

**Exam 1: California's Natural Provinces, Plate Tectonics**

(Multiple choice questions worth 2 points each)

- 1) Which of the following is a famous valley in the Basin and Range?
  - A) San Joaquin Valley
  - B) Death Valley
  - C) Shasta Valley
  - D) Santa Clara Valley
  - A) island arc
  - B) transform fault
  - C) fracture zone
  - D) magmatic arc
  - E) basin and range
- 2) Why is the Basin and Range arid?
  - a) rain shadow
  - b) Horse Latitudes
  - c) Westerlies
  - d) Easterlies
- 3) What was the tectonic setting of Mesozoic California and the Sierra Nevada?
  - a) Transform margin
  - b) Divergent margin
  - c) Continent-continent
  - d) Convergent margin
- 4) What two major factors have played a role in the 1980 Mammoth Lakes earthquake swarm?
  - a) tree kill, hot springs
  - b) magma movement, faulting on Sierra fault
  - c) magma movement, tree kill
- 5) Pleistocene lakes in the California deserts resulted from glacial run off. Strandlines are one line of evidence for high lake levels, what is the second?
  - a) tufa towers
  - b) lake sediment
  - c) plant species
  - d) historical evidence
- 6) The Colorado Desert province is the on-land extension of what major geologic structure?
  - A) Sierra Nevada Fault
  - B) Cocos Plate
  - C) Trans Mexican Volcanic Belt
  - D) East Pacific Rise
  - E) None of the above
- 7) What faults border the NE and SW boundaries of the Salton Trough?
  - A) Calaveras, Hayward
  - B) Elsinor, San Jacinto
  - C) San Andreas, Garlock
  - D) San Andreas, San Jacinto
- 8) What was the tectonic setting of Mesozoic California and the Sierran Batholith?
  - 9) When was the largest historical earthquake in California?
    - A) 1857
    - B) 1971
    - C) 1906
    - D) 1868
  - 10) What province did this historic quake occur in?
    - A) Basin and Range
    - B) Sierra Nevada
    - C) Transverse
    - D) Coast Ranges
  - 11) What is the tectonic setting of the Cascade Range?
    - A) Divergent boundary
    - B) Convergent boundary
    - C) Transform boundary
    - D) Fracture zone
  - 12) The Big Bend in the San Andreas transform results in uplift of the Transverse Ranges. The Big Bend forms a \_\_\_\_\_.
    - A) restraining bend
    - B) releasing bend
    - C) seismic bend
    - D) aseismic bend
  - 13) What faults define the NW and SW boundaries of the Mojave Desert?
    - A) Transverse Ranges, Sierra Nevada
    - B) Garlock Fault, San Andreas Fault
    - C) Whittier Fault, Garlock Fault
    - D) San Jacinto Fault, San Andreas Fault
    - E) Elsinor Fault, San Gabriel Fault
  - 14) The three basic concepts of plate tectonics are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
    - A) Convergent, Divergent, Transform
    - B) Ocean-Ocean, Ocean-Cont., Cont.-Cont.
    - C) Rigid plates, Plates move, Deformation at plate boundaries
    - D) East Pacific Rise, Ocean Trenches, Hot Spots

- 15) What is the difference between island arc and continental magmatic arc?
- Island arcs occur in ocean-continent tectonic settings whereas continental arcs occur in ocean-ocean tectonic settings.
  - Island arcs occur in divergent boundaries where as continental arcs occur in convergent boundaries.
  - Island arcs and continental arcs are the same
  - Island arcs occur in ocean-ocean tectonic settings whereas continental arcs occur in ocean-continent tectonic settings.
- 16) The California Cascade volcanoes are a result of the subduction of what oceanic plate?
- Gorda Plate
  - Juan de Fuca Plate
  - Farallon Plate
  - Pacific Plate
  - Cocos Plate
- 17) The San Andreas Transform is a \_\_\_ between the Pacific and North American plate.
- divergent boundary
  - convergent boundary
  - transform boundary
  - fracture zone boundary
- 18) The San Andreas is a plate boundary between which two tectonic plates?
- Pacific plate, Juan de Fuca plate
  - Farallon plate, North American plate
  - Nazca plate, Pacific plate
  - Pacific plate, North American plate
- 19) What are the three types of plate tectonic boundaries?
- ocean-ocean, ocean-cont., cont.-cont.
  - asthenosphere, lithosphere, mantle
  - transform, divergent, convergent
  - crust, mantle, core
- 20) The three compositional layers of Earth are
- lithosphere, asthenosphere, crust
  - core, mantle, crust
  - crust, asthenosphere, outer core
  - crust, upper mantle, asthenosphere
- 21) Alfred Wegner proposed continental drift, and he named the supercontinent that formed at the end of the Paleozoic \_\_\_\_.
- Gondwanaland
  - Eurasia
  - Laurentia
  - Pangea
- 22) The lithosphere is composed of \_\_\_ and \_\_\_\_.
- outer core, asthenosphere
  - inner core, mantle
  - crust, uppermost mantle
  - crust, asthenosphere
- 23) The weak sphere of Earth is called the
- asthenosphere
  - lithosphere
  - upper mantle
  - outer core
- 24) The definition of plate tectonics is \_\_\_\_.
- isostatic adjustment of Earth's crust
  - the separation of mantle and core
  - the movement and deformation of Earth's crust
  - thickness of the asthenosphere
- 25) What is a batholith? Name one batholith in California.
- basaltic lava flows, Modoc Plateau
  - igneous plutonic rock in magmatic arcs, Sierra Nevada
  - one stock, Sierra Nevada
  - igneous plutonic rock in island arcs, Sierra Nevada
- 26) The boundary between crust and mantle is called \_\_\_\_.
- Moho
  - Low velocity zone
  - Lithosphere
  - asthenosphere
- 27) Peridotite is rock that composes the upper mantle. The upper mantle is also called \_\_\_\_.
- crust
  - mantle
  - crust lithosphere
  - mantle lithosphere
- 28) What is the Benioff zone?
- zone of earthquakes in subduction zone
  - zone of earthquakes in transform fault
  - zone of earthquakes in divergent margins
  - zone of earthquakes in San Andreas Fault
- 29) What provides the lubrication for plate tectonics?
- lithosphere
  - liquid outer core
  - asthenosphere
  - ocean seawater

- 30) What causes the mantle to melt at subduction zones (~100 km to 150 km depth) to form arc volcanoes?  
 A) higher temperature  
 B) dewatering of ocean lithosphere  
 C) mantle plumes
- 31) Island arcs occur in \_\_\_\_ tectonic settings.  
 A) ocean-ocean convergent  
 B) ocean-continent convergent  
 C) transform  
 D) divergent
- 32) The San Andreas is \_\_\_\_ transform fault.  
 A) right-lateral  
 B) left-lateral  
 C) fracture zone  
 D) thrusting
- 33) The Hawaiian Islands are a volcanic chain formed in \_\_\_\_ tectonic setting.  
 A) Convergent  
 B) Transform  
 C) Hot Spot  
 D) Divergent
- 34) To locate the epicenters of earthquakes, a total of \_\_\_\_ seismic stations are needed.  
 a) two  
 b) one  
 c) three  
 d) none
- 35) On the diagram below, label the Benioff zone, accretionary wedge (mélange), batholith, continental magmatic arc, arc-trench gap, and ocean trench (6 pts).
- 36) On the following, label the natural provinces.