C - Geologic Mapping (C) - Pearl City Invitational - 12-12-2020

This Geologic Map is a compilation of a variety of Geologic Map analysis as listed in the rules.

Spelling will count. Incorrect spelling but close to will be given partial points.

You have 50 minutes to complete this test, 5 minutes to photograph/scan cross-section and email it to the address listed.

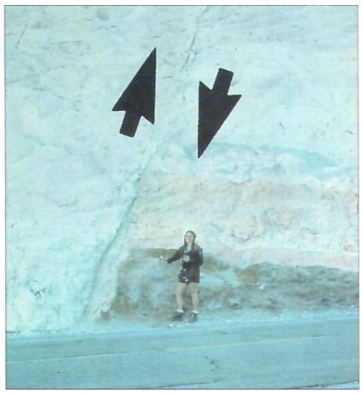
1. (1.00 pts) Fig 1. This photo of a road cut shows why type of fault in the lower right hand corner?

Normal Fault

2. (1.00 pts) Fig 1's fault is caused by what type of stress, force or movement?

Extension, pulling apart

3. (1.00 pts) Fig 2. The arrows show direction of movement along this fault. What type of fault is it?



Reverse Fault

4. (1.00 pts) Fig 2's fault is caused by what type of stress, force or movement?

Compression, Collison

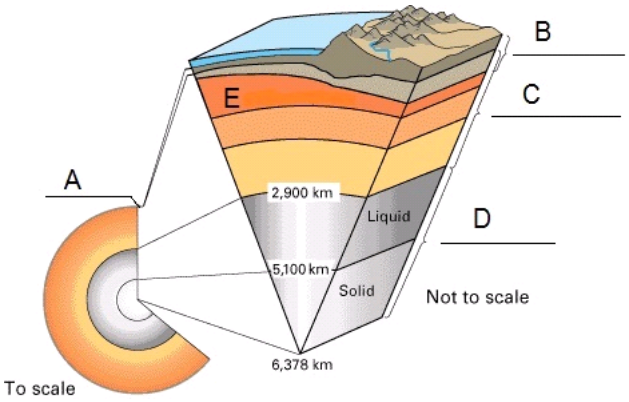
5. (1.00 pts) Fig 3. What type of fault shown by the large outcrops is in this aerial photo?

Transform, Right Latera

6. (1.00 pts) Fig 3's fault is produced by what kind of stress, force or movement?

Shear, sliding

Fig 4. Use this image to answer the following questions regarding Earth's interior.



7. (1.00 pts) Feature A:

Crust

8. (1.00 pts) Feature B:

Llithosphere (crust & up

9. (1.00 pts) Feature C:

Mantle

10. (1.00 pts) Feature D:

Core

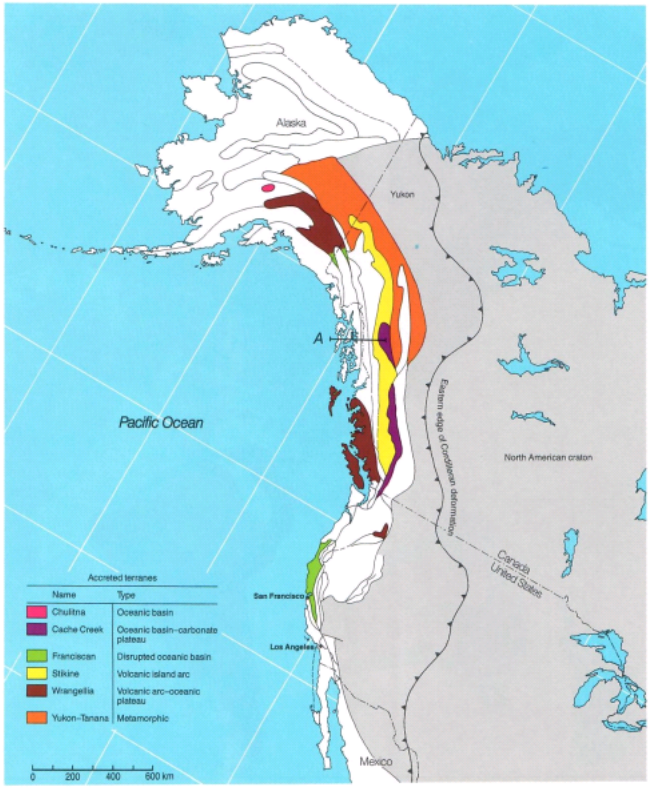
11. (1.00 pts) Feature E:

Asthenosphere

12. (3.00 pts) Explain how seismologist were able to figure out the Earth's interior structures? (Hint: waves)

Expected Answer: Seismic wave, P-, S-, Rayleigh waves. From natural & man-made movement. Different properties of the the earth's interior has different effects on what waves go through or don't.

Fig 5. Answer the following questions based on this map.



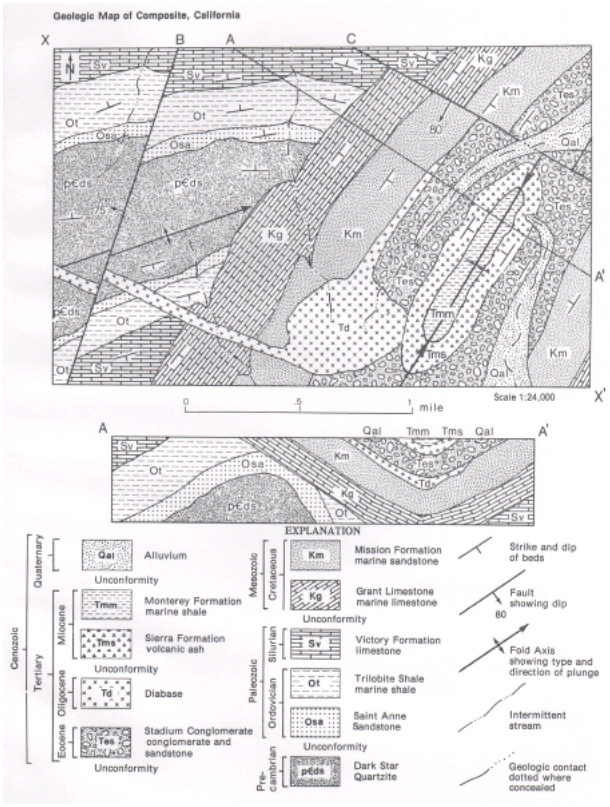
13. (10.00 pts)
This map shows a number of accreted terranes. Explain, using your knowledge of plate tectonics, what is an accreted terrane and what is shown in this map. Use details from the map to support your explanation.

Expected Answer: Accreted terranes are enlargements to continents from the tectonic addition of crustal elements such as island arcs, seamounts, or continental fragments, often carried over long distances from original location. Usually caused by direct collison at a convergent plate boundary or by a strike-slip motion along a transform fault. In this map, yo see the brightly colored rock assemblages that differ sharply from the gray continental crust. The white and colored terranes are where they are at due to collison of the Pacific Plat with the North American Plate and getting stuck during the late stages of the Cordilleran mountain building orogeny.

14. (3.00 pts)
In Image 5, there is a line with arrows. What is this line with arrows indicating? What type of boundary in plate tectonic terminology is occuring. (try to include which plates are traveling in what general directions).

Expected Answer: Thrust fault, first generation, certain. Showing a convergent plate boundary in which the right side is thrusting over the left side in a westward fashion;

Fig. 6 A hypothetical geologic map of Composite, California. Other than a few stream channels to illustrate Rule of V's, topography has been omitted due to lack of color. Use this map to answer the following questions.



15. (2.00 pts) Explain what is the "Rule of V's" and how it is used?

Expected Answer: The "V" shape in a stream contour indicates streams and direction of flow. The pointed V points upstream and water flows towards the open in.

16. (3.00 pts)
The stream in the center of the map, outcrop Td, crosses Km, Kg, pCds, Osa, Ot, Sv. Explain water flow direction(s) and what is possibly occuring here. What can you reason wha is happening on this map?

Expected Answer: Stream starting at Td is flowing northward based on the V's pointing to the south. It continues this flow direction across the outcrops until it intersects with pCd (trough/valley/depression). On the north side (Sv, Ot, Osa), the stream is flowing in a southward direction. pCds is Dark Star Quartzite and the oldest lithologic unit in the area which probably has experienced a lot of erosional activity. Water will flow to the lowest elevation.

17. (1.00 pts) What type of streams are shown on this map?

Intermittent stream

18. (2.00 pts) There are three major rock families. List one rock family and an example from the map.

Sedimentary | Alluvium (see map)

19. (2.00 pts) There are three major rock families. List another rock family not listed in previous question and an example from the map.

Igneous | Diabase

20. (2.00 pts) There are three major rock families. List another rock family not listed in the previous questions and an example from the map.

Metamorphic | Dark Star Quartzite

21. (2.00 pts) What is the general regional strike of the Paleozoic formations?

E-W, dip N

22. (2.00 pts) List two general types of structures present on this map?

transform fault, faults, ι | anticline, syncline

23. (2.00 pts) What is the major structural pattern on the East side of the map?

Syncline, plunging

24. (2.00 pts) What is the major structural pattern on the West side of the map?

Anticline

25. (2.00 pts) The contact between the Paleozoic and younger rocks is a(an) _____.

unconformity

26. (2.00 pts) Which side has been uplifted? (Hint: uplifted side will have more of the older rocks)

West, Northwest portio

27. (2.00 pts) What is the name of the igneous feature that has been bisected along the fault labeled B on the map?

dike, extrusion

28. (2.00 pts)
Stream distribution and erosion patterns provide additional information about a region. Streams originate in topographically higher areas which generally consist of more resistant rock. What the the two most resistant rocks in this area?

pCds ('Quartzite)

Td (Diabase)

Fig 7. Located in the Black Hills of South Dakota. Use this figure to answer the following questions.

29. (2.00 pts) List the formation ages shown in Fig 7 from youngest to oldest.

Expected Answer: Tertiary Cretaceous Paleozoic PreCambrian

30. (3.00 pts) Fig 7 has an interesting shape or characteristics to it. What is this structure and why do you think this happened?

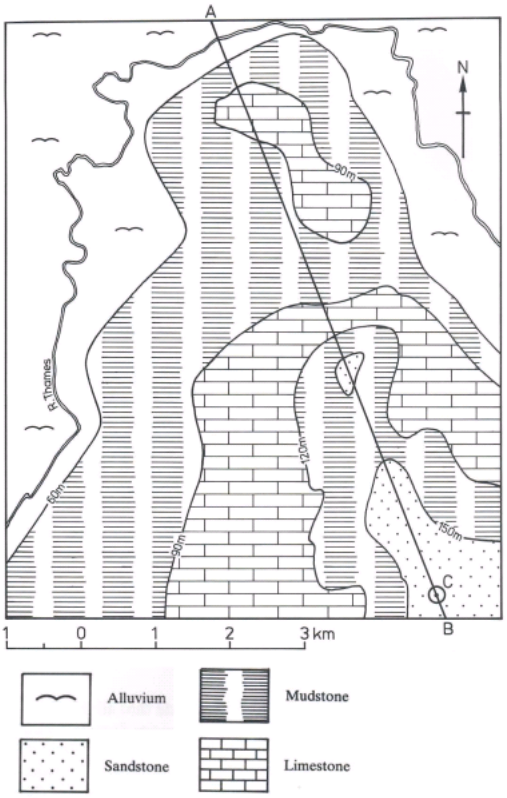
Expected Answer: Oval dome - an area of uplift sloping off more or less uniformly in all directions from it's highest point. It's due to upward movement with little or moderate faulting or folding. More erosional features that help expose the domal uplift.

Fig 8. A travel to England. Geologic Map 1 Cross-Section

Map Information:

A vertical borehole located on a site at point C 170m Above Ordnance Datum (A.O.D.) passed through the following Cretaceous and Jurassic Formations: 0-20 m Lower Greensand, 20-50 m Kimmeridge Clay, 50-80 m Corallian Beds, 80-170 m Oxford Clay. All the bedding planes encountered in the borehole displayed a horizontal attitude. The Geologic Map and key are below.

A Travel to England Map 1



31. (30.00 pts)
Draw a Geologic Cross-Section along the line A-B and on it mark the Formations intersected by the borehole. Graph paper is best to use. Be clear with your drawings.

1. Indicate A-B on cross-section
2. Include Title

3. Include Key with the lithologic units
4. Vertical Scale: 1mm = 5mm (Include written and drawn scale, indicate that is for vertical)
5. Horizontal Scale: Include what you determine from your screen.
6. Show location of Borehole C on cross-section
7. Draw a dashed line to connect outcrops over open valleys
8. Include your elevation points used at the bottom of your cross-section (verification process for assessment, no need to erase)

Email photo or scanned copy of your Cross-Section to:

Team Name/Number/Names etc should also be written on the cross-section. If not identified, it will not be graded.

GeoMaps.SO@gmail.com w/i **5 minutes of official test ending time**. (times will be cross-checked)

Expected Answer: See cross-section.

Congratulations!

I hope you had fun doing this test and were suitably challenged.