Name _____ Team Number _____

Part I: Multiple Choice (30pts)

Directions: Please choose the best answer for each question. There is only one correct answer for each question unless otherwise stated. There are 30 questions. Each one is worth 1 point apiece. All answers must be placed on your answer sheet or they will not be scored.

1. The famous question: What percent of Earth's surface is covered by glaciers?
A) 5%
B) 10%
C) 30%
D) there are no glaciers on Earth anymore

2. The total gain of new snow to a glacier system for a year is called:
A) ablation
B) wastage
C) accumulation
D) neve

3. This term refers to the wobbling of Earth's axis:
A) precession
B) eccentricity
C) obliquity
D) wobblicity

4. Who developed the first comprehensive theory of glaciation?
A) Milankovitch
B) Agassiz
C) Lyell
D) Charpentier

5. Who first proposed that glaciers had been more extensive than at present?
A) Darwin
B) Lyell
C) Charpentier
D) Venetz

6. What are the two board categories of glaciers?
A) alpine and national glaciers
B) mountain glaciers and ice caps
C) cirque glaciers and continental glaciers
D) valley glaciers and ice sheets

7. Which of the following water features are not formed by glaciers? (more than one answer is possible)
A) tarn
B) meandering stream
C) braided stream
D) kettle lake
E) hummock
F) oxbow lake

8. What is meant by the term periglacial processes?
A) processes which occur in a glacier
B) processes which occur under a glacier
C) processes which occur around a glacier's edge
D) processes that occur on land that used to be covered by glaciers

9. Which of the following types of glacier can be either alpine or continental?
A) piedmont glacier
B) tidewater glacier
C) corrie glacier
D) Hanging glacier

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10. Which of the following is not a type of patterned ground?
A)circles
B) steps
C) polygons
D) stripes
E) these are all patterned ground types
F) 3 of the types listed A-D are correct but one is not

11. How would the type of snowflakes seen in glacier ice be different between a place (Place A) where the average winter temperature is -2C and a place with an average winter temperature of -30C (Place B)? Assume all other meteorological conditions are the same & both places received precipitation.
A) Place A would have needle ice while Place B would have dendrites
B) Place A would have solid plates while Place B would have thin plates
C)Place A would have hollow prisms while Place B would have solid prisms
D) Place A would have dendrites while Place B would have columns

12. Which of the following is not an erosion feature created by a glacier?
A) kame
B) arete
C) U-shaped valley
D) all of the above are created by a glacier

13, How are felsenmeer (aka blockfields) created?
A) Freeze-thaw action
B) glacial erosion
C) glacial deposition
D) solifluction

14. What is the collective name for processes that occur under a patch of snow?
A) supranixation
B) ablation
C) nivation
D) subnixation

15. A drumlin's stoss end points north while its lee end points south. From which direction did the glacier come?
A) North
B) South
C) East
D) West
E) Not enough information to answer the question.

16. What would need to occur to transform an arete into a pyramidal peak?
A) a landslide
B) another cirque eroding headward
C) a meltwater stream
D) wind and an average of about 10,000 years

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17. The trivia question of the day: What is a ledoyom?
A) a former terminal moraine which was destroyed during a glacial surge
B) a glacier that forms between mountains during an ice age
C) a synonym for a bergschrund
D) a mound of earth covered ice which is larger than a pingo

18. How would the melting of the Greenland Ice Cap affect the Earth?
A) Cities that are less than 25 m above sea level would become submerged
B) The amount of atmospheric CO_2 would decrease since the increased water in the ocean would absorb excess CO_2 in the atmosphere.
C) The sea level would rise about 7m
D) It would have no effect

19. If a glacier has a positive mass balance, it would be expected to be:
A) advancing
B) retreating
C) staying stationary

20. Which of the following is not one of the main ways glaciers move?
A) Creep
B) Basal sliding
C) subglacial deformation
D) Internal deformation
E) All are way in which glaciers move
F) Two answers A-D are incorrect

21. Which of the following moraines is the most common and can be found on every continent?
A) medial moraines
B) ground moraines
C) terminal moraines
D) lateral moraines

22. Suppose an alpine glacier has 3 medial moraines. What is the minimum number of other alpine glaciers this glacier merged with?
A) 1
B) 2
C) 3
D) 4

23. Parts of Canada that used to be below sea level are now above sea level. How do you explain this?
A) Global warming has melting glaciers, which caused the sea level to rise
B) Magma is building here and a volcanic eruption will probably occur within the next 100 yrs
C) Sea level has decreased since sea level is being incorporated in forming glaciers
D) The land was depressed by glaciers and is now undergoing isostatic rebound

24. Which type of glacial sediment is deposited by a glacier undergoing basal melting?
A) varve
B) lodgement till
C) eolian deposits
D) erratics

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25. What were the two main ice sheets in North America during the Wisconsin Ice Age?
A) Cordilleran & Agassiz
B) Cordilleran & Laurentide
C) Laurentide & Agassiz
D) Agassiz & Bonneville

26. Where would you find the largest velocity in a flowing glacier?
A) the top near the sides
B) the center of the glacier
C) the top in the center
D) the sides

27. Suppose a glaciologist find striations in a rock. They are oriented point north and south. In which direction could the glacier have flowed?
A) west or north
B) south or east
C) north or south
D) west or east

28. Sometimes when an iceberg calves underwater, it will jump out of the water. Why is that?
A) the iceberg is light so it floats
B) the ice is less dense compared to the water, so it moves to the surface rapidly
C) cracking glacial ice released oxygen which acts as a propellant to push the glacier out of the water.
D) the iceberg is really excited

29. Which of the following sequences shows the North American Ice Ages in order from the least recent to the most recent?
A) Kansan, Illinoisan, Wisconsinan, & Nebraskan
B) Nebraskan, Kansan, Illinoisan, & Wisconsinan
C) Wisconsinan, Illinoisan, Kansan, & Nebraskan
D) Illinoisan, Wisconsina, Nebraskan, Kansan

30. Which of the following pluvial lakes formerly occupied Death Valley during the Holocene Epoch?
A) Lake Manly
B) Lake Bonneville
C) Lake Missoula
D) Lake Lahontan

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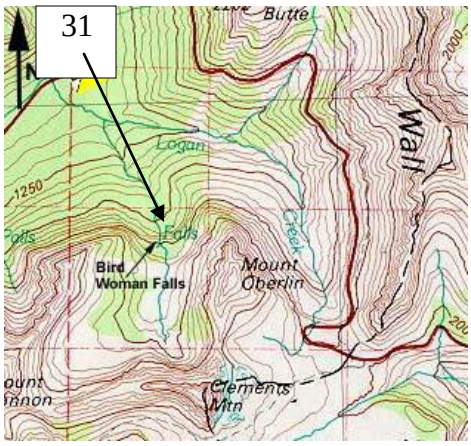
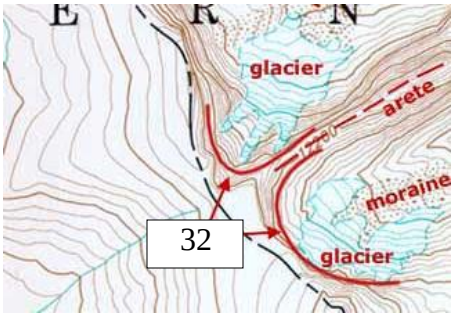
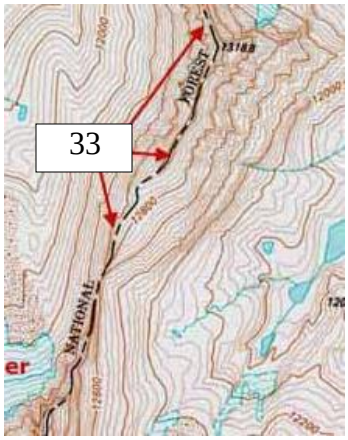
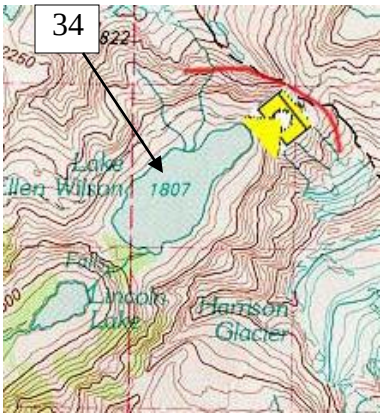
Part II: Glacial Features (13 pts)

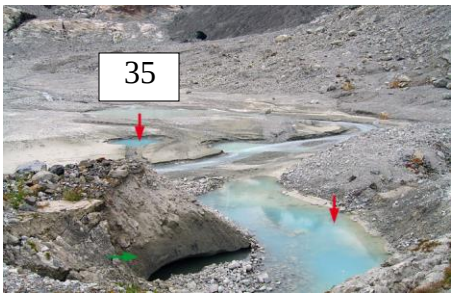
Directions: Please write the name of the feature seen in the image on your answer sheet. Each question will be worth one point.

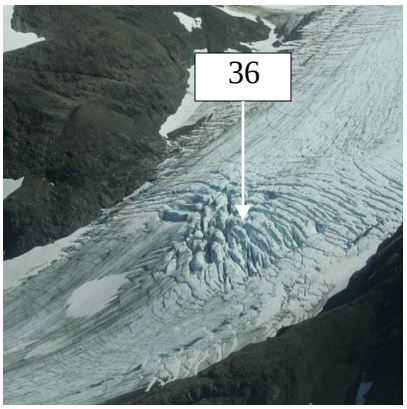


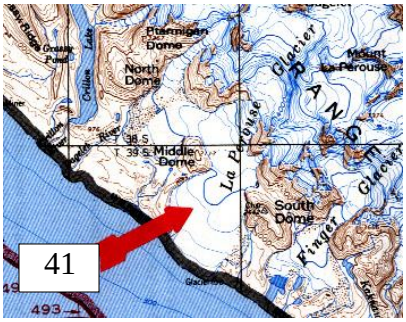


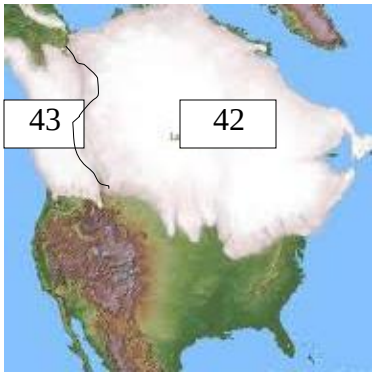












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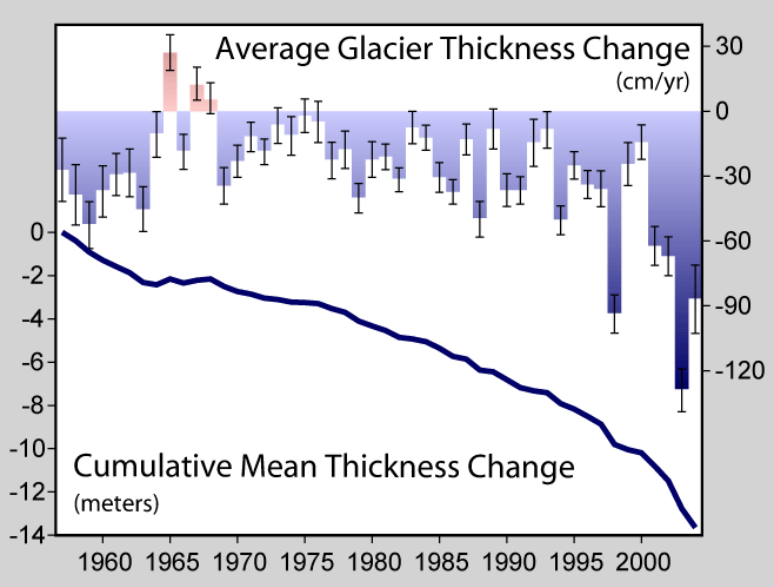
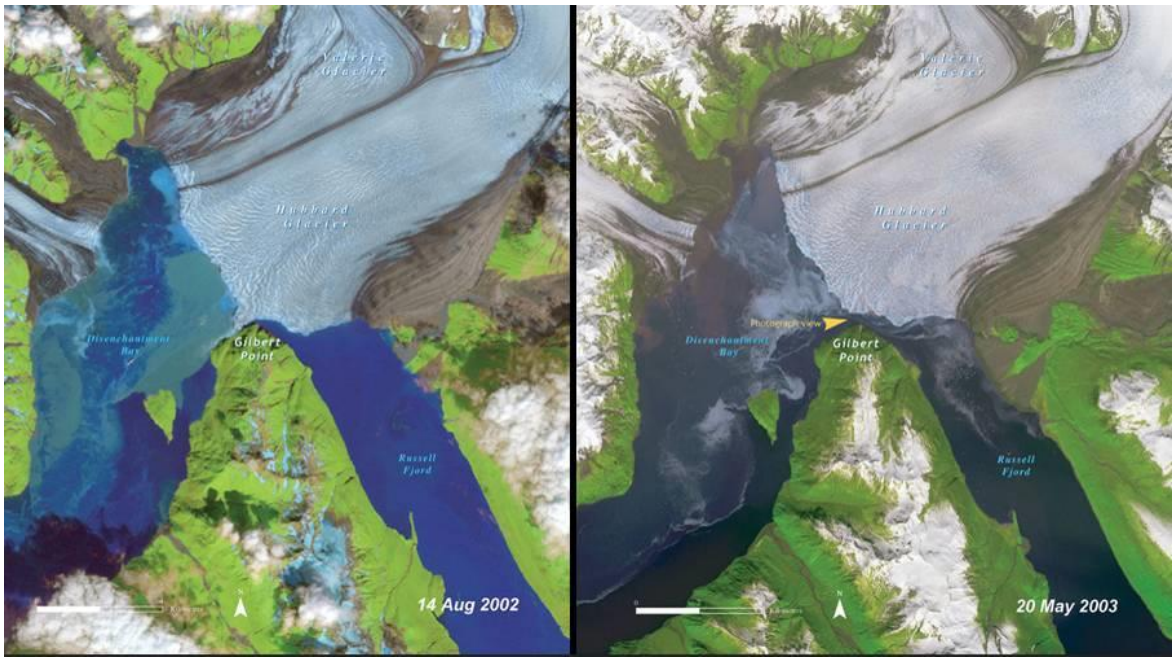
Part III: Free Response (21pts)

Directions: Please answer the following questions to the best of your ability. When applicable, please include units as given in the problem. Include as much terminology as possible since this can only increase the points you earn. Point values are listed next to each of these questions.

44. The following graph shows the cumulative mean thickness change. Based on this, about how much was the thickness decreased per decade from 1960 to 2000? (2pts)



45. The following image shows the same region in Aug 2002 & then later in May 2003. Note the opening of a passage between the bay & the fjord.



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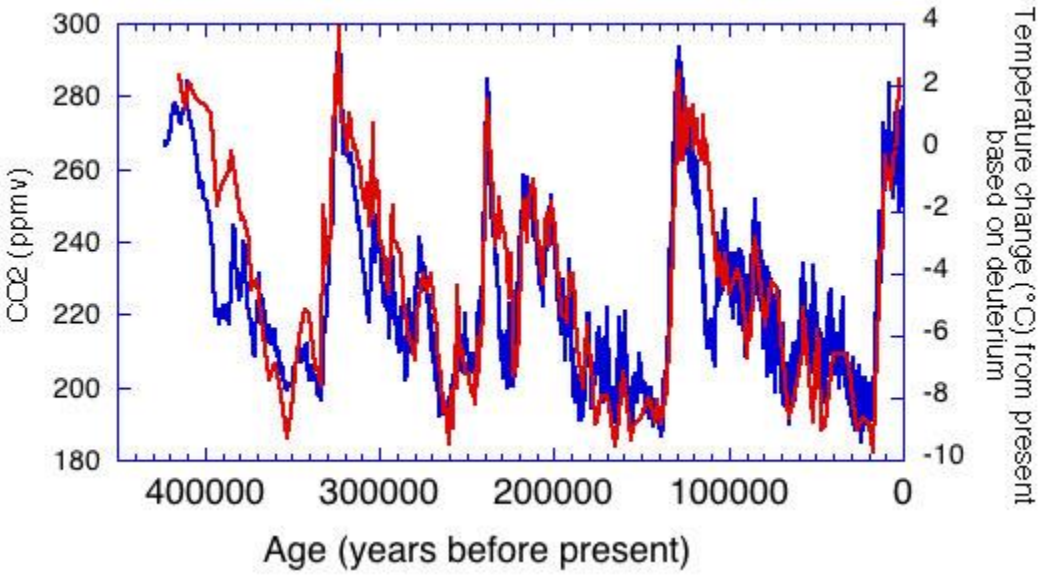
a. Briefly explain what could have caused this to happen (1pt)

b. Explain one negative consequence of the "ice dam" melting (1pt).

46. A NASA article states that Antarctic ice shows a greater variability than Arctic ice does. Why is that? (2pts)

47. Place the ice ages in order, starting with the most recent (5pts):
_____ Karoo
_____ Huronian
____ Wisconsin
_____ Saalian
____ Andean-Saharan
_____ Elsterian

48. In the following diagram, temperature is shown in blue & carbon dioxide is shown in red. Based on this graph, it is reasonable to say that there is a direct correlation between CO_2 and temperature? Explain why this correlation exists or if there is no correlation, explain an environmental factor that does have a direct correlation to temperature (2pts).



49. Scientists were not around 100,000 years ago, yet we know what the climate was like back then. Name one method we use to determine past climates. Give a brief description of the method. (3pts)

Score on page: _____

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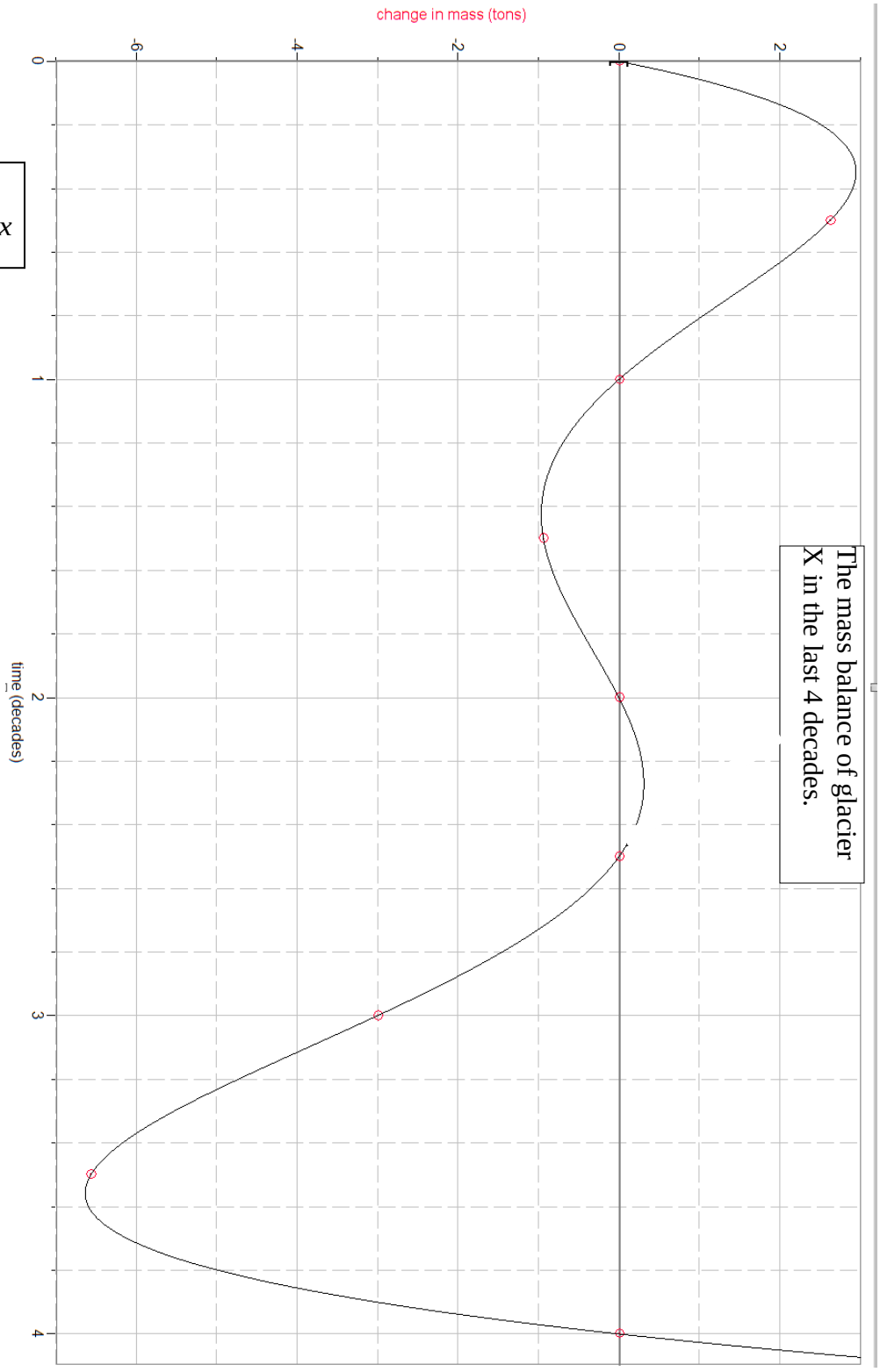
50. The following graph shows the mass balance of the glacier over a four-decade period. A positive value indicates that accumulation exceeded ablation while a negative value means the ablation was greater than accumulation. From the graph, determine the net change in mass balance of this glacier. (5pts)

Model of the function:
$x^5 - 9.5x^4 + 31.5x^3 - 43x^2 + 20x$



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Name _____ Team Number _____

Part IV: Themes (10pts)

Directions: You will be given five groups of three words. Please state which word does not belong with the other two and then briefly explain why. Each question is worth two points, one point for stating which term does not belong and one point for the description.

51. Active glacier, undernourished glacier, reconstituted glacier

52. Drumlin, esker, moraine

53. Lambert Glacier, Malaspina Glacier, Konwakiton Glacier

54. Valdivia, Devensian, Riss

55. jökuhlaup, outburst flood, bora

Score on page: _____

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Answer Sheet

Directions: Please place all answers on this sheet. You may separate the test and write on it, but only answers written on these answer sheets will be scored. The point values of the questions are written by each question or in the directions. You will only have 50 minutes to complete the test. Since this is a practice test, I suggest following a slightly different set of rules: 1) Work alone. The purpose of this test is to help you stay sharp on glaciers throughout the summer. You will learn much more if you and a partner each take this test on your own so that you can each see were your weak points are. 2) Do not use a reference sheet. Again, the purpose of this test is to see what you know, not if you can find the information on your reference sheet. You will be more successful in the coming season if you put knowledge of glaciers into your memory now rather than spending the summer filing your mind with the location of where everything is on your reference sheet. After you have graded the test, then use your reference sheet to see if everything is there or if you need to add anything.

Part I (30pts)

1. _____
2. _____
3. _____
4. _____
5. _____
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7. _____
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26. _____
27. _____
28. _____
29. _____
30. _____

Part II (13pts).

31. _____
32. _____
33. _____
34. _____
35. _____
36. _____
37. _____
38. _____
39. _____
40. _____
41. _____
42. _____
43. _____

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Part III (21 pts)

44.

45a.

45b.

46.

Score on page: _____

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47. _____ Karoo

_____ Huronian

____ Wisconsin

_____ Saalian

____ Andean-Saharan

_____ Elsterian

48.

49.

50.

Score on page: _____

Cumulative Score : _____

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Part IV (10 pts)

51.

52.

53.

54.

55.

Score on page: _____

Cumulative Score : _____