

Class Enrichment and Review activities for April 1--9th
Mrs. Linda Henry-Biology

Mrs. Henry can be reached at lhenny@rockwoodschoools.org OR by calling the school at 814-926- 4688 extension 2201. Mrs. Henry will send you an email to alert you to the location on her class page. Take care and stay healthy!

All assignments and materials for all classes are on Mrs. Henry's Google Classroom pages and also attached at the bottom of this PDF.

Academic Biology classes—You have received and finished most of your power notes before the coronavirus shut down of the school. Answers are provided from the textbook webpage.

April 1—RE-READ section 3 of your power notes for Chapter 10. Complete study guide for section 3 as a review

April 2—RE-READ section 4 of your power notes for Ch. 10. Complete study guide for section 4 as a review

April 3—Re-READ section 5 of your power notes for Ch. 10 and fill in power notes. Complete the study guide for section 5 as a review.

April 6--locate the assignment “Explorations through Time-Life has a History”. Read the intro and complete the questions.

April 7-- locate the assignment “Peppered Moth ”Read and complete the questions.

April 8--locate the evolution crossword puzzle, use your notes to complete.

April 9--locate History of Life with Clock and Calendar...see how long it was estimated for organisms to change over time. You will you “lines” on the clock labeled with the “times” these organisms appeared on the planet...then on the Calendar, label the “dates” the organisms appeared on the Earth.

BELOW YOU WILL FIND ATTACHED DOCUMENTS FROM THE ABOVE ASSIGNMENTS FOR APRIL 1 THROUGH APRIL 9TH....

Principles of Evolution

Study Guide B**Answer Key****SECTION 1. EARLY IDEAS ABOUT EVOLUTION**

1. developed a classification system to group organisms by their similarities, that also reflects evolutionary relationships
2. suggested that species shared ancestors
3. contended that all living things were descended from a common ancestor and that more-complex forms of life arose from less-complex forms.
4. proposed that changes in physical characteristics could be inherited and were driven by environmental changes over time
5. they must be able to reproduce and have fertile offspring
6. Lamarck thought that greater use or disuse of a structure or organ would cause changes that could then be passed on to offspring.
7. different species could be produced with hybridization, showing that species can change
8. **Catastrophism:** the theory that natural disasters such as floods and volcanic eruptions have happened often during Earth's long history. These events have shaped landforms and caused species to become extinct.
Gradualism: the principle that changes observed in landforms resulted from slow changes over a long period of time.
Uniformitarianism: the theory that the geologic processes that shape Earth are uniform through time.
9. fossils
10. evolution

11. catastrophism
12. uniformitarianism
13. Erasmus Darwin
14. Lamarck
15. Linnaeus
16. Buffon

SECTION 2. DARWIN'S OBSERVATIONS

1. interspecific variation
2. intraspecific variation
3. Galápagos Islands
4. that species may somehow be able to adapt to their surroundings
5. He thought modern animals might have some relationship to fossil forms
6. It would take much longer than 6000 years for the changes to occur between the fossil organisms he saw and their modern-day relatives.
7. Darwin saw that in geologic processes, great changes can occur slowly, over a long period of time. He extended this insight to the evolution of organisms.
8. There are differences in shell shape, the edges of the shells, the lengths of the tortoises necks, the lengths of their legs.
9. variation
10. adaptation
11. adaptation
12. variation

Be Creative: First sketch should depict a bird with a strong, thick beak. Second sketch should depict a bird with a delicate-looking beak.

SECTION 3. THEORY OF NATURAL SELECTION

1. Darwin noticed breeders could produce a great amount of diversity in species.
2. If a trait is not heritable, it won't be passed down to offspring.
3. The traits are selected only if they give advantages to individuals in their present environment.
4. Human populations would grow geometrically if resources were unlimited. Instead, disease and a limited food supply kept the population smaller.
5. overproduction
6. variation
7. adaptation

Study Guide B *continued*

8. descent with modification
9. sketch should reflect variation in a population
10. sketch should reflect overproduction
11. sketch should reflect an adaptation
12. sketch should reflect descent with modification over generations
13. increase
14. decrease
15. artificial selection
16. natural selection
17. fitness
18. heritability
19. population

SECTION 4. EVIDENCE OF EVOLUTION

1. **Fossils:** More primitive fossil organisms are in older layers, with more complex forms found in upper layers
2. **Geography:** Different ecosystems favor different traits and can establish separate populations that have a common ancestor
3. **Embryology:** Embryos of very different organisms that develop similarly provide evidence of a common ancestor
4. **Anatomy:** Homologous structures are features that are similar in structure but appear in different organisms and have different functions. They are evidence of a common ancestor
5. The tiny pelvic bones and hind limbs in many snakes, the wings of ostriches, and the human appendix
6. The ancestor of whales lived on land.
7. homologous structure
8. analogous structure
9. analogous structure
10. vestigial structure
11. homologous structure
12. analogous structure
13. vestigial structure

Sketch it Out: Students should match

homologous structures directly between the two forelimbs.

SECTION 5. EVOLUTIONARY BIOLOGY TODAY

1. most living things do not form into fossils after they die, and fossils have not been looked for in many areas of the world
2. *Basilosaurus isis*
3. They demonstrate the evolution of traits within groups as well as the common ancestors between groups.
4. The more related two organisms are, the more similar their DNA will be. Because there are thousands of genes in even simple organisms, DNA contains a huge amount of information on evolutionary history.
5. Pseudogenes no longer function but can change as they are carried along with functional DNA through generations. Similarities between pseudogenes must come from a common ancestor.
6. Homeobox genes control the development of specific structures. Similar homeobox gene clusters are evidence of a common ancestor.
7. Similarities of proteins across organisms can be revealed by molecular fingerprinting, and are evidence of a common ancestor.
8. The theory of natural selection combined with genetics
9. Comparisons of milk protein genes confirm the fossil evidence that modern-day whales descended from land mammals
10. The basic principles of evolution are used in all the fields of biology
11. The study of fossils can provide new information and support current hypotheses about how evolution occurs.

Sketch It Out: Answers should reflect knowledge that *Pakicetus* lived on land and *Durodon* lived in water.

Section 1: Early Ideas about Evolution

Study Guide B

KEY CONCEPT

There were theories of biological and geologic change before Darwin.

VOCABULARY

evolution	fossil	gradualism
species	catastrophism	uniformitarianism

MAIN IDEA: Early scientists proposed ideas about evolution.

In a phrase, tell what each scientist did to help develop evolutionary theory.

Scientist	Contribution to Evolutionary Theory
1. Linnaeus	
2. Buffon	
3. E. Darwin	
4. Lamarck	

5. What two conditions must be true for a group of animals to be considered the same species?

6. Lamarck’s ideas of evolution are known as the inheritance of acquired characteristics. What was incorrect about his theory of how organisms evolve?

7. In the 1700s, many people believed that species were fixed and did not change. How did plant hybridization—a type of crossing that could be observed in experiments—help change this view?

MAIN IDEA: Theories of geologic change set the stage for Darwin's theory.

8. Write a description of each theory in the space provided.

Geologic Theory	Description
catastrophism	
gradualism	
uniformitarianism	

Vocabulary Check

9. What word refers to traces of an organism that existed in the past?

10. What is the process of biological change by which descendants come to differ from their ancestors?

11. Events such as volcanoes, floods, and earthquakes are the basis of what geologic theory?

12. What geologic theory can be summarized by the phrase "the present is the key to the past"?

Who's Who

Linnaeus	Lamarck	Buffon	E. Darwin
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_____ 13. Charles Darwin's poetic grandfather

_____ 14. Thought that a giraffe's long neck evolved from reaching high in trees

_____ 15. Grouped living organisms into categories based on what they looked like

_____ 16. Wrote *Historie Naturelle* (Natural History) in 1749

Section 2: Darwin's Observations

Study Guide B

KEY CONCEPT

Darwin's voyage provided insights into evolution.

VOCABULARY

variation

adaptation

MAIN IDEA: Darwin observed differences among island species.

1. What is variation among members of *different* species called?

2. What is variation among members of *the same* species called?

3. What island chain in South America was the source of many of Darwin's insights?

4. Darwin saw populations of various species that seemed well-suited to their environment. What did this suggest?

MAIN IDEA: Darwin observed fossil and geologic evidence supporting an ancient Earth.

5. Darwin observed fossils of huge animals such as *Glyptodon*, a giant armadillo. Why were these fossils of interest to him?

6. Many people in the 1700s thought that Earth was only about 6000 years old. How did the fossil organisms Darwin saw lead him to think Earth must be much older than that?

7. Darwin also observed fossil shells of marine organisms high up in the Andes mountains, and saw an earthquake move land that was underwater above sea level. How did he apply these insights to the evolution of organisms?

Study Guide B *continued*

8. Look at Figure 2.2 in your textbook. What differences between the two Galápagos tortoises can you identify from the two pictures?

Vocabulary Check

variation	adaptation
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- _____ 9. the difference in the physical traits of an individual from those of other individuals in the group to which it belongs
- _____ 10. a feature that allows an organism to better survive in its environment
- _____ 11. A tortoise population lives in an area with high grass. These tortoises have longer necks than tortoises that live in other areas. The long necks are an example of this.
- _____ 12. One bird in a population has a slightly thicker beak than its relatives. This thicker beak is an example of what in the population.

Be Creative

In the space below, draw a sketch of a bird that may eat the food choice that is given in the left column.

Food choice	Sketch
Eats large, hard-shelled nuts	
Eats fruit and insects	

Section 3: Theory of Natural Selection

Study Guide B

KEY CONCEPT

Darwin proposed natural selection as a mechanism for evolution.

VOCABULARY

artificial selection	natural selection	fitness
heritability	population	

MAIN IDEA: Several key insights led to Darwin's idea for natural selection.

1. Why did artificial selection interest Darwin?

2. Why must selected traits be heritable?

3. In natural selection, what must be true of traits that are passed down through generations?

4. What important idea from Thomas Malthus inspired Darwin?

MAIN IDEA: Natural selection explains how evolution can occur.

variation	overproduction	adaptation	descent with modification
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- _____ 5. producing many offspring, some of which may not survive
- _____ 6. individual differences that may be heritable
- _____ 7. a structure well-suited for the environment
- _____ 8. a heritable trait becoming common in a population

Use an organism of your choice to sketch the four principles of natural selection.

9. overproduction	10. variation
11. adaptation	12. descent with modification

MAIN IDEA: Natural selection works on existing variation.

13. Peter and Rosemary Grant observed natural selection acting on traits within a population of finches on the Galápagos Islands. A drought reduced the number of small, soft seeds but left plenty of large, tough-shelled seeds intact. The next year there was a(n) _____ (increase, decrease) in the number of large-beaked hatchlings.
14. After several years, the supply of large seeds went down after an unusually wet period. The increase in small, soft seeds brought a(n) _____ (increase, decrease) in the number of large-beaked hatchlings the following year.

Vocabulary Check

15. *Humans* are the selective agent in which type of process, artificial selection or natural selection?

16. *The environment* is the selective agent in which type of process, artificial selection or natural selection?

17. What is the measure of the ability to survive and produce more offspring relative to other members of the population called?

18. What is the ability of a trait to be passed down from one generation to the next called?

19. What are all the individuals of a species that live in an area called?

Section 4: Evidence of Evolution

Study Guide B

KEY CONCEPT

Evidence of common ancestry among species comes from many sources.

VOCABULARY

biogeography

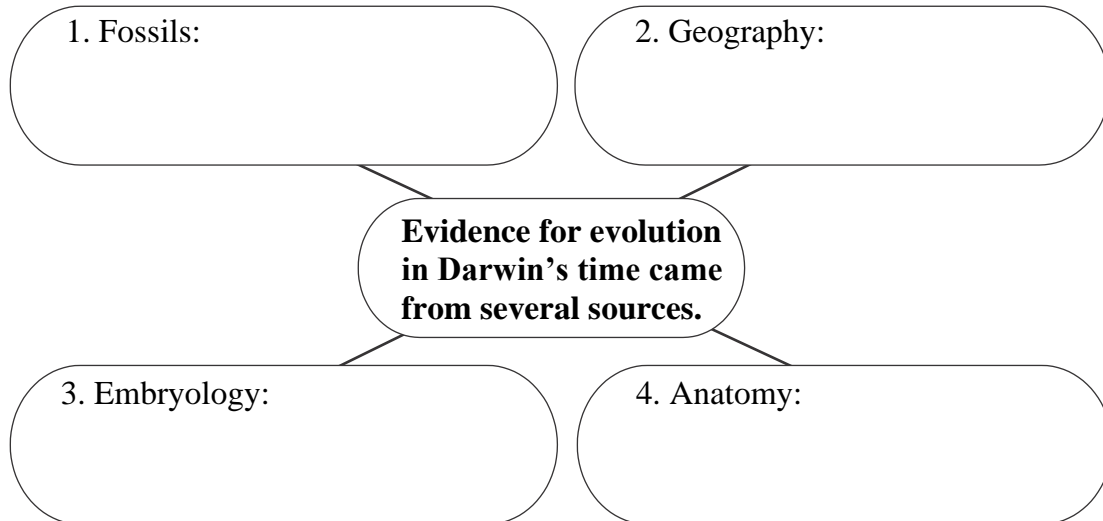
analogous structure

homologous structure

vestigial structure

MAIN IDEA: Evidence for evolution in Darwin's time came from several sources.

In the diagram below, give examples of each type of evidence for evolution.



MAIN IDEA: Structural patterns are clues to the history of a species.

5. Vestigial structures seem to lack any useful function, or are at least no longer used for their original purpose. Give three examples of vestigial structures.

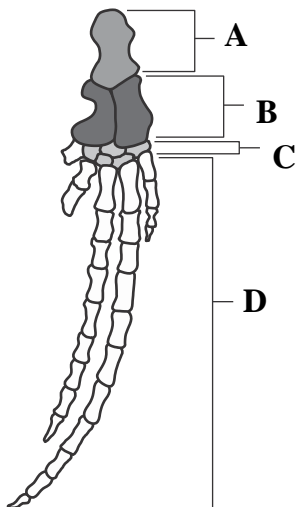
6. Many modern whale species have vestigial pelvic and leg bones. What does this suggest about the ancestry of modern whales?

Vocabulary Check

homologous structure	analogous structure	vestigial structure
_____	7. Feature that is similar in structure in different organisms but has different functions	
_____	8. Feature that performs a similar function in different organisms but is not similar in origin	
_____	9. Is <i>not</i> evidence of a common ancestor	
_____	10. Remnant of an organ or structure that had a function in an early ancestor	
_____	11. Examples include the wing of a bat and the hand of a human	
_____	12. Examples include the wing of a bird and the wing of an insect	
_____	13. Examples include the wing of an ostrich and the appendix of a human	

Sketch It Out

Use Figure 4.4 to sketch a skeleton of a human hand next to the whale fin skeleton shown below. Draw lines to match the groups of bones that are homologous for these two structures.



Section 5: Evolutionary Biology Today

Study Guide B

KEY CONCEPT

New technology is furthering our understanding of evolution.

VOCABULARY

paleontology

MAIN IDEA: Fossils provide a record of evolution.

1. What are two reasons that the fossil record is not complete?

2. What is one example of a transitional fossil that has been found?

3. Why are transitional fossils important?

MAIN IDEA: Molecular and genetic evidence support fossil and anatomical evidence.

In a phrase, explain how each of the following contribute to evolutionary theory.

Molecular Evidence	Contribution to Evolutionary Theory
4. DNA sequence analysis	
5. Pseudogenes	
6. Homeobox genes	

Name _____ Class _____ Date _____

7. Protein comparisons	
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Study Guide B *continued*

MAIN IDEA: Evolution unites all fields of biology.

8. What two things combine to make up our modern evolutionary theory?

9. How has molecular evidence helped support fossil evidence in determining the early ancestor of modern-day whales?

10. What is meant by the phrase “Evolution unites all fields of biology”?

Vocabulary Check

11. How does paleontology contribute to evolutionary biology?

Sketch It Out

Look at the fossil evidence of whale evolution shown in Figure 5.3. Sketch one part of the skeletons (such as the skull, forelimbs, hindlimbs, or ribcages) of each of the whale ancestors. Briefly describe their differences and propose how these differences are well-suited for the habitat in which the animals lived.

Name _____

Explorations Through Time - Life Has a History

<http://www.ucmp.berkeley.edu/education/explotime.html> -

Go to "Life Has a History" Level 2—read through and answer the questions below....

1. How many different species of living things exist today?

2. Which group of animals has the largest number of species?

3. How many mammal species exist today? _____

4. Number the organisms from 1 (most abundant) to 8 (least abundant)
____ Mammals ____ Molluscs ____ Roundworms ____ Arthropods
____ Flatworms

5. What is biodiversity (click on the purple links for definitions):

6. 470 Million Years Ago (**click circle for a "closer look" at the period and READ**)

What was the name of the period? _____

What was the dominant predator? _____

What was the first arthropod? _____

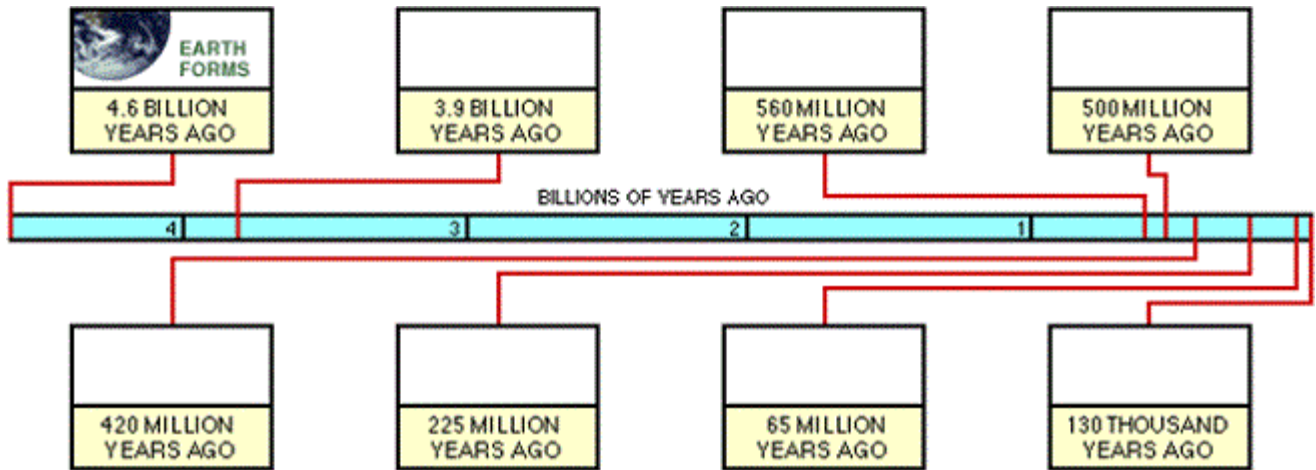
7. 160 Million Years Ago

What was the name of the period? _____

What large marine reptile existed? _____

8. How old is the earth? _____

9. Fill in the blanks of the timeline



10. The best source of evidence for determining events in earth's history are _____

11. What is a paleontologist? _____

Name: _____

Peppered Moth Simulation



Objective: Simulate changes in moth population due to pollution and predation, and observe how species can change over time.

Introduction:

Charles Darwin accumulated a tremendous collection of facts to support the theory of evolution by natural selection. One of his difficulties in demonstrating the theory, however, was the lack of an example of evolution over a short period of time, which could be observed as it was taking place in nature. Although Darwin was unaware of it, remarkable examples of evolution, which might have helped to persuade people of his theory, were in the countryside of his native England. One such example is the evolution of the peppered moth *Biston betularia*.

The economic changes known as the industrial revolution began in the middle of the eighteenth century. Since then, tons of soot have been deposited on the country side around industrial areas. The soot discoloured and generally darkened the surfaces of trees and rocks. In 1848, a dark-coloured moth was first recorded. Today, in some areas, 90% or more of the-peppered moths are dark in colour. More than 70 species of moth in England have undergone a change from light to dark. Similar observations have been made in other industrial nations, including the United States.

Instructions:

Click the link below to read more information on Kettlewell's study of moths. At the end, you will run two simulations for 5 minutes each, during this time you will play the part of a bluejay that eats moths.

After 5 minutes record the % of dark moths and light moths - you will need this information later.



Peppered Moth Simulation at peppermoths.weebly.com

Data and Analysis

Read the background information and answer the questions as you go.

Life Cycle of the Peppered Moth

1. Why are these moths called "peppered moths?"
2. What animals eat the peppered moth?
3. What is a lichen?
4. What do the larvae of the moth eat?
5. How do peppered moths spend the winter?
6. Moths that have more dark spots than the average moth are called what?

Impact of Pollution

7. Where was the first black form of the moth found?
8. What was the Industrial Revolution?

- 9. What was causing the different colors in the moths?
- 10. What is natural selection?
- 11. Who suggested that peppered moths were an example of natural selection?
- 12. What is industrial melanism?

Kettlewell's Experiments

- 13. What is an entomologist?
- 14. How do scientists test theories?
- 15. Write down ONE of Kettlewell's predictions.
- 16. Dark moths were found in what parts of the country?
- 17. How did Kettlewell directly study the moths?
- 18. Why did dark moths have a survival advantage?
- 19. When Kettlewell recaptured the marked moths, what did he find?
- 20. Where did Kettlewell publish his findings?

Birdseye View

21. Open the simulation and play the role of the bird in both the dark and the light forest. Try to behave as a bird would behave, choosing the moths that are the most obvious. At the end of each simulation, record the percent of moths captured in the table below.

	Percent Dark Moths	Percent Light Moths
Light Forest		
Dark Forest		

Final Analysis

Name _____ Class _____ Date _____

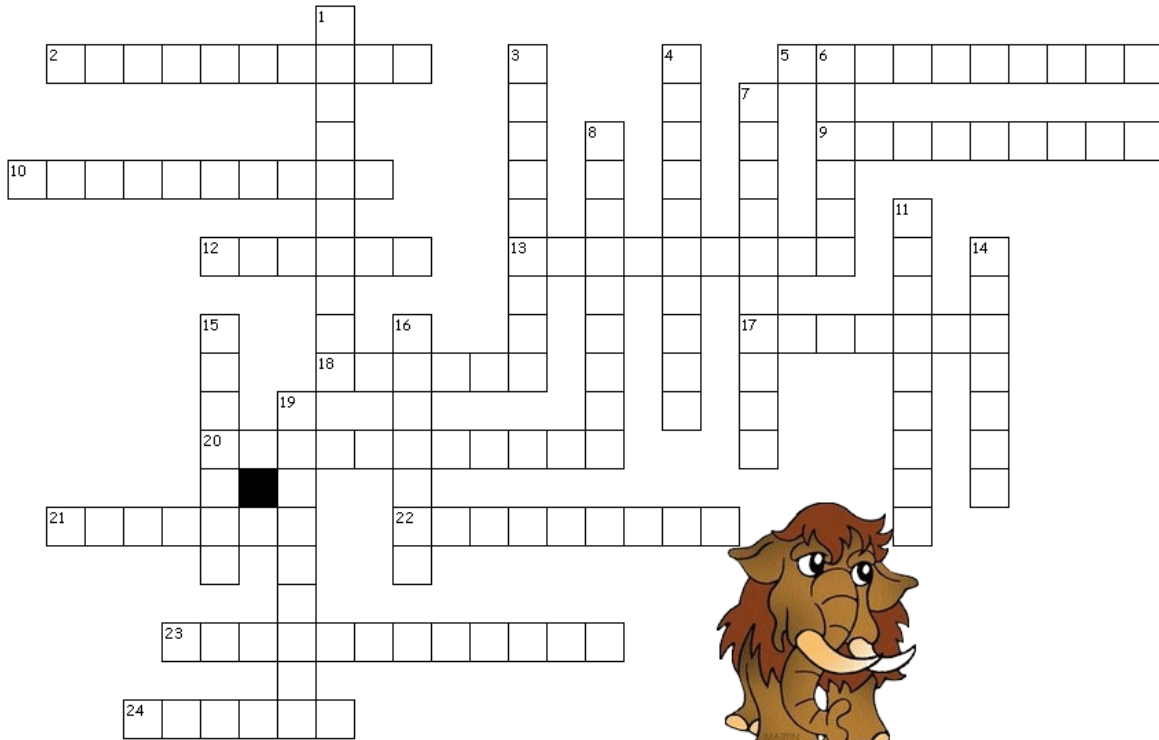
22. Explain how the color of the moths increases or decreases their chances of survival.

23. Explain the concept of "natural selection" using your moths as an example.

24. What would happen if there were no predators in the forest? Would the colors of the moths change over time? Defend your answer?

Name: _____

Evolution Crossword



Down

1. when two unrelated organisms look alike (sharks & dolphins)
3. refers to the variety of living things
4. when organisms disappear from the earth
6. proposed the theory of evolution by natural selection
7. formation of new species
8. change over time
11. required for new species to form
14. preserved remains of ancient organisms
15. had different shaped beaks depending on the island they were from
16. the study of the earth
19. structures that have no current function

Across

2. structures that are similar
5. a characteristic that helps an organism survive
9. when one species evolves into many; adaptive _____
10. pattern of evolution where a species is stable for a long time then rapidly changes; _____

Name _____ Class _____ Date _____

equilibrium

12. the name of Darwin's book; the ____ of species

13. process by which evolution occurs; natural _____

17. had different shaped shells depending on the island they were from

18. well-supported testable explanation

20. when two species evolve together

21. natural selection is also known as the survival of the _____

22. islands that Darwin visited

23. principle that states that living species are descended from ancient ones; descent with

24. the name of the ship that Darwin traveled on

Name: _____

Comparing the Simple History of Life to a Clock

Use a ruler to create lines showing each of the following events..... 4.6 billion years in 12 hours

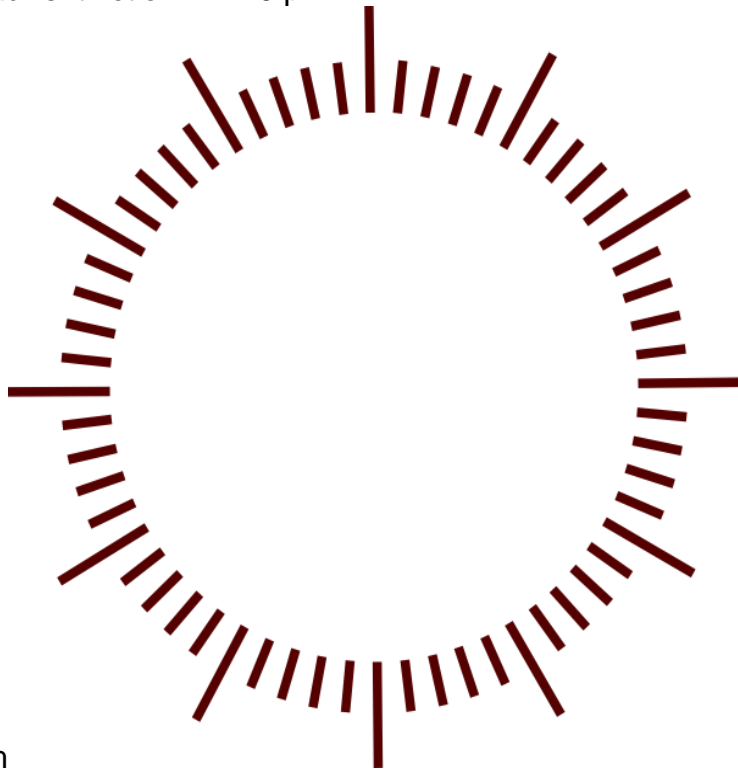
Origin of the Solar System and Earth: 12:01 am

First Bacteria: 7:30 am

First Cell with Nucleus (eukaryotes): 8:05

Animals: 9:57 pm

Land Plants: 10:13 pm Dinosaur extinction: 11:40 pm



Human appearance: 11:59 pm

Name _____ Class _____ Date _____

Name _____

Comparing the History of Life to a Calendar

These same events can be illustrated on a yearly calendar....

First living cells - April 1st, 6pm
Algae & Marine Invertebrates - November 26th, 4:24am
Arthropods, Mollusks, first fish - December 1st, 6:36am
Many fish, trilobites, vascular plants - December 5th, 7:42am
Age of fishes, first amphibians, first insects - December 7th, 4:24am
Mosses, many amphibians, first reptiles - December 13th, 6pm
Marine Extinction, amphibian decline, Pangaea - December 14th, 2:21pm
First mammals and dinosaurs - December 16th, 10:14pm
Age of Dinosaurs, first birds - December 19th, 1:03am
Flowering plants, mass extinction - December 23rd, 5:54am
Birds and mammals flourish - December 28th, 1:09am
Hominids, ice ages, giant mammals - December 31st, 9:09pm

****Circle and label important dates****

Name _____ Class _____ Date _____

January						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

February						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

March						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

April						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

May						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

June						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

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July						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

August						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

September						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

October						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

November						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

December						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	