

**Earth Sciences 089G**  
**Short Written Assignment: Our Perceptions of Geological Time**  
**(Due in Drop Box by 4 pm, March 8, 2007)**

This assignment is designed to give you an appreciation of concepts of geological time within a historical context. Unlike the term paper, this report will not require “Introduction” or “Conclusions” sections. However, your report must contain the following components in the following order:

- Title Page (include name, student number and course number in addition to title)
- Part 1: Early Estimates for the Age of Earth
- Part 2: Stratigraphic Principles and Concepts and the Discovery of Deep Time
- Part 3: Revised Concepts of the Geological Record
- Part 4: Constructing Time Scales (completed worksheet)
- Part 5: Putting Geological Time into Perspective (completed worksheet)
- References
- Additional Sources (see below)

The various written sections should be logically organized and must be written in clear, complete sentences. Use of tables summarizing the data is acceptable, but only as a secondary means of presentation (i.e. all required information must be written in the main body of each section). Information sources used for the first three sections of the report (Parts 1, 2 and 3) must be cited properly following the format of the Canadian Journal of Earth Sciences as for the term paper (see the course website). It is expected that adequate effort will be invested in gathering and synthesizing information from multiple and varied sources. Do not expect one source to cover any particular topic thoroughly. You must check the information in one reference with that in others to ensure that it is reasonably correct and complete. The use of website sources is acceptable, but the use of printed sources (i.e. books, scholarly magazine articles) is strongly encouraged. **You must follow the policy laid out in the course outline regarding the citation of references, and you must avoid the perils of plagiarism at all costs!** In the event that the student deems a direct quotation to be absolutely necessary, the passage must be included in closed quotations. This must be followed by a typical citation. For print references, the page number(s) in the cited source, on which the passage is found, must also be included in the citation (e.g., Johnson et al. 1996, p. 206). A page number is not required for citations from web articles. If additional reference material was consulted, but is not cited in Parts 1-3, a formatted list of these sources should appear after the reference list under the heading “Additional Sources”.

**DON'T ASSUME: If you are uncertain as to how something is expected to be done, please ask the instructor for assistance.**

Grading of parts 1-3 will be based on content, formatting, and on your general presentation of the concepts involved.

**Instructions**

**Part 1: Early Estimates for the Age of Earth (1½-3 double spaced pages)**

The age of the Earth has been debated since the beginning of human history and a wide variety of methods have been used to estimate its absolute age. Identify the calculated age and method of determination of the age of the Earth as put forward by the following individuals: James

Ussher; Georges-Louis LeClerc De Buffon (also known as “Buffon”); William Thomson (Lord Kelvin); John Joly (as determined from the age of the oceans), and Bertram Boltwood. In your answer, be sure to also mention any obvious or noted problems with the assumptions, data and methods employed (scientific methods only!) to determine the Earth’s age and how they might have affected the resultant age dates.

**Note:** *Information for each individual should be obtained from separate articles, and ideally, more than one article for each.*

### **Part 2: Stratigraphic Principles and Concepts and the Discovery of Deep Time (3-5 pages)**

Identify the prime contributions of the following individuals to the understanding of geological time as it relates to the stratigraphic/rock record: Georges Cuvier, James Hutton, Nicolas Steno, William Smith, Charles Lyell, Charles Darwin and Thomas Henry Huxley. In your answer, you should identify and define any relevant theories or principles associated with these individuals and the role of the individual in their conceptual development or acceptance within the contemporary scientific community. Note: some of these roles were more “scientific” in nature while others were more “cultural”. Also be sure to outline how non-quantitative evidence identified by some (at least two) of these individuals suggested that the Earth was much older than suggested by the absolute age dates in existence at the time.

### **Part 3: Revised Concepts of the Geological Record (1-2 pages)**

Explain why Catastrophism and Uniformitarianism (Gradualism) may not be completely mutually exclusive with reference to the modern concepts of “Neocatastrophism” and “Punctuated Equilibrium”.

**Note:** *The concept of Punctuated Equilibrium may be conceived of in terms other than those of biological evolution.*

### **Part 4: Constructing Time Scales (Completed Worksheet)**

You are provided with a chart labeled “Worksheet for Part 4: Constructing Time Scales” with two timelines (the geological time scale and a comparative timeline for the past 106 years of world history). This part of the assignment involves completion of the chart as instructed. References for information sources used in this part of the assignment are not required.

The following information is to be indicated on your chart:

a) In the long “EONS” column of “Geological Time Divisions,” fill in the names of the four eons of Earth History and the boundaries separating them according to the time increments provided on the left timeline. In the shorter “ERAS” column provided on the chart, draw in the boundaries the three eras of the youngest eon in the same manner. Then write the names of the eras in the appropriate spaces. Obviously, as this information is not provided for you, we expect you to look it up. When doing so, please use the most up-to-date sources (i.e. don’t use sources which are more than 10 years old). Absolute dates tend to change as a result of ongoing radiometric and stratigraphic studies.

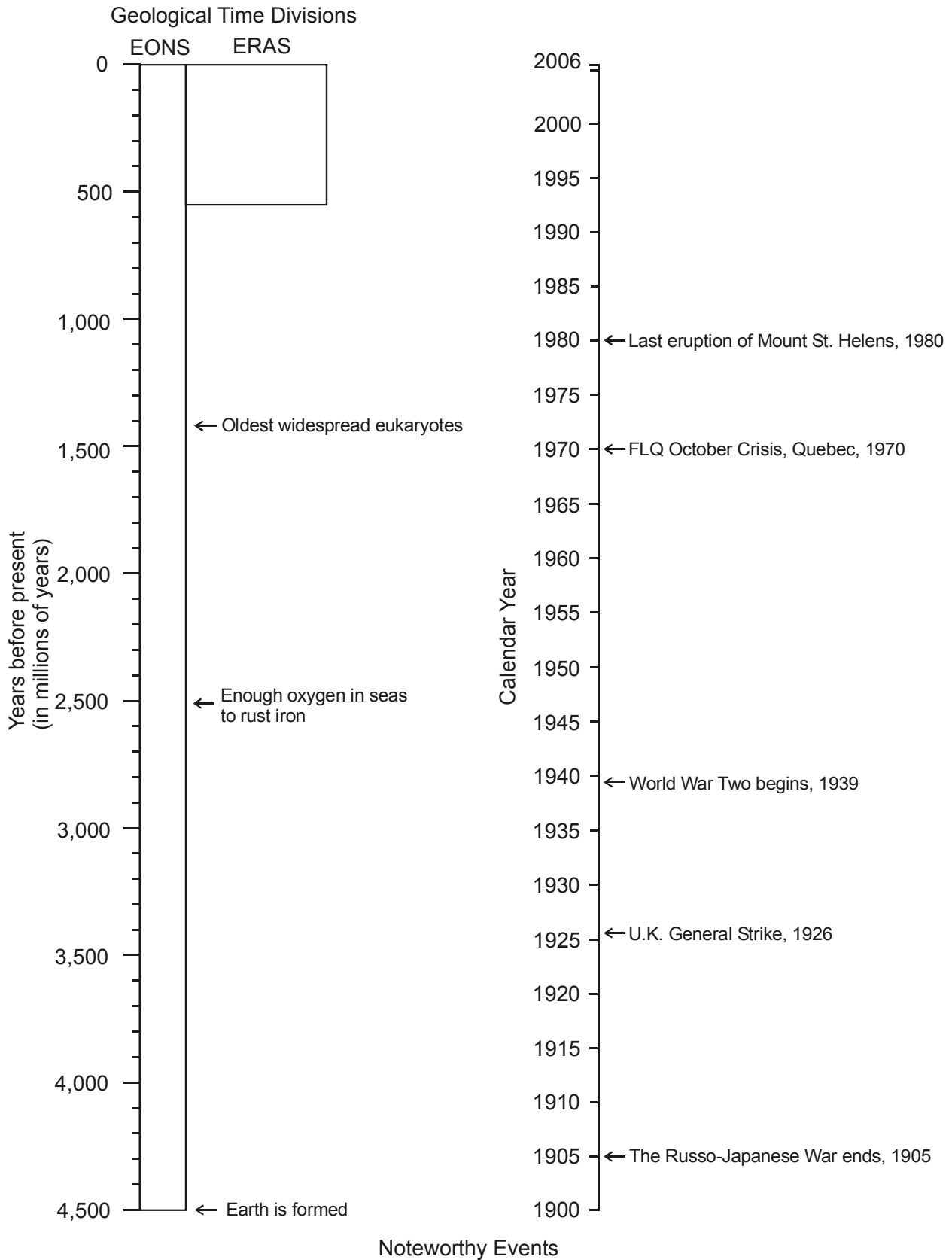
b) The timeline on the right side of the page represents the past 106 years of world history (1900-2006) in calendar years. The dates of several significant events have already been plotted on the timeline. Plot the remaining events listed in the chart below in the same manner. Once again, it is up to you to do some research to determine the years associated with these events.

Year	Event
	The Falkland Islands War breaks out between Great Britain and Argentina.
	The Ford Model T is introduced for public use.
	“Hockey Night in Canada” debuts on television.
	The Bolsheviks overthrow the Czar and the provisional government of Russia.
	India detonates its first atomic bomb.
	George Gershwin composes “Rhapsody in Blue”.
	The Berlin Wall falls and German reunification begins.
	Canada celebrates its centennial.
	Adolf Hitler is appointed Chancellor of Germany.
	Queen Victoria dies.
	The Korean War begins.
	The Great Depression begins.
	John Diefenbaker wins the largest majority government in Canadian political history.
	Mikhail Gorbachev and his gov’t are overthrown (briefly) by communist hard-liners.
	World War One begins.
	George W. Bush, 43 <sup>rd</sup> U.S. President is inaugurated as president for the first time.
	Alaska becomes the 49 <sup>th</sup> U.S. state
	ENIAC, the world’s first large-scale electronic computer first operated.
	The Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma is bombed.
	Benito Mussolini becomes Premier of Italy.
	Astronauts of Apollo 11 land on the Moon.
	Canada officially adopts its current flag.
	Pierre Trudeau resigns as Prime Minister of Canada, and from politics in general.
	Hurricane Katrina devastates northern coastal areas of the Gulf of Mexico.
	NASA space shuttle Columbia disintegrates upon re-entry to Earth’s atmosphere.

**Part 5: Putting Geological Time into Perspective (Completed Worksheet)**

Now suppose we compress the entire geological time scale to fit into the past 106 years of world history. By doing this, we can compare the relative timing of events in geological history to points of reference (significant events in twentieth and early twenty-first century history) on a much shorter time scale to which we can better relate. In the table provided (Worksheet For Part 5: Putting Geological Time Into Perspective”), you are given a list of “significant time markers” in Earth history. It is your task to name the event during the period 1900-2006, which most closely corresponds to that time marker in Earth history if 4.5 billion years were condensed to 106 years. To facilitate this, it is recommended that you plot the additional Earth History events on the chart for Part 4 (once you have determined the appropriate geological age of the events—the first two are already plotted) and then compare their position with events on the recent world history timescale.

## Worksheet For Part 4: Constructing Time Scales



**Worksheet For Part 5: Putting Geological Time Into Perspective**

<b>Significant Event in Earth's history</b>	<b>Corresponding Significant Event in Recent World History (1900-2006)</b>
Earth is formed	
Enough oxygen in the oceans to rust iron	
Earliest known multicellular animals	
First abundant animals with mineralized hard parts.	
Oldest known rocks	
Oldest known mammals	
Oldest known dinosaurs	
Extinction of dinosaurs	
Earliest known prokaryotic organisms (bacteria)	
First australopithecines (early relatives of humans)	