



How do we know how living things have changed?

Evolution the gradual development of something. The process by which different kinds of living

Organisms have developed over **Time**

Fossils are the remains or impressions of a prehistoric plant or animal embedded in rock and preserved in petrified form. **Write down as many facts as you can! Make sure you have at least 3 facts in full sentences and at least one question you would like to find out the answer to.**

Environment the surroundings or conditions in which a person, animal, or plant lives or operates.

Adaptation the process of change by which an organism or species becomes better fitted to its environment.

Fantastic fossils

Watch <https://www.youtube.com/watch?v=S5tMR5vyjk4> - Bill Nye the Science guy. Write down as many facts as you can! Make sure you have at least 3 facts in full sentences and at least one question you would like to find out the answer to.

Read **Fossils** on page 2 and answer the questions on page 3.

Using the notes you collected and any additional research, write a magazine article about fossils. On page 4 there is an example magazine article and on page 5 there is a magazine article template for you to use.



Animal Adaptations

Read through the information on pages 6 to 12. Think back to our trip to Durham Botanical Gardens. Can you remember the different plants in the desert room compared to the rainforest room? How were the plants different? How had they adapted to survive in their habitat?



Complete the challenge on pages 13 and 14.

Natural Selection

Meet the Muntz Flumple 

Read all about his life below on pages 15 to 17 and find out what happened to his species. Fill in the blanks on page 18.

Now complete the natural selection activity on pages 19 to 22. Think about everything you have learnt about adaptations and evolution... Design the landscape your creature lives in. Will more/new competition move in to eat all the prey or will a natural disaster affect the landscape like in the Muntz Flumple example?

Key Vocabulary

Fossils

Fossils are shapes of dead animals and plants that lived millions of years ago made in rock. Usually when something dies it is eaten or decays and disappears. However, when an animal or plant dies and gets covered over, it can stay there and over time, become a fossil.

Dinosaur

Fossils are really important in understanding what has happened a long time ago. Without them we would not even know that dinosaurs existed! People who study fossils are called paleontologists and these are the people who have found out what we now know about dinosaurs. However, this only started 200 years ago, so we've only known about dinosaurs for 200 years!



Did You Know...?

- 'Sus' is the nickname given to the most complete and best preserved Tyrannosaurus Rex specimen ever found.
- The word 'fossil' comes from an old word 'fossilis', meaning 'dug up'.
- Fossils are only found in sedimentary rock.
- The fossils in the pictures are called ammonites. It is the town symbol for Whitby in North Yorkshire. Whitby is good for fossil hunting and long ago, people thought that the ammonites were snakes turned to stone by St. Hilda!

How a Fossil is Made

When some plants or animals die, their body sinks into mud or is buried by sand. This often happens at the bottom of the sea and stops it from rotting or being eaten by other animals. Whilst it is underground, water and minerals seep into the bones and where the bones and body used to be, to make a hard shape. This is squashed under more layers of sand, mud and eventually rock over many, many millions of years.

1. Which one is closest in meaning to the word **decay**? Tick one.

- fossil
- rot
- disappear
- die

2. Use the text to fill in the blanks:

Fossils are made when a dead animal or plant gets _____

3. Explain in your own words why we have only known about dinosaurs for 200 years.

4. What does the Latin word 'fossilis' mean?

5. What is the name of the place that is good for fossil hunting? Tick one.

- St Helens
- Whitby
- Ammonites
- Sedimentary

6. What is the name of the spiral shaped fossil pictured in the text? Tick one.

- ammonites
- ammonites
- fish
- minerals

7. Why aren't there any fossils of cats that lived twenty years ago?

8. Number the boxes to show the order in which fossils are created. The first one has been done for you.

- 1 It is squashed under more layers of sand and mud.
- 2 Minerals and water seep into the bones and where the bones used to be.
- 3 The layers of sand and mud turn into rock, and create a fossil.
- 4 Their body sinks into the mud or sand.
- 5 A plant or animal dies.

Mission to Mars?

What will Starship be able to do?

- SpaceX hopes that Starship will be able to travel to space and back without getting damaged.
- This will hopefully make it easier to send people to the Moon and to Mars.

From: A NASA Space Shuttle being launched

New Spacecraft Revealed

Could we be on our way to Mars? A new spacecraft is being built which might make it easier.

SpaceX unveiled the new spacecraft, called Starship at an event in October. They were in Texas, USA.

SpaceX is a company which designs and builds spacecraft. It is run by Elon Musk, who spoke about Starship to a crowd of space fans and journalists.

"This is the most inspiring thing I've ever seen," he said.

Starship is special because it is designed to be reusable. This means that it will be built to travel into space and back to Earth again without being damaged.

SpaceX hopes that this will make space travel easier and cheaper!

The spacecraft isn't ready to go yet. It will have a test flight in a couple of months time. If all goes well, it might be able to fly into Earth's orbit within six months.

SpaceX has big plans for this spacecraft! In the future, it wants to send people to the

Moon and then on to Mars. It even wants to make it possible for people to live there!

No one has been to the Moon since 1972. In fact, only 12 people have ever set foot on Earth's **continent**.

NASA has also said that it wants to build bases on the Moon and send scientists to study it. Jen Brudenstone, an important member of NASA, said he hopes the bases will be built "within a decade."

Glossary

spacecraft A vehicle used for traveling in space

unveiled To have shown or revealed something for the first time.

orbit To travel round a star, planet or moon.

satellite Something, like a moon or a man-made object which orbits around a planet.

What Is Adaptation?



Adaptation is the process of change by which a species becomes better suited to its environment.

Why Must Animals Adapt?

Animals adapt when their natural habitat changes.

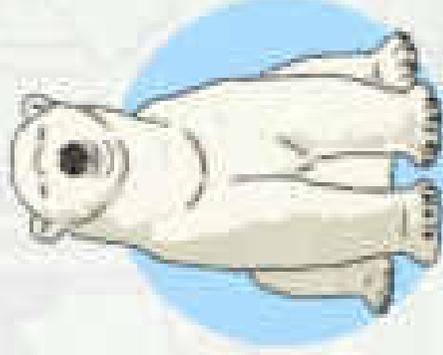
In Canada, winters can bring extreme changes in weather. In order to survive through the cold winters, animal species must adapt.



How Do Animals Adapt?

Each animal has certain features that help it adapt to its environment. For example, the polar bear does not hibernate in winter like the grizzly bear does. Polar bears have features that help them adapt to the cold.

- They have thick fur coats.
- They have a layer of fat under their fur.
- They have hair on their paws that helps them avoid slipping on the ice.



Adaptive Features

Can you think of other animals that have adaptive features?



Arctic Hare



An Arctic hare has brown fur that turns white in the winter, so it is more difficult to find in the white snow.

Their hair grows longer and thicker in winter. They have strong claws to dig into the hard snow.

Sloth



Sloths are adapted to survive in tropical rainforests. They have very sharp claws which helps them to climb trees.

Sloths spend most of their lives in tree tops to avoid the predators living on the floor of the rainforest. Green algae grows on sloths fur which help to camouflage sloths from their predators.

Whale

Whales are adapted to help them survive in the oceans. They are streamlined and can travel through water easily using their flippers.

Whales are warm-blooded mammals and have a thick layer of blubber under their skin to keep them warm. They have blow holes on top of their heads which let them breathe air in and out.



Elephant



Elephants eat plants and are adapted to survive in savannas, forests and deserts. Their cushioned feet help them to walk silently which helps them avoid predators.

Elephants have very large ears to cool them down. They also have a long trunk which they use for many things including shovelling, making trumpeting sounds and picking things up.

Meerkat



Meerkats live in groups. One or two meerkats will stand on their hind legs. They act as lookout for predators, whilst the other meerkats use their forefeet to help them find insects by digging the dirt.

eyes. This helps them see predators more clearly in bright sunlight.

Arctic Fox



Arctic foxes are adapted to survive in cold places. They have white fur to help to camouflage them against the

Arctic foxes have many other adaptations to help them survive in the cold. They have small ears and noses to reduce heat loss. Their thick fur and thickly furred footpads help to keep them warm.

Walrus



A walrus is adapted to live in very cold places. The bottom of a walrus' flippers are bumpy to help them grip onto the ice. A walrus' tusks help them climb out of the water.

They have a thick layer of fat to protect them from getting too cold.

Porcupine



Porcupines are adapted to live in forests. They have sharp quills to help them if they are in trouble with another animal.

They are great tree climbers because they have thick pads under their paws.

Snowy Owl



Snowy owls are well adapted predators. They have large eyes to help them see their prey and asymmetric ears help them to hear their prey. Their silent feathers help them to sneak up silently on their prey and catch it!

Do Humans Adapt?

Humans have the ability to adapt to changes in their environment.

Yes

Think about what happens when you go swimming or take a bath. Does your body adapt to the water in any way?

Your fingers become wrinkled! Your body does this in order to help your fingers grip onto things, even in the water!



Adaptation Activity Sheet

Animals and plants adapt to the environment that they live in. This means that over time they change to make themselves best fit the conditions of their habitat.

Those who live in the Arctic, where it is bleak and very cold and those who live in the desert where it is very hot and dry, are well adapted to these harsh conditions. If they were not they would not survive.

Animals that are prey hide from predators as this helps them survive. The fur of some animals is adapted to its habitat. This is called camouflage.

Fill out the table below with plants and animals that live in the five habitats.

Garden	Desert	Urban	Forest / Wood	Sea

- worm
- short
- lobster
- ladybird
- deer
- owl
- rat
- oak tree
- woodlouse
- camel
- flower
- squirrel
- snail
- dandelion
- pigeon
- seaweed

Choose one plant or animal from each habitat and find out how it adapted to its environment.

Garden

Desert

Urban

Forest / Wood

Sea

Munty Flumple



The Munty Flumple eats



The Munty Flumple offspring

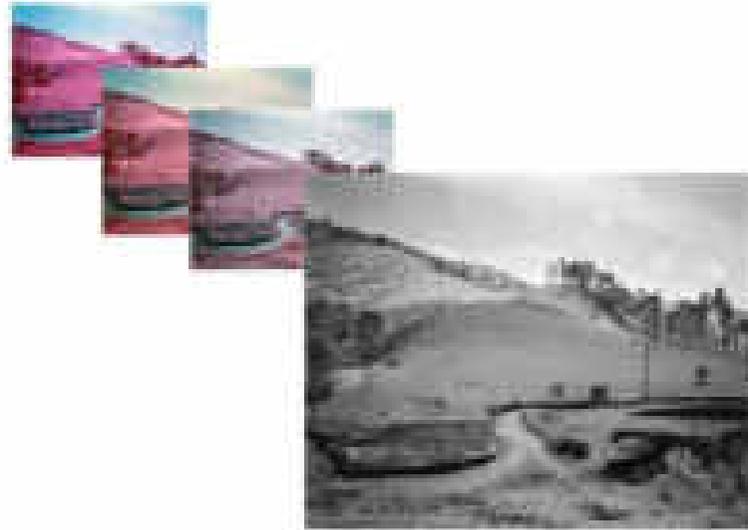


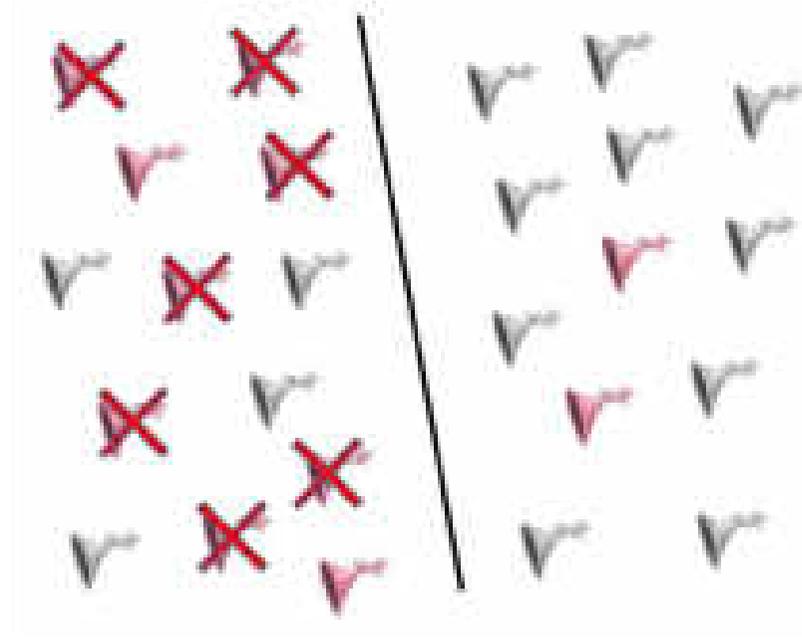
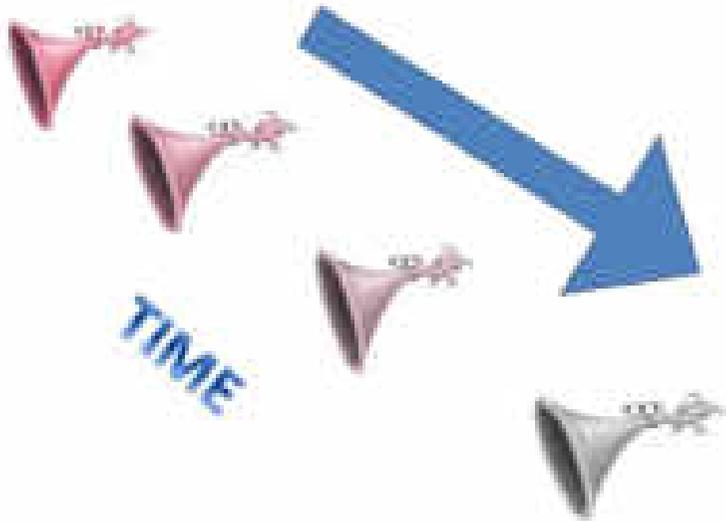
The Munty Flumple are eaten by



This is where the Munty Flumple live - think about why this landscape is a good habitat for them?

After a natural disaster their habitat turns grey.





Over time the Muntjacs turn grey as they have a better chance of survival in the now grey habitat. If they remain pink they are more likely to be noticed by the predator and eaten. As more and more pink Muntjacs are eaten the grey Muntjacs survive and have offspring that are also grey.

The Munty Flumple's Colour, large eyes and loud honk are all inherited _____ that allow it to compete to _____.

When the environment began to change Munty Flumple's with the _____ of being more grey than pink became the _____ of their species.

This adaptation of the characteristic of colour would have been passed down by a _____ from some parents to their offspring.

Over many many generations of Munty Flumps the grey colour becomes the most common as they are better able to survive _____ and so live to produce offspring of their own.

The Munty Flumps have _____ to be grey instead of pink by the process known as _____.

**PREDATION NATURAL SELECTION ADAPTATION EVOLVED
CHARACTERISTIC MUTATED GENE SURVIVE FITTEST**

NATURAL SELECTION

Choose a creature: put a circle round it.

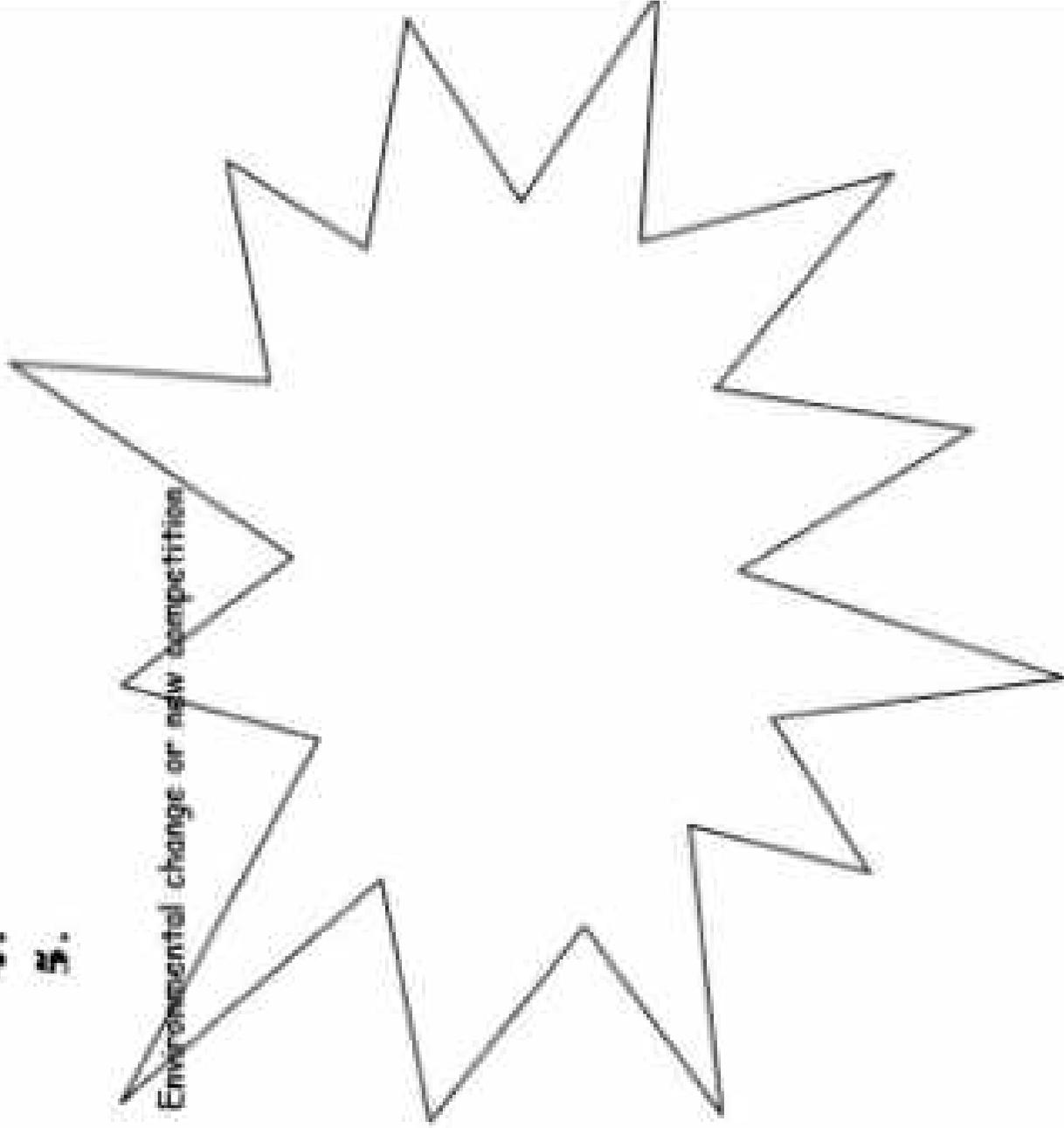


NATURAL SELECTION

Write down five characteristics your organism had and how those adaptations help your creature to survive.

- 1.**
- 2.**
- 3.**
- 4.**
- 5.**

Environmental change or new competition



Things to think about

What does it eat?

Is it brightly coloured or camouflaged?

How does it move?

How does it keep cool/warm?

Where does it live?

How big is it?

What eats it?

Possible Environmental Changes

Flood or sea level rise / Drought

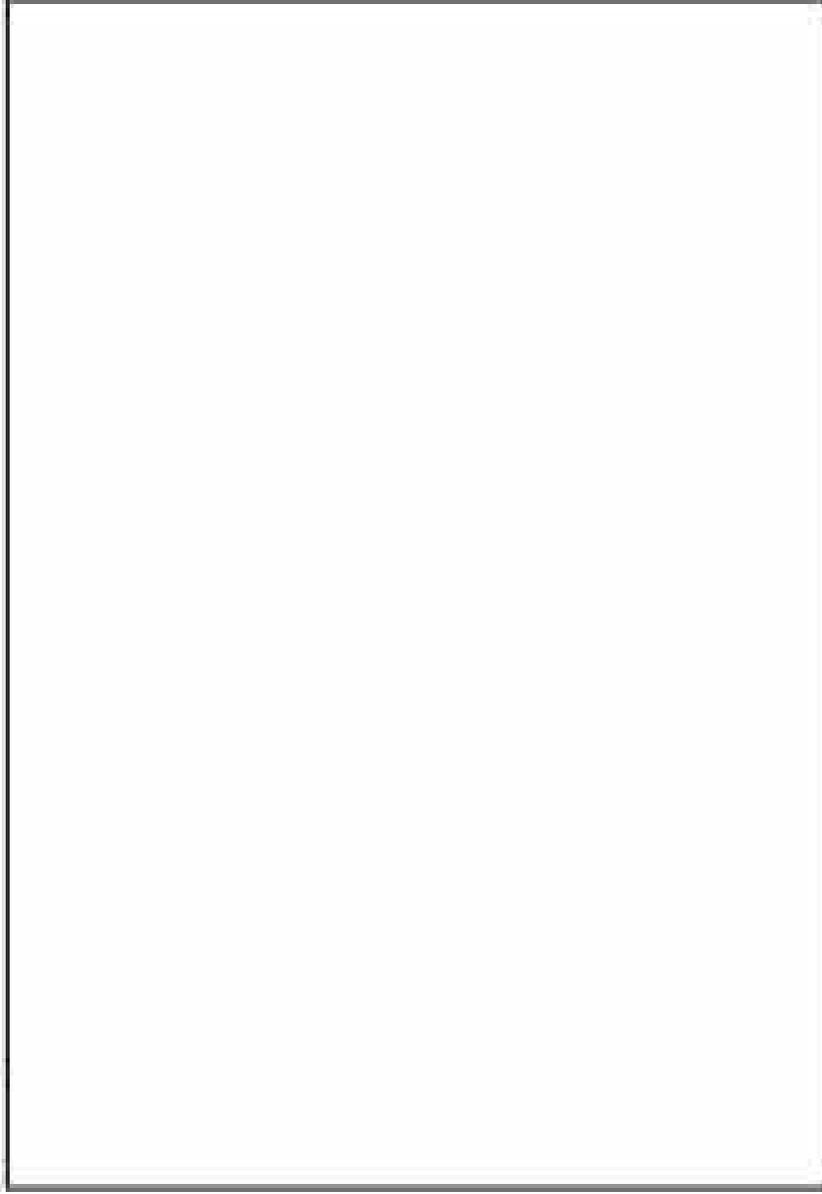
Preferred characteristics of mates

Temperature increase / decrease

New predator / Lack of food

How would your creature adapt to survive?

Draw what the future generations of your creature will look like (trace the original if that helps). Show how natural selection over time has led to adaptation/s that enabled this species to survive.



Explain how these adaptations have increased the fitness of this species.
