

I. True/False Questions: circle a "T" for true or "F" for false (10% total -or- 0.5 per) (Correct answer in red)

1. (T F) The Uranium used in nuclear power plants may explode if not controlled properly.
2. (T F) Natural Gas is an example of a renewable energy resource.
3. (T F) Ductile deformation permanently changes the shape of an object.
4. (T F) Brittle deformation is predominately elastic behavior.
5. (T F) Strain is defined as a force applied to a unit area.
6. (T F) Oxidation is considered one of the chemical weathering processes.
7. (T F) A reverse fault is defined as hanging wall up motion.
8. (T F) Carbon dioxide (CO₂) is considered a greenhouse gas.
9. (T F) Quartz is the hardest known mineral.
10. (T F) Normal faulting is associated with divergent plate boundaries.
11. (T F) Cross-bedding in a sandstone can be produced by currents of air or water.
12. (T F) The hinge line of a fold contains points of maximum curvature.
13. (T F) Continental shelf depositional environments are considered to be marine environments.
14. (T F) A mineral reserve consists of all proven occurrences of the material.
15. (T F) A batholith will have greater than 100 km² exposure area.
16. (T F) Regional metamorphic rocks are produced along convergent plate boundaries.
17. (T F) Contact metamorphic rocks are produced by the intrusion of magma.
18. (T F) A schist is an example of a foliated metamorphic rock.
19. (T F) Solar power is an example of a non-renewable energy resource.
20. (T F) Metamorphic facies represent regions on a temp. vs. press. graph.

II. Multiple Choice (80% total -or- 2 points per question)

1. A dip-slip fault where the hanging wall block moves up relative to the footwall block is a:
a) Normal Fault
b) Left-lateral Fault
c) Reverse Fault
d) Left-lateral Fault

2. The largest percentage of energy consumption in the U.S. is from
a) Hydroelectric
b) Oil (petroleum)
c) Nuclear
d) Wood

3. A fossil fuel that combusts cleanly to only CO₂ and H₂O would be:
- a) Coal
 - b) Oil
 - c) Natural gas**
 - d) None of the above
4. Of the following the lowest temperature metamorphic mineral isograd is
- a) Staurolite
 - b) Chlorite**
 - c) Garnet
 - d) Biotite
5. Of the following the largest remaining world energy resource in terms of energy content is:
- a) Crude oil
 - b) Coal
 - c) Natural gas
 - d) Uranium oxide**
6. Of the following the highest temperature metamorphic mineral isograd is:
- a) Kyanite
 - b) Staurolite
 - c) Garnet
 - d) Sillimanite**
- 7) The plane that passes through points of maximum curvature in a fold is a:
- a) fold limb
 - b) fold hinge
 - c) axial plane**
 - d) inflection point
- 8) “Black Smoker” volcanic vents along divergent plate boundaries tend to develop:
- a) Vein ore deposits
 - b) Disseminated ore deposits (massive sulfides)**
 - c) Kimberlites.
 - d) Pegmatites
- 9) Of the following list which is not a clastic sedimentary rock:
- a) Sandstone
 - b) Siltstone
 - c) Shale
 - d) Dolostone**

10) The term diagenesis refers to:

- a) A type of clastic sedimentary rock
- b) A type of metamorphism
- c) A type of chemical weathering process
- d) The physical and chemical changes that buried sediments undergo

11) The material that is found on the inside of a chewing gum foil wrapper is:

- a) powdered sandstone
- b) powdered marble
- c) powdered halite
- d) powdered corundum

12) Roloids tablets are composed of 50%:

- a) Basalt
- b) Halite
- c) Feldspar
- d) Calcium carbonate

13) The magnitude of an earthquake can be measured with the:

- a) Richter scale
- b) Mohs scale
- c) Mercalli scale
- d) All of the above

14) The Bushveld complex of South Africa is economically important because of its:

- a) Petroleum reserves
- b) Natural gas reserves
- c) Metallic ore deposits
- d) Coal reserves

15) The majority of the world's petroleum reserves are found in:

- a) Persian Gulf
- b) North America
- c) Russia
- d) China

16) Sand sized particles have the range:

- a) > 256 mm
- b) 2 - 0.062 mm**
- c) < 0.0039 mm
- d) None of the above

17) A tabular intrusion that is discordant is termed a:

- a) Dike**
- b) Batholith
- c) Stock
- d) Sill

18) A sandstone that contains >25% feldspar is termed a:

- a) Quartz arenite
- b) Arkose**
- c) Graywacke
- d) Lithic sandstone

19) Which type of mineral deposit contains diamonds:

- a) Kimberlite**
- b) Pegmatite
- c) Veins
- d) All of the above

20) The type of deposit where deposition at a point bar concentrates ore minerals is termed:

- a) Placer**
- b) Hydrothermal
- c) Vein
- d) Disseminated

21) Requirements for metamorphism of rocks include:

- a) Elevated temperature
- b) Elevated pressure
- c) Presence of fluids like H₂O, CO₂, and CH₄
- d) All of the above**

22) Ductile mechanical behavior in rocks is favored by:

- a) High temperature
- b) High pressure
- c) Deep burial
- d) All of the above**

23) A felsic igneous rock is:

- a) Dark colored and rich in Fe and Mg.
- b) Dark colored and rich in K and Na.
- c) Light colored and rich in K and Na.
- d) Light colored and rich in Fe and Mg.

24) The main difference between low-grade and high-grade metamorphic rocks is:

- a) Pressure
- b) Temperature
- c) Degree of deformation
- d) Color

25) Directed pressure, which produces distortion in rocks, is due to

- a) Tectonic forces
- b) Forces built up during burial
- c) Increasing temperature
- d) Increasing amounts of fluid

26) A gradual change in the chemical composition of a rock during metamorphism is termed:

- a) Porphyroblast development
- b) Metasomatism
- c) Cataclastic development
- d) Hydrothermal metamorphism

27) A fold structure that contains oldest units in the core of the structure is termed a:

- a) Syncline
- b) Anticline
- c) Dip-slip fault
- d) Strike-slip fault

28) The tendency of a fine-grained metamorphic rock to split along planar fractures is termed:

- a) Cleavage
- b) Foliation
- c) Metasomatism
- d) Cataclastic

29) A type of chemical bond where electrons are gained or lost by atoms is:

- a) ionic
- b) covalent
- c) metallic
- d) None of the above

30) The best term for a dip-slip fault dipping less than 45 degrees with hanging wall up motion would be:

- a) Normal dip-slip fault
- b) Right-lateral strike-slip fault
- c) Thrust fault
- d) None of the above

31) A structure that contains circular contacts with the youngest units in the core of the structure would be termed a:

- a) Anticline
- b) Reverse fault
- c) Basin
- d) Thrust fault

32) A strike-slip fault that possesses right-handed offset is a :

- a) Left-lateral fault
- b) Normal fault
- c) Right-lateral fault
- d) Reverse fault

33) If a basalt were metamorphosed to a low grade it would be termed a:

- a) Amphibolite
- b) Greenstone
- c) Granulite
- d) Eclogite

34) The interior of a continent containing old Precambrian rock is termed the:

- a) Coastal plain
- b) Orogenic belt
- c) Shield
- d) Craton

35) An overturned fold is a special type of fold because it contains:

- a) a Limb
- b) an Axial plane
- c) overturned strata
- d) a Hinge

36) Flat-lying undeformed Paleozoic sediments that ring the shield are termed:

- a) Platform
- b) Craton
- c) Orogenic belt
- d) None of the above

37) The “Age of Dinosaurs” corresponds to:

- a) Paleozoic
- b) Archean
- c) Mesozoic
- d) Cenozoic

38) The principle of superposition states that:

- a) Undisturbed layered strata contain the older beds uppermost in the sequence
- b) Sediments are deposited as essentially vertical layers
- c) Sediments are deposited as essentially horizontal layers
- d) Undisturbed layered strata contain the younger beds uppermost in the sequence

39) A type of unconformity where tilted beds below the unconformity are truncated is termed a:

- a) Nonconformity
- b) Disconformity
- c) Angular unconformity
- d) None of the above

40) The shield and platform are collectively referred to as the:

- a) Coastal Plain
- b) Craton
- c) Cordillera
- d) Appalachians

Discussion Questions (10%)

I. (5%) Fill in the correct physiographic province name using the below figure: (see text for answers)

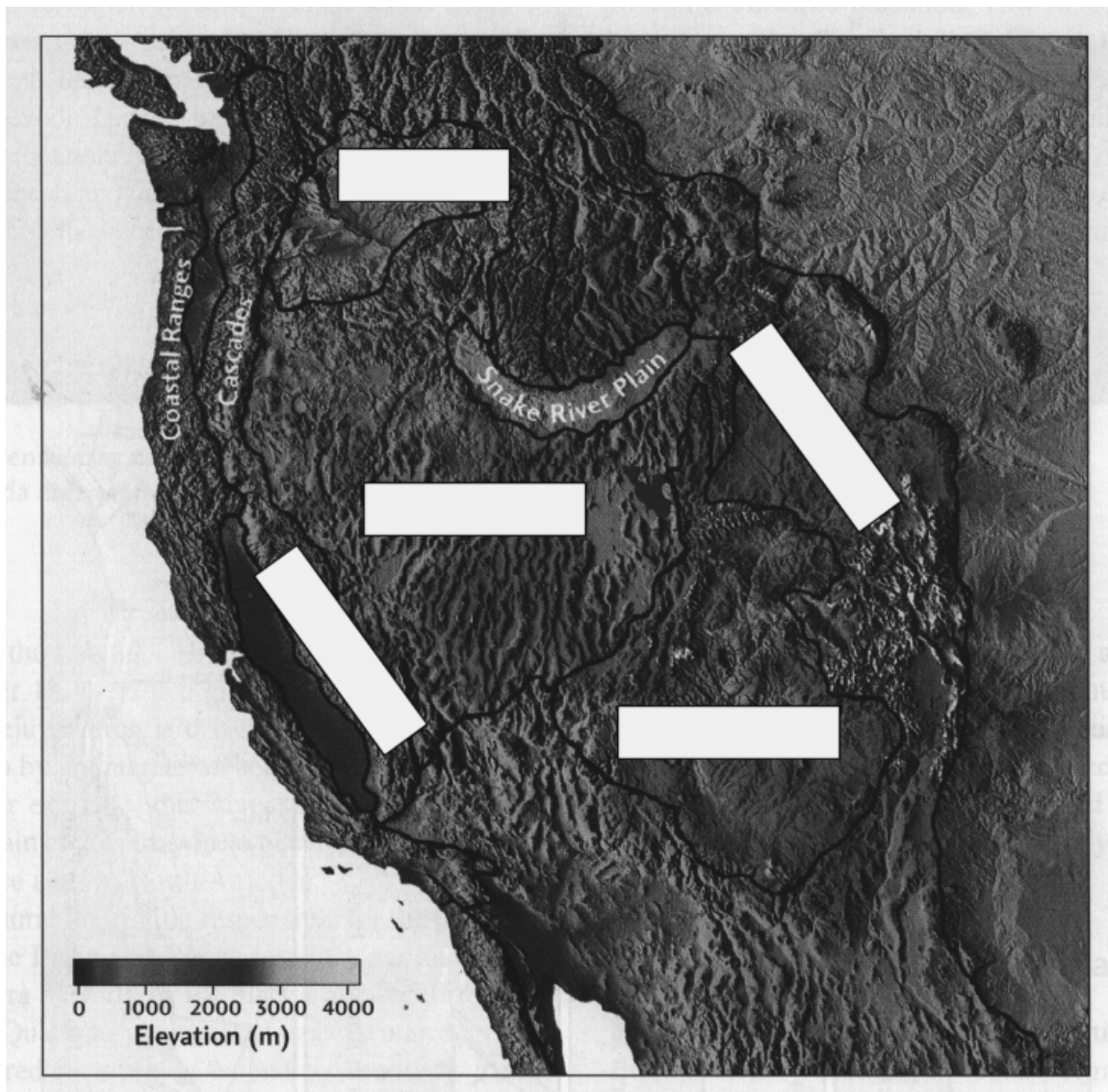


Figure 1: Cordilleran physiographic provinces.

II. (5%) Discuss the differences between the following types of seismic waves:

- (1) P-waves (Compressional)
- (2) S-waves (Shear)
- (3) Surface waves

Describe with a sketch how each type of wave affects molecules of matter when they are transmitted. Also describe which are faster or slower, and how seismic waves can be used to locate a specific earthquake epicenter.

1. P-waves or compressional waves cause vibration of molecules back-and-forth in the direction of travel of the wave front. In this regard P-waves are analogous to sound waves. P-waves are the fastest type of seismic wave generated by a seismic event.

2. S-waves or shear waves cause vibration of molecules back-and-forth perpendicular to the direction of travel of the wave front. S-waves are slower than P-waves but are faster than surface waves. S-waves are not transmitted by liquid, therefore, they are attenuated by the Earth's liquid outer core.

3. When the energy of the seismic event is transported to the Earth's surface by P- and S-waves the result is the creation of seismic surface waves. Seismic surface waves are analogous to surface waves on the ocean, and they cause the structural damage to buildings during seismic events. Surface waves have the slowest transmission velocity of the 3 types of seismic waves.

The time differential between the 1st arrival of P-waves and S-waves can be used to calculate the distances from the seismic event epicenter. If this is done with 3 different seismic stations the distance circles drawn around the stations will converge on the epicenter point on a map.