



Exploring the World of Science

Captain's Tryouts 2018

Dynamic Planet

Total Points: _____/79

For each of the following events, give an approximate date of occurrence in mya (millions of years ago) (10 points, 1 point each for being within 50 million years of correct)

1. Breakup of Gondwanaland
180 Mya
2. Breakup of Rodinia
750 Mya
3. Breakup of Pangea
200 Mya
4. Breakup of Pannotia
600 Mya
5. Formation of Gondwanaland
450 Mya
6. Formation of the Rocky Mountains
60 Mya
7. Formation of the Himalayas
50 Mya
8. Separation of Australia from Antarctica

50 Mya

9. Separation of Laurasia from Gondwanaland

150 Mya

10. Separation of North America from Eurasia

80 Mya

Continental crust covered by sediment at a passive margin displays what type of faulting?

(1 point)

- a. Normal
- b. Reverse
- c. **Listric**
- d. Transform
- e. Slip

Which of the following would be first to crystallize as magma cools?

(1 point)

- a. Amphibole
- b. Pyroxene
- c. **Olivine**
- d. Quartz
- e. Garnet

Which of these is **classified** as the earliest known landmass?

(1 point)

- a. Kenorland
- b. **Ur**
- c. Vaalbara
- d. Scavia
- e. Cimmeria

As plates age, they become:

(1 point)

- a. **More dense**
- b. Less dense
- c. Plate age has no effect on density

After glaciers retreated from North America, the average height of the land left behind:

(1 point)

- a. **Increased**

- b. Decreased
- c. Stayed constant

90% of the Earth's crust (by volume) is composed of which of the following types of rock?

(1 point)

- a. Igneous
- b. Sedimentary
- c. Metamorphic
- d. Basaltic

Which of the following is NOT a force that impacts plate movement?

(1 point)

- a. Basal Drag
- b. Isostasy
- c. Slab Suction
- d. Hypsometric Pressure

Which of the following separates the mantle from the outer core?

(1 point)

- a. Mohorovic Discontinuity
- b. Conrad Discontinuity
- c. Gutenberg Discontinuity
- d. Lehmann Discontinuity
- e. Weinberg Discontinuity

Earthquakes along which fault formed the Aleutian Islands?

(1 point)

- a. Dead Sea Transform
- b. San Andreas Fault
- c. Alpine Fault
- d. Queen Charlotte Fault
- e. Hayward Fault

Which of the following represents a reasonable bulk chemistry for a sample collected at the top of the ocean ridge?

(1 point)

- a. 50% SiO₂, 22% MgO
- b. 60% SiO₂, 15% MgO
- c. 40% SiO₂, 22% MgO

- d. 50% SiO₂, 8% MgO
- e. 30% SiO₂, 26% MgO

Who theorized convection cells in the mantle that dissipate radioactive heat and move tectonic plates?

(1 point)

- a. Arthur Holmes
- b. Fred Vine
- c. Eduard Suess
- d. Frank B. Taylor

An earthquake that causes most people to feel it and some indoor objects to shake or fall but not buildings to be damaged would likely be of about which magnitude on the richter scale?

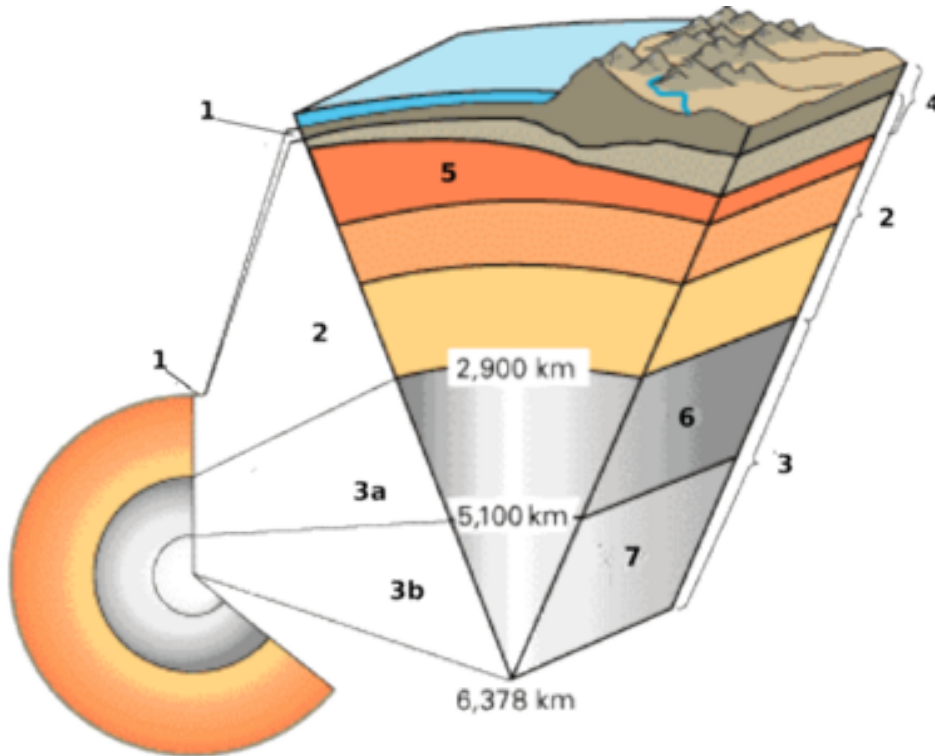
(1 point)

- a. 2.0
- b. 3.0
- c. 4.0
- d. 5.0
- e. 6.0

Name the person who:

(1 point each for correct last name)

1. Hypothesized that new crustal material is formed at oceanic ridges and spreads outward at a rate of several centimeters per year.
Robert Dietz
2. Believed that continental drift is impossible because the strength of the underlying mantle should be far greater than any conceivable driving force
Sir Harold Jeffreys
3. Postulated that the arcuate mountain belts of Asia and Europe resulted from the creep of the continents toward the Equator.
Frank B. Taylor
4. Proposed that identical fossil plants in North American and European coal deposits could be explained if the two continents had formerly been connected.
Antonio Snider-Pellegrini
5. Suggested the process called seafloor spreading.
Harry H. Hess



Provide the appropriate label for each layer of the earth:

(1 point each)

1. Crust

2. Mantle

3a. Outer Core

3b. Inner Core

4. Lithosphere

5. Asthenosphere

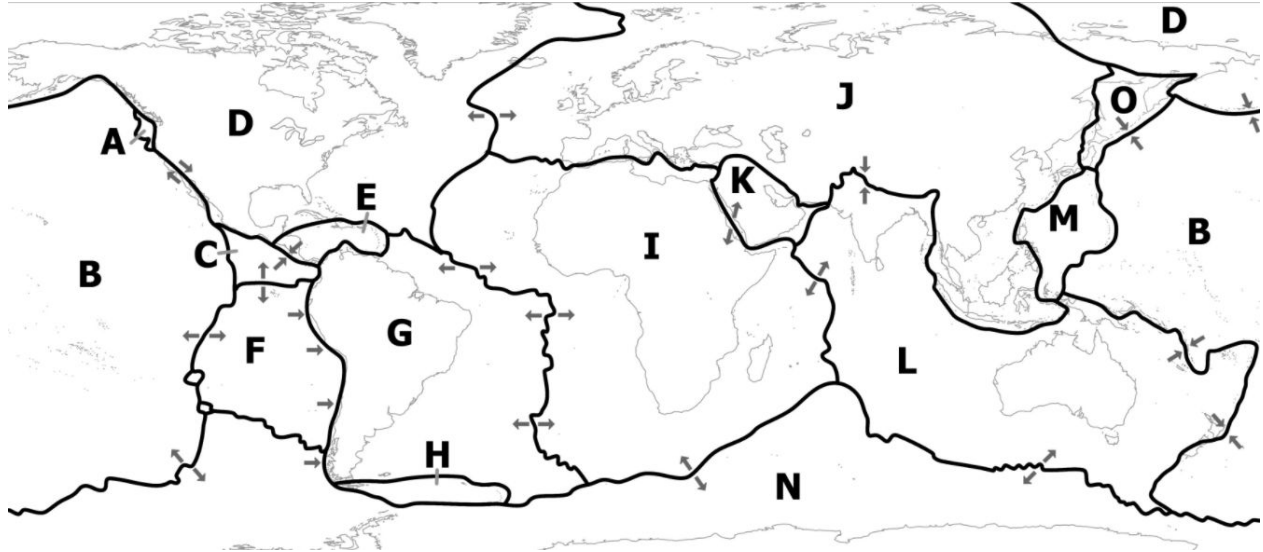
Provide the appropriate state of matter for these layers of the earth:

(1 point each)

6. Liquid

7. Solid

Name the following plates:



A: Juan de Fuca Plate

B: Pacific Plate

C: Cocos Plate

D: North American Plate

E: Caribbean Plate

(1 point each)

F: Nazca Plate

G: South American Plate

H: Scotia Plate

I: African Plate

J: Eurasian Plate

K: Arabian Plate

L: Indo-Australian Plate

M: Philippine Sea Plate

N: Antarctic Plate

O: Okhotsk Plate

Which of these is classified as the deadliest volcanic eruption by number of deaths?

(1 point)

- Vesuvius, Italy, 1631
- Ruiz, Colombia, 1985
- Kelut, Indonesia, 1919
- Tambora, Indonesia, 1815
- Unzen, Japan, 1792

Name the type of volcano that:

(Stratovolcano, Shield, Cinder Cone, Lava Dome)

(answers may be used once, more than once, or not at all)

(1 point each)

- Is formed by the layering of viscous lava.

Stratovolcano

2. Involves low viscosity and low to high gas content.
Shield
3. Involves mid to high viscosity and high gas content.
Stratovolcano
4. Is formed when lava pushes up like a balloon.
Lava Dome
5. Glassy gas filled hardened scoria fragments build up.
Cinder Cone

Which of the following is most likely to cause isostatic rebound?
(1 point)

- a. Entering an interglacial period**
- b. Volcanic flood basalts
- c. Entering a glacial period
- d. Solar and lunar tidal forces
- e. Sediment loading into a region

A failed triple junction is called a(n): (1 point)

- a. Thrust
- b. Backarc basin
- c. Sinkhole
- d. Pit
- e. Aulacogen**

Which type of magma is most viscous?
(1 point)

- a. Andesitic
- b. Basaltic
- c. Rhyolitic**

Tectonic motions are driven by all of the following except:
(1 point)

- a. Slab push**
- b. Mantle convection
- c. Sea level rise
- d. Hotspot clusters
- e. Slab pull

The lower part of a rift valley is a(n):

(1 point)

- a. Ophiolite
- b. Backarc basin
- c. Trench
- d. Horst
- e. Graben

Gondwanaland and Laurasia made up:

(1 point)

- a. Gondina
- b. Pangea
- c. Ur
- d. Vaalbara
- e. Pannotia

Which volcanic eruption type is characterized by effusions of molten basaltic lava that flow from long, parallel fissures?

(1 point)

- a. Hawaiian
- b. Strombolian
- c. Vulcanian
- d. Icelandic
- e. Pelean

Which volcanic eruption type is associated with explosive outbursts that generate pyroclastic flows and dense mixtures of hot volcanic fragments?

(1 point)

- a. Hawaiian
- b. Strombolian
- c. Vulcanian
- d. Icelandic
- e. Pelean

Which volcanic eruption type generally involves moderate explosions of gas laden with volcanic ash, resulting in dark, turbulent eruption clouds that rapidly ascend and expand in convoluted shapes?

(1 point)

- a. Hawaiian
- b. Strombolian

c. **Vulcanian**

d. Icelandic

e. Pelean

Which volcanic eruption type involves moderate bursts of expanding gases that eject clots of incandescent lava in cyclical or nearly continuous small eruptions?

(1 point)

a. Hawaiian

b. **Strombolian**

c. Vulcanian

d. Icelandic

e. Pelean

Which volcanic eruption type involves fluid lava flowing from a volcano's summit and radial fissures to form shield volcanoes, which are quite large and have gentle slopes?

(1 point)

a. **Hawaiian**

b. Strombolian

c. Vulcanian

d. Icelandic

e. Pelean

Mass wasting refers to:

(1 point)

a. Volcanic eruptions

b. Trash production

c. Glacial melting

d. **Soil and rock motion due to gravity**

e. Aulacogens

All of these are major silicate rock forming elements except:

(1 point)

a. O

b. Si

c. Al

d. **S**

e. Fe

Major mechanisms can cause a rock to melt...

(1 point)

- I. Heating
 - II. Pressure decrease
 - III. Addition of water
- a. I only
 - b. II only
 - c. III only
 - d. I and II
 - e. I, II, III

In 1977, _____ produced a seafloor map showing mid-ocean ridges and trenches.

(1 point)

- a. Hess
- b. Wegner
- c. Vine and Matthews
- d. Tharp and Heezen
- e. Ballard

What is the driving force for plate tectonic motion?

(1 point)

- a. Gravity of the moon pulling on the continents. This moves both the continent and the whole tectonic plate in which that continent is embedded.
- b. Mantle convection
- c. Slab pull
- d. Both b and c
- e. All of the above

What will eventually happen to the East Africa Rift Zone and the Red Sea?

(1 point)

- a. The Red Sea will be closed off as opposing tectonic plates collide
- b. The Red Sea will shrink in size as a result of colliding tectonic plates
- c. A large ocean basin will form as opposing tectonic plates diverge and the Red Sea opens wider.
- d. They will remain relatively the same because these features are in the middle of the African Plate.
- e. None of the Above

The opening of this passage during the Eocene enabled the formation of the Antarctic Circumpolar Current and cooling of Antarctica to occur:

(1 point)

- a. Drake Passage
- b. Tethys Seaway
- c. Tasmanian Gateway
- d. Sinai Peninsula
- e. Isthmus of Panama

Which of these formations are NOT created from the deformation of ductile rocks?

(1 point)

- a. Synclines
- b. Basins
- c. Grabens
- d. Domes
- e. Plunges

Lines on the seafloor that connect rocks of the same age are called what?

(1 point)

- a. Isobars
- b. Isochrons
- c. Isotopes
- d. Isostasy
- e. Isograds

How wide are the crystal mush zones (magma chambers) beneath mid-ocean ridges?

(1 point)

- a. 10 meters
- b. 100 meters
- c. 1 kilometer
- d. 10 kilometers
- e. 100 kilometers

Which of the following occurs at convergent boundaries?

(1 point)

- a. New ocean floor is created.
- b. Oceanic lithosphere is destroyed through subduction.
- c. Convection within the Earth's mantle allows material to rise to the base of the lithosphere.
- d. Rocks closest to a boundary are younger than rocks further away on the same plate.
- e. Plate sliding

Temperatures in the outer part of the core range from:
(1 point)

- a. 10000-20000K
- b. 2500-3800K
- c. 6500-9500K
- d. 4250-6250K
- e. 1000-2400K