so they don't interfere with the predator who is sneaking up. If a predator successfully grabs the baby rhino and makes it to the outside of the circle, they can become the new rhino. Keep playing giving multiple pupils a turn to be the predators and the rhino. For older group consider having multiple predators sneaking up at the same time and tying it into a discussion of how many predators hunt in groups (packs, prides, clans, etc.).

At the Zoo Ideas:

These are ideas to help your class focus during their trip to the zoo. Use these ideas as a starting point with or without the pre-made activities and worksheets on the next pages.

1. Use the worksheets in this pack to help focus your students
2. Encourage students to spend time observing the animals. Some unique animal behaviours can only be seen if we watch very carefully.
3. Have students make a detailed sketch of a zoo animal, sketching encourages careful observation.
4. Take photos of the animals and around the Zoo. When you get back to school make a photo scrapbook of your trip.
5. Attend the feeds or talks and have your students take notes. Often the keepers are available after to answer questions if you want to learn more.
6. Pupils can examine the animal enclosure and determine, if they were an animal at the Zoo, which enclosure would they want to live in? Why?
7. Have pupils keep track of how many of each type (e.g. monkey, mammal, bird, big animal, small animal, etc.) of animal they see. Which type is the most common at the zoo. Why do they think the Zoo has the most of that type of animal?
8. Count how many animal enclosures have climbing structures. Have the pupils try to guess what this means about the animal's adaptations and how they move.
9. Which animals seem comfortable with the temperature? Do any look too hot or too cold? Where do you think they are adapted for in the wild?

At the Zoo Activities:

Camera

This activity gets students focusing quietly and independently, and works well when pupils are taking real photos to get them to decide what to take photos of beforehand.

Time: 15 minutes or more

Subjects: Art, ICT, observational Science skills

Materials Required: Cameras (optional), small bits of card (optional), pencils (optional).

Before starting, take time to talk with the pupils to consider what make interesting subjects for good photos. Should they take close up images? Are walls interesting? Is it easier to take photos of an animal that moves a lot or an animal that's resting?

Find an animal that the pupils can stay focused on rather than get over excited when they see the animal. Divide the pupils into pairs. Within each pair one student takes the role of photographer and one takes the role of camera. The child pretending to be the camera keeps their eyes closed while the photographer leads them to an interesting viewpoint.

The photographer chooses when the camera opens their eyes and takes a picture. A good way to do this is to have the photographer gently tap the camera on their shoulder to have them open their eyes. When the camera opens their eyes, their job is to try to remember and visualise everything they see in front of them: Do they see an animal? How many animals? What is the enclosure like? What textures do they see? When taking photos it's best if the camera only has their eyes open for 5-10 seconds, then closes them again. Have the photographer move the camera to a few different locations. Do they see different animals? Is there a slightly different view point? After they've taken a few 'photos' have them switch roles.

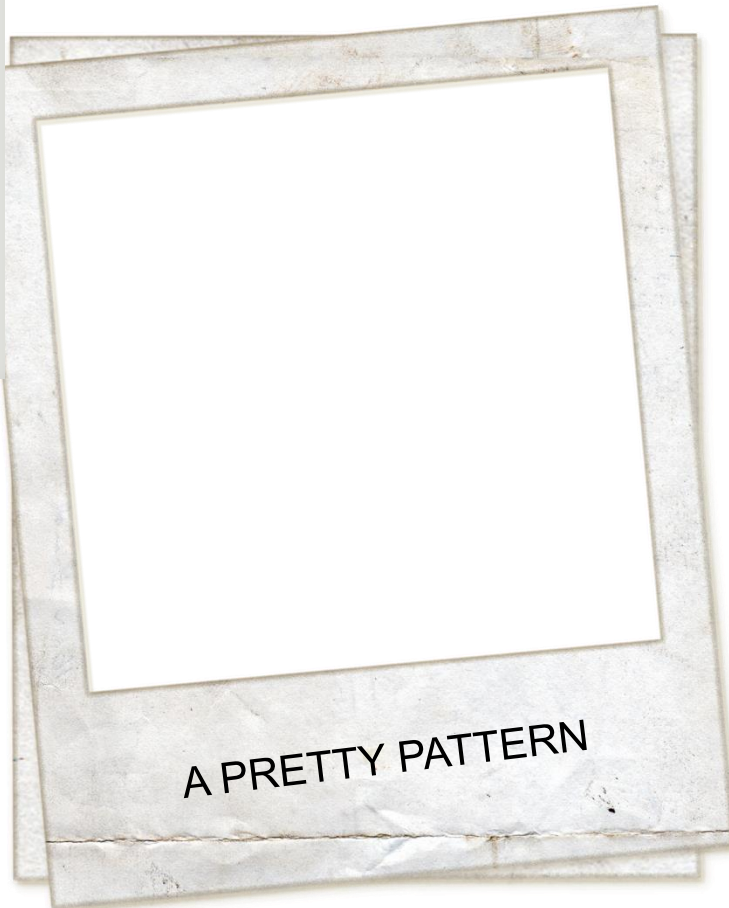
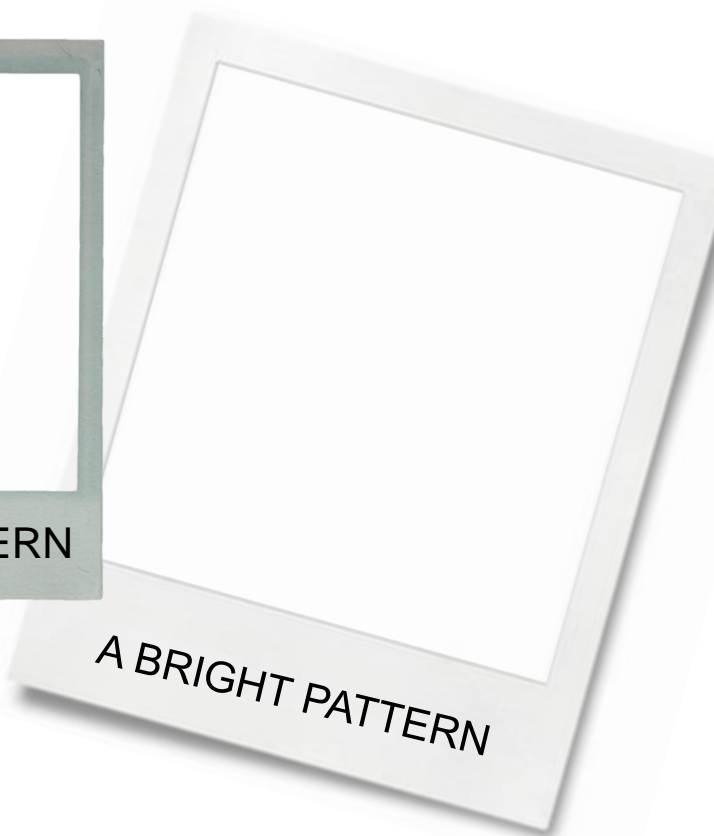
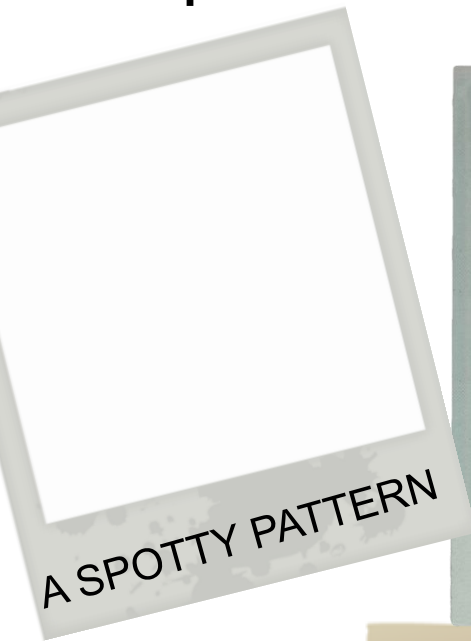
Optional: If the group has actual cameras, have them all select their favourite photo from their activity and see if they can capture it using their real camera/s.

Optional: for an extended activity, hand out small bits of card to each pupil. Explain that they are going to process the photos they took with their eyes. Have them select their favourite image they photographed (real or with just their eyes) and have them draw the picture on the card, just like a photo.

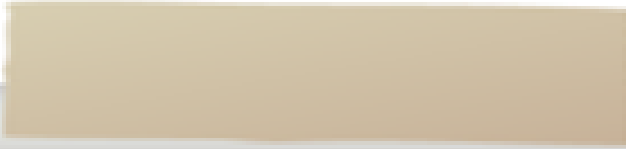
At the Zoo Ideas: Senses Scavenger Hunt

Subjects: Art, Science

Draw pictures of the animals or things when you find them:



At the Zoo: Animal Close Look



MY CHOSEN ANIMAL IS _____

List as many of it's adaptations as you can: _____

At the Zoo: Observing Animals

Name of animal: _____

Observe your animal for 10 minutes.

Make a check mark each time it does one of the following:

Walks/Runs	Eats	Drinks	Lies Down
Sleeps	Yawns	Looks at people	Plays

How can you identify your animal from others in their group:

Which animal in the group is the leader? How can you tell?

What adaptations does this animal have for living in a group?

What things can you see in the enclosure which would encourage the animal to use its adaptations? (e.g. if it has digging paws does it have sand to dig in; if it is good at climbing does it have climbing structures)

At the Zoo: Africa Paddock Maths

Visit the Kingdom of the Wild Paddock (the mixed African animal paddock). See how many of these adaptations you can discover.

1. An average Zebra has up to 50 stripes. _____ zebras were in the paddock today. If an average herd of zebras in the wild has 1,000. animals in it. How many stripes would be in the herd?
2. Look closely at the ostrich. How many toes do they have? Check the track for a hint. _____ toes. _____ ostriches were in the paddock today. How many ostrich toes were in the paddock?
3. (Remember how many legs they have!)
4. Giraffes have very long necks. However, they have the same number of bones in their neck that people do, 7 bones. There were _____ giraffes in the paddock today. How many giraffe neck bones were in the paddock?
5. The crowned crane have very pretty yellow crowns of feathers. If each crown has an average of 24 feathers, how many yellow feathers did you see today?
6. Greater kudu are the large, brown-grey antelopes. They have two very large ears to listen for predators. How many kudu are in the paddock _____. How many ears?
7. White rhinos have one big horn and a smaller one.
How many rhinos were in the paddock today? _____
How many big horns?

Total stripes

Herd stripes

Ostrich toes

Giraffe neck bones

Yellow Feathers

Kudu ears

Big rhino horns

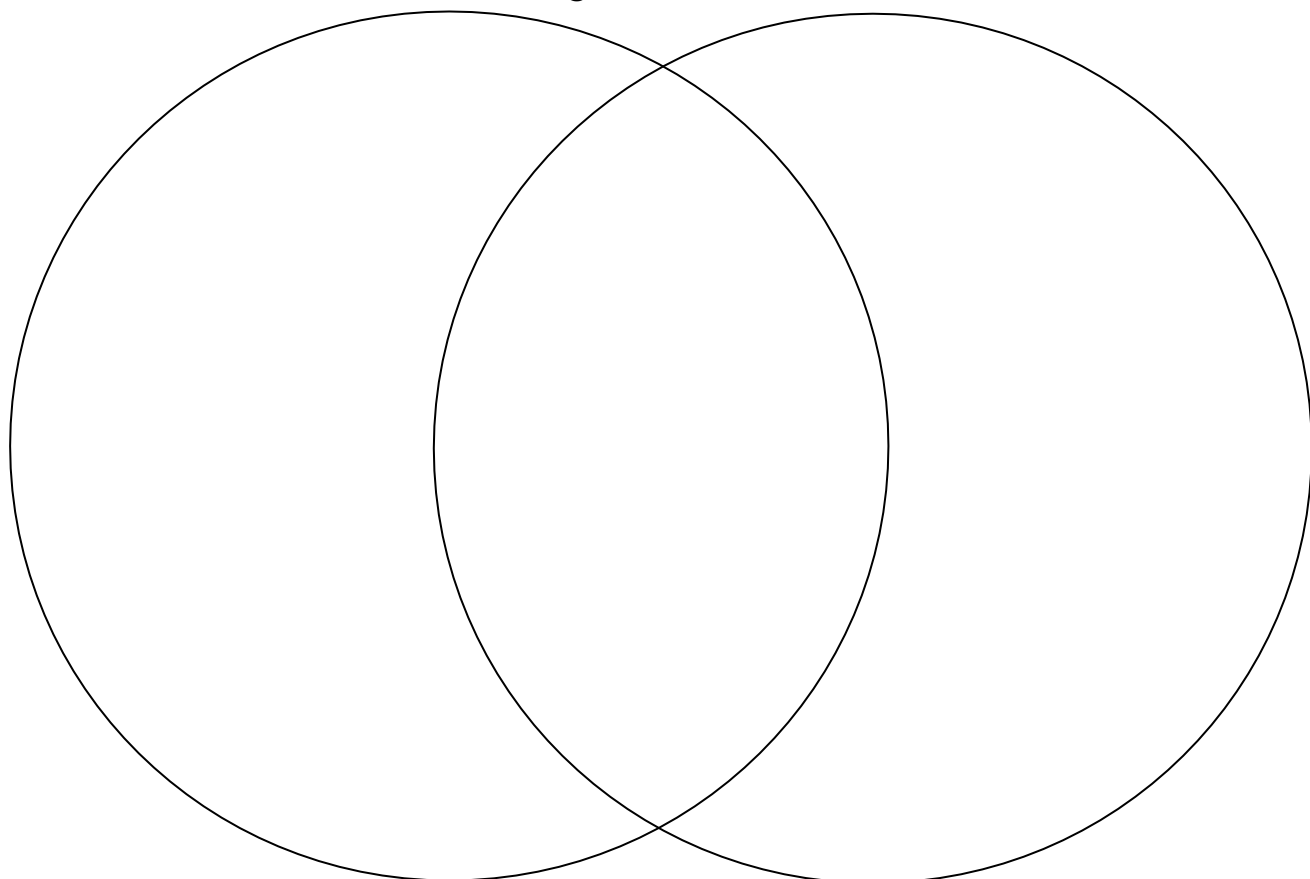


At the Zoo: Animal Diet

Choose 6 animals at Colchester Zoo. Read the signs at the animal's enclosure to learn what they eat and record the information in the chart.

Name of Animal	Herbivore (plant eater)	Carnivore (meat eater)	Omnivore (eats both)

Fill in the Venn Diagram to show this information



Which group has the most animals? _____

Which group has the least animals? _____

At the Zoo: Bird Anatomy

Imagine you are a famous researcher studying variation in the beaks of birds (just like Charles Darwin did). Your task is to gather data at the Zoo looking at different species of birds. Based on this research, you need to decide which geographical location you should visit to continue your research. Your choice should be the place where you are most likely to see the greatest variety and types of adaptations in the beaks of birds.

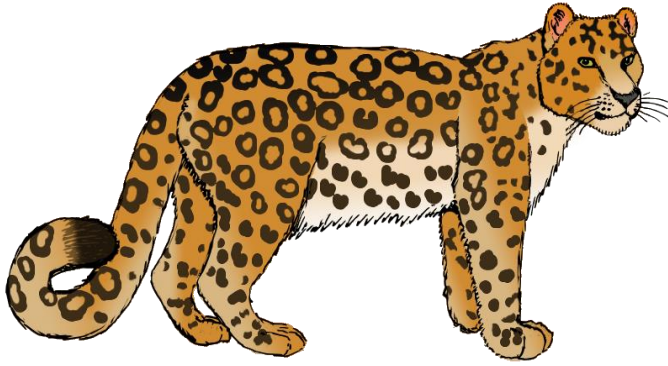
Birds and Beak Adaptation			
Animal Name (Common & Scientific)	Wild geographical location and features (i.e. vegetation, temperature)	Information about the beak (e.g. colour? Curved? Thick?), draw a sketch	Ecological role of beak (what purpose does this type of beak serve)

At the Zoo: Big Cat Comparison

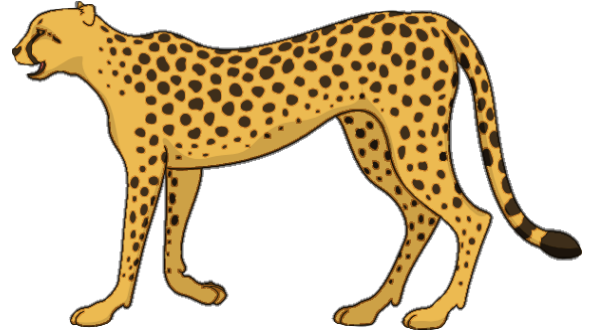
Amur leopards live in the very cold parts of Far East Russia.

Cheetahs live in the very hot parts of Sub-Saharan Africa.

Both are large, spotty cats. Because they live in very different habitats (hot vs cold) they have very different adaptations. Describe each of their features to contrast and compare their adaptations.



Amur Leopard



Cheetah

Fur length: _____

Fur length: _____

Body weight: _____

Body weight: _____

Size of ears: _____

Size of ears: _____

How fluffy is the tail: _____

How fluffy is the tail: _____

Fur colour: _____

Fur colour: _____

At the Zoo: How They Climb

Visit these animals' enclosures and read the signs to learn what adaptations they have which help them climb (e.g. strong hands, grabbing claws, long tails, etc.). Record at least one climbing adaptation for each animal.



Binturong



Ring-tailed Lemur



Spider Monkey



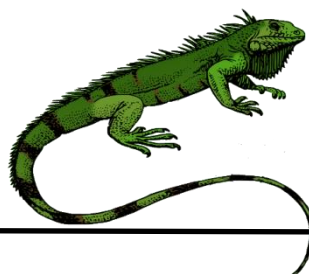
Orangutan



Red Panda



Sloth



Green Iguana

Post-Trip Classroom Ideas:

These are ideas to help teachers relate animals they have seen at the zoo to further learning about animal adaptations. Use these ideas with or without the pre-made activities and worksheets on the previous pages.

1. This idea is the second part to task 10 in the pre-zoo trip classroom ideas. Having chosen their animal and answered their questions have the students create a poster showing the adaptations the animal has that help it survive.
2. Create a 'zoo guide book' of your school trip to Colchester Zoo. Have students write article about the animals they saw, and include pictures/sketches they made during the trip. Students should note adaptations for each animal.
3. Using their memory, pupils can create a map of the Zoo. Include animals that they saw and areas they remember (including food, toilets, play areas, etc.). After drawing from memory compare their maps to an actual map of the Zoo. What's different?
4. Have the students design zoo enclosures for animals they saw. Remind them to include features suitable for the animal's adaptations (e.g. sloths need climbing structures, hippos need water, Amur tigers don't need heat, etc.)
5. Research different habitats and have students design an animal with specific adaptations for that habitat.
6. Play animal charades. Divide the class into team and each team must act out an animal's movements. Use animals they observed at the Zoo, with a focus on how they are adapted to moving.
7. Research a specific country/places/habitat (but not the animals that live there). Have pupils draw and design an animal that would be adapted to this location. After designing a made up creature, look at pictures of real animals from that location. Compare the pupils made up creatures to the real creatures, do they look the same?

Post-Trip Classroom Activities:

Create a Creature

Pupils will use their knowledge about animal adaptations to create a creature

Time: 30+ minutes

Subjects: Science, Art

Materials Required: Potato for each pupil, toothpicks, craft supplies, glue, coloured paper.

Explain to the pupils that they will be building an imaginary animal that is adapted to one of the habitats in Africa, the savannah. They will use the potato as the body for the animal and can stick in toothpicks/pipe-cleaners/paperclips for legs (if it has legs!). Encourage them to be creative and add anything else than can think of from other materials.

Remind them to think about:

- What does their animal eat? What food is available on the savannah
- How does it survive in the dry season when there can be drought, and in the wet season when areas can flood? For example; do they migrate, dig for water?
- How does it avoid predators? Or
- How does it hunt?

After the pupils have finished construction, have each pupil name and describe their animal. Pupils can share the adaptations with the group.

For a longer activity, after they are finished have pupils compare their creations to real animals that they saw at the zoo. Which animal is the closest match?

Post-Trip Classroom Activities:

Animal Poetry

Pupils use their knowledge of animal adaptations to write poetry.

Time: 15-30 minutes

Subjects: Literacy

Materials Required: None

Introduce the pupils to different forms of poetry, for example, haiku, cinquain and acrostic. Show them the example poems, by writing them on the board. After the pupils are familiar with the concept, they should choose an animal that they saw at the zoo. Using their memory and imagination they can try and write poetry about the animals with a focus on the animal adaptations.

Haiku

Originating in Japan, the haiku is three line of poetry, following the pattern of five syllables, seven syllables and ending with five syllables. The lines do not need to rhyme. For example:

Leopard in the trees	(five syllables)
Spots are perfect camouflage	(seven syllables)
Stealthy and secret.	(five syllables)

Cinquain

Cinquain poems have five lines and have specific pattern. Word cinquains are based on the number of words in a line. For example:

Orangutan	(one word—an animal)
Forest man	(two words that describe it)
Climbing tall trees	(three words expressing action)
Long arms and strong hands	(four words explain how you feel about it)
Amazing	(sum up with one word)

Acrostic

These are poems where the first letter (or syllable or word) spell out a word or message. The easiest is spelling out the name of an animals (for older children try hiding messages). For example:

Lying motionless in the sun
In daytime they are lazy and sleepy
On moonlit nights they prowl
Nocturnal

Post-Trip Classroom Activities:

Genetic Diversity

To explore the concept of genetic diversity and how it relates to adaptations.

Time: 20 minutes

Subjects: Science

Materials Required: Copies of the genetic wheel for each student

Variation in animals is caused by genetic or environmental diversity. This variation might be beneficial to the animals survival. If the variation is beneficial, then over the course of many generations of animals, they might evolve so that this variation becomes a new adaptations that makes them better suited to their environment.

Have students fill in their genetic wheels. They should colour in each characteristics as it applies to them. Move circle by circle from the centre to the outside. They should record the number when they reach the edge of the circle.

This is a very simplified study of genetics. Most of these traits are controlled by many genes, and are measured on a scale (not simply presence or absence). For the purposes of this study, it is assumed that the traits are genetically controlled by one gene which is recessive and the trait is present or absent.

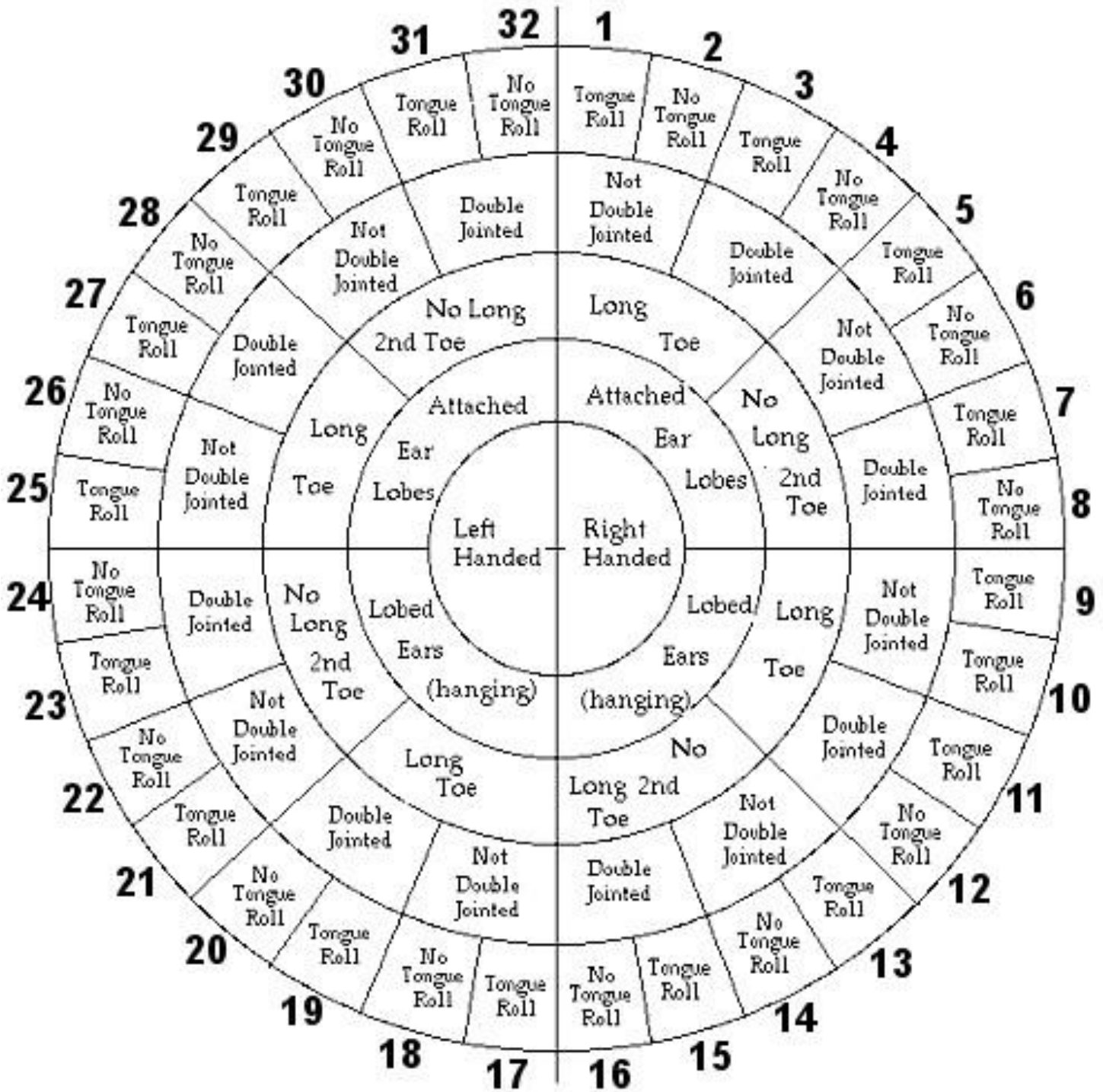
Have students compare their numbers to others. How many of them had the same number? Find out where their numbers branches off.

Have students take copies home and create genetic wheels for their parents to investigate how their genetic inheritance works.

Discuss if they think any of this variation might have adaptive benefits. Is it useful for survival to be right or left handed? Does having a tongue that rolls up provide any adaptive benefits? This can be tied into a discussion about the difference between variation/mutation and adaptations and why some adaptations evolve.

Post-Trip Classroom Activities:

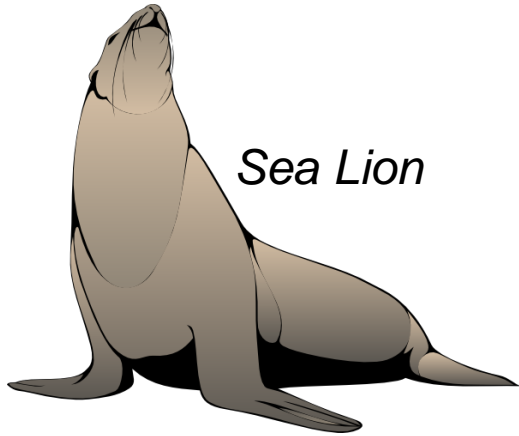
Genetic Diversity Wheel



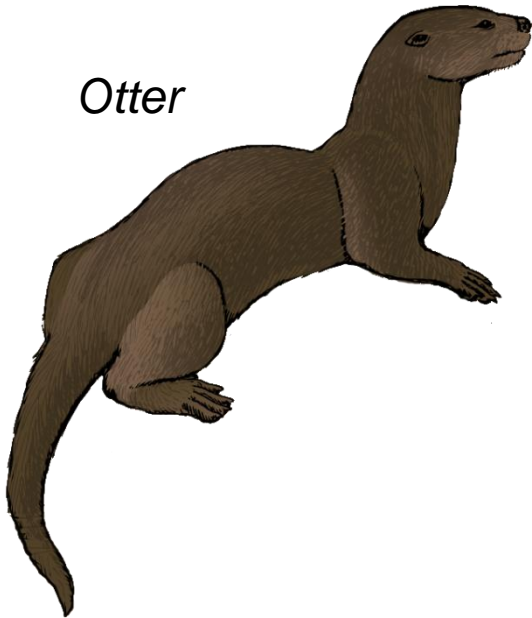
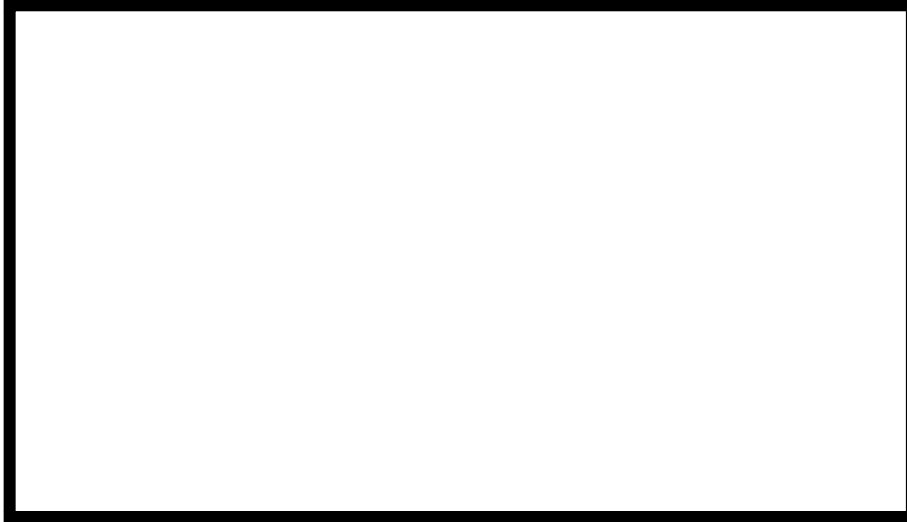
At the Zoo: Where do I Live

By looking at these animals' adaptations, draw what you think would be a good habitat for each of them.

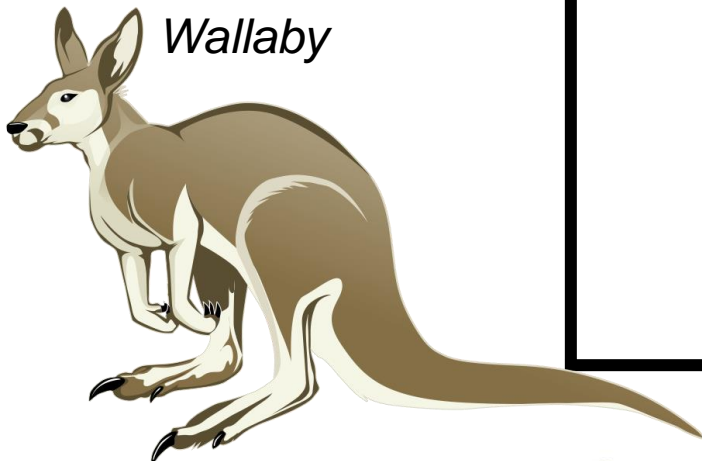
See the animals at the Zoo and check if your guess was correct.



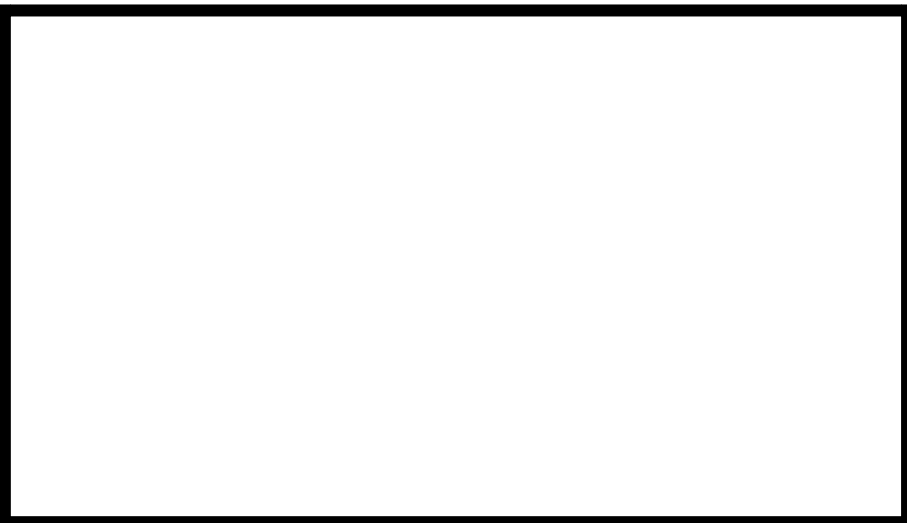
Sea Lion



Otter



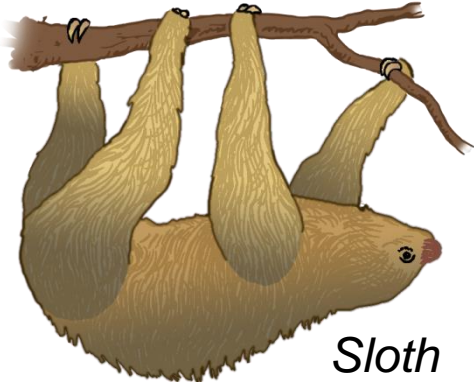
Wallaby



At the Zoo: Where do I Live

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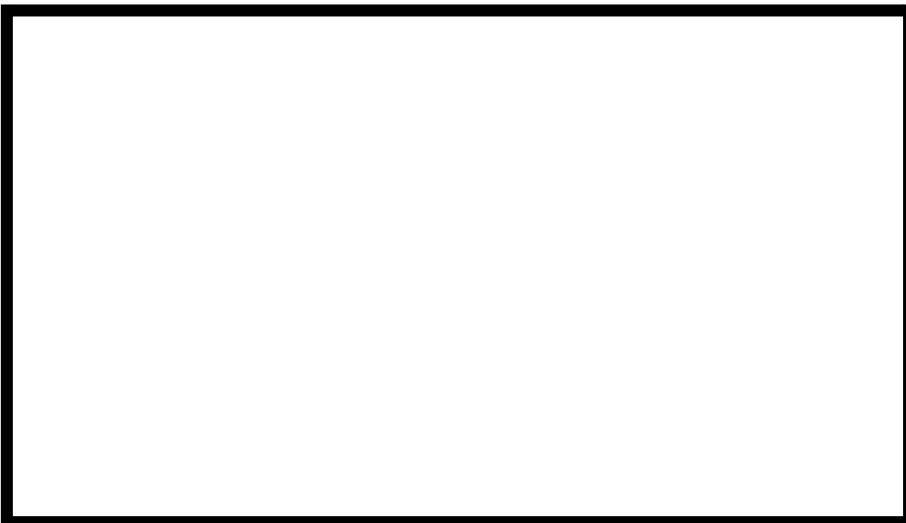
Sloth



Fennec Fox



Giraffe



We hope you enjoyed your trip to



Learning about
Animal
Adaptations