

A Trip Through TIME!

Grade Level or Special Area: 7th Grade Science

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Length of Unit: 5 lessons (approximately 8 days long; one day = 50 minutes)

I. ABSTRACT

- A. Students will learn about the Earth's history and the Geological time scale. They will investigate about Earth, learning how it has been dated and what types of life forms lived in the past. They will then apply their knowledge to create a time scale of Geologic time. This unit is a hands-on, interactive way to study our past.

II. OVERVIEW

A. Concept Objectives

1. Understand the processes of scientific investigation and design, conduct, communicate about and evaluate such investigations. (Adapted from the CMCS for Science 1)
2. Understand how organisms change over time in terms of biological evolution. (Adapted from the CMCS for Science 3.4)
3. Understand the composition of Earth, its history, and the natural process that shape it. (Adapted from the CMCS for Science 4.1)
4. Understand that science involves a particular way of knowing and understanding common connections among scientific disciplines. (Adapted from the CMCS for Science 6)

B. Content from the *Core Knowledge Sequence*

1. 7th Grade Science: Geological Time (176-177)
 - i. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 - ii. Organizing geologic time: Scientists have organized the earth's history into four major eras
 - a. Precambrian Era (earliest forms of life, such as bacteria and blue-green algae; later in the period, invertebrates such as jellyfish)
 - b. Paleozoic Era (Pangaea; invertebrate life, such as trilobites, early in this era, followed by amphibians, and the beginning of reptiles; development of simple plants, such as mosses and ferns)
 - c. Mesozoic Era (Pangaea separates into continents; "Age of Reptiles"; dinosaurs, flowering plants, small mammals and birds)
 - d. Cenozoic (Present) Era (Ice Age; mammoths; gradual development of mammals, birds and other animals recognizable today; humans; flowering plants, forests, grasslands)

C. Skill Objectives

1. Students will interpret and evaluate data in order to formulate conclusions. (Adapted from the CMCS for Science 1.6)
2. Students will communicate results of their investigations in appropriate ways (Adapted from the CMCS for Science 1.7)
3. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time. (Adapted from the CMCS for Science 3.4.3)
4. Students will explain how fossils are used as evidence to indicate that life has changed through time. (Adapted from the CMCS for Science 4.1.2)

5. Students will identify and illustrate natural cycles within systems, such as geological changes. (Adapted from the CMCS for Science 6.5)

III. BACKGROUND KNOWLEDGE

- A. For Teachers
 1. <http://www.enchantedlearning.com/subjects/Geologictime.html> (website with Geological time scale)
- B. For Students
 1. None

IV. RESOURCES

- A. Very helpful for the students' understanding: Prentice Hall *Earth's Changing Surface* (All Lessons)

V. LESSONS

Lesson One: Dating the Rocks (50 minutes)

- A. *Daily Objectives*
 1. Concept Objective(s)
 - a. Understand how organisms change over time in terms of biological evolution.
 - b. Understand the composition of Earth, its history, and the natural process that shape it.
 2. Lesson Content
 - a. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 3. Skill Objective(s)
 - a. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time.
 - b. Students will explain how fossils are used as evidence to indicate that life has changed through time.
- B. *Materials*
 1. Student copies of Appendix A, page 1 and 2: Dating the Rocks
- C. *Key Vocabulary*
 1. Covered in Appendix A
- D. *Procedures/Activities*
 1. Today the students begin their study of geological time. If you teach out of the Prentice Hall series of books you are going to read from chapter 4, sections 2 and 3, in the *Earth's Changing Surface* book. If you do not teach out of this series, Appendix A has definitions and facts that should be covered with the students.
 2. Hand out copies of Appendix A, page 1 and 2: Dating the Rocks. The students should fill this out after they are done reading.
 3. Read and discuss with the students sections 2 and 3 from the book, make sure that they have a strong understanding of the material and how rocks help us to date the earth.
 4. After you are done reading and discussing the students may fill out the definition and fact sheet.
- E. *Assessment/Evaluation*
 1. Student's completion of Appendix A, page 1 and 2. You can collect and grade or just do a quick check for completion.

Lesson Two: Geological Time (50 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Understand how organisms change over time in terms of biological evolution.
 - b. Understand the composition of Earth, its history, and the natural process that shape it.
 2. Lesson Content
 - a. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 3. Skill Objective(s)
 - a. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time.
 - b. Students will explain how fossils are used as evidence to indicate that life has changed through time.
- B. *Materials*
1. Paper
 2. Scissors
 3. Watch with second hand or timer
 4. Student copies of Appendix B, page 2: Geological Time
- C. *Key Vocabulary*
1. Covered in Appendix B
- D. *Procedures/Activities*
1. To start today, have the student's retrieve a piece of paper and a pair of scissors out. If there are not enough scissors for everyone the students can pair up.
 2. The students are going to start with their full sheet of paper. Start timing and after one minute have the students cut the piece of paper in half. They will put one half off to the side and hold onto the other half.
 3. Again after one minute have the students cut their paper in half, setting aside one half and holding onto the other half. Continue to do this until the paper cannot be cut into half again.
 4. Have the students pick up all of their paper and discuss what they think this activity was demonstrating? The students should respond with half-life or radioactive decay.
 5. Ask the students what the whole piece of paper was representing in terms of radioactive decay? Answer is the start of the decay.
 6. Have them answer what the pieces of paper that were set aside after each cut represent? Answer is that it is the amount of decay that is gone.
 7. Once you are done discussing the activity, if you teach out of the Prentice Hall series have the students open their books to chapter 4, section 4 in their *Earth's Changing Surface* book. If you do not teach out of this series use Appendix B: Facts About Geologic Time to help you cover all the material needed with the students. At this time I would recommend if you do not teach out of the Prentice Hall series to make sure that you have a poster or picture of the geological time scale that shows the break up of all the eras and periods.
 8. Once you are done reading pass out Appendix B, page 2: Geological Time to all of the students and have them complete the worksheet. If there is not enough time to finish in class assign the worksheet for homework.
- E. *Assessment/Evaluation*
1. Students' completion of Appendix B, page 2 should be turned in for a grade.

Lesson Three: Earth's History (50 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand how organisms change over time in terms of biological evolution.
 - b. Understand the composition of Earth, its history, and the natural process that shape it.
2. Lesson Content
 - a. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 - b. Organizing geologic time: Scientists have organized the earth's history into four major eras
 1. Precambrian Era (earliest forms of life, such as bacteria and blue-green algae; later in the period, invertebrates such as jellyfish)
 2. Paleozoic Era (Pangaea; invertebrate life, such as trilobites, early in this ear, followed by amphibians, and the beginning of reptiles; development of simple plants, such as mosses and ferns)
 3. Mesozoic Era (Pangaea separates into continents; "Age of Reptiles"; dinosaurs, flowing plants, small mammals and birds)
 4. Cenozoic (Present) Era (Ice Age; mammoths; gradual development of mammals, birds and other animals recognizable today; humans; flowing plants, forests, grasslands)
3. Skill Objective(s)
 - a. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time.
 - b. Students will explain how fossils are used as evidence to indicate that life has changed through time.

B. *Materials*

1. Two copies of Appendix C, page 3: Earth's History

C. *Key Vocabulary*

1. Covered in Appendix C, page 1 and 2

D. *Procedures/Activities*

1. Teachers, prior to class, need to cut up two copies of Appendix C, page 3: Earth's History into strips. Also, on the white board teachers need to put up the Geological time scale, including all of the eras and periods.
2. Students are going to learn about the specific time eras and periods today. If you teach out of the Prentice Hall series you are going to read section 5 of chapter 4 today. If you do not teach out of the Prentice Hall series, Appendix C, page 1 and 2: Earth's History Facts has information that should be covered with the students as well as some discussion questions that can be covered. Also recommended is a big poster or student copies of the Geologic history, so students can see it and study it.
3. Read through section 5 with the students, stop and discuss.
4. Once you are done discussing with the students pass out the cut up strips. One needs to go to each student of Appendix C, page 3: Earth's History.
5. After every student has a strip they need to get with the other student whose strip matches their own. This is going to be their partner for the activity.
6. They then need to take out a piece of paper and a pencil. They are going to then look up their era or period that they received and look through their book, or information, and summarize in two to three sentences what their era or period was best known for.

7. Give the students ten minutes to summarize their period.
 8. Once the ten minutes is up have each group come up and tape their summary to the white board under their time frame.
 9. All the groups need to read and explain their summary to the class.
- E. *Assessment/Evaluation*
1. Students' participation in the activity can be given a grade at the end of the day.

Lesson Four: Geologic time in a Day (50 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand the processes of scientific investigation and design, conduct, communicate about and evaluate such investigations.
 - b. Understand how organisms change over time in terms of biological evolution.
 - c. Understand the composition of Earth, its history, and the natural process that shape it.
 - d. Understand that science involves a particular way of knowing and understanding common connections among scientific disciplines.
2. Lesson Content
 - a. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 - b. Organizing geologic time: Scientists have organized the earth's history into four major eras
 1. Precambrian Era (earliest forms of life, such as bacteria and blue-green algae; later in the period, invertebrates such as jellyfish)
 2. Paleozoic Era (Pangaea; invertebrate life, such as trilobites, early in this ear, followed by amphibians, and the beginning of reptiles; development of simple plants, such as mosses and ferns)
 3. Mesozoic Era (Pangaea separates into continents; "Age of Reptiles"; dinosaurs, flowing plants, small mammals and birds)
 4. Cenozoic (Present) Era (Ice Age; mammoths; gradual development of mammals, birds and other animals recognizable today; humans; flowing plants, forests, grasslands)
3. Skill Objective(s)
 - a. Students will interpret and evaluate data in order to formulate conclusions.
 - b. Students will communicate results of their investigations in appropriate ways.
 - c. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time.
 - d. Students will identify and illustrate natural cycles within systems, such as geological changes.

B. *Materials*

1. Teacher copy of Appendix D: Geological Time in a Day, break down
2. Colored pencils or markers
3. Paper plate
4. Ruler
5. Black sharpie or marker

C. *Key Vocabulary*

1. None

D. *Procedures/Activities*

1. Today the students are going to make a Geological time scale on a paper plate watch. This activity will really help the student to see how much time it has taken for everything to evolve into what it is today.
2. First thing the students need to do is they need to evenly break up their clock, labeling from one o'clock to twelve o'clock with a black sharpie or marker.
3. After they have labeled their clock they are ready to break it down to show how much time each era was in history. Depending on your student's math ability you can either do this as a whole class or have the students work in pairs.
4. The students need to start by finding out how much time is in each era. They can do this by subtracting the beginning number with the ending number. For example the Precambrian time started at 4.6 billion years and lasted until 544 million years ago. If you subtract those two numbers you get 4,056 million years.
5. After all of the eras are broken down have the students use a scratch sheet of paper to add all of the time. It should equal 4,600 million year total. It is much easier if the students do not use all of the zeros at the end and they just know that they time is in millions.
6. They now need to find out what percentage of time the Precambrian time took up. They do this by dividing the Precambrian time by the total. Students should find that it was 88%.
7. Once they have found out the percentage they then need to figure out how much time that should be on their clock. It does not need to be exact, have them round to the nearest hour. You will find that if you start at twelve o'clock and go all the way to ten o'clock that is 83% of the time. This is fine because it give the students an understanding of how long the Precambrian time lasted and it will make it much easier to break down the last three eras in the two hours.
8. The students should now move on to the Paleozoic era, which they should have found lasted 299 million years.
9. Have the students add up the remaining three time periods to receive a total. They should get a total of 544.
10. Once they have their total they need to take the Paleozoic era and the new total, divide the two numbers to find out the new percentage. The new percentage should be 55%. Make sure the students understand that this new percentage is for the remaining time on the clock, 2 hours, and not the total clock.
11. Now that the students know that the Paleozoic era is 55% of the time remaining they should be able to see that with the two hours left, that one-hour is equal to 50%, which is very close to 55%. The students should designate from ten o'clock to eleven o'clock to the Paleozoic era.
12. To finish off the students need to add up the remaining time of the Mesozoic era, which is 180 million years, and the Cenozoic era, which is 65 million years. If they add the two numbers up they should get 245 million years.
13. After they figure out the remaining time they need to find out for the last hour how much should be Mesozoic and how much should be Cenozoic. The break down becomes that 73% is Mesozoic and 27% is Cenozoic. So from eleven o'clock to twelve o'clock 73% should be Mesozoic and 27% Cenozoic.
14. After the students are done breaking up their clock they need to color in the different eras with different colors. They also need to label each part of their clock with the name of the era it contains.
15. One the back of the paper plate have the students write a short paragraph on how the Earth has changed over time and how the Earth has evolved from the beginning of Earth to the present.

16. Once all of the students have completed their paper plate clock of Geological time and paragraph, discuss as a class the activity.
- E. *Assessment/Evaluation*
1. Students' completed activity should be turned in. Use Appendix D, page 2 to grade the paragraph and the break down of the paper plate clock.

Lesson Five: Trip Through Time (four 50 minutes class periods)

B. *Daily Objectives*

1. Concept Objective(s)
 - a. Understand the processes of scientific investigation and design, conduct, communicate about and evaluate such investigations.
 - b. Understand how organisms change over time in terms of biological evolution.
 - c. Understand the composition of Earth, its history, and the natural process that shape it.
 - d. Understand that science involves a particular way of knowing and understanding common connections among scientific disciplines.
2. Lesson Content
 - a. The age of the Earth is about 4.6 billion years, based on geological evidence and radioactive dating. Life has existed on earth for more than 3 billion years.
 - b. Organizing geologic time: Scientists have organized the earth's history into four major eras
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3. Skill Objective(s)
 - a. Students will interpret and evaluate data in order to formulate conclusions.
 - b. Students will communicate results of their investigations in appropriate ways.
 - c. Students will describe evidence that reveals changes or constancy in groups of organisms over geological time.
 - d. Students will identify and illustrate natural cycles within systems, such as geological changes.

C. *Materials*

1. Computer paper
2. Meter sticks
3. Colored pencils or markers
4. Scissors
5. Student copies of Appendix E, page 1 and 2: Trip Through Time!

D. *Key Vocabulary*

1. None

E. *Procedures/Activities*

1. Pass out Appendix E, page 1 and 2 to the students. Read over the procedure as a class.
 2. The students are to use their Prentice Hall books to help them. If you do not teach out of the Prentice Hall books have the students research each topic in the computer lab, or if a computer lab is not available have student copies of information on each of the eras and periods.
 3. Once you have gone over the procedure, group the students into groups of four.
 4. Once the students are in their groups they need to assign jobs and get started on their project.
- F. *Assessment/Evaluation*
1. Student's completion of the project. Use Appendix E, page 2 to grade the projects.

VI. CULMINATING ACTIVITY

- A. Science Test: There is a study guide on Appendix F, page 1: Review: Geological Time that can be passed out the day before to students to help them prepare for the test. Pass out Appendix F, page 2-6: Test: Geological Time to all students. They should follow directions and turn the test in upon completion. Use Appendix F, page 7-8 to grade the tests as a summative assessment.

VII. HANDOUTS/WORKSHEETS

- A. Appendix A: Dating the Rocks (Lesson One)
- B. Appendix B: Geological Time (Lesson Two)
- C. Appendix C: Earth's History (Lesson Three)
- D. Appendix D: Geological Time in a Day, break down (Lesson Four)
- E. Appendix E: Trip Through Time (Lesson Five)
- F. Appendix F: Test (Culminating Activity)

VIII. BIBLIOGRAPHY

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- B. Lewis, C., *The Dating Game: One Man's Search for the Age of the Earth*. New York: Cambridge University Press, 2000, ISBN 0-521-790514.
- C. Padilla, M., *Pearson Prentice Hall Science Explorer: Cells and Heredity*. Upper Saddle River, NJ: Prentice Hall, 2000, ISBN 0-13-434479-0.
- D. Smith, N., *Millions and Billions of Years Ago*. New York: Franklin Watts, 1993, ISBN 0-531-12533-5.

Dating the Rocks

Define:

1. Relative age:

2. Absolute age:

3. Law of superposition:

4. Unconformity:

5. Index fossils:

6. Radioactive decay:

7. Half-life:

Short answer:

8. How are index fossils useful to geologists?

9. How would a geologist find out what the relative age is of a rock?

10. What is shown by an unconformity?

11. What are two types of radioactive dating?

12. How old is Earth and how did scientist determine the age?

Answer Key: Dating the Rocks

1. Relative age: The age of a rock compared to its rock layers around it.
2. Absolute age: Number of years since the rock was formed.
3. Law of superposition: Oldest layer of rock is on the bottom and the youngest is on the top.
4. Unconformity: A gap in geological time; where a rock layer is missing because of erosion.
5. Index fossil: A widely distributed fossil that contains an organism that lived briefly.
6. Radioactive decay: Over time, the elements break down and decay releasing particles and energy.
7. Half-life: The rate of decay in the element.
8. Index fossils are useful because they are wide spread over many areas so geologist can compare them from many locations to date the rocks.
9. A geologist would find the relative age by looking at the rock and its relation to the other rock layers above and below it.
10. An unconformity shows a gap in geologic time due to erosion.
11. The two types of radioactive dating are Potassium-Argon dating and Carbon-14 dating.
12. Earth is about 4.6 billion years old and we know this because of radioactive dating.

Facts about Geological Time

The geological time scale is used to show us a record of life forms that have taken place during Earth's history.

If you were to look at Earth's history in a day humans were developed a second before midnight.

There are three different ways in which geological time is broken down. They are eras, periods and epochs.

Eras are the longest units of time and have the biggest range.

Periods break down the eras.

Epochs break down the periods.

There are three main eras, which are the Paleozoic, Mesozoic and Cenozoic. The time frame before the Paleozoic is known as the Precambrian time that takes up 88% of Earth's history.

Geological Time

1. What is the geological time scale?

2. Put the three units of time into order from the biggest to smallest.

Period, Era, Epoch

3. What is the time frame for the Precambrian time period?

4. If you could travel back in time 150 million years, what ear and period would you be in?

Answer Key: Geological Time

1. The geological time scale is the record of life forms on Earth's surface over time.
2. Era, Period, Epoch
3. 4.6 million years ago – 544 million years ago
4. You would be in the Mesozoic era and the Jurassic period.

Earth's History Facts

PRECAMBRIAN TIME

Earth is 4.6 billion years old.

Earliest life forms of single-celled organisms are dated back to around 3.5 billion years ago.

Energy from the sun was used from organisms 2.5 billion year ago.

PALEOZOIC ERA

Life explodes at the beginning of this era, known as the “Cambrian explosion.” A large number of organisms develop.

During the Ordovician and Silurian period’s vertebrates, an animal with a backbone, appeared as jawless fish.

During the Devonian period animals began to move to land. Amphibians, an animal that lives half its life on land and half its life in water, appeared as lungfish, which evolved.

Mass extinction ends the Paleozoic era.

As much as 95% of the ocean life disappeared as a cause of this mass extinction.

At the end of the Paleozoic era, during the Permian period, 260 million year ago, all of Earth’s continents were one. They called great mass of land Pangaea the supercontinent.

MESOZOIC ERA

The Mesozoic era is known as the “age of reptiles” because reptiles were so abundant at this time. This is the era in which dinosaurs roamed the earth.

Pangaea starts to break apart at the end of the first period called the Triassic period.

Mammals, warm-blooded vertebrate that feeds it young milk, also developed during the Triassic period.

During the Jurassic period dinosaurs became the dominant animals on the land.

In the Cretaceous period Tyrannosaurus rex ruled the land, along with flowering plants evolved.

Another mass extinction took place 65 million years ago. Scientists think that an object that struck Earth caused the mass extinction. This mass extinction killed off all of the dinosaurs and over half of the plants and animals.

CENOZOIC ERA

Mammals evolved and lived in many different environments such as in water, on land and in the air.

During the Tertiary period whales and dolphins evolved.

The Quaternary period the climate cooled causing a series of ice ages.

The fossil records show that human evolved around 3.5 million years ago.

Discussion questions:

What made the “Cambrian explosion” so important to the history of the Earth?

How did dinosaurs becoming extinct help mammals evolve?

What was Pangaea?

How do you think that mass extinctions have affected the evolution of species on Earth?

PRECAMBRIAN TIME

PALEOZOIC ERA

CAMBRIAN PERIOD

ORDOVICIAN PERIOD

SILURIAN PERIOD

DEVONIAN PERIOD

CARBONIFEROUS PERIOD

PERMIAN PERIOD

MESOZOIC ERA

TRIASSIC PERIOD

JURASSIC PERIOD

CRETACEOUS PERIOD

CENOZOIC ERA

TERTIARY PERIOD

QUANTERNARY PERIOD

Geological Time in a Day: Breakdown

Precambrian Time: 4.6 billion years – 544 million years
= 4,056 million years

Paleozoic Era: 544 million years – 245 million years
= 299 million years

Mesozoic Era: 245 million years – 65 million years
= 180 million years

Cenozoic Era: 65 million years – 0 (Present day)
= 65 million years

Configuring how to break down the plate clock

Precambrian Time:
 $4,056 + 299 + 180 + 65 = 4,600$
 $4,056/4,600 = 88\%$

Paleozoic Era:
 $299 + 180 + 65 = 544$
 $299/544 = 55\%$

Mesozoic Era:
 $180 + 65 = 245$
 $180/245 = 73\%$

Cenozoic Era
 $180 + 65 = 245$
 $65/245 = 27\%$

Break down of the clock

$10/12 = 83\%$ (Precambrian time from twelve o'clock to ten o'clock)
 $1/2 = 50\%$ (Paleozoic era from ten o'clock to eleven o'clock)
 $.7/1 = 70\%$ (Mesozoic era from eleven o'clock until eleven forty-five)
 $.3/1 = 30\%$ (Cenozoic era from eleven forty-five until midnight)

Geological Time in a Day

Teacher Name: **Ms. Spencer**

Student Name: _____

CATEGORY	4	3	2	1
Neatness	Great care taken in construction process so that the plate clock is neat, attractive and follows plans accurately.	Construction was careful and accurate for the most part, but 1-2 details could have been refined for a more attractive product.	Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.	Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.
Measurements and Labeling	The plate clock is neat with clear measurements and labeling for all components.	The plate clock is neat with clear measurements and labeling for most components.	The plate clock provides clear measurements and labeling for most components.	The plate clock does not show measurements clearly or is otherwise inadequately labeled.
Paragraph X2	The paragraph is neatly written with complete sentences. It is 3-5 sentences long. The paragraph describes how Earth has changed over time and how the Earth has evolved from the beginning of Earth to the present.	The paragraph is neatly written with complete sentences. It is 3-5 sentences long. The paragraph briefly describes how Earth has changed over time and how the Earth has evolved from the beginning of Earth to the present.	The paragraph is written with some complete sentences. It is 2-3 sentences long. The paragraph starts to describes how Earth has changed over time and how the Earth has evolved from the beginning of Earth to the present.	The paragraph is not written in complete sentences. It is 2-3 sentences long. The paragraph barely describes how Earth has changed over time and how the Earth has evolved from the beginning of Earth to the present.

TOTAL = _____/16

Trip Through Time!

Procedure:

1. Create a geologic timescale to the scale of **1 million years = 1 millimeter**.

NOTE: For the Precambrian Time, since it would be over 4000 millimeters which equals 4 meters, make it just one meter long.

2. You will need to show major geologic eras and periods.
3. Each member of the lab group should have one of the following roles for the activity:
 - a. **Measurer:** measures the distance of the various lengths of the geologic timescale.
 - b. **Artist:** draw (you can trace the actual sample organisms) three organisms that were alive at each time period.
 - c. **Detailer:** colors the organisms
 - d. **Explainer:** Writes and attaches a short explanation of each period.

The explanation should contain at least 2 facts about each time period.

4. The measurer should begin to measure out the distances taken by each of the eras and periods so that **1 million years = 1 millimeter**. Measure from left to right and from older to more recent history.
5. The artist should sketch at least three organisms that lived during each period of geologic time.
6. The detailer should color and or detail the organisms.
7. The explainer should write the brief explanations either on a separate piece of paper and attach it to the geologic time scale or write it on the time scale. Others not busy can help with this task.
8. Place the names of all members of the group on your geologic timescale.
9. Present your time scale to the class. Show us all what you have done and explain at least two time periods.

Trip Through Time!

Grading Rubric:

Names:

Role:

Measurements of timescale:

Geologic timescale proper length
 Geologic Time scale is properly labeled

4 3 2 1 0

TOTAL _____

23-24 A

21-22 B

18-20 C

Organisms:

Properly identified organisms
 Three organisms present per period

4 3 2 1 0

16-17 D

0-15 F

Artistic:

All organisms are colored and detailed.

4 3 2 1 0

Explanations:

Topic covered thoroughly
 Enough information given to understand the periods.
 Did not exclude any important information or include any unnecessary information

4 3 2 1 0

DESIGN:

Very creative, unique fossils
 Easy to see and follow
 Did not include any unnecessary graphics

4 3 2 1 0

Class presentation:

Clear description of each persons role in the project
 Description of at least two periods.

4 3 2 1 0

Review: Geological Time

Evolve:

Fossils:

Relative age:

Absolute age:

Law of superposition:

Radioactive decay:

How old is Earth?

How do scientists know this?

Era:

Period:

Know the order of the eras.

Mammal:

Amphibian:

Pangaea:

Name: _____

Test: Geological Time

Multiple Choice: (2pts)

- _____ 1. The earliest forms of life appeared during
a. the Paleozoic Era c. the Cenozoic Era
b. Precambrian Time d. the Mesozoic Era
- _____ 2. On the Geological Time Scale, eras are divided into
a. epochs c. indexes
b. periods d. relative dates
- _____ 3. Fossils provide evidence for all of the following **EXCEPT** for
a. changes in Earth's surface.
b. how Earth originally formed.
c. how environments on Earth have changes over time.
d. how groups of organisms have changed over time.
- _____ 4. In the Cambrian Explosion,
a. the supercontinent broke apart.
b. an asteroid collided with Earth.
c. a great number of different organisms formed.
d. mammals spread into every environment on Earth.
- _____ 5. Most fossils form when organisms die and are buried in
a. sediment c. faults
b. unconformities d. ice
- _____ 6. The Mesozoic Era is often called the
a. Age of Mammals. c. Age of Fish
b. Age of Reptiles d. Age of Amphibians.
- _____ 7. Reptiles evolved from
a. dinosaurs c. mammals
b. birds d. amphibians

- _____ 8. Scientists use radioactive dating to
- a. find traces fossils in igneous rock.
 - b. discover the source of index fossils.
 - c. determine the relative ages of extrusions.
 - d. determine the absolute ages of rocks.
- _____ 9. What is the animal without a backbone called?
- a. vertebrate
 - b. invertebrate
 - c. mammal
 - d. amphibian

Matching: (2pts)

- | | |
|-----------------------------|--------------------------------|
| _____ 10. Scientific theory | _____ 15. Evolution |
| _____ 11. Fossils | _____ 16. Law of superposition |
| _____ 12. Radioactive decay | _____ 17. Absolute age |
| _____ 13. Mammal | _____ 18. Relative age |
| _____ 14. Amphibian | _____ 19. Extinct |

- a. Used to determine the relative age of sedimentary rock layers.
- b. The number of years since the rock formed.
- c. Elements that break down, or decay, by releasing particles and energy.
- d. The preserved remains or traces of living things.
- e. The gradual change in living things over long periods of time.
- f. An animal that lives part of its life on land and part of its life in water.
- g. A rocks age compared to the ages of other rocks.
- h. A well-tested concept that explains a wide range of observations.
- i. A type of organism that no longer exists.
- j. A warm blooded vertebrate that feeds its young milk.

Fill in the blank: (2pts)

- 20. According to the law of superposition the oldest layer is located at the _____.
- 21. A _____ is what hit the Earth and caused the dinosaurs to become extinct.
- 22. Fossil record can show different groups of organisms that have _____ over time.
- 23. Geologists use the _____ time scale to show Earth's history.

Fill in the chart (2pts)

- 24. Label the eras.
- 25. Label two periods in the correct era. Then write a fact or draw an animal that existed during that period.

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Short Answer (2pts)

- 26. Which layer is the youngest in undisturbed rock layers?

27. Which layer is the oldest in undisturbed rock layers?

28. What is an unconformity and how does it happen?

29. What are geological periods?

30. What is the Cambrian Explosion?

31. What was Pangaea?

Essay (4pts)

32. How old is Earth? How do scientists know this?

33. What is the difference between an amphibian and a mammal? Explain.

Answer Key: Geological Time

1. B
2. B
3. A
4. C
5. A
6. B
7. A
8. D
9. B
10. H
11. D
12. C
13. J
14. F
15. E
16. A
17. B
18. G
19. I
20. bottom
21. asteroid
22. changed
23. Geological
- 24/25. Answers will vary

26. The top layer
27. The bottom layer
28. An unconformity is a missing piece of a rock layer and this takes place by erosion.
29. Geological time periods are subdivisions of eras. They are used to break down the Geological time scale into more specific categories.
30. The Cambrian explosion was a time in which many different organisms developed.
31. Pangaea was a supercontinent that consisted of all of the landmass together forming one.
32. Earth is approximately 4.6 billion years old. Scientist have been able to date earth by using radioactive dating and the different fossil records, particularly the index fossils.
33. An amphibian is an animal that lives part of its life on land and the other in the water. An amphibian also lays its young as an egg and is cold-blooded.
A mammal is a warm-blooded vertebrate, who feeds its young milk.