UFSO

SCIENCE OLYMPIAD
AT THE
UNIVERSITY OF FLORIDA

Northern Regional: January 19th, 2019

Geological Mapping C Answer Key

Name(s): _____

Team Name: _____

School Name: _____

Team Number: _____

Rank: _____

Score: _____

UF GEOMAP KEY

Multiple Choice- Select All:

1. A, B, C
2. A, E
3. B, D
4. A, B, C, E
5. B, E
6. A, B
7. A, D, E
8. C, D
9. A, B, C, E
10. A, B, D

Multiple Choice- Select One:

11. C
12. C
13. C
14. A
15. D
16. E
17. A
18. B
19. B
20. E

Rock Layers:

21. H, E, F, B, T, W, J, R, A, K, L, M, P **[TIEBREAKER #4]**

Math

+5 pt. for exact answer. +3 pt. for ± 0.5 the correct answer. +1 pt. for ± 1 the correct answer.

22. 29.64 ft
23. 400 ft/mi
24. 58.63°
25. 1.17 meters
26. 7.93 meters **[TIEBREAKER #1]**

Written Response:

27. What is a dip isogon? Distinguish between the three classes of dip isogons in fold geometry. (5 points; 2 points for defining "dip isogon"; 1 point for each Class description)

Dip isogons: imaginary lines that can be drawn between two points of equal dip within the fold structure. They are straight lines that can be used to connect inner and outer boundaries of folded layers. The orientation of dip isogons can be used to classify folds into three classes. Imaginary lines between fold plains are used for analysis of geometry.

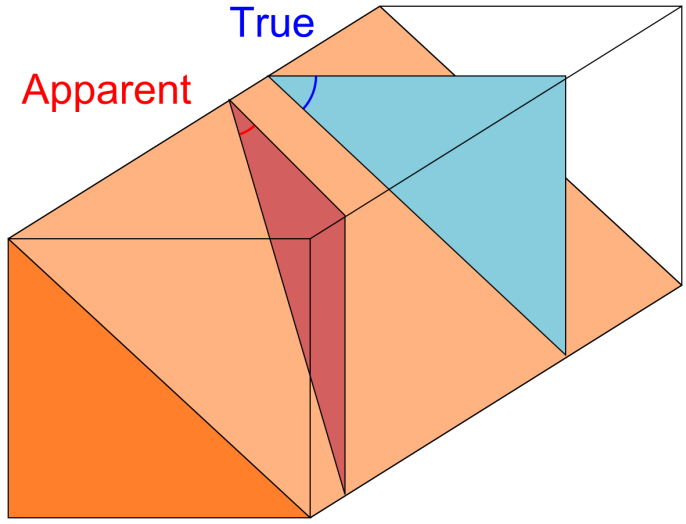
Class 1 – The dip isogons converge toward the inner arc, which is tighter than the outer arc.

Class 2 – The dip isogons are parallel hence the inner and outer arc curvatures are the same. It is known as a "similar fold".

Class 3 – Is characterized by parallel dip isogons with no convergence on either side.The Class 3 type has the isogons converging toward the outer arc.

28. Distinguish between true dip and apparent dip. Supplement your answer with a sketched diagram. (4 points; 2 points for contrasting apparent dip and true dip; 2 points for diagram)

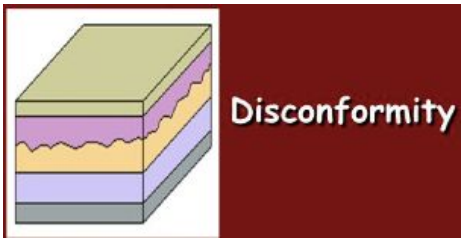
Apparent dip refers to the inclination of geologic beds as seen from any vertical cross section not perpendicular to the strike of the cross sections, while true dip refers to the inclination seen between the geologic beds when the vertical cross-section is perpendicular to the strike.



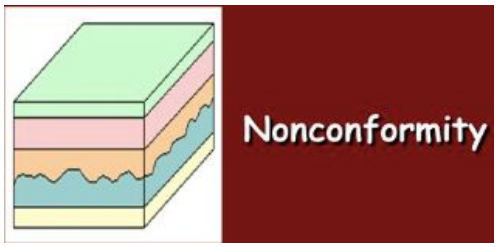
29. Contrast the three different types of unconformities. Supplement each description with a sketched diagram. (6 points; 1 point for each correct description; 1 point for each correctly drawn diagram)

Angular Unconformity: Where an older package of sediments has been tilted, truncated by erosion, and than a younger package were deposited on this erosion surface.

Disconformity: An erosion surface between two packages of sediment, but the lower package of sediments was not tilted prior to deposition of the upper sediment package



Nonconformities: Unconformities that separate igneous or metamorphic rocks from overlying sedimentary rocks.



30. Name and explain three factors that affect how a material behaves throughout the stages of deformation. (6 points; 1 point for each factor named; 1 point for each correct explanation. Give credit for name & explanation of any 3 of the 5 factors below) **[TIEBREAKER #3]**

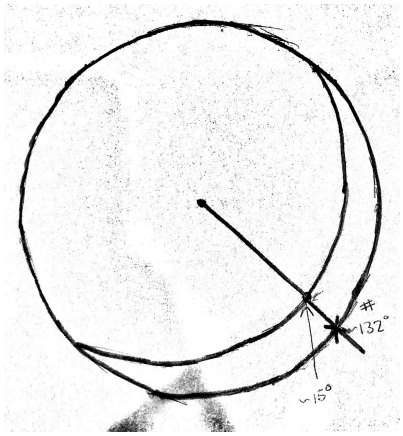
1. Temperature- At high temperature molecules and their bonds can stretch and move, thus materials will behave in more ductile manner. At low Temperature, materials are brittle.
2. Confining Pressure- At high confining pressure materials are less likely to fracture because the pressure of the surroundings tends to hinder the formation of fractures. At low confining stress, material will be brittle and tend to fracture sooner.
3. Strain Rate- At high strain rates material tends to fracture. At low strain rates more time is available for individual atoms to move and therefore ductile behavior is favored.
4. Mineral Composition- Some minerals, like quartz, olivine, and feldspars are very brittle. Others, like clay minerals, micas, and calcite are more ductile This is due to the chemical bond types that hold them together. Thus, the mineralogical composition of the rock will be a factor in determining the deformational behavior of the rock.
5. Presence or absence of water- Water appears to weaken the chemical bonds and forms films around mineral grains along which slippage can take place. Thus wet rock tends to behave in ductile manner, while dry rocks tend to behave in brittle manner.

Matching (2 points for each correct answer)

31. C
32. A
33. B
34. G
35. H
36. D
37. F
38. E

Stereonet

39. Reference the image below.



40. 130°-135° accepted
41. 13°-17° accepted **[TIEBREAKER #2]**

Topographic Map Interpretation:

Image A:

42. (2 points) 10 meters
43. (3 points; 1 point for showing step(s); 2 points for correct answer)

$$\text{Gradient} = \frac{\Delta \text{ Elevation (m)}}{\text{Distance (km)}}$$

$$\text{Gradient} = \frac{310\text{m} - 230\text{m}}{3.3\text{ km}}$$

Gradient = 24.24 m/km (+1 point for answers from 22.8 - 26.7)

44. (5 points; 1 point for correct setup; 3 points for correct values, 1 point for smooth curve)
[TIEBREAKER #6]

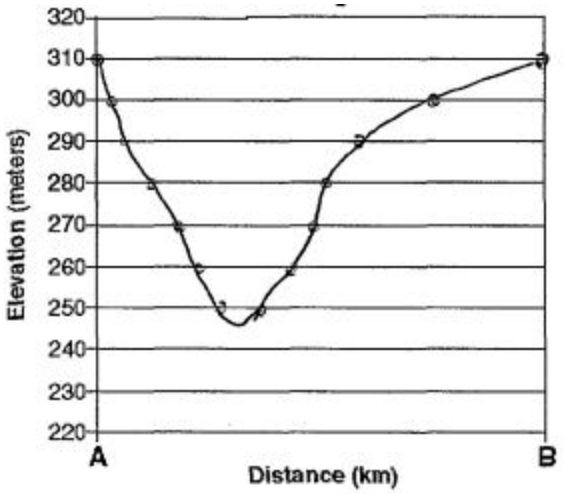
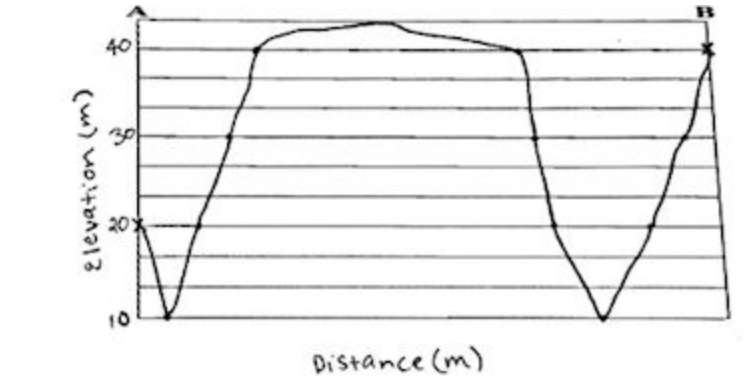


Image B:
45. (2 points) 10 meters
46. (8 points) Quidditch Pitch, Eragog, Hogsmeade Station, Unicorn, Whomping Willow, Grawp, Shrieking Shack, Boat Landing
47. (3 points) 6.25m (2 points for values ± 0.25 m; 1 point for values ± 0.5 m)
48. (5 points) ~ 35 meters (Full credit for values ± 3 m; 3 points for values ± 6 m)
49. (5 points) ~ 150 meters squared (Full credit for values ± 10 m; 3 points for values ± 15 m)
[TIEBREAKER #5]
50. (5 points; 1 point for correct setup; 3 points for correct values, 1 point for smooth curve)



Fill in the Blank:

51. Magnetic declination
52. Flux melting
53. Compressional/longitudinal; shear/transverse
54. Left-lateral
55. Chevron fold
56. Baked contacts
57. Cretaceous
58. Dike
59. James Hutton
60. Transitional

Labeling:

61. Magnetic Needle or Needle
62. Orienting Arrow or Arrow.
63. Azimuth Ring. Accept Degree Dial.
64. Mirror. Accept other answers that include mirror.