

Student Name:

Grade:

TORREY PINES BEACH FIELDTRIP #1 WORKSHEET GEOLOGY AND TECTONICS OF COASTAL SAN DIEGO

GEOLOGIC AND TECTONIC HISTORY OF SAN DIEGO COUNTY

1) List the 4 major tectonic periods that San Diego has experienced in its 250 million year history?

1st Stage _____ **Period of Time:** _____ to _____ million years ago

2nd Stage. _____ **Period of Time:** _____ to _____ million years ago

3rd Stage _____ **Period of Time:** _____ to _____ million years ago

4th Stage _____ **Period of Time:** _____ million years ago to present

2) What rock type formed San Diego's first original crust? (Hint: Stage #1) _____

3) San Diego's coastal basement rock consists of volcanic and intrusive rocks (mostly andesite & granite). These rocks were generated during which of the four tectonic periods? _____

COASTAL GEOLOGY OF TORREY PINES BEACH BLUFFS

4) What type of rock make up the local bluffs? (Circle one) Igneous Sedimentary Metamorphic

5) Name the three specific rock type(s) observed. _____

6) What sorts of sediments make-up the bluffs rocks? _____, and _____, and _____

7) What two dominant minerals make-up bluffs rock sediments? _____, and _____

8) What minor minerals also make-up bluffs rock sediments? _____, _____
_____, _____, _____, and _____

9) Name 3 present-day marine depositional settings where such sediments are currently depositing.

1. _____ 2. _____ and 3. _____

10) List the geologic names and ages for the major rock formations making up the bluff.

<u>Formation Name</u>	<u>Age (myo)</u>	<u>Lithology</u>	<u>Depositional Setting</u>
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Top Fm.

Bottom Fm.

11) What is the general name for the boundary between two rock formations? _____

12) Del Mar Fm and Torrey Sandstone formed during which of the four tectonic periods? _____

13) If the Torrey Pines Sandstone originated as a sandy beach or barrier island, then how did this rock formation end up 10's of meters above sea level? List 2 ways that this could have happened.

a) _____ and/or b) _____

Given that the Eocene period was a very warm time on Earth, which scenario above is more likely? Hint: Compare the most likely sea level conditions of the Eocene to today's level.

14) Based on your newfound understanding of how each of these rock formations were formed within a unique coastal marine depositional setting, explain why the Del Mar Formation is lying directly beneath the Torrey Pines SS (same geographic position), even though each of these two different rock units deposited in distinctly different marine environments. Hint: Think about shoreline position and relative changes in sea level AND your answers to question #7 above.

OBSERVATIONS OF THE BEACH SEDIMENT:

15) Analysis of Beach Sand: **Color:** _____ **Grain size:** Coarse, medium or fine?

Sand Composition: Light Colored minerals: 1) _____ and 2) _____ = % _____

Dark minerals: 1 _____ 2 _____ 3, _____, 4 _____ 5 _____ = % _____

16) What's the dominant mineral making up the beach sand here? _____ Why that mineral?

17) Does the beach sand material form horizontal layers? Yes? No? If so, then why layered?

18) Two major natural sources for sand that replenishes **this** beach? _____ and _____

19) Two major artificial sources for sand that replenishes **this** beach? _____ and _____

SEISMIC HAZARDS OF COASTAL SAN DIEGO:

20) What type of plate boundary runs through Southern California? _____

21) The San Andreas Fault System represents which tectonic stage of San Diego? _____

22) Name the active SAFS fault that lies offshore of here, parallel to this beach. _____

23) What kind of fault is it? _____

24) What sort of earthquake magnitude and frequency is the Rose Canyon fault capable of?

Maximum magnitude? _____ Frequency of "Big Ones" ? _____

25) Is our shoreline susceptible to tsunamis? _____ Why? _____

26) What's estimated time of warning for locally-generated tsunami? _____ How to prepare?

POST TRIP REFLECTION:

27) Purpose of trip: _____

28) What did you actually learn on this trip? _____

29) What did you find most interesting and/or important? _____

30) What did you find most difficult or challenging? _____