

Name: _____
First Name Last Name

Name: _____
First Name Last Name

School: _____ Team Number: _____
Full School Name, No Abbreviations

PART 2 SCORE <div style="border: 2px solid black; width: 100px; height: 50px; margin: 10px auto;"></div> 15 points (raw score)
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DYNAMIC PLANET

TECTONICS

*Massachusetts State Science Olympiad, B Division
 March 3, 2018*

PART 2: SHORT ANSWER

FOR EVENT SUPERVISOR USE

<p style="text-align: center;"><u>EXAM SCORING</u></p> <p>1. Stations: _____ (1st tiebreaker) 80 points.</p> <p>2. Short Answer: _____ (2nd tiebreaker) 30 points. [2x raw Part 2 score]</p>	<p style="text-align: center;"><u>ADDITIONAL SCORING</u></p> <p>Raw Score: _____ (sum of parts)</p> <p>Deductions: _____ (subtract from raw)</p> <p>Tiebreaker: _____ (add 0.1 if won)</p>	<p style="text-align: center;"><u>FINAL SCORE</u></p> <div style="border: 2px solid white; width: 100px; height: 50px; margin: 10px auto;"></div> <p style="text-align: center; color: white;"><i>Total points: 110</i></p>
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INSTRUCTIONS

- Be sure to write your names, school, and team number neatly and legibly above.
- Make sure all answers are legible. An illegible response will be an incorrect response. Thus, **write neatly**.
- Points will **not** be deducted for minor spelling errors. If spelling is so far off as to impair the judge's understanding of what is written, the response will be counted as incorrect.
- You **do not need to use complete sentences**. Fragments and bullet points are welcome, so long as your answer is clear and easy to understand.
- Be sure you have **five pages in the Part 2 packet**. If you do not have all of the pages, alert the Event Supervisor immediately. You are welcome to split up the test packet while completing Part 2.

FORMAT

- **The exam is 110 points** and consists of two parts: Stations (Part 1, 80 points) and Case Study (Part 2, 30 points).
- You have **twelve minutes to complete Part 2**. This section contains fifteen points and consists of scenario-related short answer questions. Your **fifteen-point score on Part 2 will be doubled** for the final score calculation.

Exam by Jeffrey Rubel • Williams College • Bain & Company • Boston, MA

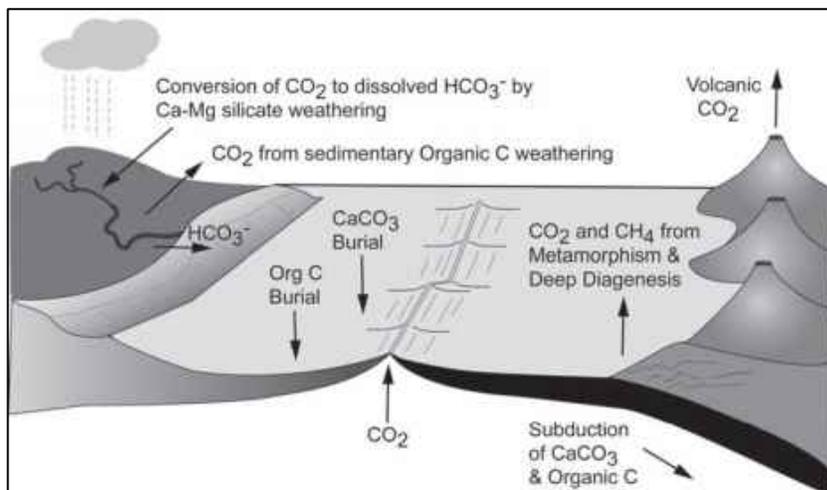
PART 2: EARTH, WIND, AND FIRE

Part 2 of this exam, the Short Answer section, is divided into four questions. Each question focuses on a different period of Earth history, looking at the implications of geologic events on the ocean, the climate, and the biosphere.

1: NEOPROTEROZOIC.

During the Neoproterozoic, the Earth was covered in glaciers from the poles to the equator. Twice. (~710 and ~640 million years ago.) However, exactly what caused these “Snowball Earth” events to start and stop is still up for debate.

One leading hypothesis for how the Earth exited its “snowball state” relates to the interplay between volcanism, glaciation, and the geologic carbon cycle. (A diagram of the geologic carbon cycle is on the right.)

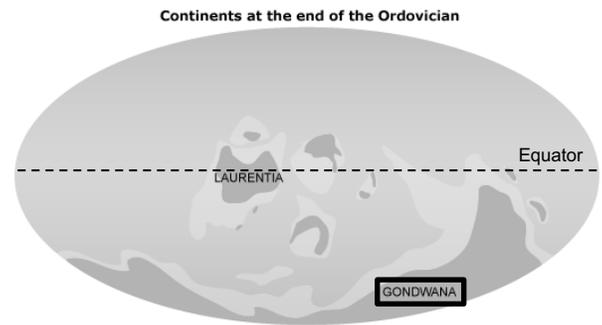


Explain how glaciation could affect volcanism, and how this—through effects on the carbon cycle—led to the warming of the planet and the end of Snowball Earth. (4 points)

2: PALEOZOIC, ORDOVICIAN.

The Phanerozoic is punctuated by five big mass extinctions, and the first of these extinctions was the Late Ordovician Mass Extinction. The leading hypothesis for the cause of this mass extinction is glaciation, which led to sea level fall, global cooling, and habitat loss.

Explain how the location of Gondwana at the end of the Ordovician (shown to the right) contributed to the onset of a global cooling. (2 points)



3: CENOZOIC, OLIGOCENE.

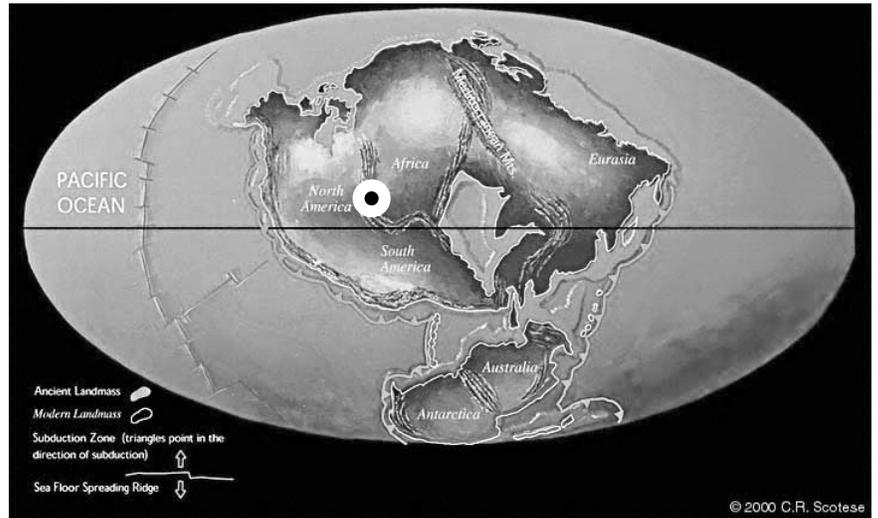
Around 10-20 million years ago, the Isthmus of Panama formed, connecting the continents of North and South America. The closure of the seaway that used to flow between the Atlantic and the Pacific had drastic effects on life, the ocean and climate.

Explain how the formation of the Isthmus of Panama affected (a) the mammals in North America, (b) the climate in present-day England, and (c) the onset of Northern Hemisphere glaciation. (4 points)

4: THE FUTURE.

It's always hard to predict the future, but that doesn't stop people from trying. To the right is one hypothesis of continental configuration might look like in 250 million years. Note how a supercontinent has formed near the equator.

Considering this continental configuration, let's try and predict what the global climate might be like. (Let's assume humans are extinct by then, the Anthropocene has ended, and the effects of human-induced climate change are over.)



Compared to the current continental configuration, would the temperature at the equator be warmer or cooler than it is now? What about at the North Pole? Why? (3 points)

Consider the location marked by the circle near the center of the supercontinent. What would you expect the temperature (hot v. cold) and precipitation (wet v. dry) to be like at this location? Why? (2 points)

EXTRA PAPER

*If you need more room for any of your responses, feel free to use this sheet of paper.
Be sure to clearly label which question you are answering.*