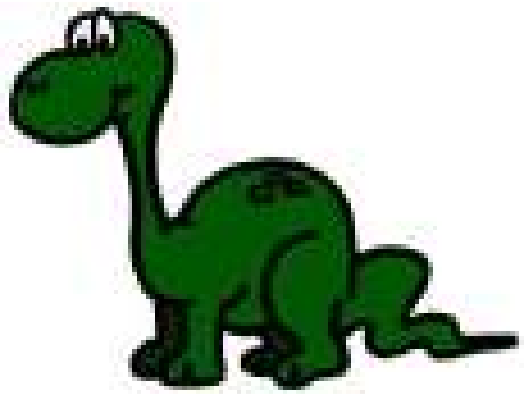
1-1-2010

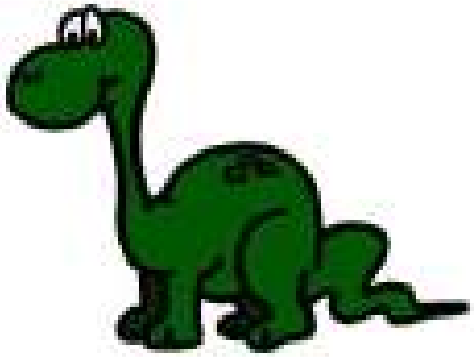
Grades 9-12 Earth Science

Katie Whittaker
Pace University

Geologists as Time Travelers: Exploring Geologic Time



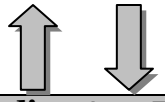
By: Katie Whittaker
7-12 Earth Science

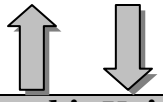


OVERVIEW OF UNIT

Your Name:	Katie Whittaker
Course Name:	Regents Earth Science
Grade Level:	10th Grade
Unit Name:	Geologic Time
Length of Unit:	2 Weeks
Standards Addressed	Standard 4 1.2 f, 1.2h, 1.2 i, 1.2 j

Big Ideas For the Course	**Essential Questions For the Course**
1. To study the world and the universe, galaxy and solar system that Earth belongs to, which allows scientists to understand processes, reach conclusions, and make predictions about events that impact the Earth and universe 2. To study the many interconnected forces shape and continue to change our world	1. How does our life and society impact science? 2. How does science impact our life and society?





Student Understanding As a Result of This Unit Related to Big Ideas For the Course	**Essential Questions For this Unit**
1. The study of rocks allow scientists to understand how the Earth formed 2. The study of rocks allow scientists to determine how life has changed and developed since the creation of the Earth 3. The study of Earth's history assists scientists in making prediction on future events based on trends. 4. The study of rocks helps scientists to determine the age of rocks, which puts a timetable to geological events of the past. 5. The history of Earth is directly related to the changing climate of the planet	1. How do rocks tell a story about history? 2. Why does Earth have oxygen free for the use of life while other planets do not? 3. How can the age of rocks be determined? 4. How do people know what happened in the past before the existence of humans and recordkeeping? 5. How has geologic time been broken down? 6. What characteristics are used to separate different spans of time and why?

Performance Tasks, Projects

1. RAFT Assignment
2. RAFT Assignment: Group Presentations
3. RAFT Assignment: Postcards
4. RAFT Assignment: Fortune Cookie Express
5. Fishbone: Principles of Superposition, Correlation, Unconformities and Horizontality
6. Lab: Sequence of Events
7. Pizza Project: How a Half-Life Works

Quizzes, Tests, Essays

-Pre-Test: Geologic Time
-Quiz on Reference Table information (pages 8 and 9)
-Post-Test: Geologic Time

Other Evidence (e.g. observations, homework, classwork)

1. Observations during class discussion on absolute age and relative age
2. Venn Diagram: Relative Dating vs. Absolute Dating
3. Word Wall/Vocabulary List: Geologic Time Definitions
4. Color-Code Reference Tables pages 8 and 9
5. Think/Pair/Share: Sequence of Events
6. Lab: Sequence of Events
7. Pizza Project: How a Half-Life Works
8. Observations during class discussions at the end of the unit to summarize material and test understanding
9. Exit Pass: Half-Life/Radioactive Decay

Student Self-Assessment:

-Student reflection on RAFT assignment

Students will need to know:

1. Life would not be able to exist without the presence of free oxygen
2. Changes in life forms can be observed and understood by studying the rock record
3. Events of the past can be put into chronological order based on different rock features
4. Rock features, including fossils, show the relationship between the features and the environment in which they were formed
5. Concepts based on the rock record provide the basis for many scientific theories
6. The absolute age of some rocks can be determined by studying the rate of radioactive decay

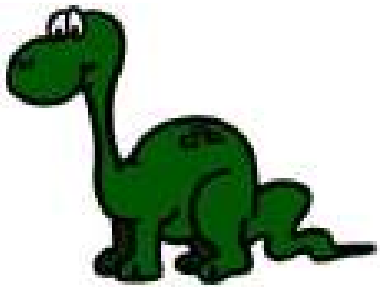
Students will need to be able to:

1. Students will be able to identify and distinguish between relative dating and absolute dating
2. Students will be able to use a chart to determine the age of a rock unit given certain characteristics
3. Students will be able to use a chart to describe the life forms and events that took place during different points in geologic time
4. Students will be able to explain superpositioning and illustrate an understanding by listing the order of events of a given rock outcrop
5. Students will be able to compare and contrast the principles of superposition, unconformities, correlation, and horizontality.
6. Students will be able to calculate the age of a rock given the radioactive data of the rock
7. Students will be able to describe what a rock record represents and list the order of events

Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**
- Pre-test: Geologic Time -Class Discussion: How would you describe the age of a person or object in years? How would you describe the age of a person or object relative to another? -Venn Diagram: Relative Dating vs. Absolute Dating	-Word Wall/Vocabulary List: Students will read through the text book, review book and reference table pages 8 and 9 in their clusters of 3. They will find words to define in their notebook and add to the class Word Wall - DI: Relative/absolute dating - Color-code Reference Tables (Each "Period" = different color)	-Hook: Movie Clips -RAFT Assignment/ Contracts: Geologic Time -Group Discussion Time	-Continue work on RAFT Assignment -Anchor Activities	-RAFT Assignment: Group Presentations
Lesson Plan 6	**Lesson Plan 7**	**Lesson 8**	**Lesson 9**	**Lesson 10**
-Wish You Were Here: RAFT Geologic Time Postcards -RAFT Reflection -Closure: RAFT Fortune Cookies	-Fishbone: Principles of Superposition, horizontality, unconformities and correlation -Steps for Determining the Sequence of Events Using the Principles of Superposition Think/Pair/Share: Determine the sequence of events	-Lab: Sequence of Events	-Pizza Project: How a Half-Life Works -Exit Pass (in groups): Determine the amount of radioactive elements left in a substance after a certain number of half-lifes (5 problems)	-Class Discussions: a. Based on what we have learned, what can we predict about the future? b. Place out numerous objects. Have students create a history of the object based on what they have learned in the unit

Accommodations for Diverse Learners:

*RAFT Assignment: Includes a choice between formal writing, drawing, creative writing, creating a timeline, create a travel brochure, making a display, writing song or rap lyrics, developing a skit and making a game
*Anchor Activities: Students will have the option to choose an activity of interest, which will include a short project to illustrate understanding
*Material will be presented in a variety of different formats including: charts, pictures, notes, verbal explanations, demonstrations, group work, individual work, and hands-on activities



PRE-ASSESSMENT

Name: _____ Period: _____

Geologic Time Scale: What do you know about the geologic past?

Directions: Answer the following questions to the best of your knowledge. You may not use any resources EXCEPT for your Earth Science Reference Table.

Multiple Choice:

1. How old is the Earth?
a. 1000 years old
b. 550 thousand (550,000) years old
c. 725 million (725,000,000) years old
d. 4.6 billion (4,600,000,000) years old

2. When did the dinosaurs become extinct?
a. 500 years ago
b. 30 thousand (30,000) years ago
c. 65 million (65,000,000) years ago
d. 235,000,000,000 years ago

3. Did the dinosaurs ever exist at the same time as humans?
a. yes b. no c. I don't know

4. What era do we live in?
a. Precambrian b. Paleozoic c. Mesozoic d. Cenozoic

5. What does radioactive mean?
a. An unstable element that is breaking down into something stable
b. A stable element that is breaking down into something unstable
c. Anything that glows
d. Something that is altered in a microwave

6. What are Phacops, Eospirifer and Eurypterus?
    a. Geologic Eras
    b. Geologic Periods
    c. Fossils
    d. Types of dinosaurs

7. How do scientists know the history of the Earth going back to when the Earth was created?
    a. Stories from people who were alive
    b. Scientists guess based only on what they think makes sense
    c. Scientists have no way of knowing, but make something up so they have something to base their studies upon

d. Scientists are able to study rocks that have preserved parts of the geologic past

8. Which of the following choices list organisms from the earliest to most recent?
    a. Earliest fish, earliest insects, earliest reptiles, earliest birds
    b. Earliest birds, earliest insects, earliest fish, earliest reptiles
    c. Earliest insects, earliest fish, earliest birds, earliest reptiles
    d. Earliest reptiles, earliest fish, earliest insects, earliest birds

Definitions:
Write the definitions to the following words to the best of your ability.

a. Absolute: _____

b. Relative: _____

c. Half-life: _____

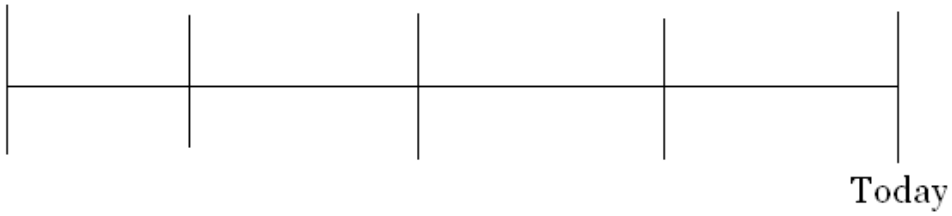
d. Rock outcrop: _____

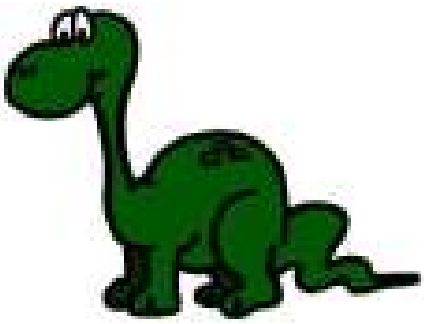
e. Geologic time: _____

Diagram
The timeline below marks the time when Earth was though to be formed to the present day. If you had to hypothesize as to when the following events took place, where would you place them on this timeline? Place the letter on the time line where you think the corresponding event occurred.

T= Today
E= Earth Forms
M= Wholly Mammoths Became Extinct
R= Oldest Known Rocks
H= First Humans

Geologic Time Scale





DIFFERENTIATED LESSON PLAN

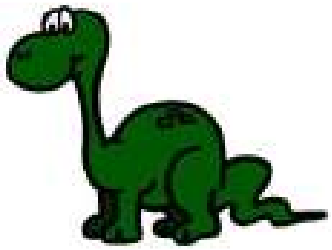
Your Name:	Katie Whittaker
Course Name:	Regents Earth Science
Grade Level:	10th Grade
Unit Name:	Geologic Time
Name of Lesson Plan:	Geologic History
Lesson Plan Numbers:	3-6 (Each anticipated class period is separated by a line)
Standards Addressed	NYS Standards 1,2,7 NYS Standard 4: 1.2 f, 1.2h, 1.2 i, 1.2 j

The Big Ideas:	
Essential Questions for this lesson:	-How do rocks tell a story about history? -How can the age of rocks be determined? -How do people know what happened in the past before the existence of humans and recordkeeping? -How has geologic time been broken down? -What characteristics are used to separate different spans of time and why?
Evidence of Student Understanding (Assessment) in this Lesson:	- RAFT Assignment - Anchor Assignment - Group Presentations - Postcards - Reflection

Lesson Preparation:	
Student preparation for this lesson:	-An understanding of the relative and absolute dating of rocks -A familiarity with the vocabulary words placed on the Word Wall
Materials Required:	- RAFT Assignment - Construction paper - Loose leaf - Markers - Scissors - Glue sticks - Pieces of thin cardboard
Specific purpose(s) or Objective(s):	-Students will be able to use a chart to determine the age of a rock unit given certain characteristics -Students will be able to use a chart to describe the life forms and events that took place during different points in geologic time

Lesson Sequence:	
Hook:	Bill and Ted's Excellent Adventure Clip Time Travel: http://www.youtube.com/watch?v=ijqnsRqSo2k Back to the Future trailer: http://www.youtube.com/watch?v=yosuvf7Unmg

Step by Step Explanation of Activities/Strategies:	1. Discuss movie clips 2. Introduce RAFT Assignment: Students will have the chance to "travel back in time" to explore a geologic time period 3. Contracts: Display RAFT options. Have students sign a contract, choosing their format 4. Tier by Complexity: Assign students to different time Eons and Eras a. Tier 1 (Easy): Cenozoic Era b. Tier 2 (Medium): Mesozoic Era c. Tier 3 (Difficult): Paleozoic Era d. Tier 4 (Hard): Precambrian Eon 5. Group Discussion Time: Allow students time to discuss their projects with each other _____ 6. Project time: Give students time to work on their project in class 7. Anchor Activities _____ 8. RAFT Group Presentations _____ 9. Wish You Were Here: RAFT Postcards 10. RAFT Reflection
Closure:	Fortune Cookie: Based on the geologic past, what can we predict to happen in the future?



ACTIVITIES

Name: _____
RAFT ASSIGNMENT- Geologic Time

Objective: To explore a period or eon of geologic time

Scenario: You are an employee of Time Travelers, Inc., a local travel agency. You and your team have been asked to prepare a sales pitch of about 10 minutes to present to a group of potential travelers who are interested in traveling back in geologic time.

Steps:

1. Review the attached RAFT chart.
2. Select a format of presentation that interests you the most.
3. Sign the attached contract and return it to the teacher.
4. You will then be assigned a time period and given time to discuss your individual projects with your team (groups are listed below).
5. Your team will then combine your individual projects to create a sales pitch, which you will then present to the class. The class is your group of potential travelers

Groups:

Group A: Cenozoic Era
Group B: Mesozoic Era
Group C: Paleozoic Era
Group D: Precambrian Eon
*See Reference Tables pages 8-9 for additional information

Timeline:

Class 1 (Today): Choose a role and meet with your group
Class 2: Come prepared to work on your task and group presentation
Class 3: Group presentation

My Information:
I have chosen and signed a contract to be the _____

I have been assigned to group _____

THE RAFT ASSIGNMENT

Role	Audience	Format	Topic
Botanist	Potential Travel Group	Book/magazine article	Plants of the assigned time period/eon
Zoologist	Potential Travel Group	Poster/Display	Animals of the assigned time period/eon
Paleontologist	Potential Travel Group	Chart	Fossil types of the time period/eon
Volcanologist and Seismologist	Potential Travel Group	Story	Physical changes of the land during the time period/eon
Game Developer	Potential Travel Group	Board Game	Challenges and advances of the time period/eon
Event Planner	Potential Travel Group	Timeline	Events and happenings during the time period/eon
Advertising Coordinator	Potential Travel Group	Brochure	The physical environment of the time period/eon
Lyricist	Potential Travel Group	Song	Life and events of the time period/eon
Community Actor	Potential Travel Group	Skit	Life and events of the time period/eon

RAFT ASSIGNMENT CONTRACT

Name: _____

Directions: Choose a task from the RAFT assignment, which is described in detail below. This task is to be completed by Friday. You must also prepare a group presentation, which will combine all of your individual tasks into a smooth, well-organized format.

You may use the following resources to help you: library books, Regents review book, textbooks, Internet, and encyclopedias.

Task 1: Botanist

Write a short book chapter or a magazine article about the plant life that was in existence during your time period/eon of study. You must include at least 3 different types of plants and describe them in detail, along with at least 1 photo or illustrations.

Task 2: Zoologist

On a display board, poster board or large piece of construction paper, create a zoo of at least 5 different animals/organisms in existence during your time period/eon of study using photos, drawings, and illustrations. You must label each animal/organism with their common name. You must cite the sources of any borrowed graphics and your graphics must be large enough to see from at least 3 feet away.

Task 3: Paleontologist

Create a chart including the name of all of the fossils found in New York State during your time period/eon of study. Your chart must also include a picture of the animal/organism either in living form or fossil form. Finally, include how long the fossil was found, in years, in the New York State fossil record.

Task 4: Volcanologist and Seismologist

Write a creative story describing the physical changes of the land. This includes all events having to do with earthquakes, volcanoes, Pangaea, mountain building/orogeny and erosion. The story must be 2 double-spaced typed pages in length (Font: Times New Roman, Font Size: 12).

Task 5: Game Developer

Your task is to create a board game that integrates all of the Life on Earth, Tectonic Events Affecting Northeast America, and Important Geologic Events in New York into a board game. You may also include other events that you find using other resources. Your game must include at least 20 spaces (8 of which must include some kind of event), 4 game pieces, a list of directions, and dice/spinner/cards to advance players.

Task 6: Event Planner
As an event planner, you are to take all of the geologic happenings listed on the Reference Tables during your time period/eon. These events are to include living and non-living events. Place these events in order on a chronological timeline. The design of your timeline is up to you as long as it includes all of the events. Your timeline must also be clear, easy to read, and lack spelling errors. You may add events that you find using other resources.

Task 7: Advertising Coordinator
Create a brochure that includes both words and pictures describing the physical environment of your time period/eon. Your brochure must include at least three different physical characteristics and should be points of interests that visitors would be interested in touring. Factors may include but are not limited to: weather, climate, mountain ranges, volcanoes, unique life forms, or parts of Pangaea and where they were located during your time period/eon.

Task 8: Lyricist
Write the lyrics to a song, rap song or TV ad jingle describing what life would have been like during your time period/eon. Your lyrics must include at least three blocks (each block containing 4 lines) of lyrics and a refrain/chorus. Your lyrics should provide a good description to your potential clients of what they would experience if they were to travel to your time period/eon. You are to perform your song/jingle during the group presentation.

Task 9: Community Actor
You are to perform a skit or act out an event that occurred during your time period/eon. Your skit or event should star you. You can perform a monologue or have other members of your group play supporting roles. Your skit or play should be 3-7 minutes in duration and you must submit a copy of your script. Lines do not need to be memorized.

I have chosen Task _____ to complete.

Student's signature _____ Date: _____

Teacher's signature _____

Name: _____

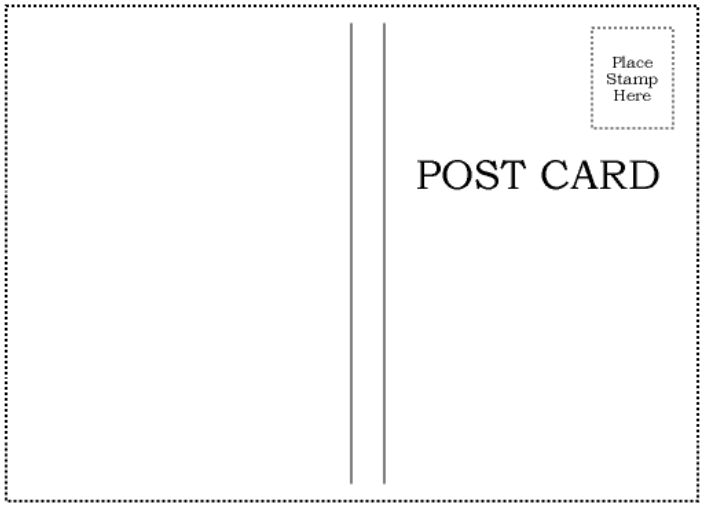
WISH YOU WERE HERE
RAFT Postcard Assignment

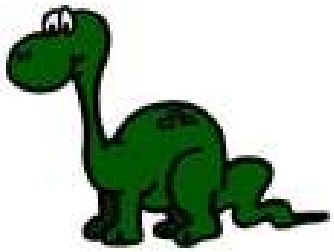
Scenario: After listening to all of the sales pitches, you have decided to travel to a different period in time. YOU ARE NOT TO CHOOSE YOUR OWN TIME PERIOD/EON!

Directions: Using the thin cardboard paper, markers, glue sticks, pictures, and illustrations provided, create a postcard to send to a fellow classmate form the time period/eon that you have chosen to visit. The front of your postcard must include a diagram, illustration or picture. The back of your card must include 5-7 sentences describing what you are doing, what you are seeing or what you have experienced during your trip to the time period/eon. **Optional:** Use the template below to create a rough draft of your postcard. After completing this task, turn in your postcard. It will then be delivered to the classmate you have chosen.

Front

Back





CLOSURE AND REFLECTION

Name: _____

Fortune Cookie Express

Directions: We have been learning about geologic time and geologic history. Based on what you have learned, you are to write a fortune on the blank fortune cookie below predicting a future event. You will present your fortune cookie to the class and will be given the opportunity to hang up your fortune cookie.

Example: One day, people will no longer have a pinky finger.

Name: _____
RAFT Assignment- Personal Reflection

Directions: Use the 7 components below to guide your personal reflection of the entire RAFT assignment process. You must address all 7 components, which were adapted from http://www.bham.wednet.edu/

1. Description of project summarizes what was created or accomplished

2. Description of process includes sequence of major steps and activities

3. Description of new skills learned or advancement of previous skills; acknowledgement of those who helped

4. Description of challenges and obstacles: e.g., time, resources, support

5. Explanation of personal growth—benefit to self

6. Descriptions of modifications—what you would have done differently

7. Application to future

RUBRICS

Format for rubrics from RubiStar
http://rubistar.4teachers.org/

Geologic Time RAFT Assignment

Role: Botanist

Format: Book/Magazine Article

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Requirements	All of the required content was present. (A description of at least 3 different plants from the time period)	Almost all the required content was present. (A description of 2 different plants from the time period)	A third of the required content was present. (A description of 1 plant from the time period)	No plants were described.
Article/Chapter - Supporting Details	The details in the article/chapter are clear, effective, and vivid 80-100% of the time.	The details in the article/chapter are clear and relevant 55-75% of the time.	The details in the article/chapter are clear and relevant 30-50% of the time.	The details in less than 25% of the article/chapter are neither clear nor relevant.
Graphics	There is at least one graphic or illustration. The graphic is of clear quality and it is clearly related to the article/chapter it accompanies.	There is at least one graphic or illustration. The graphic/illustrations not clear in quality but it is clearly related to the article/chapter it accompanies.	There is at least one graphic or illustration. The graphic/illustration is not clear and is not a good representation o the article/chapter it accompanies.	No graphics or illustrations are included.
On Time	The article/chapter is submitted on time			The article/chapter is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Zoologist

Format: Poster/Display

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Required Elements	The poster includes all required elements (Clear graphics of at least five different animals/ organisms)	Almost all required elements are included on the poster (Clear graphics of at least 4 different animals/ organisms)	About half of the required elements are included on the poster (Clear graphics of at least 3 different animals/ organisms)	Less than half of the required elements are included on the poster (Less than 2 different animals/organisms)
Labels	All animals/ organisms on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	Almost all animals/ organisms on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	About half of the animals/ organisms on the poster are clearly labeled with labels that can be read from at least 3 ft. away.	Labels are too small to view OR no animals/organisms were labeled.
Graphics - Relevance	All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.	All graphics are related to the topic and most make it easier to understand. All borrowed graphics have a source citation.	All graphics relate to the topic. Most borrowed graphics have a source citation.	Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.
On Time	The poster/display is submitted on time			The poster/display is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Paleontologist

Format: Chart

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Fossil Types	The chart includes all fossils found in NYS from the time period	The chart includes three-quarters of the fossils found in NYS from the time period	The chart includes half of the fossils found in NYS from the time period	The chart contains less than half of the fossils found in NYS from the time period
Graphics	The chart includes a clear illustration of all fossils in either fossil or living form	The chart includes a clear illustration of three-quarters of the fossils in either fossil or living form	The chart includes a clear illustration of half of the fossils in either fossil or living form	The chart includes a clear illustration of less than half of the fossils in either fossil or living form OR the illustrations are not clear
Time Span	The chart includes the time span that all fossils could be found in living existence	The chart includes the time span that three-quarters of the fossils could be found in living existence	The chart includes the time span that half of the fossils could be found in living existence	The chart includes the time span that less than half of the fossils could be found in living existence
On Time	The chart is submitted on time			The chart is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Volcanologist and Seismologist

Format: Story

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Requirements	All of the required content was present in the proper format. (2 pages in the required format describing all of the events that changed the land)	Three-quarters of the required content was present in the proper format. (2 pages in the required format describing all of the events that changed the land)	Half of the required content was present in the proper format. (2 pages in the required format describing all of the events that changed the land)	No changes to the land were described.
Format	2 pages, double spaced, Times New Roman, Size 12	The paper is not in the required format in one aspect	The paper is not in the required format in two aspects	The paper I not in the required format in two or more aspects
Story - Supporting Details	The details in the story are clear, effective, and vivid 80-100% of the time.	The details in the story are clear and relevant 55-75% of the time.	The details in the story are clear and relevant 30-50% of the time.	The details in less than 25% of the story are neither clear nor relevant.
On Time	The story is submitted on time			The story is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Game Developer

Format: Board Game

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Content	All required content is incorporated in the game including all of the Life on Earth, Tectonic Events Affecting Northeast America, and Important Geologic Events in New York	About three-quarters of the required content is incorporated into the game	About half of the required content is incorporated into the game	Less than half of the required content is incorporated into the game
Game Format and Pieces	The board game includes at least 20 spaces (8 of which must include some kind of event), 4 game pieces, and dice/spinner/cards to advance players, fulfilled completely	The board game includes all but one required element fulfilled completely	The board game includes all but two required elements fulfilled completely	The board game includes only one required element, fulfilled completely.
Rules	Rules were written clearly enough that all could easily participate.	Rules were written, but one part of the game needed slightly more explanation.	Rules were written, but people had some difficulty figuring out the game.	The rules were not written.
On Time	The board game is submitted on time			The board game is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Event Planner

Format: Timeline

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Content/Facts	All events from the Reference Tables were represented and the facts were accurate for all events reported on the timeline.	Almost all events from the Reference Tables were represented and the facts were accurate for all events reported on the timeline.	About half of the events from the Reference Tables were represented and the facts were accurate for all of the events reported on the timeline.	Less than half of the events from the Reference Tables were represented and the facts were often inaccurate
Dates	An accurate, complete date has been included for each event.	An accurate, complete date has been included for almost every event.	An accurate date has been included for almost every event.	Dates are inaccurate and/or missing for several events.
Readability	The overall appearance of the timeline is pleasing and easy to read.	The overall appearance of the timeline is somewhat pleasing and easy to read.	The timeline is relatively readable.	The timeline is difficult to read.
On Time	The board game is submitted on time			The board game is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Advertising Coordinator

Format: Brochure

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Content - Accuracy	All facts in the brochure are accurate and there are at least 3 points of interest for potential visitors.	99-90% of the facts in the brochure are accurate and there are at least 3 points of interest for potential visitors.	89-80% of the facts in the brochure are accurate and there are at least 3 points of interest for potential visitors.	Fewer than 80% of the facts in the brochure are accurate and there are less than 3 points of interest for potential visitors.
Writing - Organization	Each section in the brochure has a clear beginning, middle, and end.	Almost all sections of the brochure have a clear beginning, middle and end.	Most sections of the brochure have a clear beginning, middle and end.	Less than half of the sections of the brochure have a clear beginning, middle and end.
Graphics/Pictures	Graphics go well with the text and there is a good mix of text and graphics.	Graphics go well with the text, but there are so many that they distract from the text.	Graphics go well with the text, but there are too few and the brochure seems "text-heavy".	Graphics do not go with the accompanying text or appear to be randomly chosen.
On Time	The brochure is submitted on time			The brochure is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Lyricist

Format: Song/Rap/Jingle

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Format	The song contains at least three blocks of lyrics and a refrain/chorus	The song contains 2 blocks of lyrics and a refrain/chorus	The song contains 1 block of lyrics and a refrain/chorus	The song does not contain one full block of lyrics and/or does not contain a refrain/chorus
Accuracy	The lyrics provide a clear and detailed description of your time period	The lyrics provide an accurate description of your time period	Some lyrics are inaccurate	Lyrics do not represent your time period
Performance	The song/rap/jingle was well-rehearsed	The song/rap/jingle should have been rehearsed a couple more times	The song/rap/jingle needed much more rehearsal	The song/rap/jingle was not rehearsed
On Time	The song/rap/jingle is submitted on time			The song/rap/jingle is not submitted on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Role: Community Actor

Format: Skit

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	15 (A)	10 (B)	5 (C)	0 (F)
Setting	Lots of vivid, descriptive words are used to tell the audience when and where the story takes place.	Some vivid, descriptive words are used to tell the audience when and where the story takes place.	The audience can figure out when and where the story took place, but there isn't much detail (e.g., once upon a time in a land far, far away).	The audience has trouble telling when and where the story takes place.
Sequence	Retells story in correct sequence leaving out no important parts of story.	Retells story in sequence with 2-3 omissions.	Retells story with several omissions, but maintains sequence of those told.	Retells story out of sequence.
Duration	The skit lasts 3-7 minutes.	The skit lasts 2 or 8 minutes.	The skit lasts 9 minutes.	The storytelling lasts less than 2 minutes or more than 9 minutes.
On Time	The skit is prepared on time			The skit is not prepared on time (No partial credit will be given for timeliness because your group presentation depends on all individual projects being completed)

Geologic Time RAFT Assignment

Group Presentation

Teacher Name: _____
Course: Regents Earth Science

Time Period of Group: _____

Group Members: _____

CATEGORY	10	7	4	0
Enthusiasm	Facial expressions and body language generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language sometimes generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language are used to try to generate enthusiasm, but seem somewhat faked.	Very little use of facial expressions or body language. Did not generate much interest in topic being presented.
Flow	The combination of individual formats creates a presentation that flows extremely well	The combination of individual formats creates a presentation that flows well	The combination of individual formats creates a presentation that does not flow well	The combination of individual formats creates a presentation that does not flow at all
Preparedness	Students are completely prepared and have obviously rehearsed.	Students seem pretty prepared but might have needed a couple more rehearsals.	The students are somewhat prepared, but it is clear that rehearsal was lacking.	Students do not seem at all prepared to present.
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Time-Limit	Presentation is 8-12 minutes long.	Presentation is 7 minutes long.	Presentation is 6 minutes long.	Presentation is less than 6 minutes or more than 12 minutes long

Geologic Time RAFT Assignment

"Wish You Were Here" Postcards

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	5	4	3	0
Picture	The postcard includes a picture, diagram or illustration on the front that clearly illustrates a concept and is a good representation of the chosen time period	The postcard includes a picture, diagram or illustration on the front that clearly illustrates a concept and is a fair representation of the chosen time period	The postcard includes a picture, diagram or illustration on the front that clearly illustrates a concept but is a poor representation of the chosen time period	The postcard includes a picture, diagram or illustration on the front does not clearly illustrate a concept OR it a very poor representation of the chosen time period
Content	The written portion of the postcard is clear and contains all accurate information, showing excellent understanding of the time period.	The written portion of the postcard is clear and contains mostly accurate information, showing good understanding of the time period.	The written portion of the postcard is clear but contains many inaccurate facts, showing a lack of solid understanding of the time period.	The written portion of the postcard is not clear and all of the information is inaccurate, showing no understanding of the time period.
Length	The written portion of the postcard is 5-7 sentences in length	The written portion of the postcard is 4 or 8 sentences in length	The written portion of the postcard is 3 or 9 sentences in length	The written portion of the postcard is less than 2 or more than 9 sentences in length

Geologic Time RAFT Assignment

Fortune Cookie Express

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	5	4	3	0
Clarity	The fortune is easy to read, well-written and easy to understand	The fortune is easy to read, but difficult to understand	The fortune is not easy to read and is difficult to understand	The fortune is cannot be read.
Content	The fortune shows a an excellent understanding of the progression of past events based on the geologic rock record by making a feasible prediction	The fortune shows a good understanding of the progression of past events based on the geologic rock record by making a prediction that is feasible but not likely	The fortune shows a fair understanding of the progression of past events based on the geologic rock record by making a prediction that is hardly feasible and very unlikely	The fortune shows a poor understanding of the progression of past events based on the geologic rock record by making a prediction that is not at all based on past occurrences or trends

Geologic Time RAFT Assignment

Personal Reflection

Teacher Name: _____
Course: Regents Earth Science

Student Name: _____

CATEGORY	Exceeds standard- Excellent	Meets standard- Minimum requirements	Does not meet standard	1
Content	Reflection shows exceptional insight and introspection related to the RAFT assignment- Reflection addresses all 7 components	Reflection addresses the 7 assigned components	Lacks reflection about one or more of the 7 assigned components	
Format	Reflection is 500-1000 words. It is typed with 12 point font, double spaced in Times New Roman	Reflection is 500 words. It is typed with 12 point font, double spaced in Times New Roman	Reflection is less than 500 words. The reflection is not typed	
Organization	The components flow well through the reflection while being easily identifiable	The organization shows planning with a clear beginning, middle and end with all components being easily identifiable	The organization of the reflection is not clear and some components are missing or difficult to find	
Word Choice	Words convey an excellent sense of personality through the use of analogies, metaphors, humor, etc. to describe personal learning	Reflection is written in standard English, less formal and more personal than a scholarly paper.	Slang and/or inappropriate language is used with a limited vocabulary and a limited expression of self	
Proof-Reading	Minimal errors in punctuation, spelling and grammar are found	Few errors in punctuation, spelling and grammar are found	Many errors in punctuation, spelling, etc. seriously affect readability	

ANCHOR ACTIVITIES

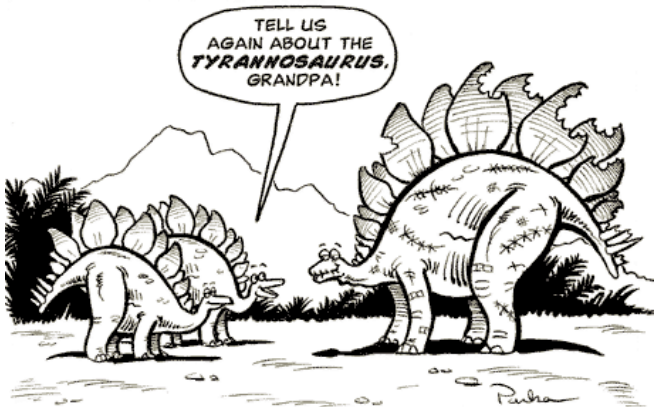
When you complete your segment of the RAFT activity, choose one activity from the following three options:

1. **Web Search-**Go the website below and click on a period, epoch or era that interests you the most. Write a journal entry describing what life would have been like for those living during that time period.

   Website: http://www.enchantedlearning.com/subjects/Geologictime.html

2. **Reading Center-** Choose a short book by David Cobb or Charles Ferguson Barker from the reading center. After reading the book, write a 1 page story or summary starting with the line, "I did not think there was anything else I could learn about geologic time until I found out that…".

3. **Cartoons-** Study the cartoons by Charley Parker from DinosaurCartoons.com below. Write a 1 page response using the questions that as guidelines.



a. During what time period did the characters in this cartoon most likely exist?
b. Approximately how many years ago were these characters in existence?
c. Describe all of the features that you see used in the cartoons that lead you to conclude that the characters were from the time period you chose.
d. What is each of the cartoons trying to illustrate? Describe the theme/idea of each separately.

Works Cited

"Personal Reflection Rubric." Bellingham Public School District. June 2000. Accessed: 1 December 2009. <http://www.bham.wednet.edu/>

"RubiStar." 4Teachers. Accessed: 1 December 2009. <http://rubistar.4teachers.org/index.php>