EVOLUTION:
INB ACTIVITY PACK

getting nerdy
With Mel and Gerdy

Interactive Notebook
Activities for Enrichment

Thank You for Getting Nerdy

We love that you have purchased a Getting Nerdy Science lesson and hope you find our resources useful in your classroom. After using this lesson, please consider leaving feedback in our store. Questions, comments or concerns? We are always happy to chat! Email us at: gettingnerdyscience@gmail.com

Because we have created many of our own graphics or have purchased licenses to other graphics with permission, we **cannot offer our resources in editable format** unless otherwise stated.

TERMS OF USE (TOU)

Purchasing or legally downloading our resources ALLOWS YOU :

- An **individual, non-transferable* license** to make copies for your classroom and students only
- The ability to upload this file to your own **password-protected** page or server (Google Drive, blogsite, etc.) as long as **only** you and your students have access to the files and presentations

*•This license is **non-transferable** meaning it can not be transferred from one teacher to another*

Purchasing or legally downloading our resources DOES NOT ALLOW YOU TO:

- Make copies for multiple teachers within a grade level, or for organizations or multiple users including but not limited to schools and school districts
- Distribute the lesson digitally to other teachers (please refer to our licensing policy below)
- Upload resources to the internet on any webpage or server that is available for public view or is able to be searched for on the internet

LICENSING: If your colleagues, department, school or district would like to use this resource, additional and transferable licenses can be purchased at a discount or at bulk pricing.
Email us at: gettingnerdyscience@gmail.com to obtain a quote.

VIOLATIONS ARE SUBJECT TO PENALTIES OF THE DIGITAL MILLENNIUM COPYRIGHT ACT

Failure to comply with these terms of use is a copyright infringement. Images and elements found within our protected documents cannot be extracted and used outside of our files without permission or license.

Here's where you can find us:

tpt · News Letter · YouTube

A special thanks to these amazing font and clip artists!

Microsoft clipart.com · This Little Piggy Reads is a Font-a-holic · Fonts created by Khrys Bosland · KG Fonts

General Directions:

Included in this Evolution INB Bundle are 16 Interactive Notebook activities for your classroom. Many of these activities are aligned with the Evolution CURRICULUM sold in our store! These activities can be used for review, enrichment, at stations, as reinforcement that can be used with our materials or easily on their own. The Table of Contents are as follows:

Evolution Topic	Number of Activities	Page/PDF Thumbnail Numbers	Next Generation Science Standard (NGSS)
Intro to Evolution	2	5-11	LS4.A: HS-LS4-1
Evolution Vocabulary	2	12-16	LS4.A: HS-LS4-1
Charles Darwin & his Finches	3	17-33	LS4.A: HS-LS4-1 LS4.C: HS-LS4-4 LS4.C: HS-LS4-5 LS4.A: MS-LS4-1
Natural Selection & Speciation	4	34-54	LS4.A: HS-LS4-1 LS4.B: HS-LS4-2 LS4.C: HS-LS4-4 LS4.C: HS-LS4-5 LS4.A: MS-LS4-1 LS4.B: MS-LS4-4
Types of Camouflage	1	55-58	LS4.B: HS-LS4-2 LS4.B: MS-LS4-4
Evolution of Whales	1	59-69	LS4.A: HS-LS4-1 LS4.A: MS-LS4-1 LS4.A: MS-LS4-2
Evidence of Evolution and Radioactive Dating	1	70-78	LS4.A: HS-LS4-1 LS4.B: HS-LS4-2 LS4.C: HS-LS4-4 LS4.C: HS-LS4-5 LS4.A: MS-LS4-1 LS4.A: MS-LS4-2 LS4.A: MS-LS4-3
Evolution Summary	1	79-81	LS4.A: HS-LS4-1 LS4.A: MS-LS4-1

General Directions cont'd:
We have included multiple Interactive Notebook Activities per page in order to conserve paper. Please make copies and cut along the long line that runs the length and/or width of the paper before providing a copy to your students. Each sheet fits perfectly inside of a standard composition notebook but will also do well in whatever kind of notebook your students use.

Illustrations have been included when applicable in blackline and full color depending on your wants and needs. If necessary, project color pictures onto your white board or print a copy or two in color and place at front of room or at tables for groups of students to see so they may color their diagrams appropriately.

Directions are often provided on individual student sheets. When space is not available, they are on the teacher notes/answer key. Students are to always cut along dark lines and fold along dashed lines.

Teacher notes/answer keys are provided for every INB activity in this packet. They contain notes and guidance for helping students fill out the INB sheets and teachers provide the appropriate information. Of course you are welcome to use your own notes to assist students in the completion of these activities. Keep in mind there are no PowerPoint slides to disseminate the information so we recommend you create your own slides, have students fill in notes in groups or individually, or discuss answers aloud. Pictures of each assignment are included to ensure understanding.

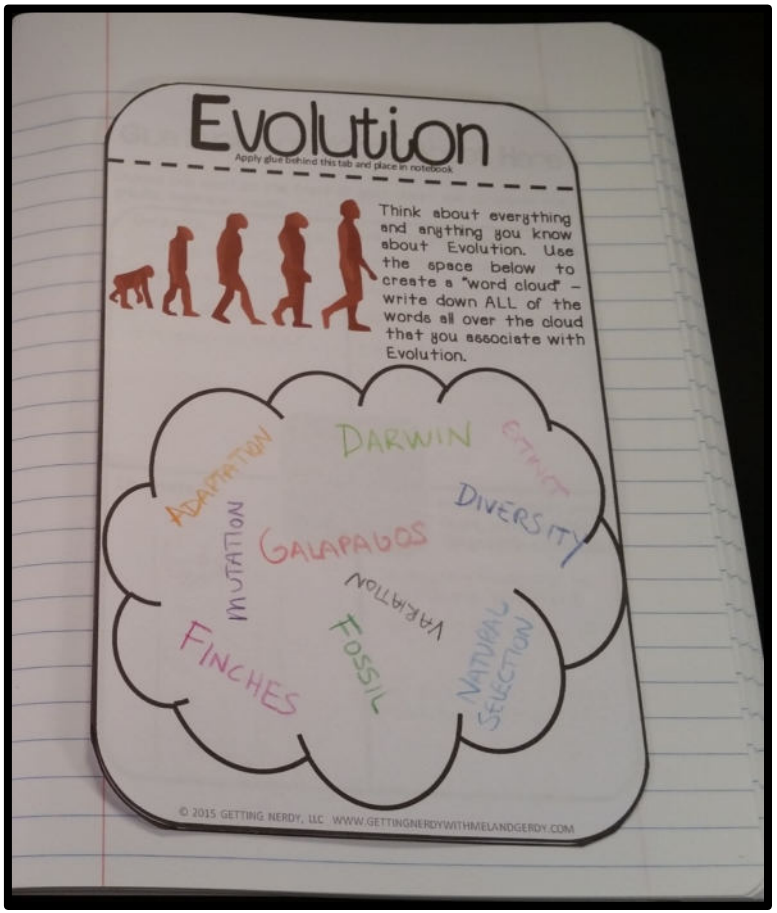
We have also provided two ways to complete some of these activities. It is up to the teacher which way you would like to complete them.

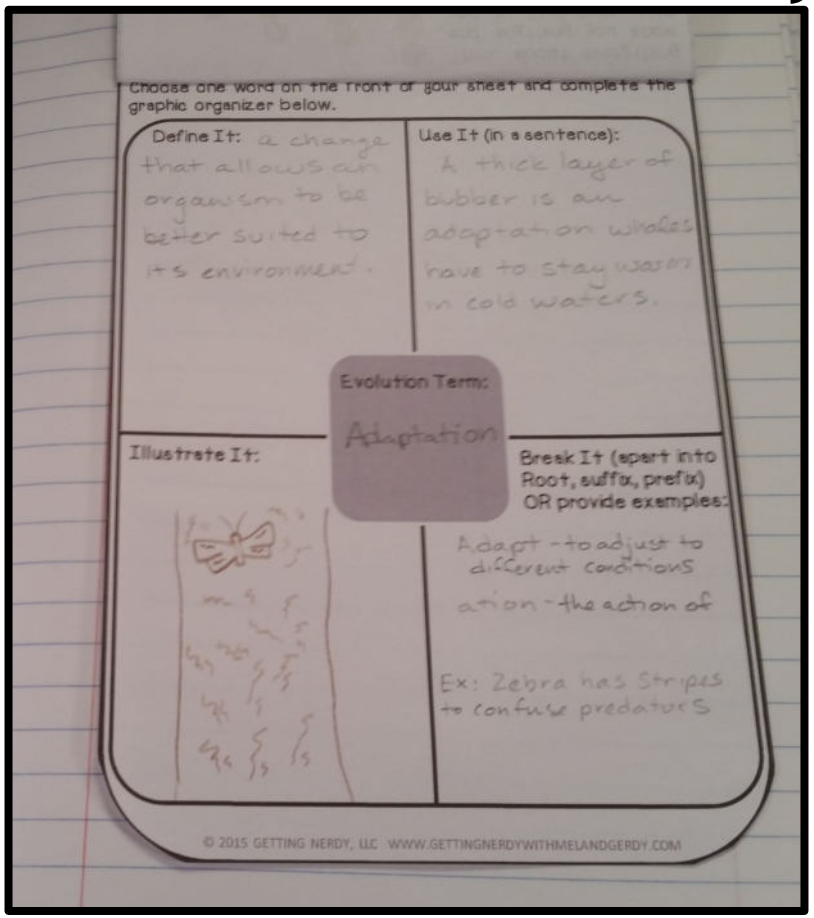
1. Students can glue activities into their INB and write answer directly in their INB under the interactive flaps.
2. We have included templates that get glued into the INB to helps students write in the amount of space provided. They then glue their interactive flap piece overtop.

Absent student sheets are also included as the last sheet of each type of activity – font is in red to help you discern between them and the actual activities. Print and hand out to students who were absent or need extra assistance. All they need to do is cut out and glue in their INB to catch up on work!

Printing: When printing this PDF you can make pages/activities smaller by printing "Actual Size" under "Page Size and Handling". To make activities/pages larger, choose "Fit". Activities may or may not fit into your particular INB depending on how you print. Please print and test it out in your INB before making copies.

Evolution Word Cloud Teacher Notes/Answer Key



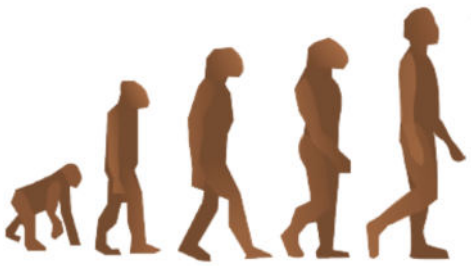


Directions: Have students cut the INB sheet out and glue it along the top tab into their notebook or onto the writing sheet provided on the following page. On the top page, have students create a word cloud or word splash by writing words on the page that they feel relate to Evolution. On the sheet glued underneath or in their INB, have students complete the graphic organizer for ONE of the words from their word cloud.

Words they might include:……..

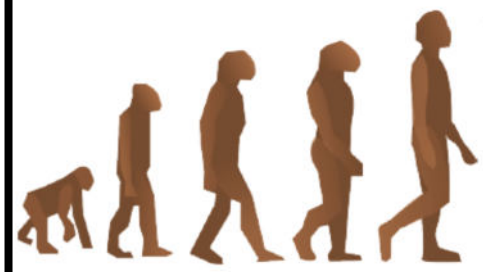
On the very back, students can glue down the KWL chart and fill it in with what they Know, what they want to know, and what they have learned at the end of the unit.

Evolution



Think about everything and anything you know about Evolution. Use the space below to create a "word cloud" - write down ALL of the words all over the cloud that you associate with Evolution.

Evolution



Think about everything and anything you know about Evolution. Use the space below to create a "word cloud" - write down ALL of the words all over the cloud that you associate with Evolution.

© 2012-present Getting Nerdy, LLC®

Glue Evolution Word Cloud Here

Choose one word on the front of your sheet and complete the graphic organizer below.

Define It:

Use It (in a sentence):

Evolution Term:

Illustrate It:

Break It (apart into Root, suffix, prefix) OR provide examples:

Glue Evolution Word Cloud Here

Choose one word on the front of your sheet and complete the graphic organizer below.

Define It:

Use It (in a sentence):

Evolution Term:

Illustrate It:

Break It (apart into Root, suffix, prefix) OR provide examples:

© 2012-present Getting Nerdy, LLC®

Glue Evolution Vocab Sheet Here

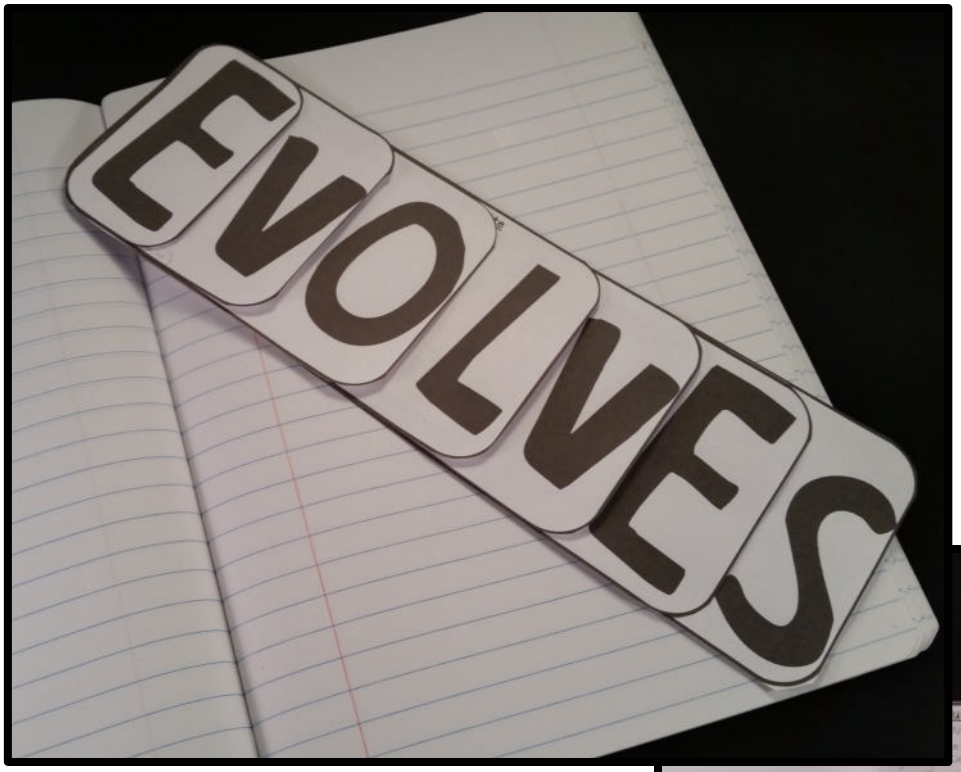
Know	Want to know	Learned

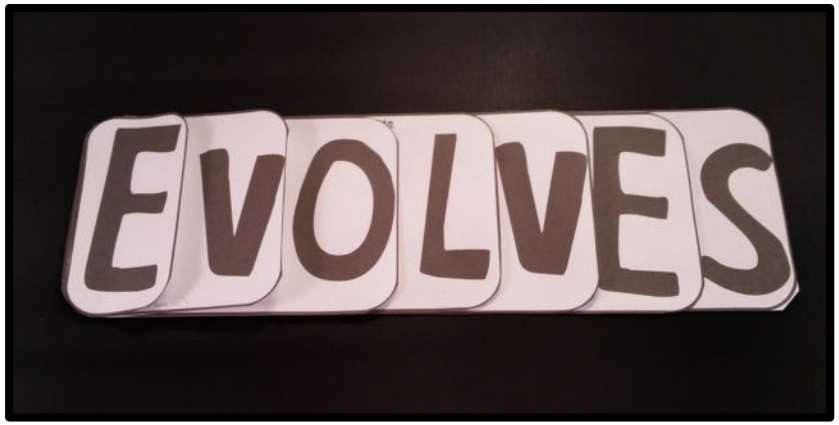
Glue Evolution Vocab Sheet Here

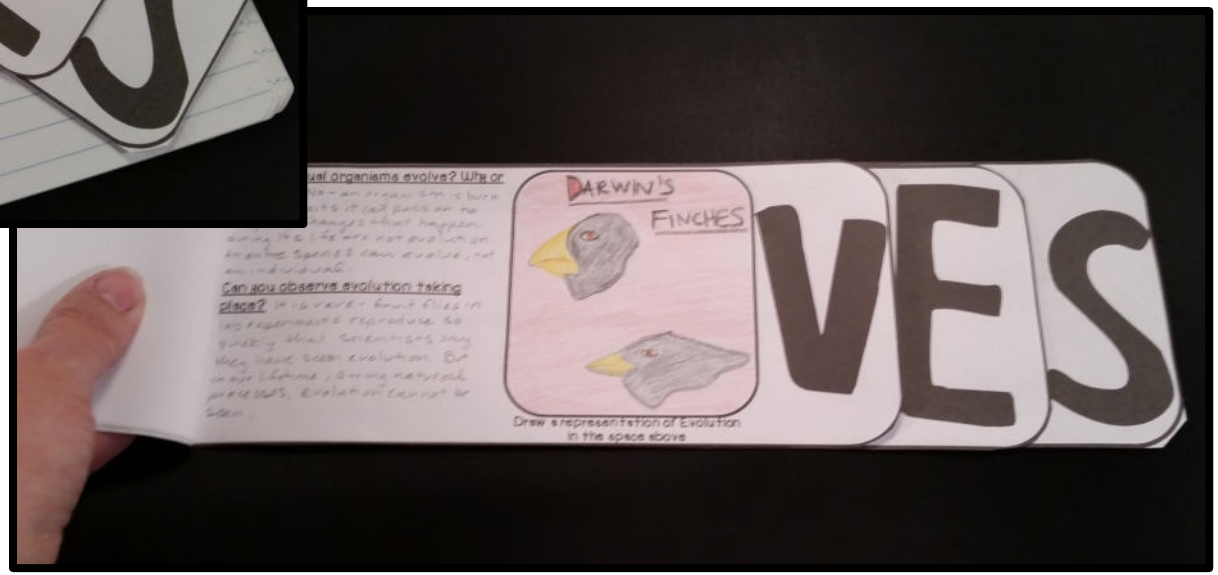
Know	Want to know	Learned

© 2012-present Getting Nerdy, LLC®

Spell it EVOLVES: A Evolution Question mini-flip booklet







Directions: Have students cut out the EVOLVES pages. Glue together according to the directions on each page. Then, have students answer the questions on each page according to what they know and understand about Evolution. Use these questions as discussion pieces during your class. Answers will vary.

To shorten the booklet so it may fit into a composition style notebook, remove the letter “S” from the end.

Glue "E" page here

What is Evolution?

V

Glue short "y" page here

Why is it important to study Evolution and from where organisms have originated?

O

Glue "O" page here

How do you think our genes (and reproduction) relate to Evolution?

L

E

Glue "L" page here

Can individual organisms evolve? Why or why not?

Can you observe Evolution taking place?

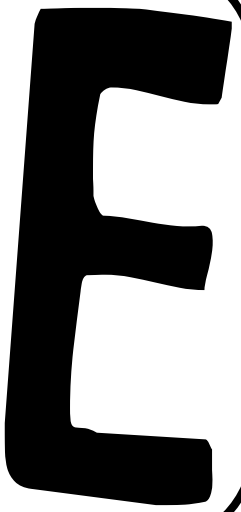
Draw a representation of Evolution in the space above

V

Glue "V" page here

Humans did NOT evolve from monkeys or apes. However, we DO share a common ancestor. Why is this an important distinction to make note of when discussing human Evolution?

What are some ways in which humans may be influencing the Evolution of mankind and other organisms?

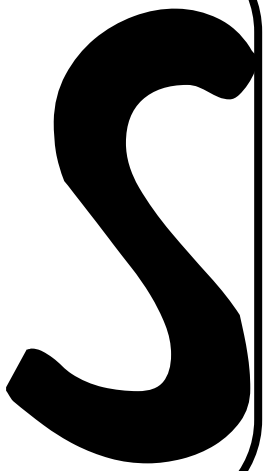


Glue long "E" page here

Why do some species evolve while others go extinct?

Are all species on Earth related?

What proof do we have of Evolution taking place?



The Evolution of Vocabulary Teacher Notes/Answer Key

Directions: Underneath each door/flap define the following Evolutionary vocabulary terms

Evolution - the gradual change in species over time

Natural Selection - a process by which individuals that are better adapted to their environment are more likely to survive and reproduce than others that are not

Mutation - any change in the DNA of an organism.

Adaptation - behavior or physical characteristic that allows an organism to survive and reproduce in its environment

Charles Darwin - British naturalist who formulated the theory of Evolution by natural selection

Galapagos Finches – While traveling on the HMS Beagle, Darwin studied finches on the Galapagos Archipelago. He made note of their diverse traits they exhibited on each of the different islands. Each species was best adapted to the food, climate, etc of the island on which they lived.

Variation - any difference between organisms of the same species

Diversity - the variety of organisms that inhabit the Earth

Fossil - the preserved remains or traces of an organism that lived in the past

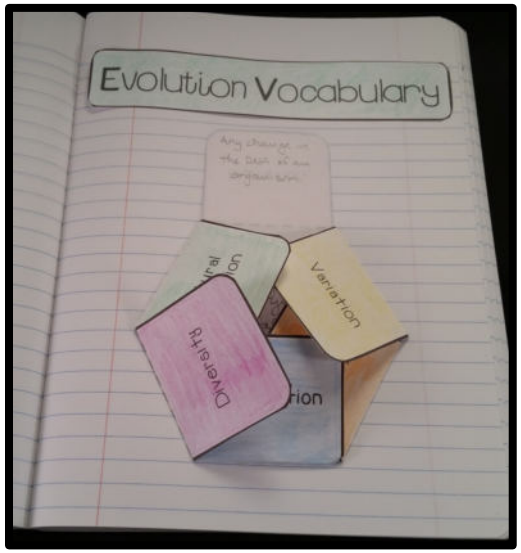
Missing Link - gaps in the fossil record that provide proof of Evolution

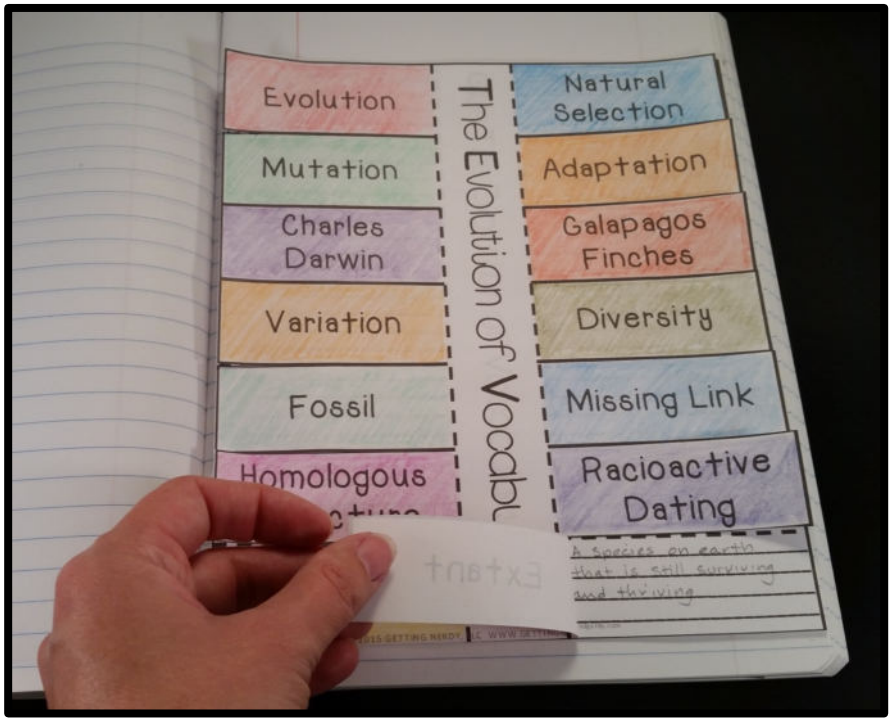
Homologous Structure - similar structures that related species have inherited from a common ancestor (example – bones in bird's wing, dolphin fin, and dog leg are very similar)

Radioactive Dating - process where scientists look at the half-life of chemicals contained in rocks around a fossil to determine the age of that fossil.

Extinct- the disappearance of all members of a species from Earth

Extant- a species on earth that is surviving and thriving

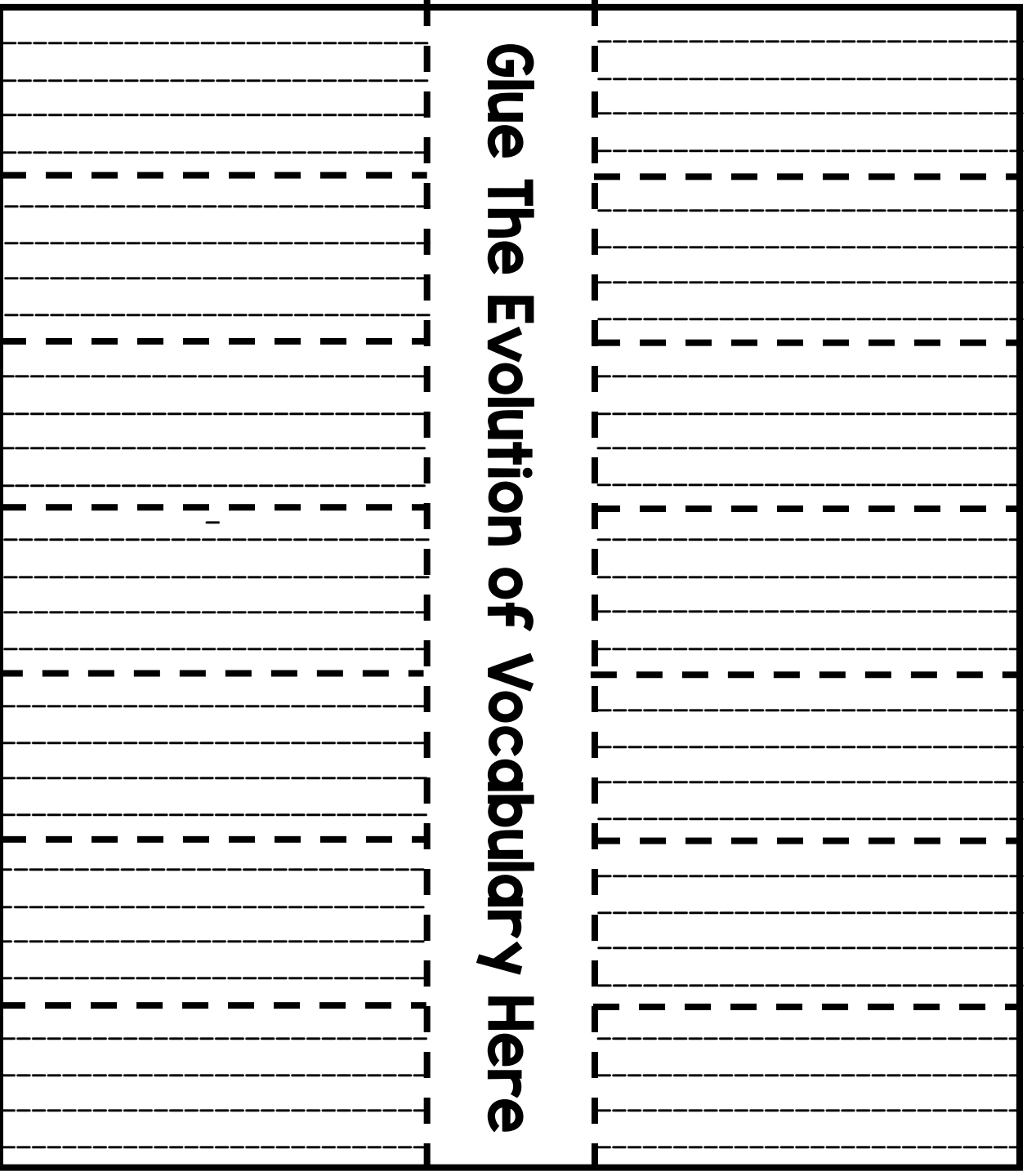




The Evolution of Vocabulary

Evolution	Natural Selection
Mutation	Adaptation
Charles Darwin	Galapagos Finches
Variation	Diversity
Fossil	Missing Link
Homologous Structure	Radioactive Dating
Extinct	Extant

Directions: Cut out the diagram on this page. Fold each door/flap along the dashed line and glue the "The Evolution of Vocabulary" tab into your INB or on top of the lined sheet. Underneath each door/flap define these terms.



Directions: Cut out the diagram on this page and blue it into your INB. Glue "The Evolution of Vocabulary" on top and use as a template for neatly writing your vocabulary definitions.

Evolution - the gradual change in species over time

Mutation - any change in the DNA of an organism.

Charles Darwin - British naturalist who formulated the theory of Evolution by natural selection

Variation - any difference between organisms of the same species

Fossil - the preserved remains or traces of an organism that lived in the past

Homologous Structure - similar structures that related species have inherited from a common ancestor (example – bones in bird's wing, dolphin fin, and dog leg are very similar)

Extinct- the disappearance of all members of a species from Earth

Glue The Evolution of Vocabulary Here

Natural Selection - a process by which individuals that are better adapted to their environment are more likely to survive and reproduce than others that are not

Adaptation - behavior or physical characteristic that allows an organism to survive and reproduce in its environment

Galapagos Finches – While traveling on the HMS Beagle, Darwin studied finches on the Galapagos Archipelago. He made note of their diverse traits they exhibited on each of the different islands. Each species was best adapted to the food, climate, etc of the island on which they lived.

Diversity - the variety of organisms that inhabit the Earth

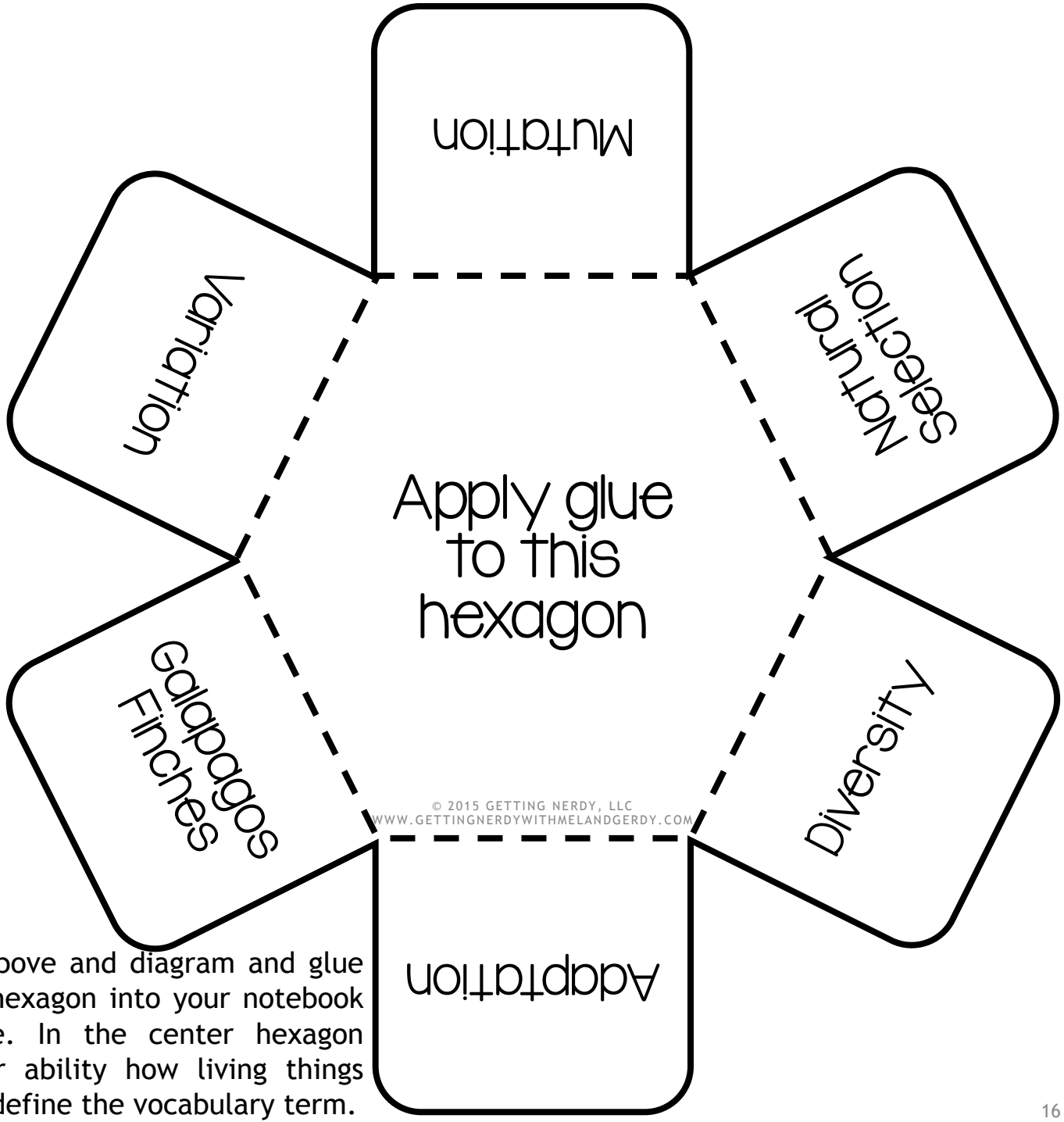
Missing Link - gaps in the fossil record that provide proof of Evolution

Radioactive Dating - process where scientists look at the half-life of chemicals contained in rocks around a fossil to determine the age of that fossil.

Extant- a species on earth that is surviving and thriving

Directions: Cut out the diagram on this page and blue it into your INB. Glue "The Evolution of Vocabulary" on top and use as a template for neatly writing your vocabulary definitions.

Evolution Vocabulary



Directions: Cut out the title above and diagram and glue the "apply glue" side of the hexagon into your notebook while leaving the flaps free. In the center hexagon describe to the best of your ability how living things evolve. Underneath each flap define the vocabulary term.

Who is Charles Darwin? Teacher Notes/Answer Key

Who is Charles Darwin?

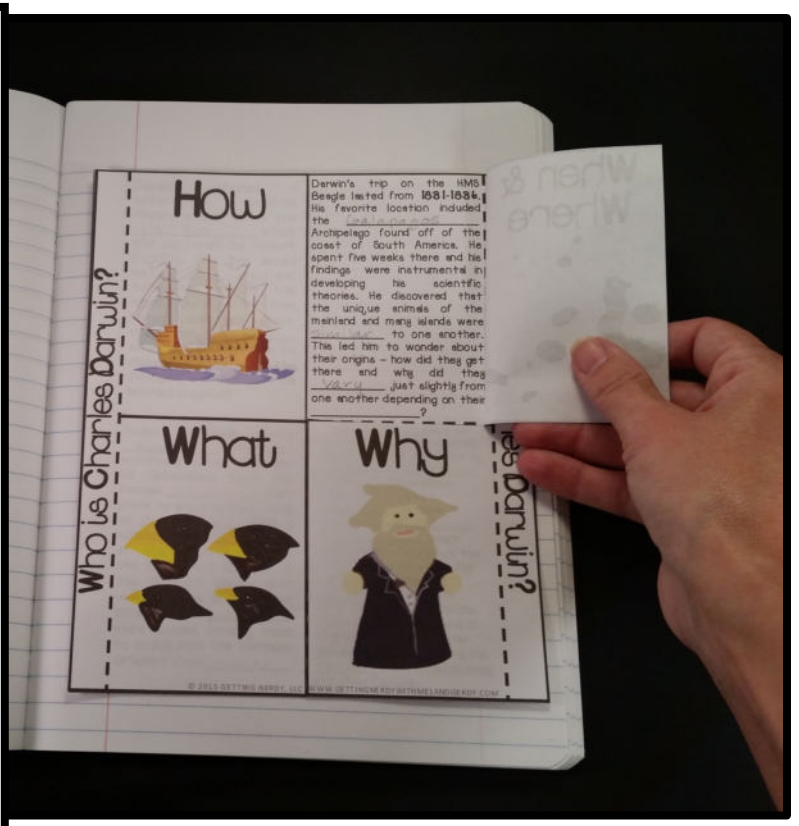
Darwin obtained a naturalist's position aboard a ship called the HMS Beagle which was captained by Robert FitzRoy. The trip would last five years and take him around the world. During this time Darwin collected plant, animal, and fossilized specimens and was able to closely observe the biological principles he learned in school.

Darwin's trip on the HMS Beagle lasted from 1831-1836. His favorite location included the Galapagos Archipelago found off of the coast of South America. He spent five weeks there and his findings were instrumental in developing his scientific theories. He discovered that the unique animals of the mainland and many islands were similar to one another. This led him to wonder about their origins – how did they get there and why did they vary just slightly from one another depending on their location?

Who is Charles Darwin?

Darwin specifically studied finches which were eventually named after him. He determined that the finches varied from place to place because they all descended from a common ancestor on the mainland. Because the birds were isolated on the different islands with various types of foods and climates, new populations were formed, causing them to evolve into the thirteen different finch species.

It took Darwin 20 years to explain WHY organisms evolved using his theory of Evolution by natural selection. Natural selection is where species that are best adapted to their environment will survive and reproduce which increases the strength of the species, while those that fail to adapt and reproduce die off. Darwin wrote about this in 1859 in On the Origin of Species by Means of Natural Selection where he backed up his theory using the fossil record, embryology, and other factors.



Who is Charles Darwin?

Born in England in 1809, Darwin was a nature lover who graduated from Christ's College with a bachelor of arts degree in 1831. His botany professor recommended him for a naturalist position on the HMS Beagle which would take him on the voyage of a lifetime. Darwin published On the Origin of Species which solidified him as the father of Evolutionary biology. He died in 1882.

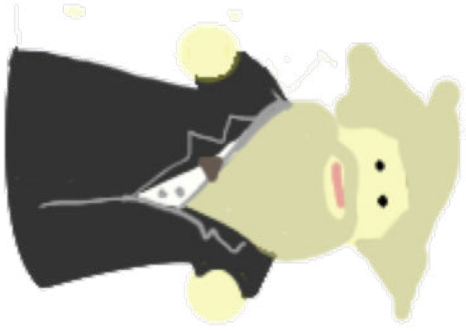
Who is Charles Darwin?

What

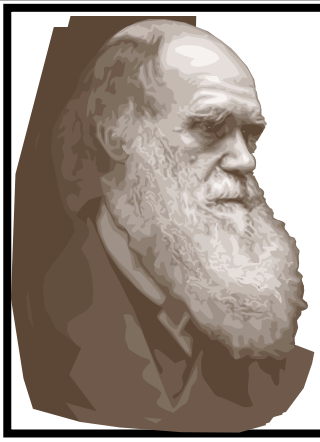
How

When & Where

Why



Who is Charles Darwin?



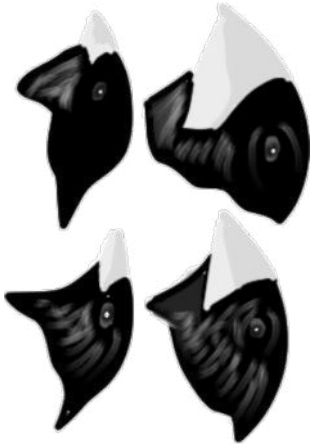
Who is Charles Darwin?

Born in England in 1809, Darwin was a _____lover who graduated from Christ's College with a bachelor of arts degree in 1831. His botany professor recommended him for a _____ position on the _____ which would take him on the voyage of a lifetime. Darwin published _____ which solidified him as the father of _____ biology. He died in 1882.

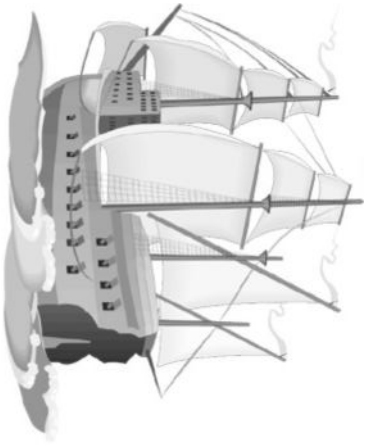
Directions: Cut out the title box and glue it into your INB. Fill in the blanks with the appropriate terms. Then, cut out the four door table along the dark lines and glue the INB activity on top of the other template found on the second page. Glue into your notebook. Underneath each door/flap fill in what you know about Charles Darwin.

Who is Charles Darwin?

What

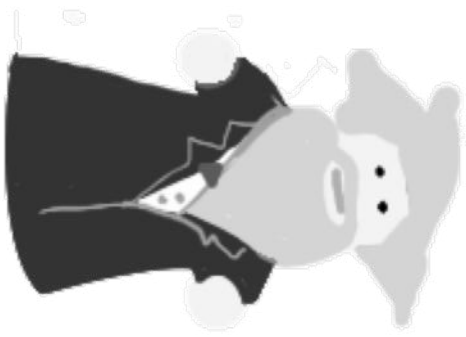


How

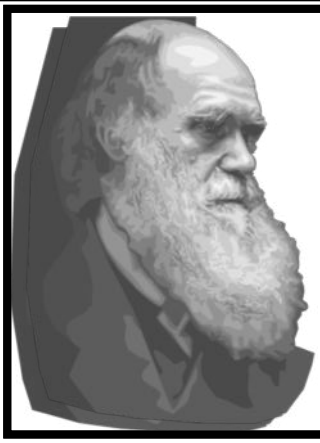


When & Where

Why



Who is Charles Darwin?



Who is Charles Darwin?

Born in England in 1809, Darwin was a _____lover who graduated from Christ's College with a bachelor of arts degree in 1831. His botany professor recommended him for a _____ position on the _____ which would take him on the voyage of a lifetime. Darwin published _____ which solidified him as the father of _____ biology. He died in 1882.

Directions: Cut out the title box and glue it into your INB. Fill in the blanks with the appropriate terms. Then, cut out the four door table along the dark lines and glue the INB activity on top of the other template found on the second page. Glue into your notebook. Underneath each door/flap fill in what you know about Charles Darwin.

Who is Charles Darwin?

Darwin obtained a naturalist's position aboard a ship called the _____ which was captained by Robert FitzRoy. The trip would last _____ years and take him around the world. During this time Darwin collected plant, animal, and _____ specimens and was able to closely observe the biological principles he learned in school.

Darwin's trip on the HMS Beagle lasted from 1831-1836. His favorite location included the _____ Archipelago found off of the coast of South America. He spent five weeks there and his findings were instrumental in developing his scientific theories. He discovered that the unique animals of the mainland and many islands were _____ to one another. This led him to wonder about their origins – how did they get there and why did they _____ just slightly from one another depending on their _____?

Darwin specifically studied _____ which were eventually named after him. He determined that the finches _____ from place to place because they all _____ from a common _____ on the mainland. Because the birds were isolated on the different islands with various types of foods and climates, new _____ were formed, causing them to evolve into the thirteen different finch _____.

It took Darwin ___ years to explain WHY organisms evolved using his theory of Evolution by _____ _____. Natural selection is where species that are best _____ to their environment will _____ and _____ which increases the strength of the species, while those that fail to adapt and reproduce _____off. Darwin wrote about this in 1859 in On the Origin of Species by Means of Natural Selection where he backed up his theory using the _____ record, embryology, and other factors.

Who is Charles Darwin?

Who is Charles Darwin?

Darwin obtained a naturalist's position aboard a ship called the HMS Beagle which was captained by Robert FitzRoy. The trip would last five years and take him around the world. During this time Darwin collected plant, animal, and fossilized specimens and was able to closely observe the biological principles he learned in school.

Darwin's trip on the HMS Beagle lasted from 1831-1836. His favorite location included the Galapagos Archipelago found off of the coast of South America. He spent five weeks there and his findings were instrumental in developing his scientific theories. He discovered that the unique animals of the mainland and many islands were similar to one another. This led him to wonder about their origins – how did they get there and why did they vary just slightly from one another depending on their location?

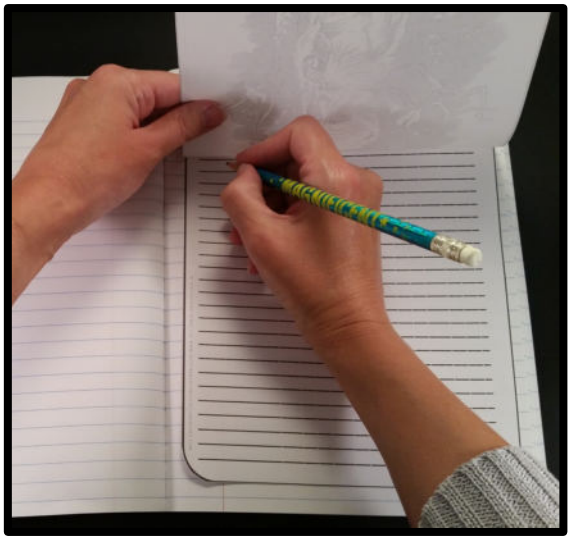
Darwin specifically studied finches which were eventually named after him. He determined that the finches varied from place to place because they all descended from a common ancestor on the mainland. Because the birds were isolated on the different islands with various types of foods and climates, new populations were formed, causing them to evolve into the thirteen different finch species.

It took Darwin 20 years to explain WHY organisms evolved using his theory of Evolution by natural selection. Natural selection is where species that are best adapted to their environment will survive and reproduce which increases the strength of the species, while those that fail to adapt and reproduce die off. Darwin wrote about this in 1859 in On the Origin of Species by Means of Natural Selection where he backed up his theory using the fossil record, embryology, and other factors.

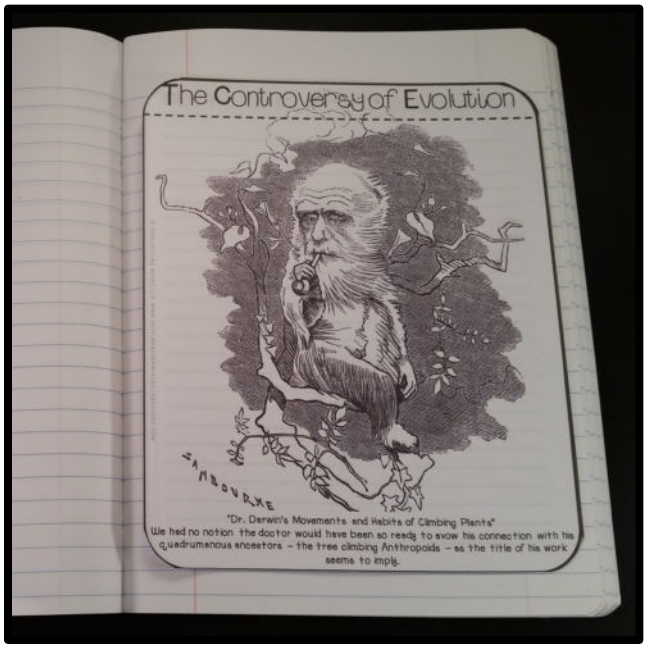
Who is Charles Darwin?

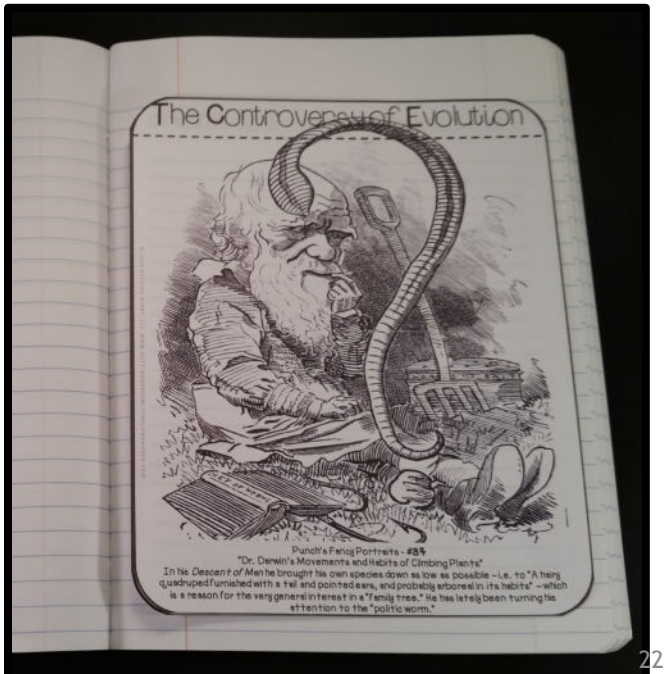
The Controversy of Darwin's Theory Teacher Notes/Key

Directions: Assign one or all three of the political cartoon sheets to your students. Have them cut out the sheets provided. Glue the Darwin political cartoon sheet on top of the other sheet and glue into the INB.



Have students look closely at the captioned political cartoon that was created in the late 1800s after Darwin published his work "On the Origin of Species". On the page underneath the cartoon, they will analyze the caption to the best of their abilities and describe their thoughts on the artist's stance on Evolution.





Directions: Cut out the sheets on your right and on the second page. Glue the Darwin political cartoon sheet on top of the other sheet and glue into your INB.

Look closely at the captioned political cartoon that was created in the late 1800s after Darwin published his work "On the Origin of Species".

On the page underneath the cartoon, analyze the caption and describe your thoughts on the artist's stance on Evolution.

The Controversy of Evolution

"Dr. Darwin's Movements and Habits of Climbing Plants"
We had no notion the doctor would have been so ready to avow his connection with his quadrumanous ancestors – the tree climbing Anthropoids – as the title of his work seems to imply.

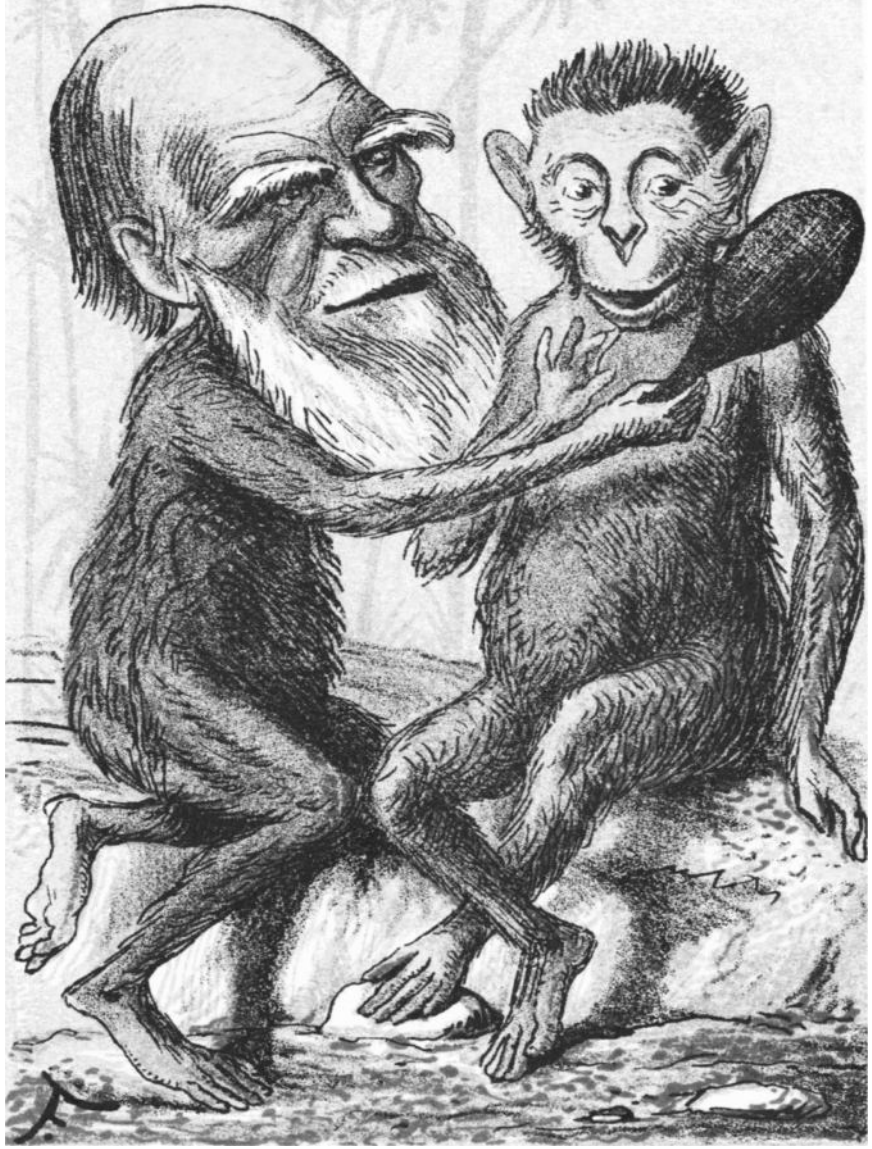
Glue The Controversy of Evolution Here

Directions: Cut out the sheets on your right and on the second page. Glue the Darwin political cartoon sheet on top of the other sheet and glue into your INB.

Look closely at the captioned political cartoon that was created in the late 1800s after Darwin published his work "On the Origin of Species".

On the page underneath the cartoon, analyze the caption and describe your thoughts on the artist's stance on Evolution.

The Controversy of Evolution



Professor Darwin
This is the ape of form.
Love's Labor Lost, act 5, scene 2.
Some four or five descents since
All's Well that Ends Well, act 3 sc. 7

Directions: Cut out the sheets on your right and on the second page. Glue the Darwin political cartoon sheet on top of the other sheet and glue into your INB.

Look closely at the captioned political cartoon that was created in the late 1800s after Darwin published his work "On the Origin of Species".

On the page underneath the cartoon, analyze the caption and describe your thoughts on the artist's stance on Evolution.

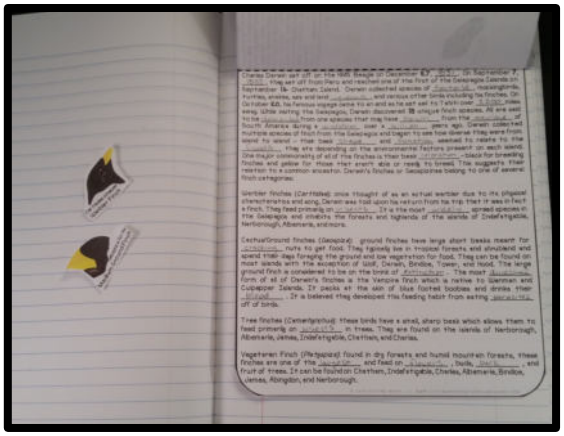
The Controversy of Evolution

Punch's Fancy Portraits - #34
"Dr. Darwin's Movements and Habits of Climbing Plants"
In his Descent of Man he brought his own species down as low as possible – i.e. to "A hairy quadruped furnished with a tail and pointed ears, and probably arboreal in its habits" – which is a reason for the very general interest in a "family tree." He has lately been turning his attention to the "politic worm."

Glue The Controversy of Evolution Here

Darwin's Finches Teacher Notes/Answer Key

Directions: Cut out the sheet on your right and on the second page. Glue the "Darwin's Finches" sheet on top of the notes sheet on the following page and glue into your INB. Cut out the finches (and their scientific and common names) below. As you fill in the notes on the second page, decide where the finches belong on the map.



Charles Darwin set off on the HMS Beagle on December 27, 1831. On September 7, 1835, they set off from Peru and reached one of the first of the Galapagos Islands on September 16- Chatham Island. Darwin collected species of tortoise, mockingbirds, turtles, snakes, sea and land iguanas, and various other birds including his finches. On October 20, his famous voyage came to an end as he set sail to Tahiti over 3,200 miles away.

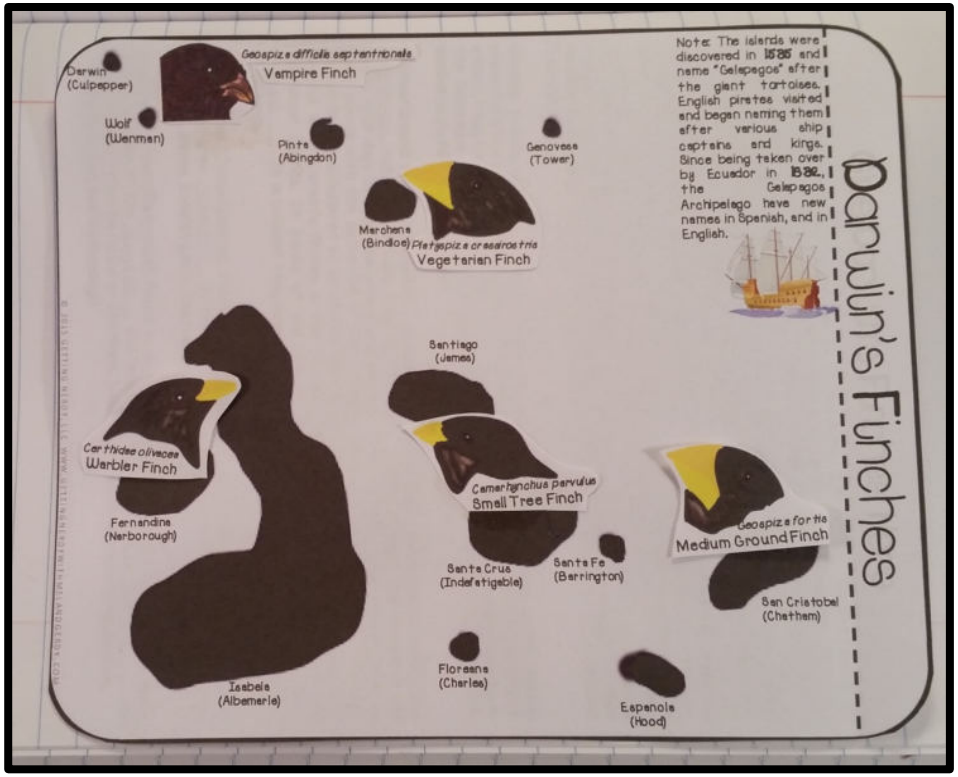
However, while visiting the Galapagos, Darwin discovered 13 unique finch. All are said to be descended from one species that may have blown from the mainland of South America during a windstorm over a million years ago. Darwin collected multiple species of finch from the Galapagos and began to see how diverse they were from island to island – their beak shape and function seemed to relate to the foods they ate depending on the environmental factors present on each island. One major commonality of all of the finches is their beak coloration – black for breeding finches and yellow for those that aren't able or ready to breed. This suggests their relation to a common ancestor. Darwin's finches or Geospizinae belong to one of several finch categories:

Warbler finches (Certhidae): once thought of as an actual warbler due to its physical characteristics and song, Darwin was told upon his return from his trip that it was in fact a finch. They feed primarily on insects using their probing beak. It is the most widely spread species in the Galapagos and inhabits the forests and highlands of the islands of Narborough.

Cactus/Ground finches (Geospiza): ground finches have large, short, crushing beaks meant for cracking nuts to get food. They typically live in tropical forests and shrubland and spend their days foraging the ground and low vegetation for food. They can be found on Chatham Island. The large ground finch is considered to be on the brink of extinction. The most ancestral form of all of Darwin's finches is the Vampire finch which is native to Wenman and Culpepper Islands. It pecks at the skin of blue footed boobies and drinks their blood. It is believed they developed this feeding habit from eating parasites off of birds.

Tree finches (Camarhynchus): these birds have a small, sharp beak which allows them to feed primarily on insects in trees. They are found on the islands of James and Indefatigable.

Vegetarian Finch (Platyspiza): found in dry forests and humid mountain forests, these finches are one of the largest and feed on flowers, buds, bark, and fruit of trees. It can be found on Bindloe.



Directions: Cut out the sheet on your right and on the second page. Glue the "Darwin's Finches" sheet on top of the notes sheet on the following page and glue into your INB.

Cut out the finches (and their scientific and common names) below. As you fill in the notes on the second page, decide where the finches belong on the map.

Darwin's Finches

Note: The islands were discovered in 1535 and name "Galapagos" after the giant tortoises. English pirates visited and began naming them after various ship captains and kings. Since being taken over by Ecuador in 1832, the Galapagos Archipelago have new names in Spanish, and in English.

Directions: Cut out the sheet on your right and on the second page. Glue the "Darwin's Finches" sheet on top of the notes sheet on the following page and glue into your INB.

Cut out the finches (and their scientific and common names) below. As you fill in the notes on the second page, decide where the finches belong on the map.

Darwin's Finches

Note: The islands were discovered in 1535 and name "Galapagos" after the giant tortoises. English pirates visited and began naming them after various ship captains and kings. Since being taken over by Ecuador in 1832, the Galapagos Archipelago have new names in Spanish, and in English.

Glue Darwin's Finches Here

Charles Darwin set off on the HMS Beagle on December 27, _____. On September 7, _____, they set off from Peru and reached one of the first of the Galapagos Islands on September 16- Chatham Island. Darwin collected species of _____, mockingbirds, turtles, snakes, sea and land _____, and various other birds including his finches. On October 20, his famous voyage came to an end as he set sail to Tahiti over _____miles away. However, while visiting the Galapagos, Darwin discovered 13 unique finch species. All are said to be _____from one species that may have _____ from the _____ of South America during a _____ over a _____ years ago. Darwin collected multiple species of finch from the Galapagos and began to see how diverse they were from island to island – their beak _____ and _____ seemed to relate to the _____ they ate depending on the environmental factors present on each island. One major commonality of all of the finches is their beak _____– black for breeding finches and yellow for those that aren't able or ready to breed. This suggests their relation to a common ancestor. Darwin's finches or Geospizinae belong to one of several finch categories:

- Warbler finches (Certhidae): once thought of as an actual warbler due to its physical characteristics and song, Darwin was told upon his return from his trip that it was in fact a finch. They feed primarily on _____ using their probing beaks. It is the most _____ spread species in the Galapagos and inhabits the forests and highlands of the Island of Narborough
- Cactus/Ground finches (Geospiza): ground finches have large, short, crushing beaks meant for _____ nuts to get food. They typically live in tropical forests and shrubland and spend their days foraging the ground and low vegetation for food. They can be found on Chatham Island. The Large ground finch is considered to be on the brink of _____ . The most _____ form of all of Darwin's finches is the Vampire finch which is native to Wenman and Culpepper Islands. It pecks at the skin of blue footed boobies and drinks their _____ . It is believed they developed this feeding habit from eating _____ off of birds.
- Tree finches (Camarhynchus): these birds have a small, sharp beak which allows them to feed primarily on _____ in trees. They are found on the islands of James and Indefatigable.
- Vegetarian Finch (Platyspiza): found in dry forests and humid mountain forests, these finches are one of the _____ and feed on _____ , buds, _____ , and fruit of trees. It can be found on Bindloe island.

Explain how the finches arrived in the Galapagos, how they vary from island to island and why they are each so unique: _____

_____

_____

_____

_____

_____

Directions: Cut out the sheet on your right and on the second page. Glue the "Darwin's Finches" sheet on top of the notes sheet on the following page and glue into your INB.

Cut out the finches (and their scientific and common names) below. As you fill in the notes on the second page, decide where the finches belong on the map.

Darwin's Finches

Note: The islands were discovered in 1535 and name "Galapagos" after the giant tortoises. English pirates visited and began naming them after various ship captains and kings. Since being taken over by Ecuador in 1832, the Galapagos Archipelago have new names in Spanish, and in English.

Darwin (Culpepper)

Wolf (Wenman)

Geospiza difficilis septentrionalis
Vampire Finch

Pinta (Abingdon)

Genovesa (Tower)

Marchena (Bindloe)

Platyspiza crassirostris
Vegetarian Finch

Santiago (James)

Camarhynchus parvulus
Small Tree Finch

Santa Fe (Barrington)

Santa Crus (Indefatigable)

Floreana (Charles)

Certhidae olivacea
Warbler Finch

Fernandina (Narborough)

Isabela (Albemarle)

Geospiza fortis
Medium Ground Finch

San Cristobal (Chatham)

Espanola (Hood)

Glue Darwin's Finches Here

Charles Darwin set off on the HMS Beagle on December 27, 1831. On September 7, 1835, they set off from Peru and reached one of the first of the Galapagos Islands on September 16- Chatham Island. Darwin collected species of tortoise, mockingbirds, turtles, snakes, sea and land iguanas, and various other birds including his finches. On October 20, his famous voyage came to an end as he set sail to Tahiti over 3,200 miles away.

However, while visiting the Galapagos, Darwin discovered 13 unique finch. All are said to be descended from one species that may have blown from the mainland of South America during a windstorm over a million years ago. Darwin collected multiple species of finch from the Galapagos and began to see how diverse they were from island to island – their beak shape and function seemed to relate to the foods they ate depending on the environmental factors present on each island. One major commonality of all of the finches is their beak coloration – black for breeding finches and yellow for those that aren't able or ready to breed. This suggests their relation to a common ancestor. Darwin's finches or Geospizinae belong to one of several finch categories:

Warbler finches (Certhidae): once thought of as an actual warbler due to its physical characteristics and song, Darwin was told upon his return from his trip that it was in fact a finch. They feed primarily on insects using their probing beak. It is the most widely spread species in the Galapagos and inhabits the forests and highlands of the islands of Narborough.

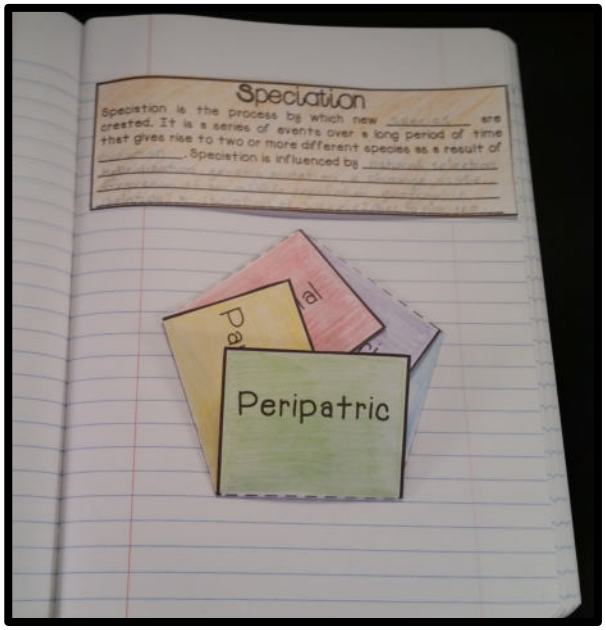
Cactus/Ground finches (Geospiza): ground finches have large, short, crushing beaks meant for cracking nuts to get food. They typically live in tropical forests and shrubland and spend their days foraging the ground and low vegetation for food. They can be found on Chatham Island. The large ground finch is considered to be on the brink of extinction. The most ancestral form of all of Darwin's finches is the Vampire finch which is native to Wenman and Culpepper Islands. It pecks at the skin of blue footed boobies and drinks their blood. It is believed they developed this feeding habit from eating parasites off of birds.

Tree finches (Camarhynchus): these birds have a small, sharp beak which allows them to feed primarily on insects in trees. They are found on the islands of James and Indefatigable.

Vegetarian Finch (Platyspiza): found in dry forests and humid mountain forests, these finches are one of the largest and feed on flowers, buds, bark, and fruit of trees. It can be found on Bindloe.

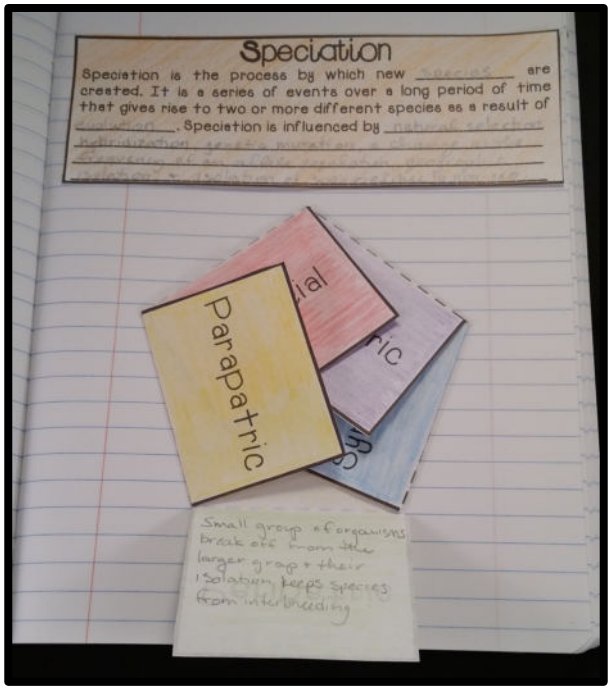
Speciation Teacher Notes/Answer Key

The five types of speciation. Speciation is the process by which new species are created. It is a series of events over a long period of time that gives rise to two or more different species as a result of Evolution. Speciation is influenced by natural selection, hybridization, genetic mutation, a change in the frequency of an allele in a population, geographic isolation, and isolation of species due to non-geographic reasons.



Allopatric speciation: two groups become isolated from one another by a physical barrier (mountains, water, etc.) and a new species is created.

Peripatric speciation: small groups of organisms break off from the larger group and their isolation from the larger group keeps species from interbreeding.



Parapatric speciation: the geographic range of a species is so large that individuals only mate with those close by, even though they may cross paths from time to time. Organisms are influenced by differences within their vast environment, like pollution, which can play a role in the changes that occur within a portion of the environment, thus affecting only the individuals that live there.

Sympatric speciation: the opposite of allopatric in that it is not caused by physical barriers. All members of a species are in range of one another but due to genetic variation, different food sources, or different mating times, the population splits into two or more different species.

Artificial speciation: instead of natural speciation like those mentioned above, it is possible that humans can play a role in the rise of new species as a result of lab experimentation (fruit flies) and husbandry of farm animals (domesticated sheep would not be able to mate with their wild counterpart).

Speciation

Speciation is the process by which new _____ are created. It is a series of events over a long period of time that gives rise to two or more different species as a result of _____. Speciation is influenced by _____

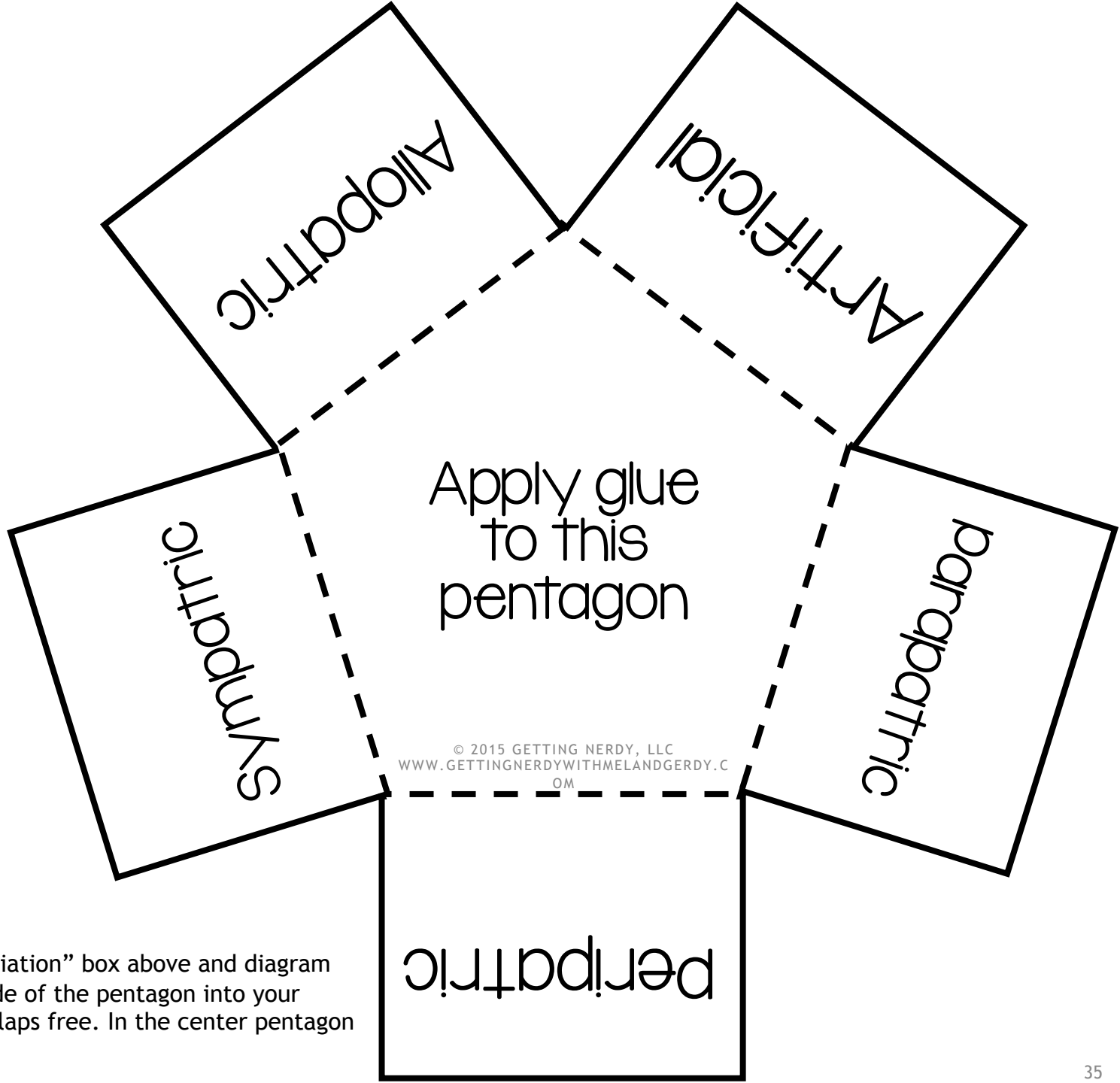
_____

_____

_____

_____

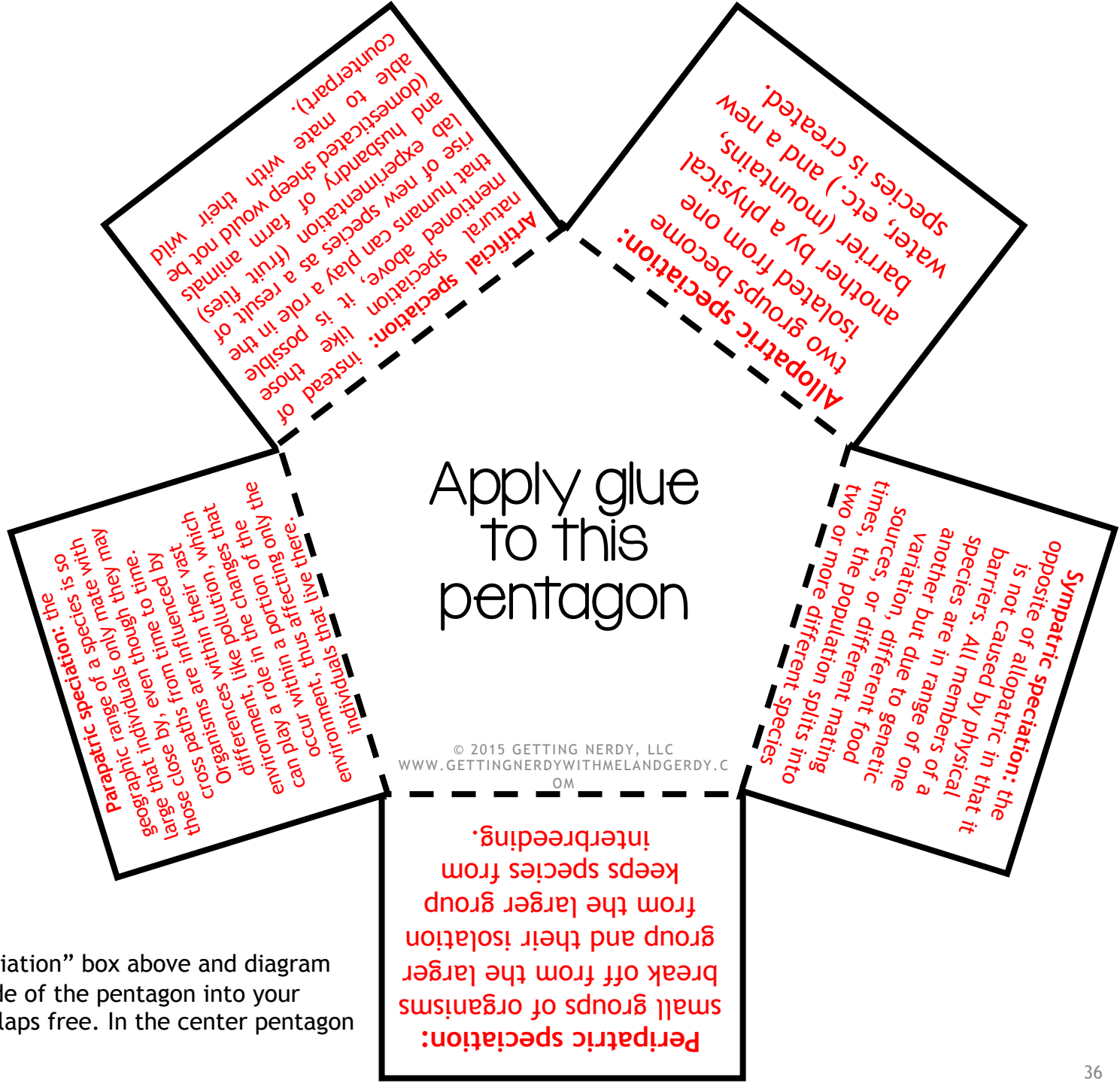
_____



Directions: Cut out the "Speciation" box above and diagram and glue the "apply glue" side of the pentagon into your notebook while leaving the flaps free. In the center pentagon define the term "species."

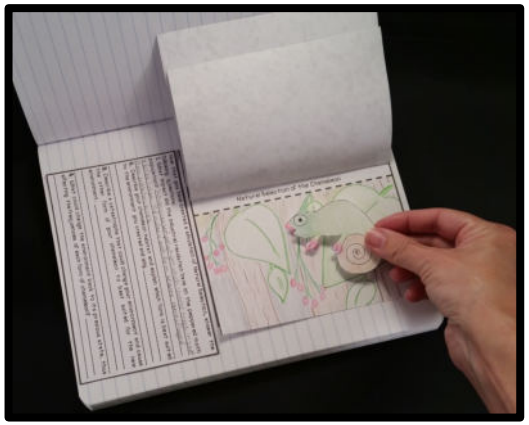
Speciation

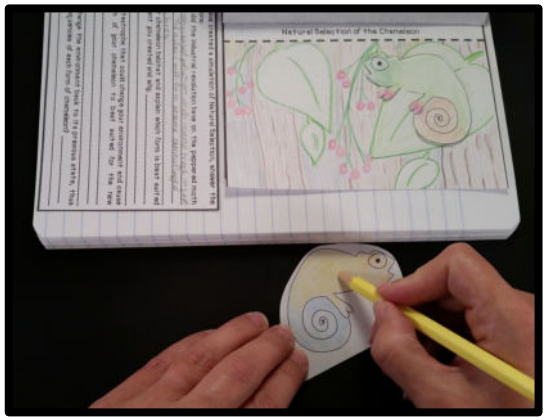
Speciation is the process by which new species are created. It is a series of events over a long period of time that gives rise to two or more different species as a result of Evolution. Speciation is influenced by natural selection, hybridization, genetic mutation, a change in the frequency of an allele in a population, geographic isolation, and isolation of species due to non-geographic reasons.

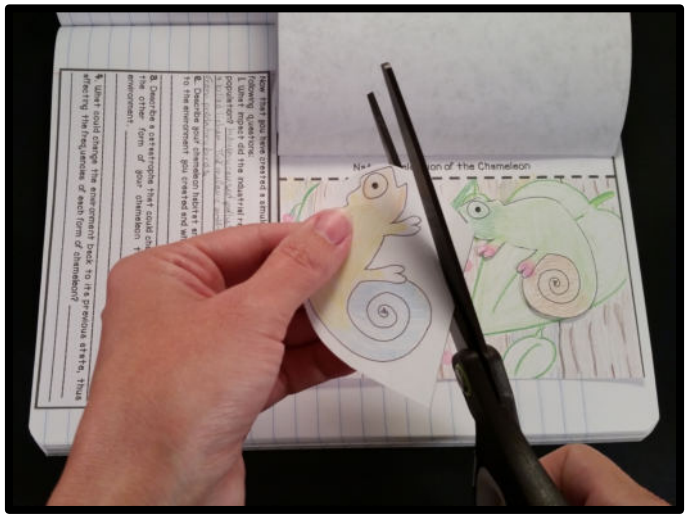


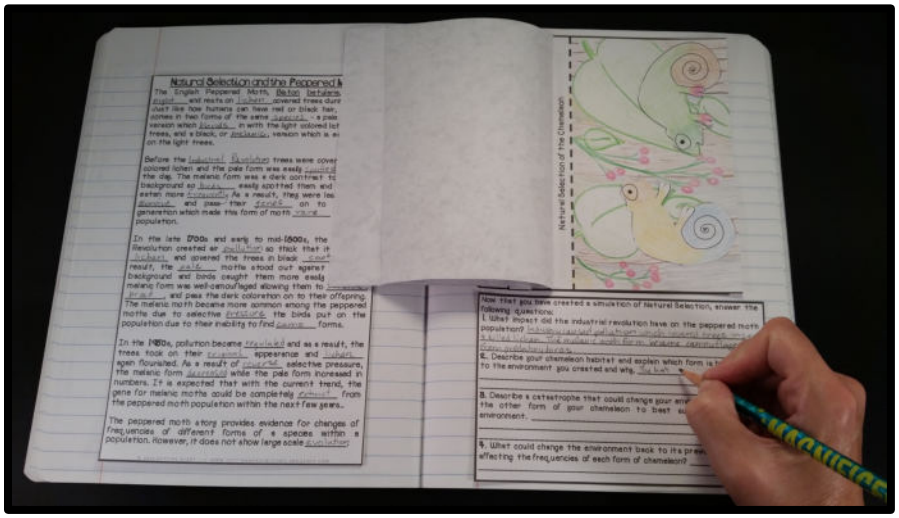
Directions: Cut out the "Speciation" box above and diagram and glue the "apply glue" side of the pentagon into your notebook while leaving the flaps free. In the center pentagon define the term "species."

Selection is Natural Teacher Notes/Answer Key









Directions: Cut out the inb pages on this page and the page that follows. Cut out two of the moths and using your colored pencils, create two forms of the moth for the "BEFORE/AFTER Industrial Revolution" using the notes on the peppered moth from the page in your INB. Then, do the same for the "DURING Industrial Revolution". Glue those down on the main template as you complete them. Lastly, create your own environment and make two forms for the chameleon in which one is best suited to its habitat while the other is not. Glue the chameleons into their new environment and answer the questions on the small inb sheet. When finished, answer the questions from the moth and chameleon cut out page.

Note: a variety of backgrounds are provided and a blank template is included so you can ask students to recreate the peppered moth scenarios from scratch.

Selection is Natural Notes/Answer Key

The English Peppered Moth, Biston betularia, flies at night and rests on lichen covered trees during the day. Just like how humans can have red or black hair, the moth comes in two forms of the same species - a pale speckled version which blends in with the light colored lichen on the trees, and a black, or melanic, version which is easy to see on the light trees.

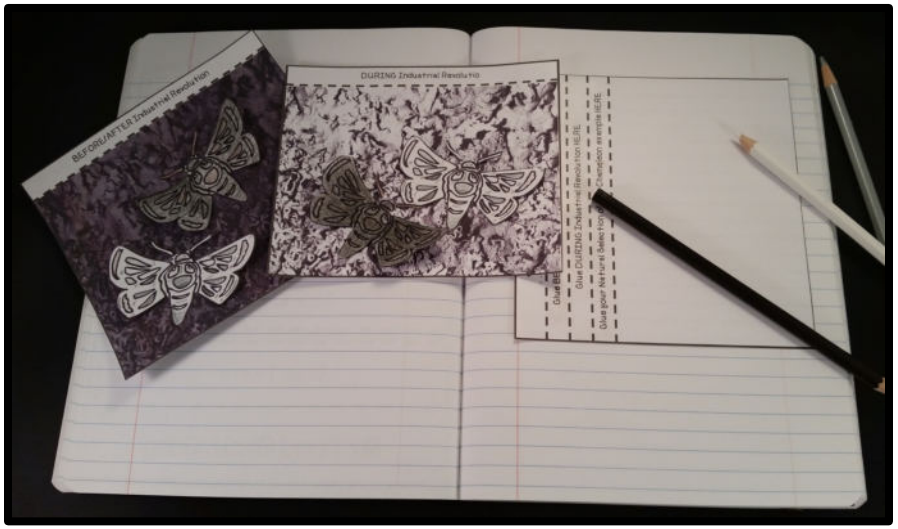
Before the Industrial Revolution, trees were covered in light colored lichen and the pale form was easily camouflaged during the day. The melanic form was a dark contrast to the light background so birds easily found them and they were eaten more frequently. As a result, they were less likely to survive and pass their genes on to the next generation which made this form of moth rare within the population.

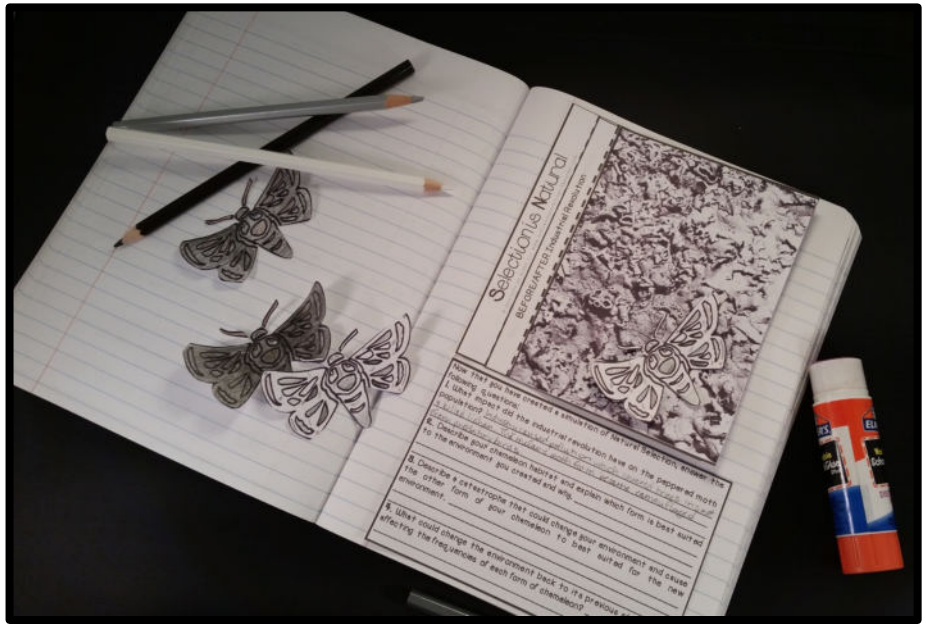
In the late 1700s and early to mid-1800s, the Industrial Revolution created air pollution so thick that it killed the lichens and covered the trees in black soot. As a result, the pale moths stood out against the black background and birds caught them more easily while the melanic form was well-camouflaged allowing them to survive, breed, and pass the dark coloration on to their offspring. The melanic moth became more common among the peppered moths due to selective pressure the birds put on the population due to their inability to find camouflaged forms.

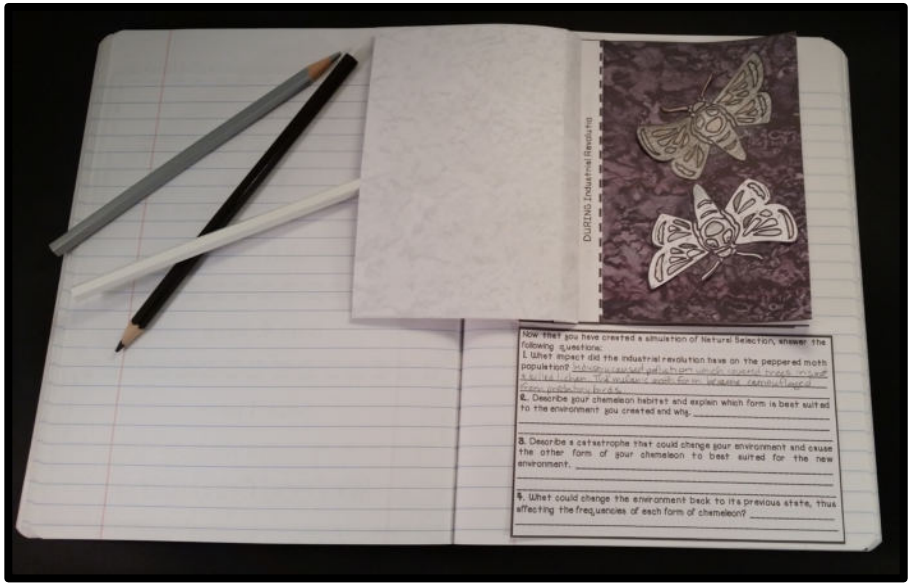
In the 1950s, pollution became regulated and as a result, the trees took on their original appearance and lichens again flourished. As a result of reverse selective pressure, the melanic form decreased while the pale form increased in numbers. It is expected that with the current trend, the gene for melanic moths could be completely eliminated from the peppered moth population within the next few years.

The peppered moth story provides evidence for changes of frequencies of different forms of a species within a population. However, it does not show large scale Evolution.

Selection is Natural Notes/Answer Key







Selection is Natural

Glue BEFORE/AFTER Industrial Revolution HERE

Glue DURING Industrial Revolution HERE

Glue your Natural Selection of the Chameleon example HERE

Natural Selection and the Peppered Moth:

The English Peppered Moth, Biston betularia, flies at _____and rests on _____covered trees during the day. Just like how humans can have red or black hair, the moth comes in two forms of the same _____ - a pale _____ version which _____ in with the light colored lichen on the trees, and a black, or _____, version which is easy to see on the light trees.

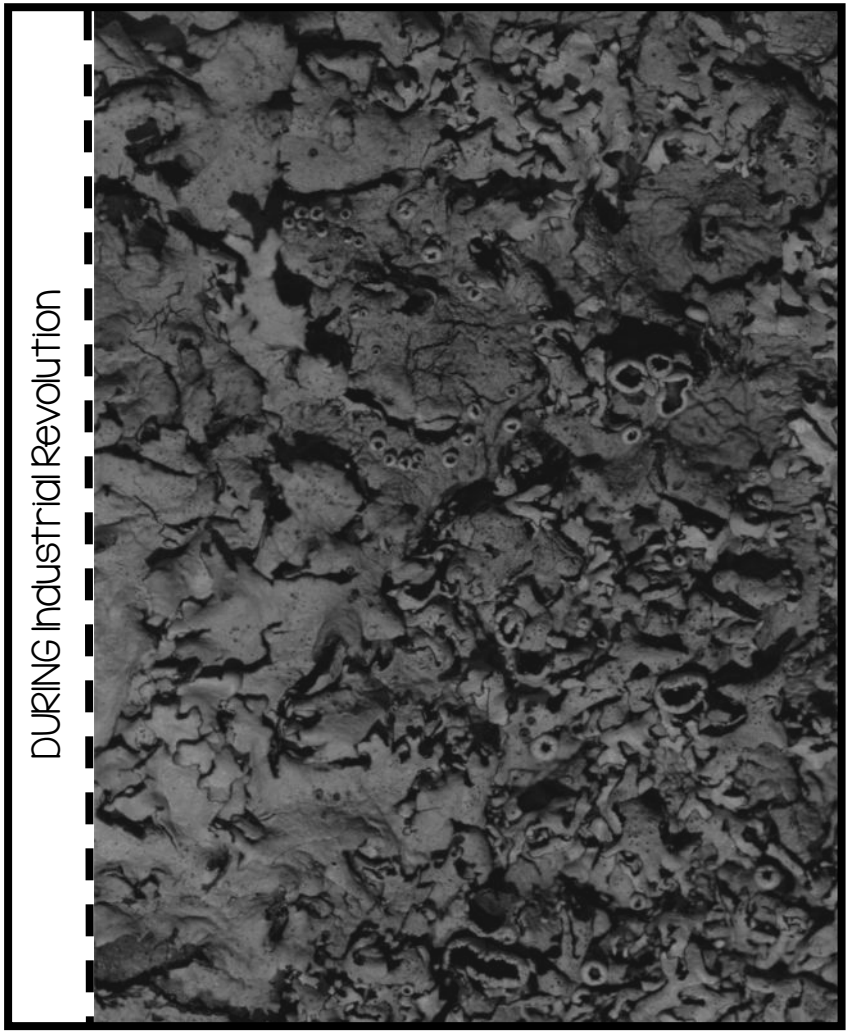
Before the _____ _____, trees were covered in light colored lichen and the pale form was easily _____during the day. The melanic form was a dark contrast to the light background so _____ easily found them and they were eaten more _____. As a result, they were less likely to _____ and pass their _____ on to the next generation which made this form of moth _____ within the population.

In the late 1700s and early to mid-1800s, the Industrial Revolution created air _____ so thick that it killed the _____ and covered the trees in black _____. As a result, the _____ moths stood out against the black background and birds caught them more easily while the melanic form was well-camouflaged allowing them to _____, _____, and pass the dark coloration on to their offspring. The melanic moth became more common among the peppered moths due to selective _____ the birds put on the population due to their inability to find _____ forms.

In the 1950s, pollution became _____, and as a result, the trees took on their _____ appearance and _____ again flourished. As a result of _____ selective pressure, the melanic form _____ while the pale form increased in numbers. It is expected that with the current trend, the gene for melanic moths could be completely _____ from the peppered moth population within the next few years.

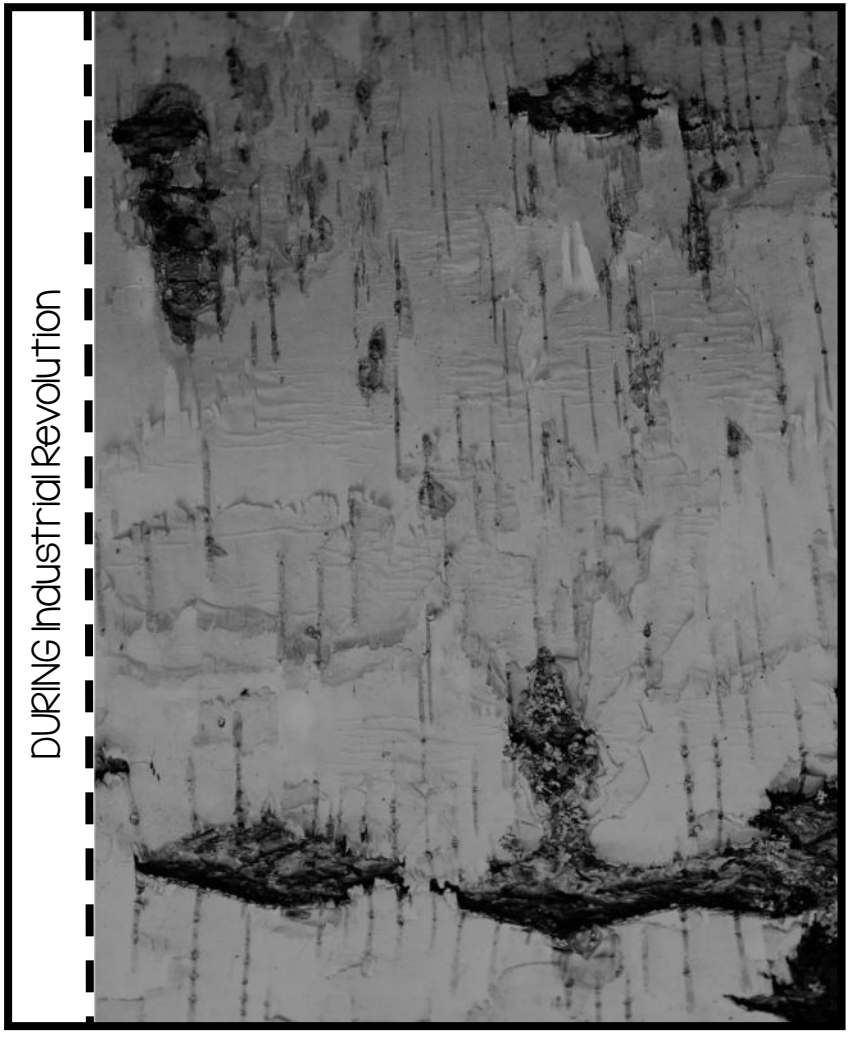
The peppered moth story provides evidence for changes of frequencies of different forms of a species within a population. However, it does not show large scale _____.

Directions: Cut out the inb pages on this page and the page that follows. Cut out two of the moths and using your colored pencils, create two forms of the moth for the "BEFORE/AFTER Industrial Revolution" using the notes on the peppered moth from the page in your INB. Then, do the same for the "DURING Industrial Revolution", making sure that the moths are near identical in appearance to those you used in the Before/After portion. Glue those down on the "Selection is Natural" template as you complete them. Lastly, create your own environment and make two forms for the chameleon in which one is best suited to its habitat while the other is not. Glue the chameleons into their new environment and answer the questions on the small inb sheet.

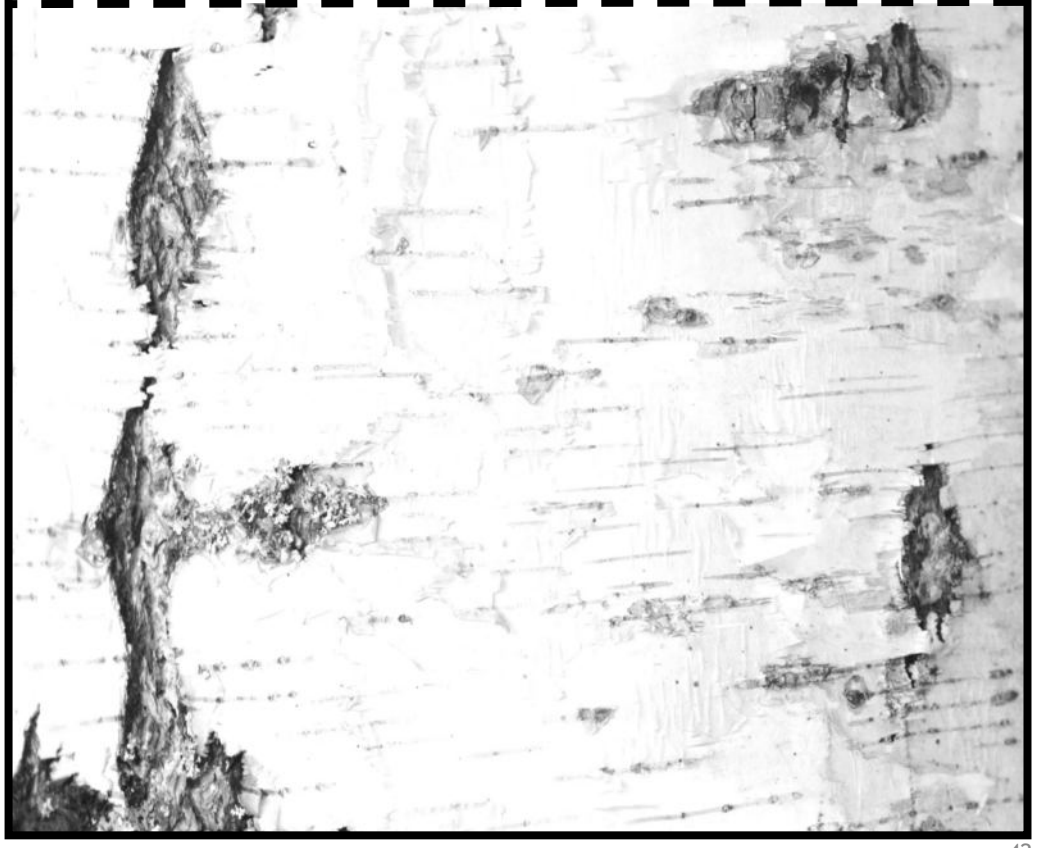


Directions: Cut out the inb pages on this page and the page that follows. Cut out two of the moths and using your colored pencils, create two forms of the moth for the "BEFORE/AFTER Industrial Revolution" using the notes on the peppered moth from the page in your INB. Then, do the same for the "DURING Industrial Revolution", making sure that the moths are near identical in appearance to those you used in the Before/After portion. Glue those down on the "Selection is Natural" template as you complete them. Lastly, create your own environment and make two forms for the chameleon in which one is best suited to its habitat while the other is not. Glue the chameleons into their new environment and answer the questions on the small inb sheet.

DURING Industrial Revolution



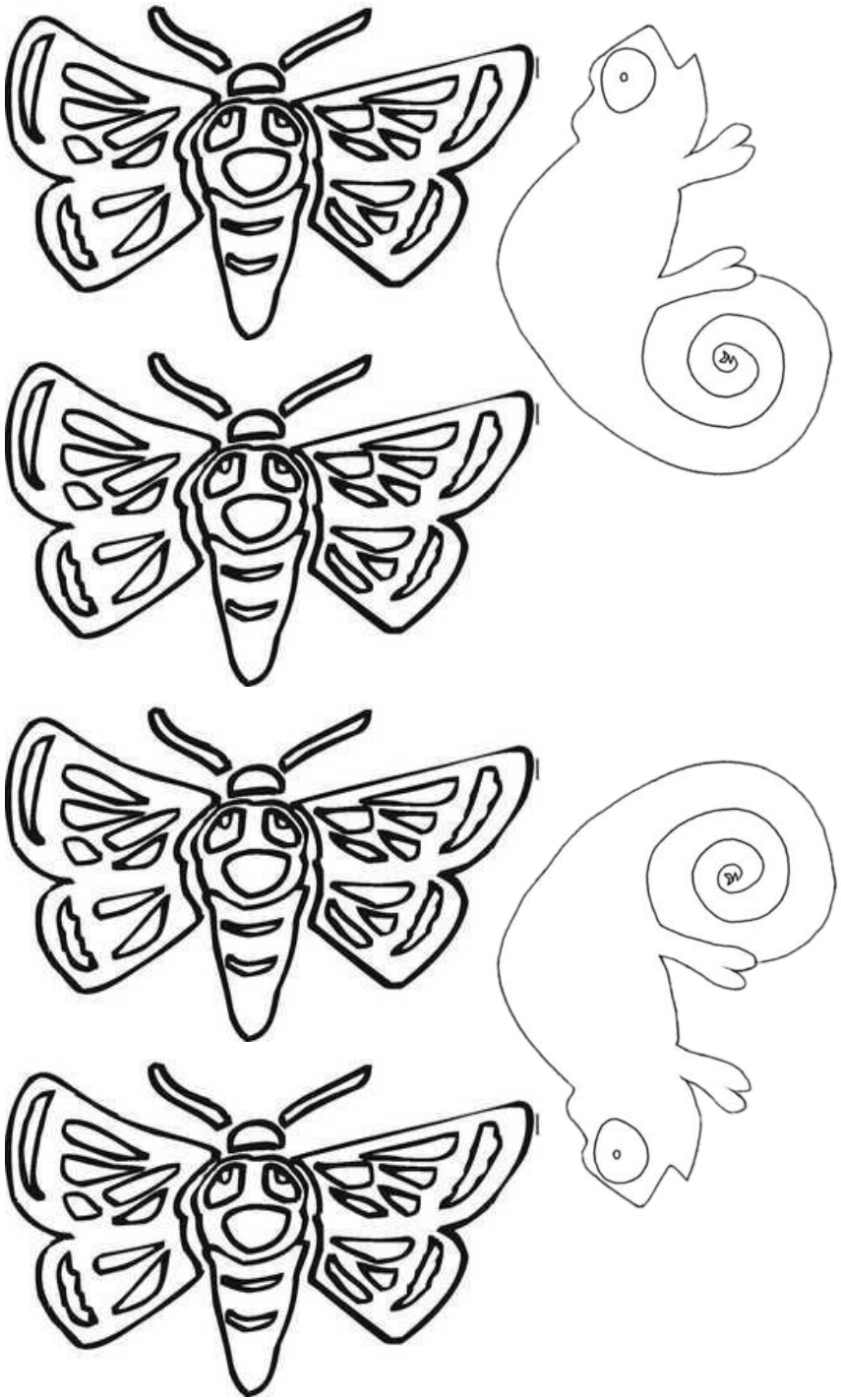
BEFORE/AFTER Industrial Revolution



Directions: Cut out the inb pages on this page and the page that follows. Cut out two of the moths and using your colored pencils, create two forms of the moth for the "BEFORE/AFTER Industrial Revolution" using the notes on the peppered moth from the page in your INB. Then, do the same for the "DURING Industrial Revolution", making sure that the moths are near identical in appearance to those you used in the Before/After portion. Glue those down on the "Selection is Natural" template as you complete them. Lastly, create your own environment and make two forms for the chameleon in which one is best suited to its habitat while the other is not. Glue the chameleons into their new environment and answer the questions on the small inb sheet.

DURING Industrial Revolution

BEFORE/AFTER Industrial Revolution



Now that you have created a simulation of Natural Selection, answer the following questions:

1. What impact did the industrial Revolution have on the peppered moth population? _____
_____
_____

2. Describe your chameleon habitat and explain which form is best suited to the environment you created and why. _____
_____
_____

3. Describe a catastrophe that could change your environment and cause the other form of your chameleon to best suited for the new environment.
_____
_____
_____

4. What could change the environment back to its previous state, thus affecting the frequencies of each form of chameleon? _____
_____

Natural Selection of the Chameleon

Selection is Natural

Glue BEFORE/AFTER Industrial Revolution HERE

Glue DURING Industrial Revolution HERE

Glue your Natural Selection of the Chameleon example HERE

The English Peppered Moth, Biston betularia, flies at night and rests on lichen covered trees during the day. Just like how humans can have red or black hair, the moth comes in two forms of the same species - a pale speckled version which blends in with the light colored lichen on the trees, and a black, or melanic, version which is easy to see on the light trees.

Before the Industrial Revolution, trees were covered in light colored lichen and the pale form was easily camouflaged during the day. The melanic form was a dark contrast to the light background so birds easily found them and they were eaten more frequently. As a result, they were less likely to survive and pass their genes on to the next generation which made this form of moth rare within the population.

In the late 1700s and early to mid-1800s, the Industrial Revolution created air pollution so thick that it killed the lichens and covered the trees in black soot. As a result, the pale moths stood out against the black background and birds caught them more easily while the melanic form was well-camouflaged allowing them to survive, breed, and pass the dark coloration on to their offspring. The melanic moth became more common among the peppered moths due to selective pressure the birds put on the population due to their inability to find camouflaged forms.

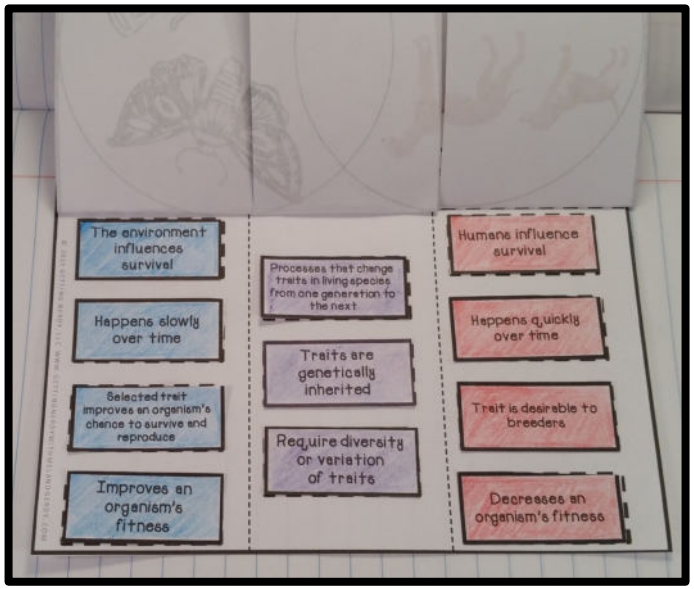
In the 1950s, pollution became regulated and as a result, the trees took on their original appearance and lichens again flourished. As a result of reverse selective pressure, the melanic form decreased while the pale form increased in numbers. It is expected that with the current trend, the gene for melanic moths could be completely eliminated from the peppered moth population within the next few years.

The peppered moth story provides evidence for changes of frequencies of different forms of a species within a population. However, it does not show large scale Evolution.

Natural Selection vs. Artificial Selection Comparison Teacher Notes/Answer Key

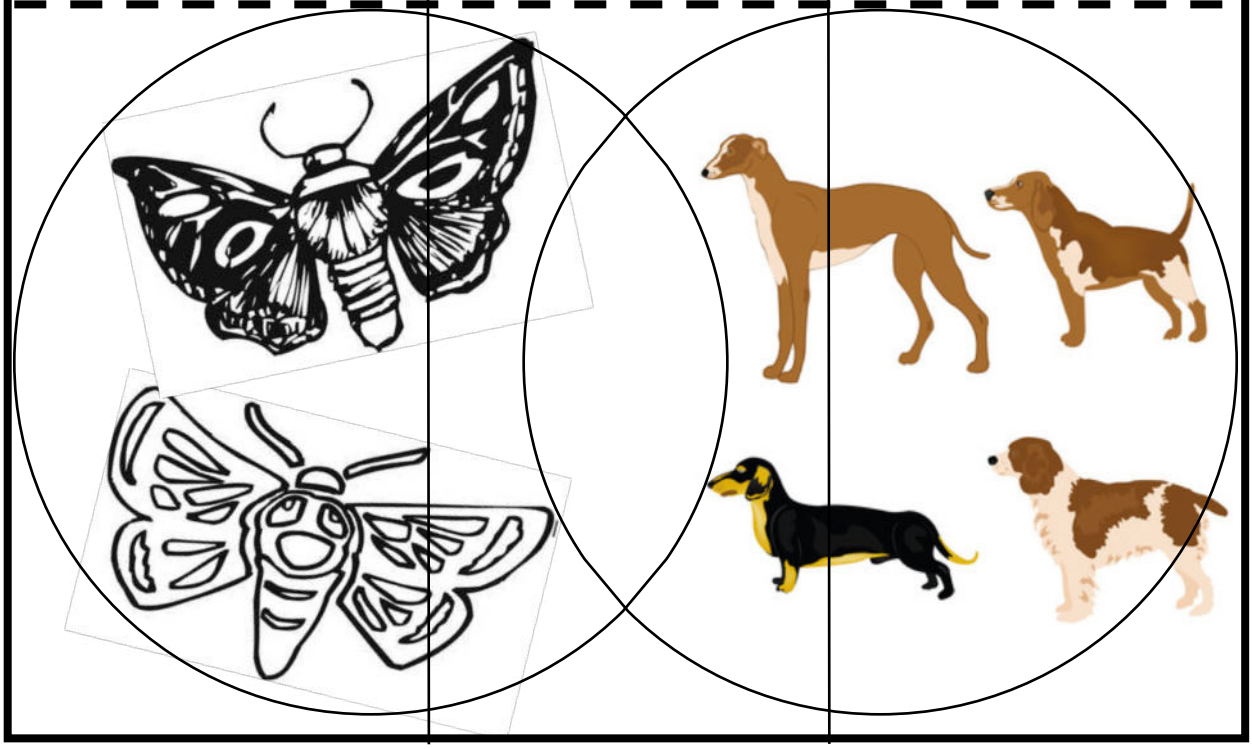
Natural and Artificial Selection Comparison

Natural Selection:	Both:	Artificial Selection:
The environment influences survival	Processes that change traits in living species from one generation to the next	Humans influence survival
Happens slowly over time	Traits are genetically inherited	Happens quickly over time
Selected trait improves an organism's chance to survive and reproduce	Require diversity or variation of traits	Trait is desirable to breeders
Improves an organism's fitness		Decreases an organism's fitness



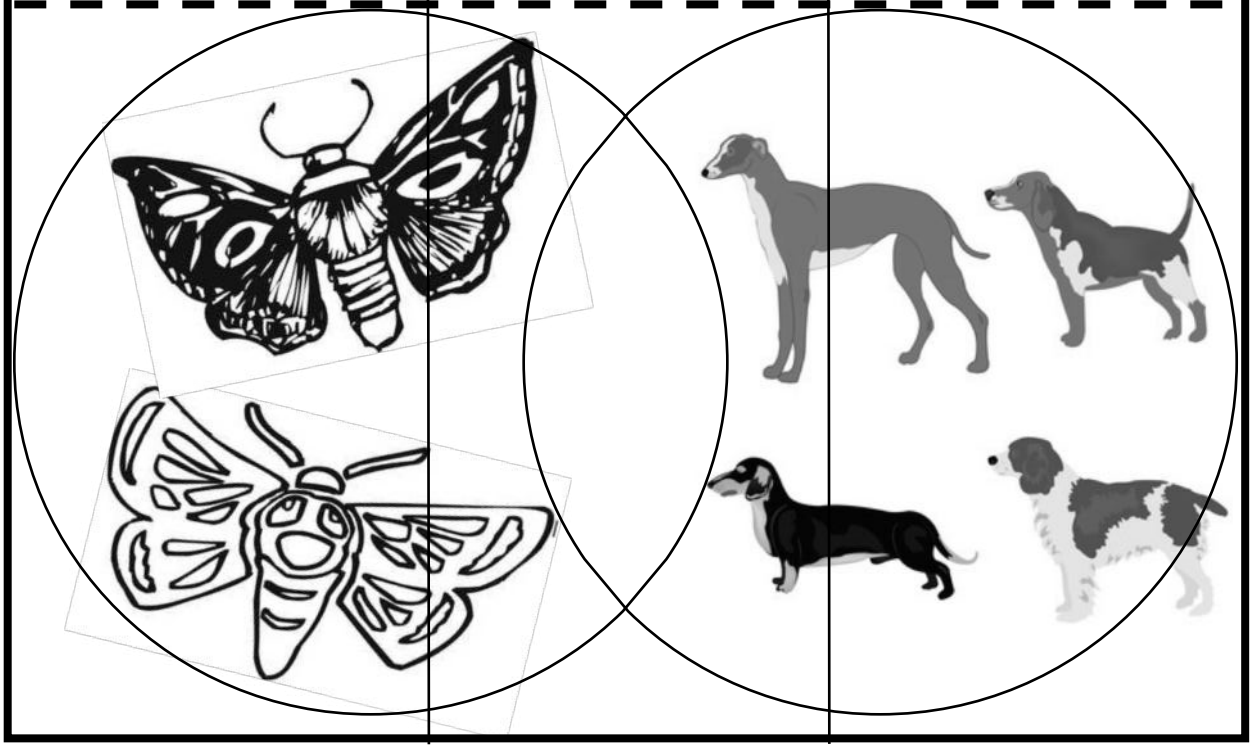
Directions: Cut out the blank sheet and glue into your INB. Cut out the Venn diagram inb sheet and cut along the three vertical lines to split the picture in thirds. Fold the tabs back along the dashed line and apply glue to the back of the tab and glue to the diagram that says "glue here". Underneath the flaps, cut out and glue down the similarities and differences between natural selection and artificial selection.

Natural Selection & Artificial Selection Comparison



Glue Natural & Artificial Selection Comparison Sheet here

Natural Selection & Artificial Selection Comparison



Glue Natural & Artificial Selection Comparison Sheet here

Natural and Artificial Selection Comparison

Directions: Cut out the blank sheet on the previous page and glue into your INB. Cut out the Venn diagram comparison sheet, then cut along the three vertical lines to split the picture in thirds. Fold the tabs back along the dashed line and apply glue to the back of the tab and glue to the diagram that says "glue here". Underneath the flaps, cut out and glue down the similarities and differences between natural and artificial selection.

Trait is desirable to breeders

Traits are genetically inherited

Happens slowly over time

The environment influences survival

Processes that change traits in living species from one generation to the next

Improves an organism's fitness

Selected trait improves an organism's chance to survive and reproduce

Require diversity or variation of traits

Decreases an organism's fitness

Humans influence survival

Happens quickly over time

Natural and Artificial Selection Comparison

Directions: Cut out the blank sheet on the previous page and glue into your INB. Cut out the Venn diagram comparison sheet, then cut along the three vertical lines to split the picture in thirds. Fold the tabs back along the dashed line and apply glue to the back of the tab and glue to the diagram that says "glue here". Underneath the flaps, cut out and glue down the similarities and differences between natural and artificial selection.

Trait is desirable to breeders

Traits are genetically inherited

Happens slowly over time

The environment influences survival

Processes that change traits in living species from one generation to the next

Improves an organism's fitness

Selected trait improves an organism's chance to survive and reproduce

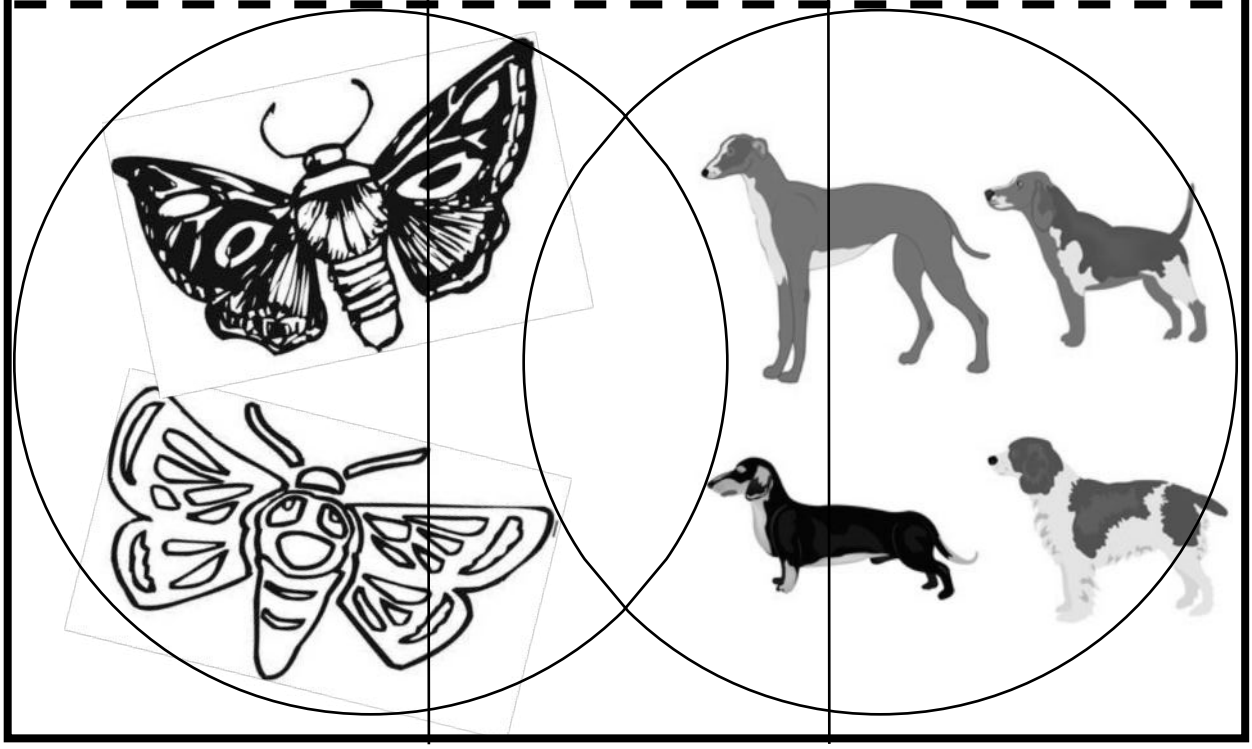
Require diversity or variation of traits

Decreases an organism's fitness

Humans influence survival

Happens quickly over time

Natural Selection & Artificial Selection Comparison



Glue Natural & Artificial Selection Comparison Sheet here

Environment influences survival

Changes traits in living species from one generation to the next

Humans influence survival

Happens slowly over time

Happens quickly over time

Traits are genetically inherited

Selected trait improves chance to survive and reproduce

Trait is desirable to breeders

Require diversity or variation of traits

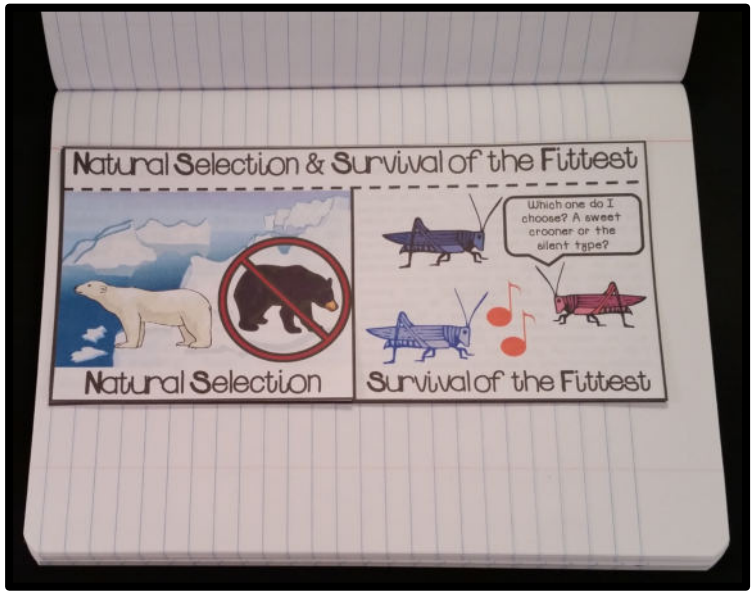
Improves an organism's fitness

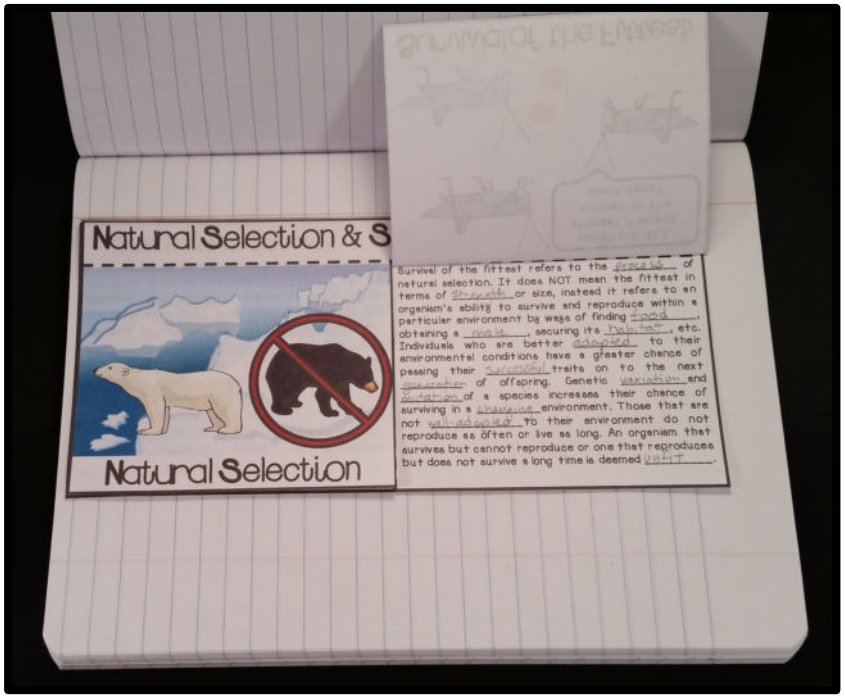
Decreases an organism's fitness

Natural Selection & Survival of the Fittest Teacher Notes/Answer Key

Natural selection is the driving force behind Evolution. Nature essentially decides who lives and who dies based on several factors: a competitive struggle to survive, reproduction and passing favorable traits on to offspring, overproduction of a population which leaves more offspring born than can survive, survival of the fittest, and speciation which is the creation of new species evolving from a common ancestor over time.

Survival of the fittest refers to the process of natural selection. It does NOT mean the fittest in terms of strength or size. Instead it refers to an organism's ability to survive and reproduce within a particular environment by ways of finding food, obtaining a mate, securing its habitat, etc. Individuals who are better adapted to their environmental conditions have a greater chance of passing their successful traits on to the next generation of offspring. Genetic variation and mutation of a species increases their chance of surviving in a changing environment. Those that are not well-adapted to their environment do not reproduce as often or live as long. An organism that survives but cannot reproduce or one that reproduces but does not survive a long time is deemed unfit.

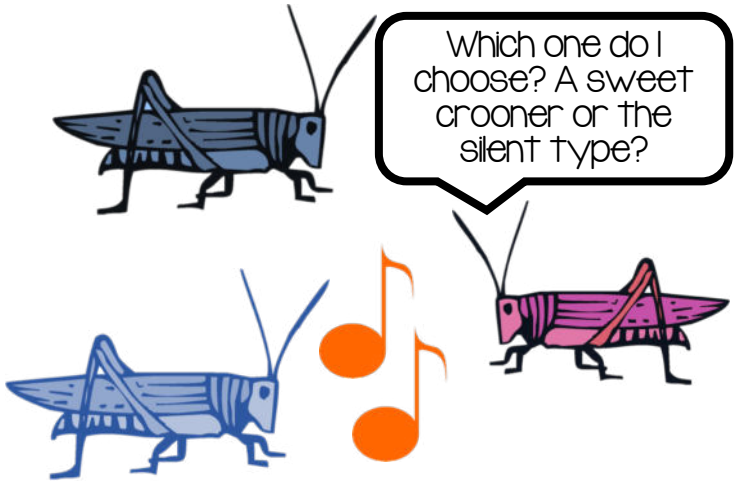




Directions: Cut out and glue together the Natural Selection & Survival of the fittest flipper and glue into your INB. Complete the information by filling in the blanks.

Natural Selection & Survival of the Fittest

Natural Selection



Survival of the Fittest

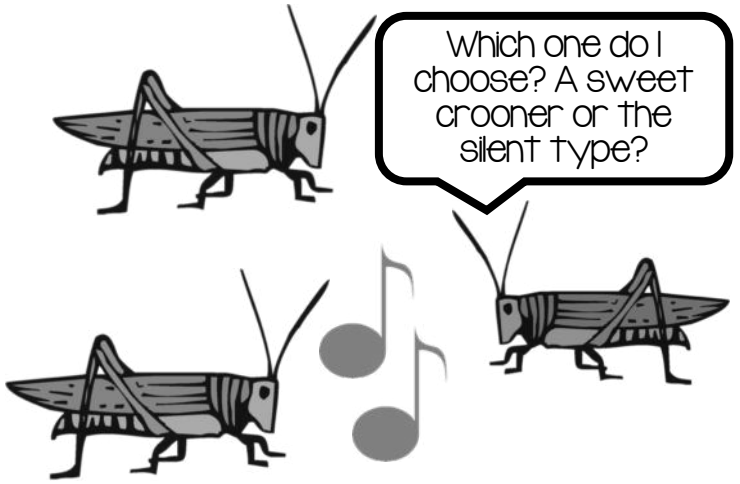
Glue Natural Selection & Survival of the Fittest Here

Natural selection is the _____ force behind _____. Nature essentially decides who lives and who dies based on several factors: a _____struggle to survive, _____ and passing _____ traits on to offspring, _____ of a population which leaves more offspring _____ than can survive, survival of the fittest, and _____ which is the creation of new species evolving from a common _____ over time.

Survival of the fittest refers to the _____ of natural selection. It does NOT mean the fittest in terms of _____or size, instead it refers to an organism's ability to survive and reproduce within a particular environment by ways of finding _____, obtaining a _____, securing its _____, etc. Individuals who are better _____ to their environmental conditions have a greater chance of passing their _____ traits on to the next _____ of offspring. Genetic _____ and _____of a species increases their chance of surviving in a _____ environment. Those that are not _____to their environment do not reproduce as often or live as long. An organism that survives but cannot reproduce or one that reproduces but does not survive a long time is deemed _____.

Natural Selection & Survival of the Fittest

Natural Selection



Survival of the Fittest

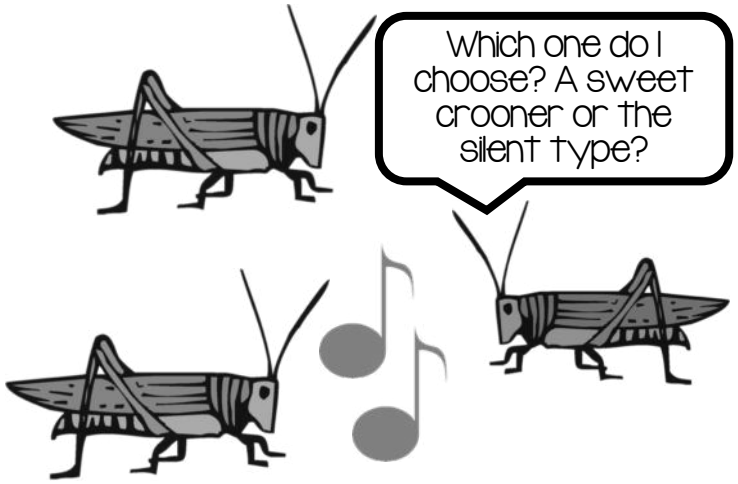
Glue Natural Selection & Survival of the Fittest Here

Natural selection is the _____ force behind _____. Nature essentially decides who lives and who dies based on several factors: a _____struggle to survive, _____ and passing _____ traits on to offspring, _____ of a population which leaves more offspring _____ than can survive, survival of the fittest, and _____ which is the creation of new species evolving from a common _____ over time.

Survival of the fittest refers to the _____ of natural selection. It does NOT mean the fittest in terms of _____or size, instead it refers to an organism's ability to survive and reproduce within a particular environment by ways of finding _____, obtaining a _____, securing its _____, etc. Individuals who are better _____ to their environmental conditions have a greater chance of passing their _____ traits on to the next _____ of offspring. Genetic _____ and _____of a species increases their chance of surviving in a _____ environment. Those that are not _____to their environment do not reproduce as often or live as long. An organism that survives but cannot reproduce or one that reproduces but does not survive a long time is deemed _____.

Natural Selection & Survival of the Fittest

Natural Selection



Survival of the Fittest

Glue Natural Selection & Survival of the Fittest Here

Natural selection is the driving force behind Evolution. Nature essentially decides who lives and who dies based on several factors: a competitive struggle to survive, reproduction and passing favorable traits on to offspring, overproduction of a population which leaves more offspring born than can survive, survival of the fittest, and speciation which is the creation of new species evolving from a common ancestor over time.

Survival of the fittest refers to the process of natural selection. It does NOT mean the fittest in terms of strength or size. Instead it refers to an organism's ability to survive and reproduce within a particular environment by ways of finding food, obtaining a mate, securing its habitat, etc. Individuals who are better adapted to their environmental conditions have a greater chance of passing their successful traits on to the next generation of offspring. Genetic variation and mutation of a species increases their chance of surviving in a changing environment. Those that are not well-adapted to their environment do not reproduce as often or live as long. An organism that survives but cannot reproduce or one that reproduces but does not survive a long time is deemed unfit.

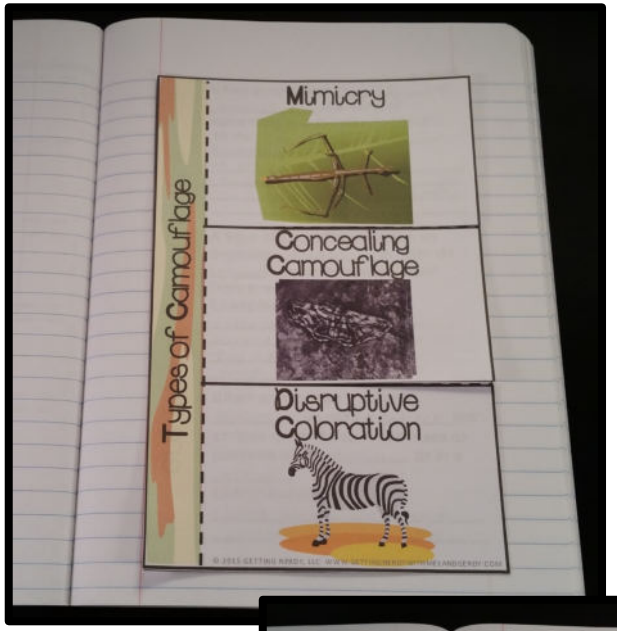
Types of Camouflage Teacher Notes/Answer Key

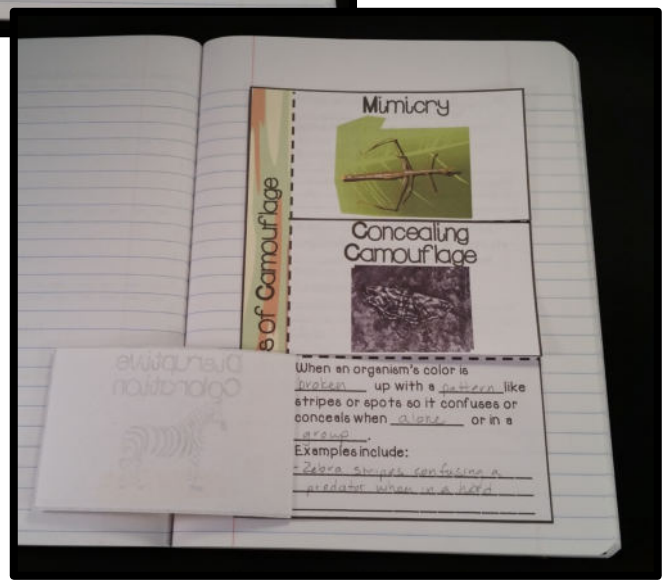
Types of Camouflage

When an organism copies or mimics the form of something else in order to blend in to its environment
Examples include: a stick bug on a branch. a viceroy butterfly pretending to be a noxious monarch.

A type of camouflage in which an organism blends in with its background in order to conceal itself from predators and prey.
Examples include: arctic hare and ptarmigan change their colors with the seasons – white in winter, brown in spring/summer. A green frog on a lily pad. A deer hiding in the underbrush of a forest.

When an organism's color is broken up with a pattern like stripes or spots so it confuses or conceals when alone or in a group.
Examples include:
A herd of zebra confusing predators with their stripes. Leopards, tigers, jaguars have spots and stripes that mimic shadows so they blend in to the forest and grasslands.

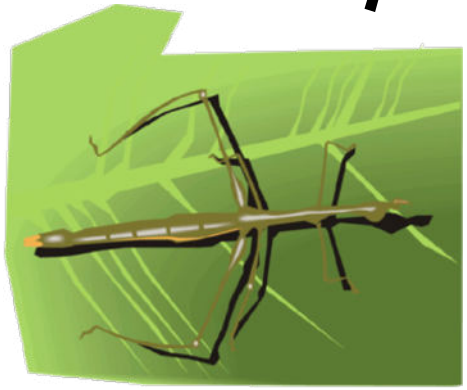




Directions: Cut out and glue the diagram into your notebook along the back of the tab. Cut along the three vertical lines to split the picture in thirds. Fold the tabs back along the dashed line and apply glue to the back of the tab. Underneath the flaps, describe the three types of camouflage.

Types of Camouflage

Mimicry



Concealing Camouflage

Disruptive Coloration

Glue Types of Camouflage Here

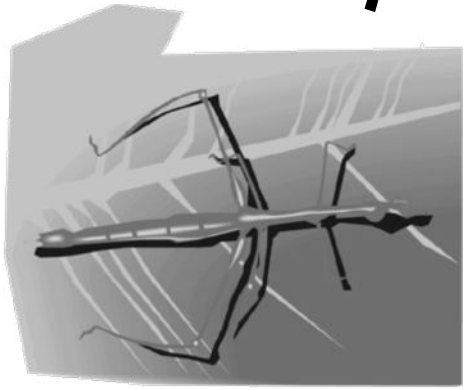
When an organism _____ or _____the form of something else in order to blend in to its _____.
Examples include:
_____
_____
_____
_____

A type of camouflage in which an organism _____ in with its _____ in order to conceal itself from predators and prey.
Examples include:
_____
_____
_____
_____

When an organism's color is _____ up with a _____ like stripes or spots so it confuses or conceals when _____ or in a _____.
Examples include:
_____
_____
_____
_____

Types of Camouflage

Mimicry



Concealing Camouflage

Disruptive Coloration

Glue Types of Camouflage Here

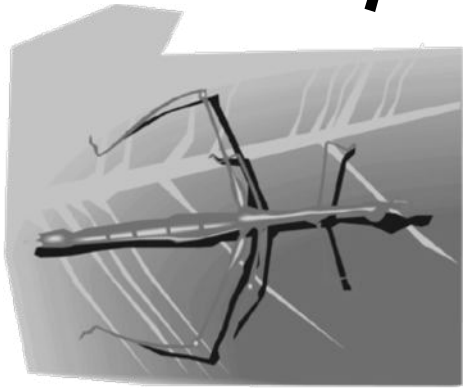
When an organism _____ or _____the form of something else in order to blend in to its _____.
Examples include:
_____
_____
_____
_____

A type of camouflage in which an organism _____ in with its _____ in order to conceal itself from predators and prey.
Examples include:
_____
_____
_____
_____

When an organism's color is _____ up with a _____ like stripes or spots so it confuses or conceals when _____ or in a _____.
Examples include:
_____
_____
_____
_____

Types of Camouflage

Mimicry



Concealing Camouflage

Disruptive Coloration

Glue Types of Camouflage Here

When an organism copies or mimics the form of something else in order to blend in to its environment

Examples include: a stick bug on a branch. a viceroy butterfly pretending to be a noxious monarch.

A type of camouflage in which an organism blends in with its background in order to conceal itself from predators and prey.

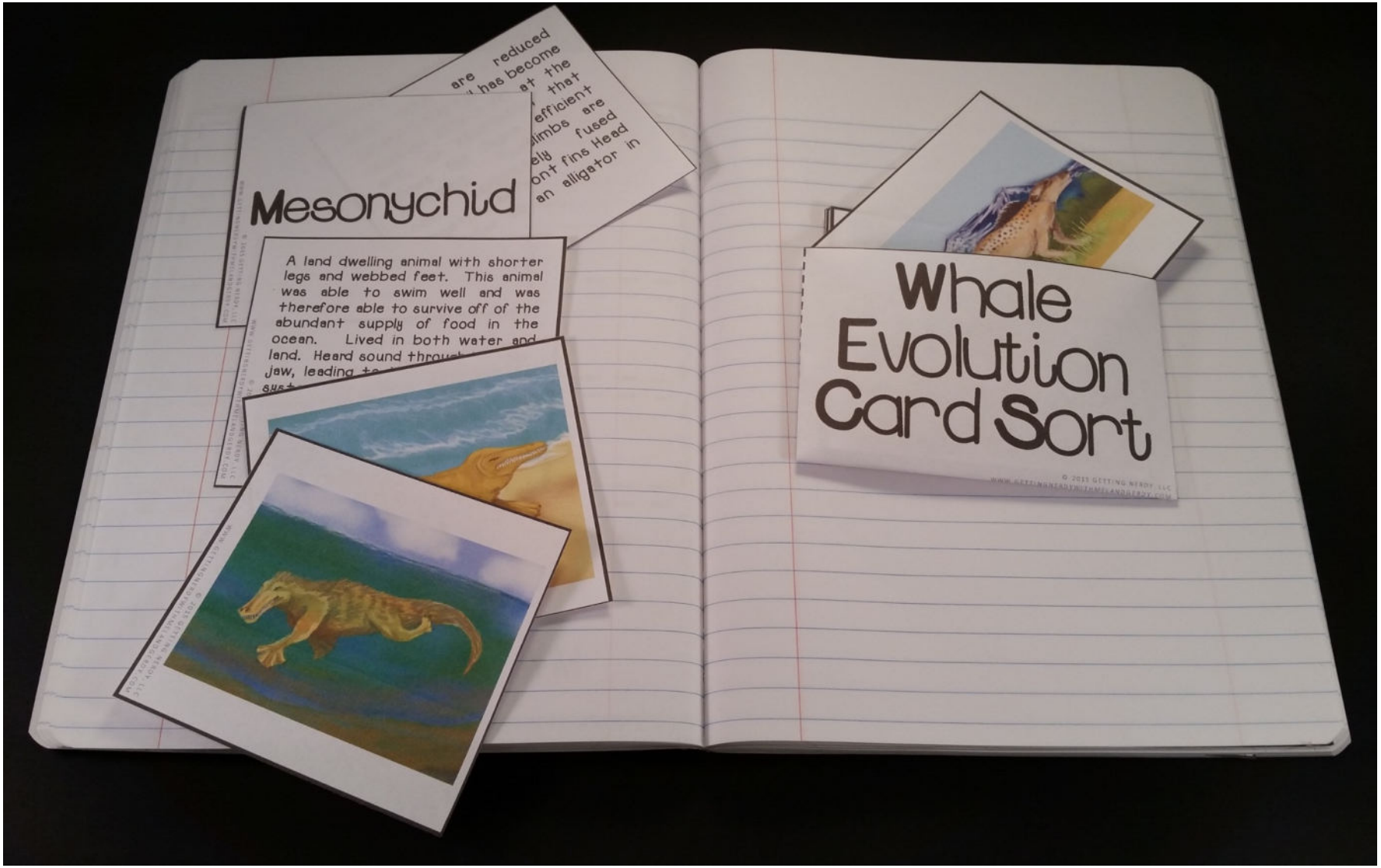
Examples include: arctic hare and ptarmigan change their colors with the seasons – white in winter, brown in spring/summer. A green frog on a lily pad. A deer hiding in the underbrush of a forest.

When an organism's color is broken up with a pattern like stripes or spots so it confuses or conceals when alone or in a group.

Examples include:

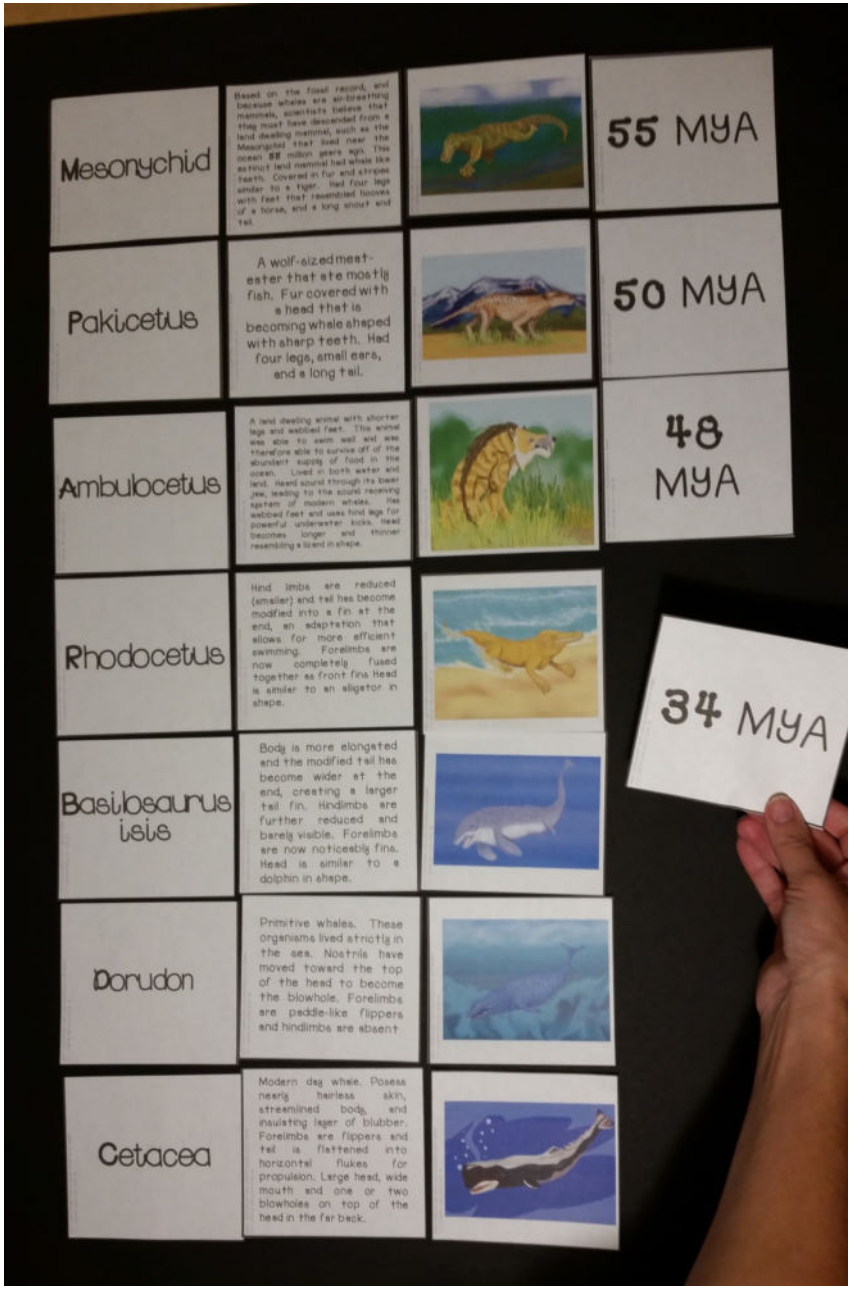
A herd of zebra confusing predators with their stripes. Leopards, tigers, jaguars have spots and stripes that mimic shadows so they blend in to the forest and grasslands.

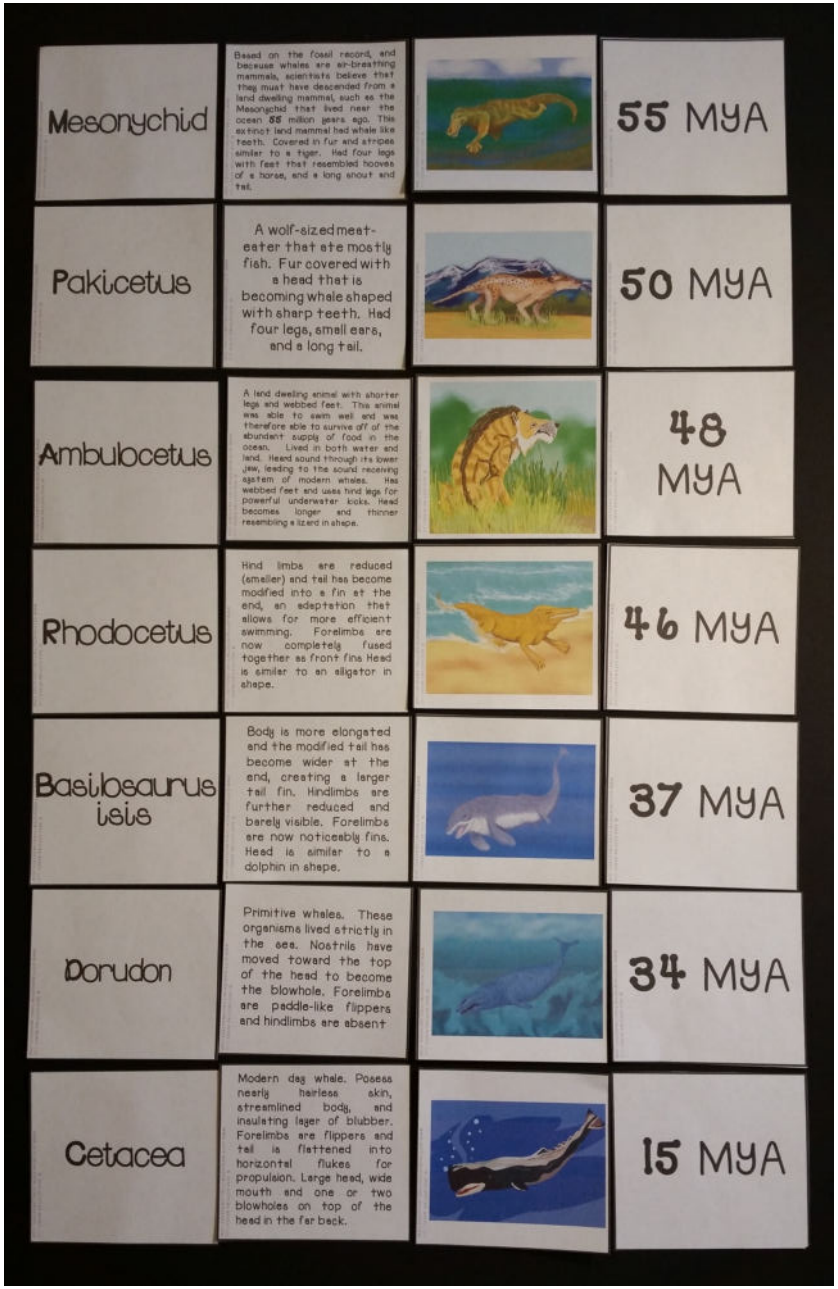
Whale Evolution Card Sort Teacher Notes/Key



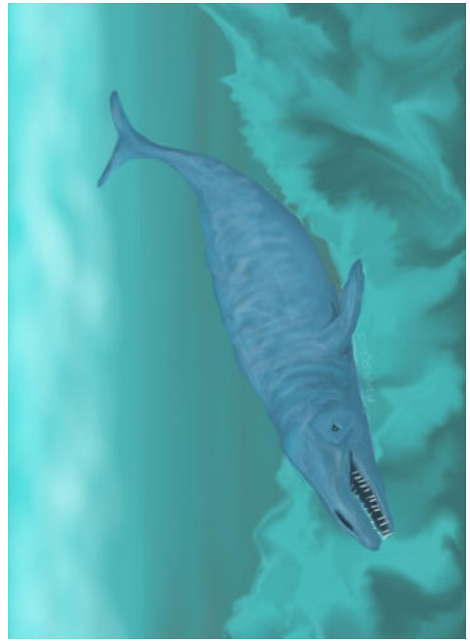
Directions: Create enough copies of the card sort to use in small groups or as individuals. Print on cardstock, cut and laminate if you plan on using them year after year with groups. If not, have students cut out the cards on the following pages and the card sort pocket. Fold the pocket along the dashed lines and glue into notebook to hold the cards. Arrange the picture and description cards appropriately to show the Evolution of the whale. Use the card sort as a warm-up activity as you walk them through the processes or use as test prep as students RACE to get them in order

Whale Evolution Card Sort Teacher Notes/Key





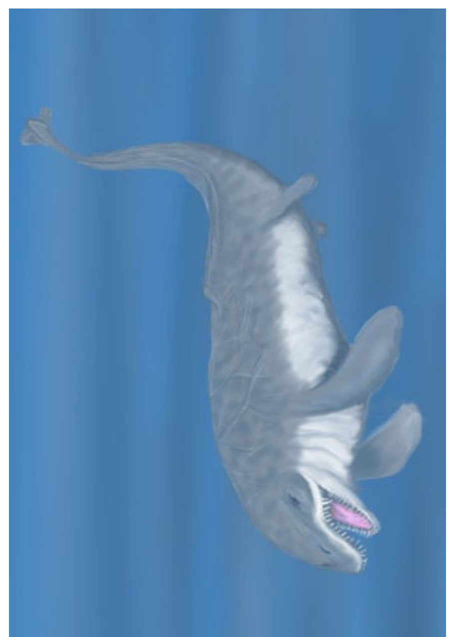
Wale Ancestor	Description	Photo	MYA
Mesonychid	Based on the fossil record, and because whales are air-breathing mammals, scientists believe that they must have descended from a land dwelling mammal, such as the Mesonychid that lived near the ocean 55 million years ago. This extinct land mammal had whale like teeth. Covered in fur and stripes similar to a tiger. Had four legs with feet that resembled hooves of a horse, and a long snout and tail.		55MYA
Pakicetus	A wolf-sized meat-eater that ate mostly fish. Fur covered with a head that is becoming whale shaped with sharp teeth. Had four legs, small ears, and a long tail.		50MYA
Ambulocetus	A land dwelling animal with shorter legs and webbed feet. This animal was able to swim well and was therefore able to survive off of the abundant supply of food in the ocean. Lived in both water and land. Heard sound through its lower jaw, leading to the sound receiving system of modern whales. Has webbed feet and uses hind legs for powerful underwater kicks. Head becomes longer and thinner resembling a lizard in shape.		48 MYA
Rhodocetus	Hind limbs are reduced (smaller) and tail has become modified into a fin at the end, an adaptation that allows for more efficient swimming. Forelimbs are now completely fused together as front fins Head is similar to an alligator in shape.		46 MYA
Basislosaurus isis	Body is more elongated and the modified tail has become wider at the end, creating a larger tail fin. Hind limbs are further reduced and barely visible. Forelimbs are now noticeably fins. Head is similar to a dolphin in shape.		37MYA
Dorudon	Primitive whales. These organisms lived strictly in the sea. Nostrils have moved toward the top of the head to become the blowhole. Forelimbs are paddle-like flippers and hind limbs are absent		34MYA
Cetacea	Modern day whale. Possess nearly hairless skin, streamlined body, and insulating layer of blubber. Forelimbs are flippers and tail is flattened into horizontal flukes for propulsion. Large head, wide mouth and one or two blowholes on top of the head in the far back.		15MYA



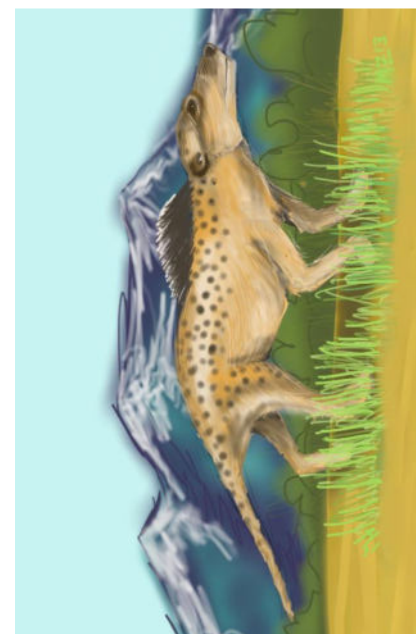
© 2015 GETTING NERDY, LLC
WWW.GETTINGNERDYWITHMELANDGERDY.COM

© 2015 GETTING NERDY, LLC
WWW.GETTINGNERDYWITHMELANDGERDY.COM

© 2015 GETTING NERDY, LLC
WWW.GETTINGNERDYWITHMELANDGERDY.COM



© 2015 GETTING NERDY, LLC
WWW.GETTINGNERDYWITHMELANDGERDY.COM



© 2015 GETTING NERDY, LLC
WWW.GETTINGNERDYWITHMELANDGERDY.COM

Based on the fossil record, and because whales are air-breathing mammals, scientists believe that they must have descended from a land dwelling mammal that lived near the ocean 55 million years ago. This extinct land mammal had whale like teeth. Covered in fur and stripes similar to a tiger. Had four legs with feet that resembled hooves of a horse, and a long snout and tail.

Body is more elongated and the modified tail has become wider at the end, creating a larger tail fin. Hind limbs are further reduced and barely visible. Forelimbs are now noticeably fins. Head is similar to a dolphin in shape.

Hind limbs are reduced (smaller) and tail has become modified into a fin at the end, an adaptation that allows for more efficient swimming. Forelimbs are now completely fused together as front fins Head is similar to an alligator in shape.

Primitive whales. These organisms lived strictly in the sea. Nostrils have moved toward the top of the head to become the blowhole. Forelimbs are paddle-like flippers and hind limbs are absent

Modern day whale. Possess nearly hairless skin, streamlined body, and insulating layer of blubber. Forelimbs are flippers and tail is flattened into horizontal flukes for propulsion. Large head, wide mouth and one or two blowholes on top of the head in the far back.

A land dwelling animal with shorter legs and webbed feet. This animal was able to swim well and was therefore able to survive off of the abundant supply of food in the ocean. Lived in both water and land. Heard sound through its lower jaw, leading to the sound receiving system of modern whales. Has webbed feet and uses hind legs for powerful underwater kicks. Head becomes longer and thinner resembling a lizard in shape.

A wolf-sized meat-eater that ate mostly fish. Fur covered with a head that is becoming whale shaped with sharp teeth. Had four legs, small ears, and a long tail.

Pakicetus

Cetacea

Dorudon

Mesonychid

55 MYA

50 MYA

48 MYA

46 MYA

37 MYA

34 MYA

Rhodocetus

Basilosaurus isis

Ambulocetus

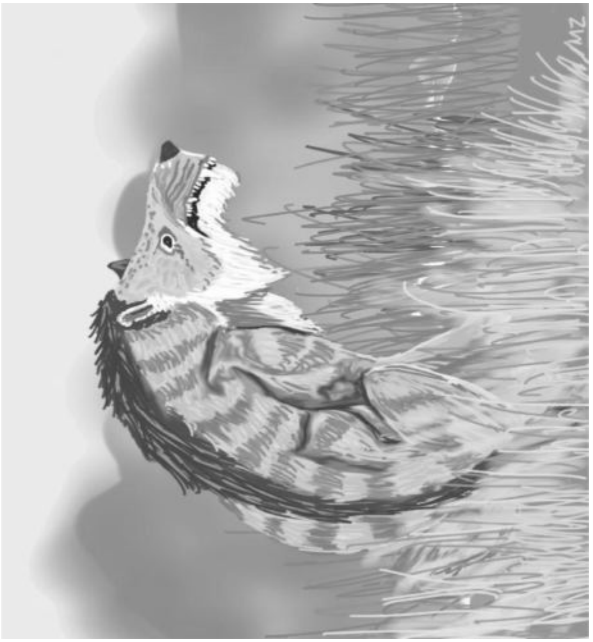
15 MYA

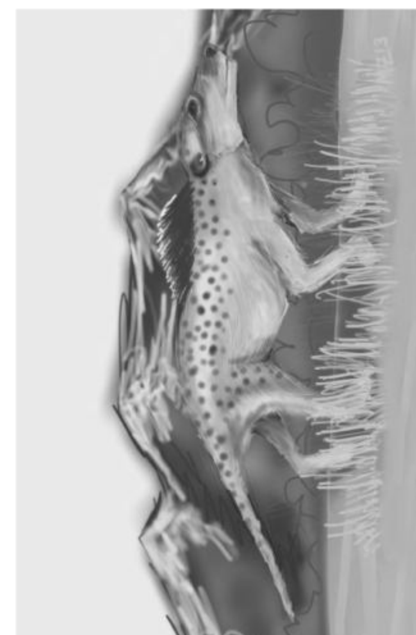
Fold along dashed line and apply glue to this tab

Whale Evolution Card Sort

Fold along dashed line and apply glue to this tab

Fold along dashed line and apply glue to this tab





Based on the fossil record, and because whales are air-breathing mammals, scientists believe that they must have descended from a land dwelling mammal that lived near the ocean 55 million years ago. This extinct land mammal had whale like teeth. Covered in fur and stripes similar to a tiger. Had four legs with feet that resembled hooves of a horse, and a long snout and tail.

Body is more elongated and the modified tail has become wider at the end, creating a larger tail fin. Hind limbs are further reduced and barely visible. Forelimbs are now noticeably fins. Head is similar to a dolphin in shape.

Hind limbs are reduced (smaller) and tail has become modified into a fin at the end, an adaptation that allows for more efficient swimming. Forelimbs are now completely fused together as front fins Head is similar to an alligator in shape.

Primitive whales. These organisms lived strictly in the sea. Nostrils have moved toward the top of the head to become the blowhole. Forelimbs are paddle-like flippers and hind limbs are absent

Modern day whale. Possess nearly hairless skin, streamlined body, and insulating layer of blubber. Forelimbs are flippers and tail is flattened into horizontal flukes for propulsion. Large head, wide mouth and one or two blowholes on top of the head in the far back.

Evidence of Evolution Teacher Notes/Answer Key

Evidence of Evolution

Comparing anatomical structures is further proof of Evolution. A homologous structure is a trait two organisms share and have inherited from a common ancestor. (i.e. wrist bones in humans and dogs)

Vestigial structures are remnant organs that no longer serve a purpose for the organism. As populations change due to natural selection the structures became obsolete. (i.e. hind limbs in whales)

Analogous structures are similar traits that are found in species not closely related. Because the species live in similar environments, they fill similar niches and these traits arise as a result of natural selection. (i.e. both bats and birds have wings to fly)

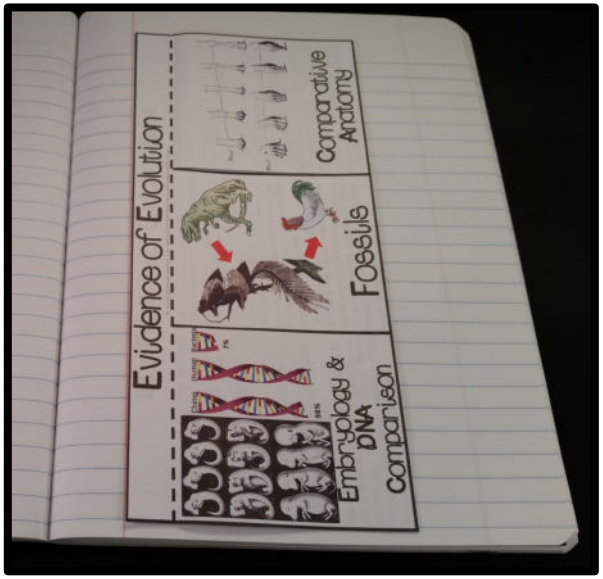
Fossils provide evidence that organisms of today originated from a common ancestor. A missing link is a transitional fossil that exhibits traits common to both an ancestral group and its descendants. Ex: the discovery of the Archaeopteryx bridged the gap between the dinosaur and present day birds, like chickens.

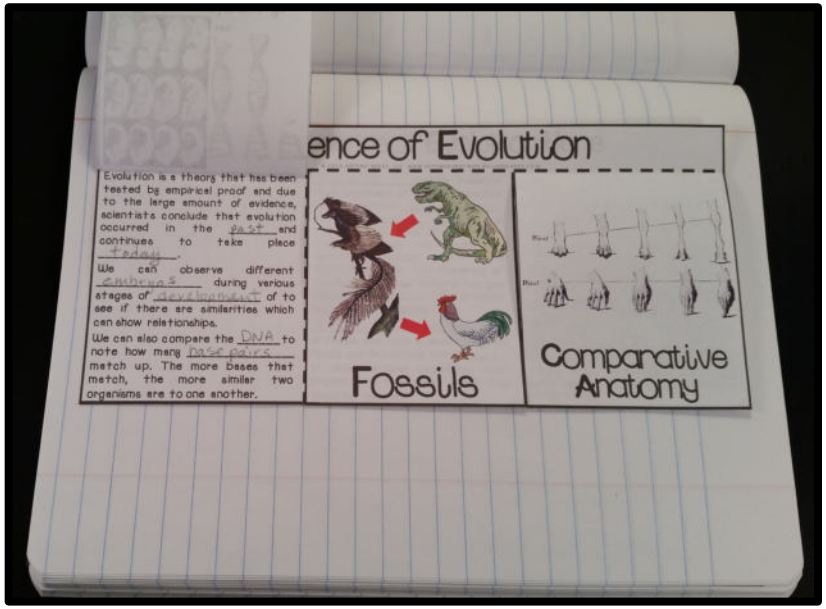
Radioactive dating of fossils and rock in which they are found can determine the times in which various organisms lived, providing further proof that they could be related.

Evolution is a theory that has been tested by empirical proof and due to the large amount of evidence, scientists conclude that Evolution occurred in the past and continues to take place today.

We can observe different embryos during various stages of development to see if there are similarities which can show relationships.

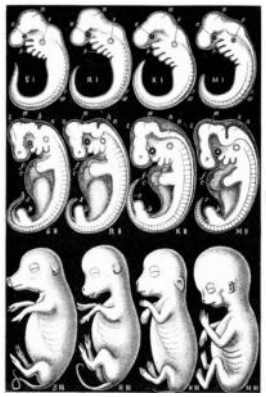
We can also compare the DNA to note how many base pairs match up. The more bases that match, the more similar two organisms are to one another.



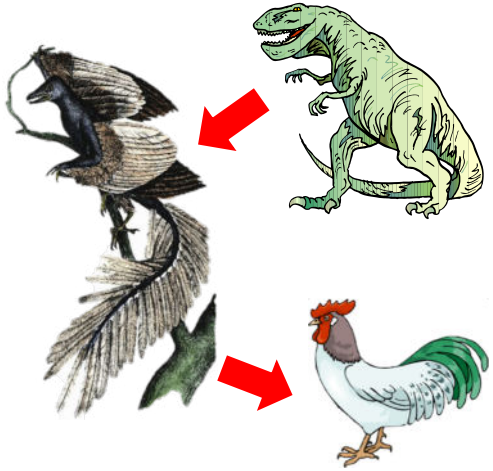


Directions: Cut out and glue the diagram into your notebook along the back of the tab. Cut along the three vertical lines to split the picture in thirds. Fold the tabs back along the dashed line and apply glue to the back of the tab. Underneath the flaps, describe the ways scientists provide evidence of the theory of Evolution.

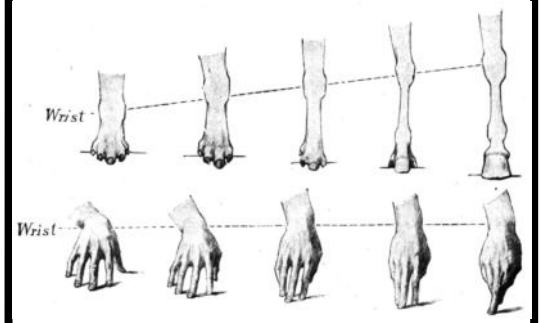
Evidence of Evolution



Embryology & DNA Comparison



Fossils



Comparative Anatomy

Glue Evidence of Evolution Here

Evolution is a theory that has been tested by empirical proof and due to the large amount of evidence, scientists conclude that Evolution occurred in the _____ and continues to take place _____.

We can observe different _____ during various stages of _____ to see if there are similarities which can show relationships.

We can also compare the _____to note how many _____ match up. The more bases that match, the more similar two organisms are to one another.

_____provide evidence that organisms of today originated from a common _____. A _____ _____ is a transitional fossil that exhibits traits common to both an ancestral group and its descendants. Ex: the discovery of the Archaeopteryx bridged the gap between the dinosaur and present day birds, like chickens.

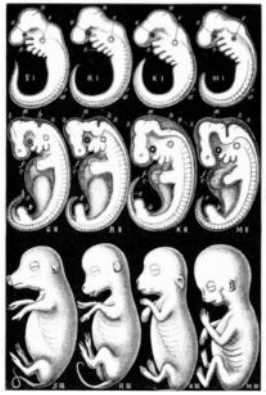
_____ _____ of fossils and rock in which they are found can determine the _____ in which various organisms lived, providing further proof that they could be related.

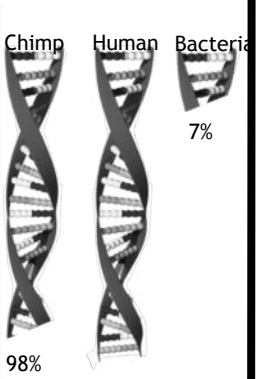
Comparing anatomical structures is further proof of Evolution. A _____structure is a trait two organisms _____and have inherited from a common ancestor (i.e. wrist bones in humans and dogs).

_____structures are remnant organs that no longer serve a _____ for the organism. As populations change due to natural selection the structures became _____ (i.e. hind limbs in whales).

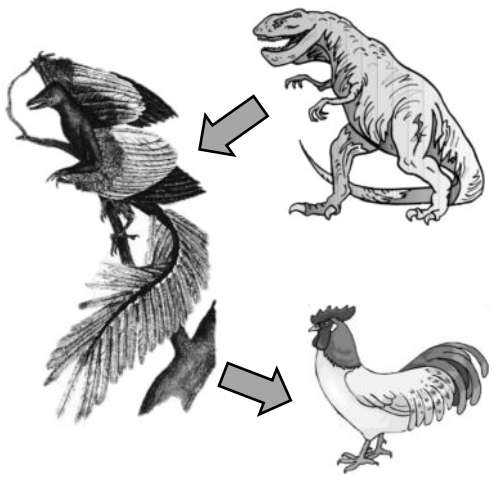
_____structures are similar traits that are found in species not closely related. Because the species live in similar environments, they fill similar _____ and these traits arise as a result of natural selection (i.e. both bats and birds have wings to fly).

Evidence of Evolution

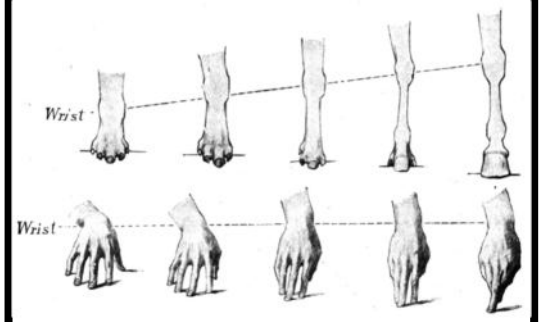




Embryology & DNA Comparison



Fossils



Comparative Anatomy

Glue Evidence of Evolution Here

Evolution is a theory that has been tested by empirical proof and due to the large amount of evidence, scientists conclude that Evolution occurred in the _____ and continues to take place _____.

We can observe different _____ during various stages of _____ to see if there are similarities which can show relationships.

We can also compare the _____to note how many _____ match up. The more bases that match, the more similar two organisms are to one another.

_____provide evidence that organisms of today originated from a common _____. A _____ _____ is a transitional fossil that exhibits traits common to both an ancestral group and its descendants. Ex: the discovery of the Archaeopteryx bridged the gap between the dinosaur and present day birds, like chickens.

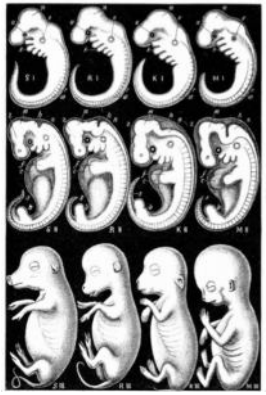
_____ _____ of fossils and rock in which they are found can determine the _____ in which various organisms lived, providing further proof that they could be related.

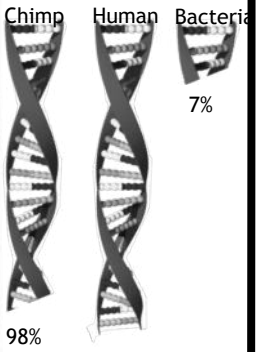
Comparing anatomical structures is further proof of Evolution. A _____structure is a trait two organisms _____and have inherited from a common ancestor (i.e. wrist bones in humans and dogs).

_____structures are remnant organs that no longer serve a _____ for the organism. As populations change due to natural selection the structures became _____ (i.e. hind limbs in whales).

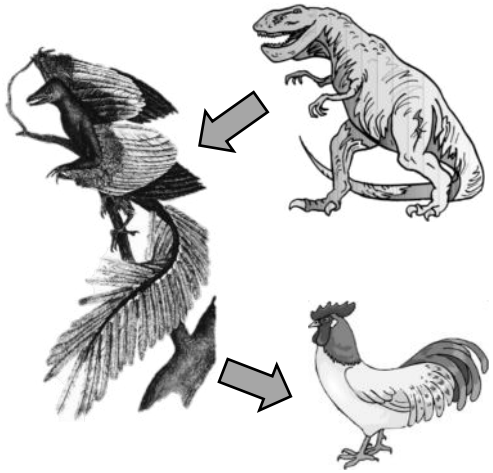
_____structures are similar traits that are found in species not closely related. Because the species live in similar environments, they fill similar _____ and these traits arise as a result of natural selection (i.e. both bats and birds have wings to fly).

Evidence of Evolution

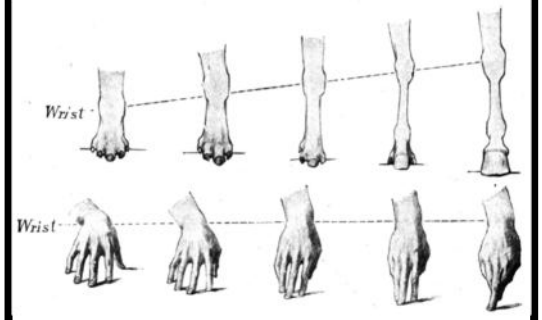




Embryology & DNA Comparison



Fossils



Comparative Anatomy

Glue Evidence of Evolution Here

Evolution is a theory that has been tested by empirical proof and due to the large amount of evidence, scientists conclude that Evolution occurred in the past and continues to take place today.

We can observe different embryos during various stages of development to see if there are similarities which can show relationships.

We can also compare the DNA to note how many base pairs match up. The more bases that match, the more similar two organisms are to one another.

Fossils provide evidence that organisms of today originated from a common ancestor. A missing link is a transitional fossil that exhibits traits common to both an ancestral group and its descendants. Ex: the discovery of the Archaeopteryx bridged the gap between the dinosaur and present day birds, like chickens.

Radioactive dating of fossils and rock in which they are found can determine the times in which various organisms lived, providing further proof that they could be related.

Comparing anatomical structures is further proof of Evolution. A homologous structure is a trait two organisms share and have inherited from a common ancestor. (i.e. wrist bones in humans and dogs)

Vestigial structures are remnant organs that no longer serve a purpose for the organism. As populations change due to natural selection the structures became obsolete. (i.e. hind limbs in whales)

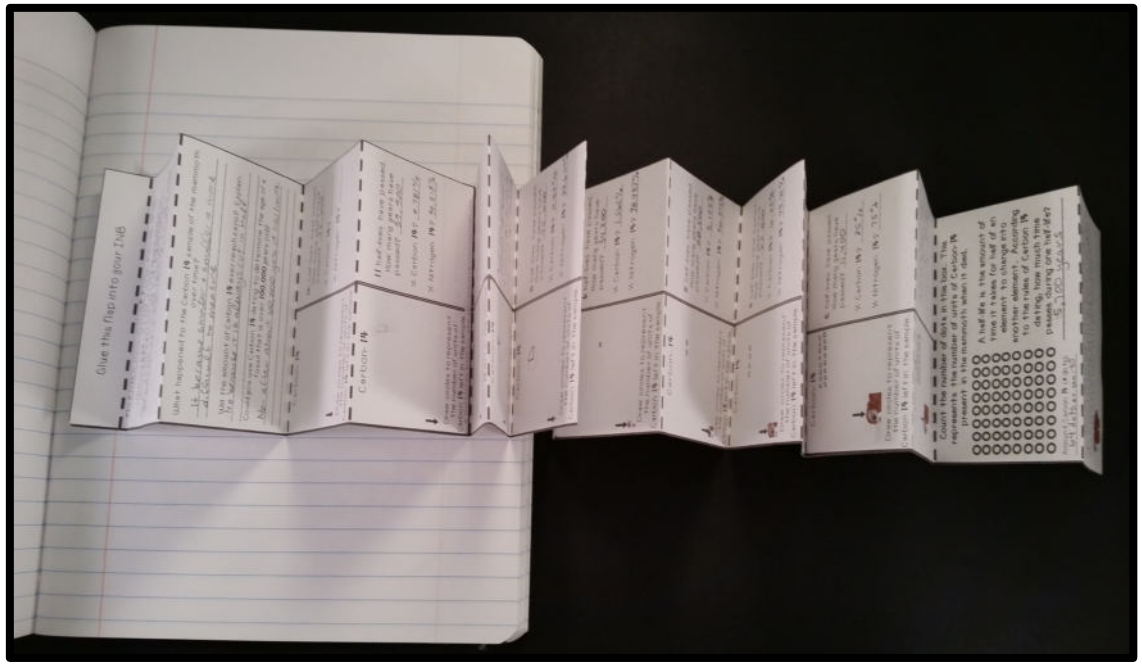
Analogous structures are similar traits that are found in species not closely related. Because the species live in similar environments, they fill similar niches and these traits arise as a result of natural selection. (i.e. both bats and birds have wings to fly)

Radioactive Decay Teacher Notes/Answer Key

Directions are not provided on this student sheet. Students are to always cut along dark lines and fold along dashed lines. When correctly assembled, this INB activity should create an accordion book inside the student notebook. Students should follow the directions for gluing each tab of the book to the next tab.

This activity teaches students how to calculate the age of a fossil or rock near a fossil to determine how long ago an organism lived. Important points to discuss with students:

- Animals and plants contain Carbon 14. Plants absorb radioactive Carbon 14 from the atmosphere. When animals eat plants, they take in Carbon 14.
- When animals and plants die, they no longer take in Carbon 14. At that moment, the unstable Carbon 14 begins to decay, turning into a more stable element, Nitrogen 14.
- The amount of time it takes for HALF of the carbon 14 in a sample to turn into Nitrogen 14 is 5,700 years. This is called the half life.
- Other radioactive elements have different half-lives and decay into other stable elements as well.
- Scientists can estimate the age of a fossil or rock sample by measuring the amount of Carbon 14 remaining in the sample and comparing it with the amount of Nitrogen 14 now present in the sample. Since it is unlikely that the original amount of Carbon 14 will be known, a comparison of the two helps to determine the age of the fossil.



Radioactive Decay Teacher Notes/Answer Key

Count the number of dots in this box. This represents the number of units of Carbon-14 present in the mammoth when it died. 64 dots or units of Carbon 14

A half-life is the amount of time it takes for half of an element to change into another element. According to the rules of Carbon 14 dating, how much time passes during one half-life? 5,700 years

1 half-life has passed. How many years have passed? 5,700 years % Carbon 14? 50% % Nitrogen 14? 50% Students should draw 32 dots

2 half-lives have passed. How many years have passed? 11,400 years % Carbon 14? 25% % Nitrogen 14? 75% Students should draw 16 dots

3 half-lives have passed. How many years have passed? 17,100 years % Carbon 14? 12.5% % Nitrogen 14? 87.5% Students should draw 8 dots

4 half-lives have passed. How many years have passed? 22,800 years % Carbon 14? 6.25% % Nitrogen 14? 93.75% Students should draw 4 dots

5 half-lives have passed. How many years have passed? 28,500 years % Carbon 14? 3.125% % Nitrogen 14? 96.875% Students should draw 2 dots

6 half-lives have passed. How many years have passed? 34,200 years % Carbon 14? 1.562% % Nitrogen 14? 98.437% Students should draw 1 dots

**For the next 6 half-lives, students should draw the dots similar to drawing a slice of pie – such as half a pie, a quarter of a pie, etc. The smallest pieces may be difficult to draw. Ask students to think about the limitations of Carbon 14 dating as their slices get smaller and smaller. Is it easy to measure this? **

7 half-lives have passed. How many years have passed? 39,900 years % Carbon 14? 0.781% % Nitrogen 14? 99.218% Students should draw half a dot

8 half-lives have passed. How many years have passed? 45,600 years % Carbon 14? 0.390% % Nitrogen 14? 99.609% Students should draw a quarter of a dot

9 half-lives have passed. How many years have passed? 51,300 years % Carbon 14? 0.195% % Nitrogen 14? 99.805% Students should draw an eighth of a dot

10 half-lives have passed. How many years have passed? 57,000 years % Carbon 14? 0.098% % Nitrogen 14? 99.903% Students should draw a sixteenth of a dot

11 half-lives have passed. How many years have passed? 62,200 years % Carbon 14? 0.049% % Nitrogen 14? 99.951% Students should draw a 32nd of a dot

12 half-lives have passed. How many years have passed? 68,400years % Carbon 14? 0.025% % Nitrogen 14? 99.976% Students should draw a 64th of a dot

What happened to the Carbon 14 sample of the mammoth over time? It became smaller and smaller until it was very difficult to measure.

Will the amount of Carbon 14 ever reach zero? Explain. No. Because the amount of Carbon 14 is always cut in half, the sample will continue to get smaller, but will never reach zero. It will, however, become so small that it can no longer be measure accurately or be detected, like the miniscule dots located in the boxes for 10, 11, and 12 half lives.

Could you use Carbon 14 dating to determine the age of a fossil that is over 100,000 years old? Carbon 14 reaches limitations in dating fossils older than 60,000 years. If you look at the results, you can see that after 10 half-lives, the sample is well over 99% Nitrogen 14. The sample of Carbon 14 is less than one half a percent. That's SMALL!

The Earth is approximately 4.6 billion years old. Which of the following would be best to date the age of the Earth? Explain.

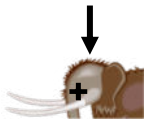
Uranium 235 has a half-life of 713,000,000 years Thorium 232 has a half-life of 13,900,000,000 years

Plutonium 241 has a half-life of 2,400,000 years

Since the Earth is 4.6 billion years old, Thorium would be the best. Measuring Thorium samples would be ideal since it's half-life is 13.9 billion years, and samples would not have decayed much at all.

Glue to the edge of 3 Half-lives

Carbon-14



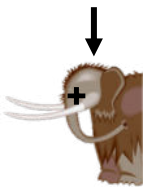
Draw circles to represent the number of units of Carbon 14 left in the sample.

2 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Carbon-14



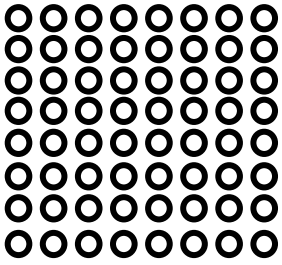
Draw circles to represent the number of units of Carbon 14 left in the sample.

1 half-life has passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Count the number of dots in this box. This represents the number of units of Carbon-14 present in the mammoth when it died.



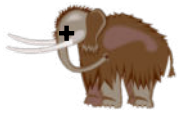
Amount Carbon 14 (# dots):
_____

A half-life is the amount of time it takes for half of an element to change into another element. According to the rules of Carbon 14 dating, how much time passes during one half-life?

_____

Radioactive Decay

Carbon-14 exists in all living things. When an organism dies, all of the Carbon 14 it contains begins to decay, turning into another element, Nitrogen 14. If we know how long it takes for Carbon 14 to turn into Nitrogen 14, we can look at the remaining amounts of each element to determine the age of the rock or fossil that was discovered.



Glue to the edge of 7 Half-lives

Carbon-14

Draw circles to represent the number of units of Carbon 14 left in the sample.

6 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Carbon-14

Draw circles to represent the number of units of Carbon 14 left in the sample.

5 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Carbon-14

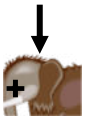
Draw circles to represent the number of units of Carbon 14 left in the sample.

4 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Carbon-14



Draw circles to represent the number of units of Carbon 14 left in the sample.

3 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

Glue this flap into your INB

Glue to the edge of II Half-lives

The Earth is approximately 4.6 billion years old. Which of the following would be best to date the age of the Earth? Explain.
Uranium 235 has a half-life of 713,000,000 years
Thorium 232 has a half-life of 13,900,000,000 years
Plutonium 241 has a half-life of 2,400,000 years

_____
_____
_____
_____
_____
_____
_____
_____

Carbon-14

10 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

What happened to the Carbon 14 sample of the mammoth over time?

_____
_____

Will the amount of Carbon 14 ever reach zero? Explain.

_____
_____

Could you use Carbon 14 dating to determine the age of a fossil that is over 100,000 years old?

_____
_____
_____

Carbon-14

9 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

Carbon-14

12 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

Carbon-14

8 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

Carbon-14

11 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

Carbon-14

7 half-lives have passed. How many years have passed? _____

% Carbon 14? _____

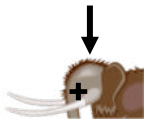
% Nitrogen 14? _____

↓

Draw circles to represent the number of units of Carbon 14 left in the sample.

Glue to the edge of 3 Half-lives

Carbon-14



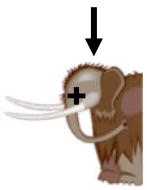
Draw 16 circles to represent the number of units of Carbon 14 left in the sample.

2 half-lives have passed. How many years have passed? 11,400

% Carbon 14? 25%

% Nitrogen 14? 75%

Carbon-14



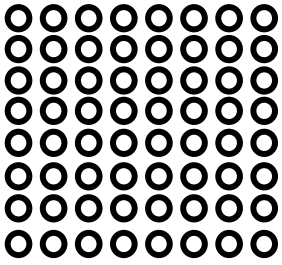
Draw 32 circles to represent the number of units of Carbon 14 left in the sample.

1 half-life has passed. How many years have passed? 5,700

% Carbon 14? 50%

% Nitrogen 14? 50%

Count the number of dots in this box. This represents the number of units of Carbon-14 present in the mammoth when it died.

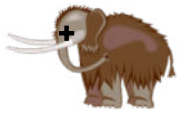


Amount Carbon 14 (# dots): 64

A half-life is the amount of time it takes for half of an element to change into another element. According to the rules of Carbon 14 dating, how much time passes during one half-life? 5,700 years

Radioactive Decay

Carbon-14 exists in all living things. When an organism dies, all of the Carbon 14 it contains begins to decay, turning into another element, Nitrogen 14. If we know how long it takes for Carbon 14 to turn into Nitrogen 14, we can look at the remaining amounts of each element to determine the age of the rock or fossil that was discovered.



Glue to the edge of 7 Half-lives

Carbon-14

Draw 1 circle to represent the number of units of Carbon 14 left in the sample.

6 half-lives have passed. How many years have passed? 32,000

% Carbon 14? 1.562%

% Nitrogen 14? 98.437%

Carbon-14

Draw 2 circles to represent the number of units of Carbon 14 left in the sample.

5 half-lives have passed. How many years have passed? 28.500

% Carbon 14? 3.125%

% Nitrogen 14? 96.875%

Carbon-14

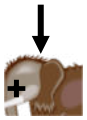
Draw 4 circles to represent the number of units of Carbon 14 left in the sample.

4 half-lives have passed. How many years have passed? 22,800

% Carbon 14? 6.25%

% Nitrogen 14? 93.75%

Carbon-14



Draw 8 circles to represent the number of units of Carbon 14 left in the sample.

3 half-lives have passed. How many years have passed? 17,100

% Carbon 14? 12.5%

% Nitrogen 14? 87.5%

Glue this flap into your INB

Glue to the edge of II Half-lives

The Earth is approximately 4.6 billion years old. Which of the following would be best to date the age of the Earth? Explain.
Uranium 235 has a half-life of 713,000,000 years
Thorium 232 has a half-life of 13,900,000,000 years
Plutonium 241 has a half-life of 2,400,000 years
Since the Earth is 4.6 billion years old, Thorium would be the best. Measuring Thorium samples would be ideal since it's half-life is 13.9 billion years, and samples would not have decayed much at all.

Carbon-14

Draw 1/16 of a circle to represent the number of units of Carbon 14 left in the sample.

10 half-lives have passed. How many years have passed? 57,000

% Carbon 14? 0.098%

% Nitrogen 14? 99.903%

What happened to the Carbon 14 sample of the mammoth over time?
? It became smaller and smaller until it was very difficult to measure.
Will the amount of Carbon 14 ever reach zero? Explain.
No. Because the amount of Carbon 14 is always cut in half, the sample will continue to get smaller, but will never reach zero. It will, however, become so small that it can no longer be measure accurately or be detected, like the miniscule dots located in the boxes for 10, 11, and 12 half lives.
Could you use Carbon 14 dating to determine the age of a fossil that is over 100,000 years old?
Carbon 14 reaches limitations in dating fossils older than 60,000 years. If you look at the results, you can see that after 10 half-lives, the sample is well over 99% Nitrogen 14. The sample of Carbon 14 is less than one half a percent. That's SMALL!

Carbon-14

Draw 1/8 of a circle to represent the number of units of Carbon 14 left in the sample.

9 half-lives have passed. How many years have passed? 51,300

% Carbon 14? 0.195%

% Nitrogen 14? 99.805%

Carbon-14

Draw 1/64 of a circle to represent the number of units of Carbon 14 left in the sample.

12 half-lives have passed. How many years have passed? 68,400

% Carbon 14? 0.025%

% Nitrogen 14? 99.976%

Carbon-14

Draw ¼ of a circle to represent the number of units of Carbon 14 left in the sample.

8 half-lives have passed. How many years have passed? 45,600

% Carbon 14? 0.390%

% Nitrogen 14? 99.609%

Carbon-14

Draw 1/32 of a circle to represent the number of units of Carbon 14 left in the sample.

11 half-lives have passed. How many years have passed? 62,200

% Carbon 14? 0.049%

% Nitrogen 14? 99.951%

Carbon-14

Draw half a circle to represent the number of units of Carbon 14 left in the sample.

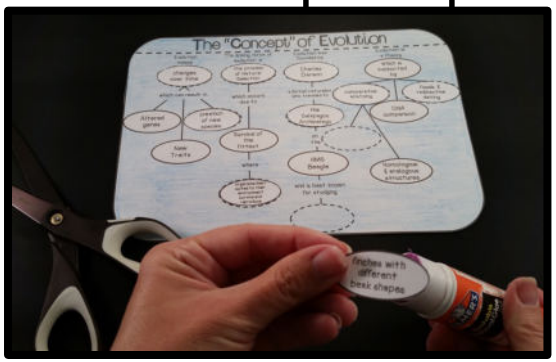
7 half-lives have passed. How many years have passed? 39,900

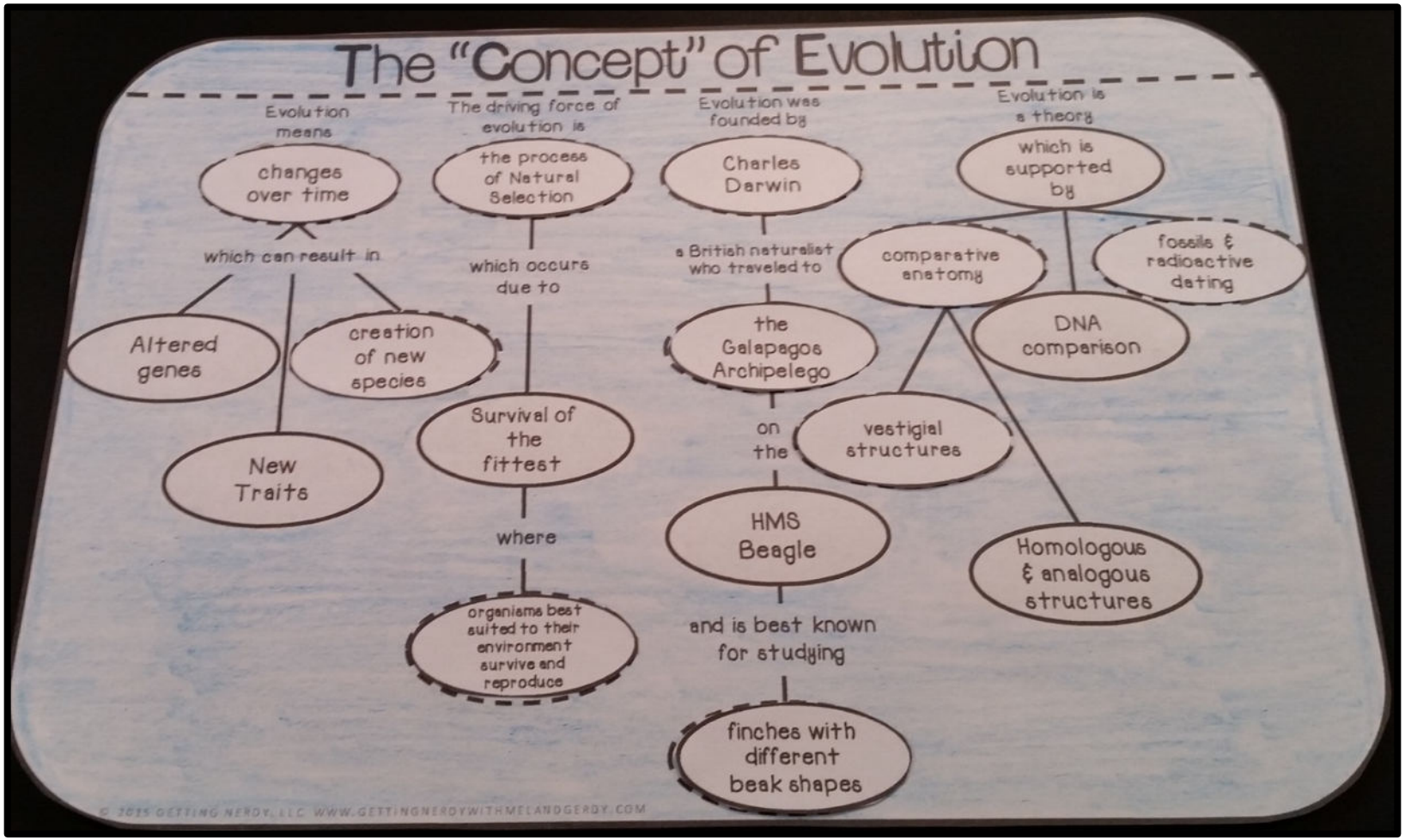
% Carbon 14? 0.781%

% Nitrogen 14? 99.218%

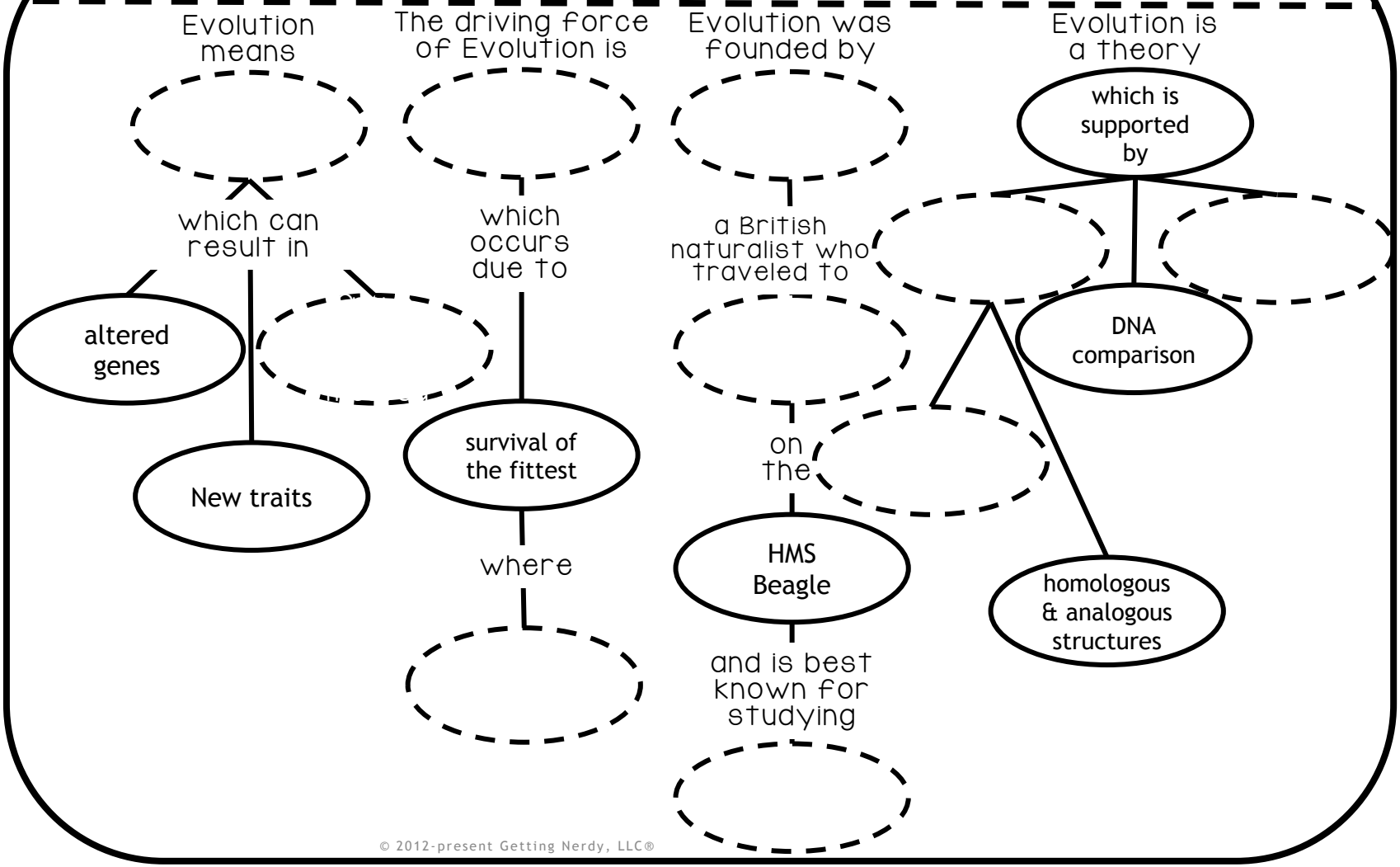
© 2012-present Getting Nerdy, LLC®

The "Concept" of Evolution Concept Map Teacher Notes/Answer Key





The "Concept" of Evolution



Directions: Cut out The Concept of Evolution and glue into your INB or, glue just the top portion to your INB depending on your teacher's instructions. Complete the concept map by cutting out the ovals below and gluing them into the appropriate spots. Flip up the map and write more detailed notes if needed.

comparative anatomy

creation of new species

the Galapagos Archipelago

the process of Natural Selection

finches with different beak shapes

organisms best suited to their environment survive and reproduce

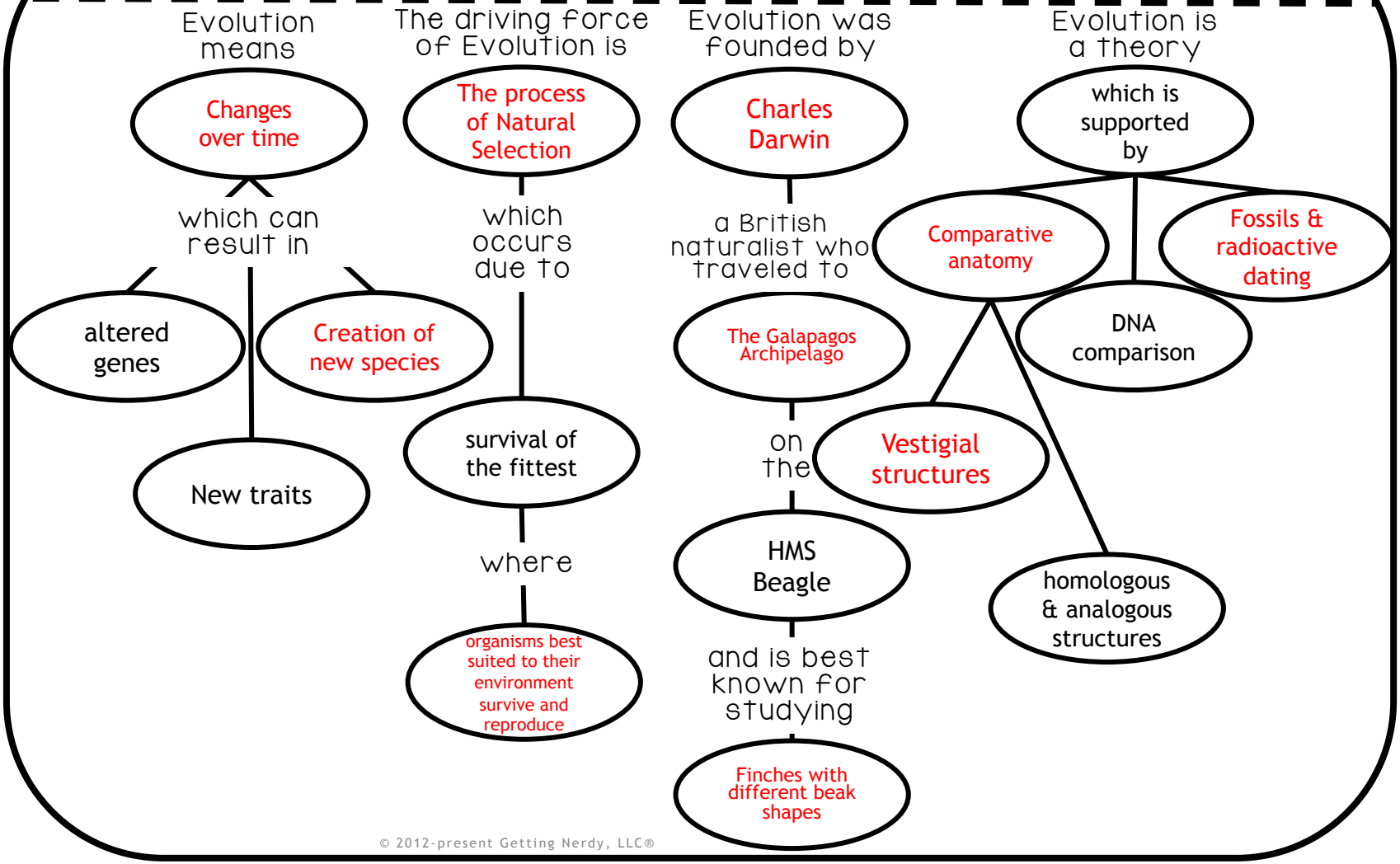
vestigial structures

fossils & radioactive dating

changes over time

Charles Darwin

The "Concept" of Evolution



Directions: Cut out The Concept of Evolution and glue into your INB or, glue just the top portion to your INB depending on your teacher's instructions. Complete the concept map by cutting out the ovals below and gluing them into the appropriate spots. Flip up the map and write more detailed notes if needed.