

Name: _____ Class: _____ Grade: _____

FIELDTRIP #1 WORKSHEET - TORREY PINES BEACH

GEOLOGIC AND TECTONIC HISTORY OF SAN DIEGO COUNTY

1) List the 4 major tectonic periods that San Diego has experienced in its 400+ million year history.

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

Geologic Setting: _____

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

Geologic Setting: _____

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

Geologic Setting: _____

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

Geologic Setting: _____

2) What rock type formed San Diego's first original thin crust? (Formed during Stage #1) _____

3) Today, San Diego's thick crust consists of felsic volcanic & plutonic rocks (e.g. andesite & granite).

These rocks were generated during which of the four tectonic periods? _____

PRESENT-DAY TECTONIC SETTING OF COASTAL SAN DIEGO:

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

5) Name the famous fault system that represents this plate boundary in So Cal _____

6) What kind of fault is the San Andreas? _____

7) Name our local active SAFS fault that runs through coastal San Diego. _____

8) What kind of fault is the Rose Canyon? _____

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

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

COASTAL GEOLOGY OF TORREY PINES BEACH BLUFFS

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

11) List the formal geologic names and ages for the two major rock formations making up the bluff.

| <u>Formation Name</u> | <u>Age (myo)</u> | <u>Rock-type</u> | <u>Depositional Setting</u> |
|-----------------------|------------------|------------------|-----------------------------|
|-----------------------|------------------|------------------|-----------------------------|

Top Fm.

Bottom Fm.

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

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

15) List 3 sediment grain-sizes of these bluff rocks. _____, and _____, and _____

16) Two most abundant minerals make-up these bluffs rocks? _____, and _____

17) What other notable minerals also make-up bluffs rock sediments? _____,
_____, _____, _____, and _____

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

1. _____ 2. _____ and 3. _____

19) 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.

1. _____ and/or 2. _____

20) Given that the Eocene period was an extremely warm time on Earth, which scenario above is more likely? Why? *Hint:* Compare the most likely sea level conditions of the Eocene to today's level.

Answer: _____

21) 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.

Answer: _____

OBSERVATIONS OF THE BEACH SEDIMENT:

22) 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 _____ = % _____

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

24) List two major sources (origins) for the beach sand? _____ and _____

POST TRIP REFLECTION:

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

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

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