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12.001 Introduction to Geology
Spring 2008

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Final assignment for 12.001
Due Monday May 12, 2007

You may use any references that you wish to, but you must cite them.

Question 1: Essay (100 points)

Write a one- page essay. Choose the topic from the following list. The essay should:

1. Use the topic as the header
2. Be typed in 12-point font with 1.5 spacing
3. Be printed out, not emailed
4. Have a separate reference list
5. May have figures or sketches added after the references

Make conclusions, don't just describe. The essay should have clear and well-supported arguments. Include what you know from class, add information from research, and feel free to add your own thoughts and analysis.

Filler sentences and unsubstantiated or vague statements will receive poor marks. Citations must be clear and references attached on a separate sheet; the more primary sources and the fewer undocumented web pages, the better the grade.

1. Rock magnetism and its importance in our understanding of plate tectonics
2. Processes of crustal growth and recycling
3. The driving forces of plate tectonics
4. Where in the stream profile is the velocity of a stream the highest? Why?
5. The effects of sea-level change on coastlines over geologic time and into the immediate future
6. The differences between Venus and the Earth
7. Processes of rock deformation that occur on the interior of continents
8. Relationships between volcanoes and earthquakes
9. Ripples in rivers, in deserts, and on Mars
10. Anthropogenic contributions to climate change
11. The Snowball Earth
12. The interaction of climate and tectonics in the Himalayas
13. The role of ocean currents in global climate patterns
14. This history of the Yellowstone hotspot and the next likely eruption
15. Comparison of causes, weather, and ecosystem in subtropical and arctic deserts

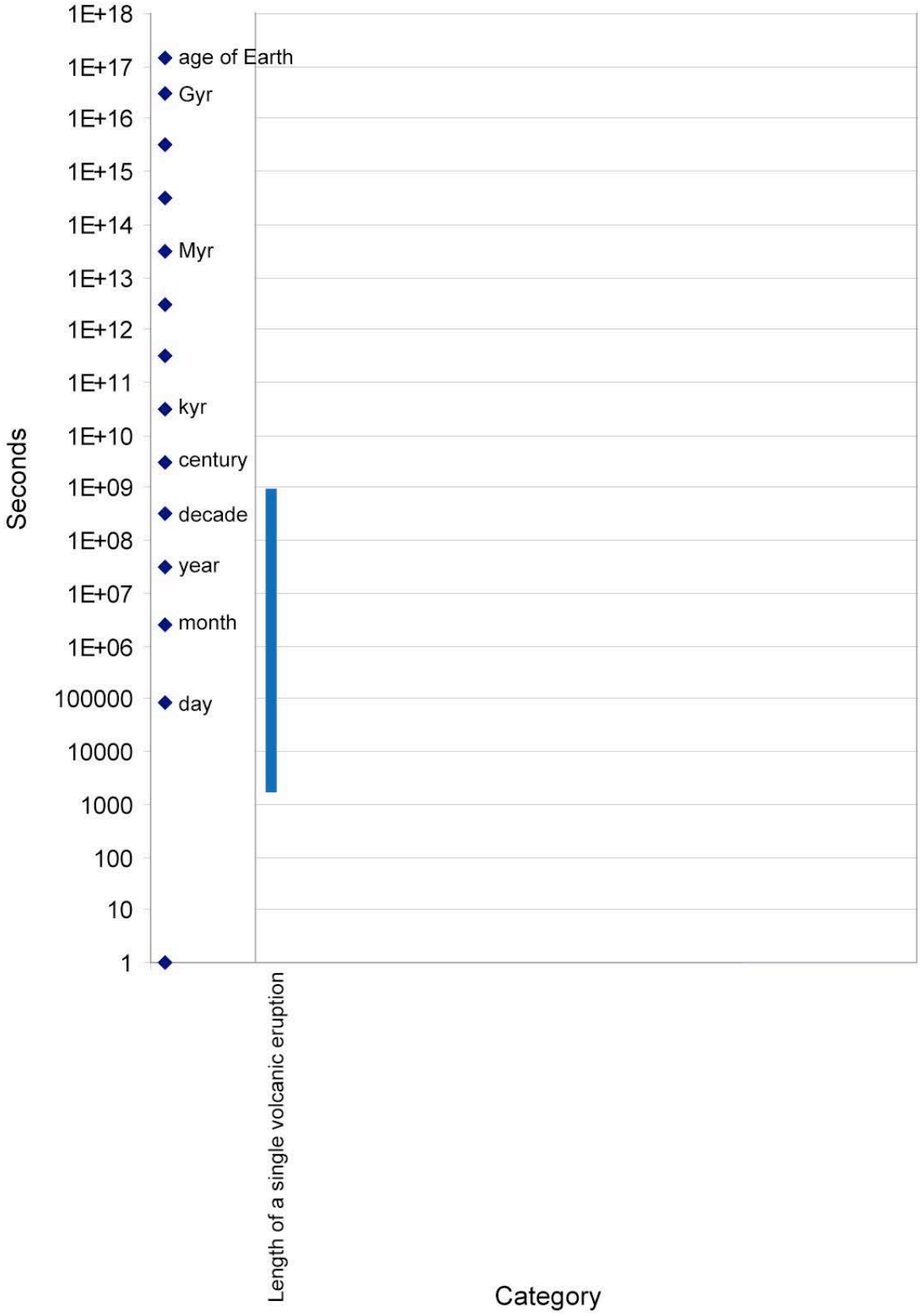
If you want some extra credit, you may write two essays instead of one. The second essay will be given 50 points if perfect.

Question 2: Rates, durations, and dates (100 points)

On the following page there is a graph for you to complete.

The vertical axis is a log scale of seconds, from one second to the age of the Earth. Along the x-axis you should fill in the categories given here and for each indicate its age or duration with a bar or a point. The first has been done as an example. You may use any references you want. *Neatness counts*.

1. Age range of oceanic crust
2. Age range of continental crust
3. Age of oldest single mineral grain from Earth
4. Age of oldest crustal rock on Earth
5. Age of Cape Cod and Long Island
6. Time the Himalayas have been forming
7. Years ago the continents were last in one supercontinent
8. Years ago oxygen in the atmosphere rose past 10%
9. Age of rocks containing the earliest fossils of life
10. Shortest estimate of number of years before all ice caps are melted
11. Timing of the largest extinction in Earth history
12. Time for a pyroclastic flow to move from the summit of Mt. Rainier to Seattle
13. Years ago you were born
14. Time for a P-wave generated by an earthquake in San Francisco to reach seismometers in Boston
15. Time it will take Niagara Falls to migrate 1 mile upstream from their present location
16. Time when Earth will be destroyed as the Sun expands into a Red Giant.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1E+12
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1E+10
1E+09
1E+08
1E+07
1E+06
100000
10000
1000
100
10
1
Seconds
age of Earth
Gyr
Myr
kyr
century
decade
year
month
day
Length of a single volcanic eruption
Category