Earth/Environmental Science Final Exam Review

*This packet is meant to help you review the important concepts for each unit covered in the course. This is not intended to be your only study tool. You should study all notes from this course to be prepared for your final.*

Physical Geology

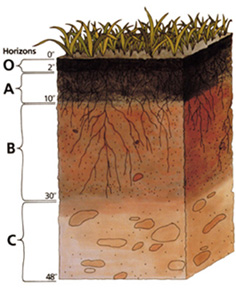
1. Describe how **sedimentary rocks** form.
2. Describe how **igneous rocks** form.
3. The longer it takes an igneous rock to cool the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (smaller/larger) the crystal size.
4. Describe how **metamorphic rocks** form.
5. Marble is formed when limestone gets buried and changes under high heat and pressure. What type of rock is marble? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. How does the Sun help drive the rock cycle? List 3 processes from the rock cycle that are influenced by the Sun.
7. Name the 5 types of **chemical weathering** that match these descriptions.
   1. The chemical reaction of oxygen with other substances (rust) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Carbonic acids dissolve rocks and can form cave systems \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Pollution from factories dissolves in rainwater and eats away rock structures \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Decaying plant material mixes with water to form acids or lichens use acids to dissolve the rocks they form on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. Water mixed with gases causes silicates and oxides to undergo chemical decomposition \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. Describe the human causes and natural causes of acid rain.

10. The movement of sediment, rocks, and gravel from one location to another is called \_\_\_\_\_\_\_\_\_\_.

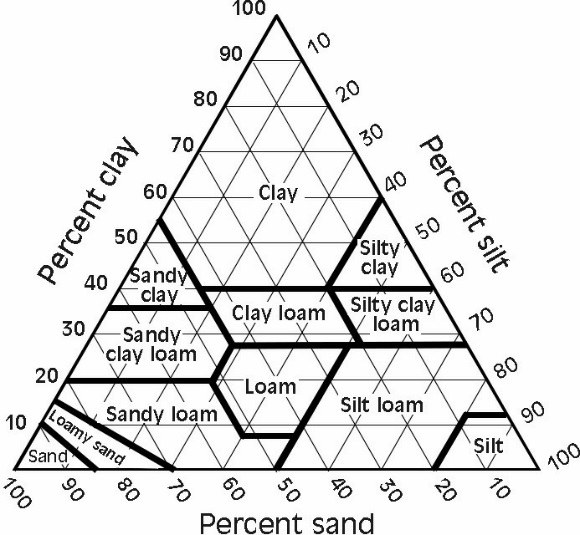
11. The process that drops off soil, rocks, and gravel in a new location, such as a river delta or a glacial moraine is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. Label the horizons of the soil profile shown below and number them from first formed (1) to newly formed (4).



1. Rank the three soil particles in terms of size from smallest to largest.
2. Define **humus**. How does it form? What color is a soil that has a lot of humus in it?
3. What soil nutrients are necessary for plant growth?
4. Define **permeability** and **porosity**.

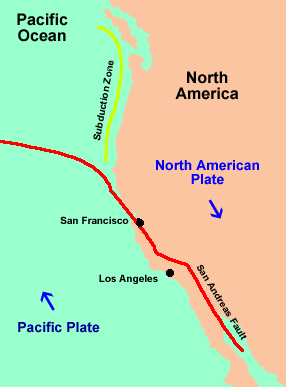
|  |  |  |  |
| --- | --- | --- | --- |
| Soil Name | Texture Class | Depth (inches) | Shrink-Swell Potential |
| Sarpy | Sandy Loam | 0-7  7-60 | Low  Low to moderate |
| Kennebec | Silt Loam | 0-38  38-60 | Moderate  Low to moderate |
| Colo | Silty Clay Loam | 0-31  31-60 | High  High |
| Blend | Silty Clay | 0-17  17-29  29-60 | High  Moderate to high  High |
| Nevin | Clay Loam | 0-28  28-48  48-60 | Moderate to high  Moderate  Moderate |
| Kenmoor | Loamy Sand | 0-24  24-60 | Low  High |

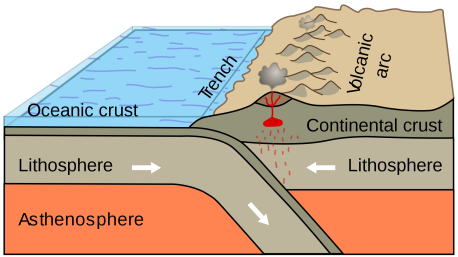


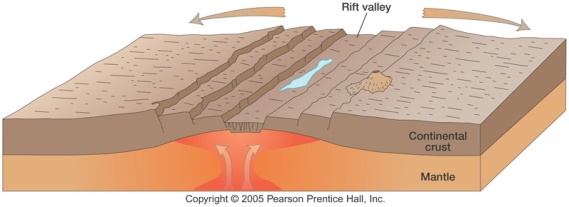
1. Sands have \_\_\_\_\_\_\_\_\_\_\_\_\_\_ pore spaces, so water and nutrients move through them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Clays have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pore spaces, so water and nutrients move through them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. If a soil has 40% sand particles, 40% silt particles and 20% clay particles, which soil texture class does it belong to?
3. Which soils are the best for agriculture? Why?
4. Which soil from the chart above would you choose to build roads, bridges and buildings on? Why?
5. List and describe 3 types of human activities that are impacting the lithosphere negatively and what measures can be taken to improve these problems.

|  |  |  |
| --- | --- | --- |
| Human Activity | Environmental Problem Caused | Possible Solutions |
|  |  |  |
|  |  |  |
|  |  |  |

Interior Geology and Plate Tectonics

Label each of the following plate boundaries, describe what is happening to the plates at each one, and include what type of fault corresponds with the plate boundary.





|  |  |  |  |
| --- | --- | --- | --- |
| Boundary Type: |  |  |  |
| Description: |  |  |  |
| Associated Fault Type: |  |  |  |

Label each of the layers of the Earth, describe its composition, and list its state of matter (solid, liquid, gas).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A | B | C | D |
| Layer: |  |  |  |  |
| Composition: |  |  |  | Image result for layers of the earth |
| State of Matter: |  |  |  |  |

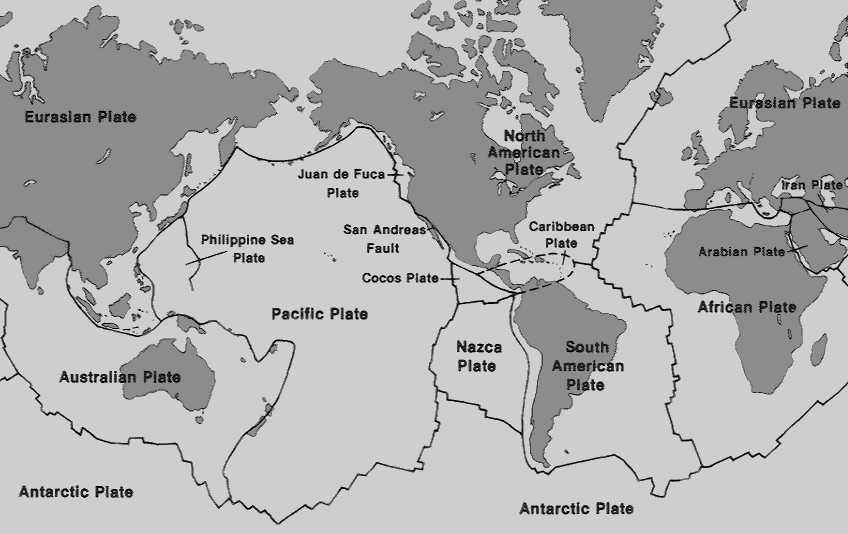
**D**

**C**

**B**

**A**

What is the Theory of Continental Drift?

List evidence used to support the Theory of Continental Drift.

1.

2.

3.

4.

5.

Fill in the following table about tectonic plate boundaries:

|  |  |  |
| --- | --- | --- |
| Boundary Type | Plates Involved | Landform that forms |
| Convergent | Oceanic + Oceanic |  |
| Convergent | Oceanic + Continental |  |
| Convergent | Continental + Continental |  |
| Divergent | Oceanic + Oceanic |  |
| Divergent | Continental + Continental |  |
| Transform | Any |  |

1. What is seafloor spreading? Draw a picture to help describe the process.
2. What is thought to be the driving mechanism that causes plate movement?
3. In the mantle material follows the basic principle: warm material \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and cool material \_\_\_\_\_\_\_\_\_\_\_.
4. Why is it necessary to have both seafloor spreading and subduction going on at the same time? Think: What would happen to Earth if the plates moved apart, but never subducted?
5. What is the name of the most recent supercontinent that all of today’s modern continents were once a part of?

When did it break apart?

1. Describe the tectonic processes that have shaped the state of North Carolina as we see it today.

Fill in the table below with information about each of the 3 types of seismic waves.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Primary Waves | Secondary Waves | Lithospheric Waves |
| Order of appearance |  |  |  |
| Direction of the motion |  |  |  |
| What material can they move through? |  |  |  |

1. How can geologists tell that the outer core of the Earth is a liquid, not a solid?
2. What is the difference between an **epicenter** and **focus**?
3. What is a **fault**?

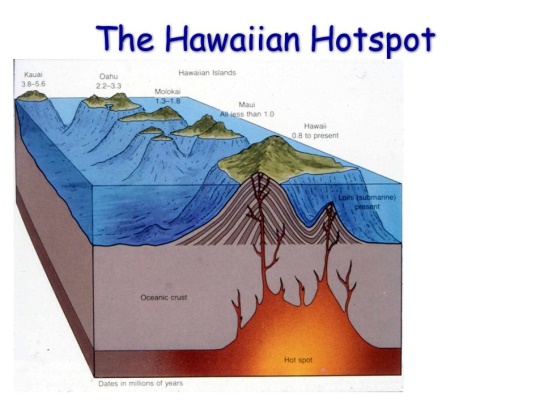
Name and draw a picture to demonstrate the 3 types of faults.

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

1. Which is more dangerous, an earthquake with a shallow focus or one with a deeper focus? Why?
2. In order to determine the epicenter of an earthquake, data from how many **seismometers** are needed?

Fill in the table below with information about the 3 types of volcanoes.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Shield Volcano | Composite (Stratovolcano) | Cinder-cone Volcano |
| Slope of sides |  |  |  |
| Type of lava |  |  |  |
| Type of eruption |  |  |  |
| Shape(draw a picture) |  |  |  |

1. The higher the **viscosity**, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(runnier/stickier) the magma, the \_\_\_\_\_\_\_\_\_\_ (more/less) explosive the volcanic eruption.
2. Geologists can tell 2 things about the Pacific Plate from looking at the Hawaiian Islands and the activity of the hot spot that has formed them. What are they?
3. How old to scientists think the Earth is?
4. What Period and Epoch of geologic time are we currently in?
5. How did the Earth get a moon?
6. How did the surface of the Earth and the atmosphere have to change to support the climate and forms of life that exist today?
7. How do scientists propose life evolved on the Earth?

Environmental Geology

Fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Energy Resource: | Extraction Method | Description of Energy Production | Environmental Consequences |
| Wood |  |  |  |
| Peat |  |  |  |
| Coal |  |  |  |
| Oil |  |  |  |
| Natural Gas |  |  |  |
| Uranium |  |  |  |
| Geothermal |  |  |  |
| Water |  |  |  |
| Solar |  |  |  |
| Wind |  |  |  |

1. What is fracking? Write a list of 3 pros and 3 cons of this practice.
2. What are the two main types of mining?
3. Which type of mining is more environmentally damaging? Why?
4. What is reclamation? Why is it important?
5. What are some of the environmental concerns that come from deforestation? (Give at least 3)
6. What forest management techniques are used in place of clear cutting forested land?
7. What is **agriculture**?
8. How has agriculture changed over time?
9. Describe some of the environmental concerns that come from modern agriculture.

Controlled succession:

Plowing:

Biodiversity:

Greenhouse gases:

Energy use:

1. What are some of the solutions to the environmental concerns from agriculture?

Hydrosphere

1. \_\_\_\_\_\_% of the water on Earth is saltwater that is found in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Of the freshwater available, \_\_\_\_\_\_% is trapped in ice sheets and glaciers leaving only a small fraction for drinking water from groundwater, rivers, and lakes.
2. Does the amount of water on Earth change over time? Why or why not?
3. Describe the relationship between **salinity** and water density.
4. Describe the relationship between temperature and water density.
5. What are 2 processes that add salt to seawater (increase salinity)?
6. What are 2 processes that remove salt from seawater (decrease salinity)?
7. What causes surface ocean currents?
8. Why are deep ocean density currents important for maintaining the current climate?
9. Where does our drinking water here in Raleigh come from?
10. How do impermeable surfaces impact the water cycle? How could this impact levels of pollution?
11. Explain how eutrophication works, step by step. What causes it and how can it lead to “dead zones”?
12. What is the difference between point-source pollution and non-point source pollution? Give one example of each.
13. What is a watershed? What watershed are we a part of in Raleigh?
14. Why are rivers also called conveyor belts for sediments?
15. What three properties of rivers determine how much sediment is transported? Explain how.
16. What is a delta? Where do they form?
17. How do rivers change over time? What is the difference between a youthful river and an old-age river?
18. What are three reasons wetlands are important?



1. Water is stored underground in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and can be trapped and brought to the surface using \_\_\_\_\_\_\_\_\_\_\_. Natural places where groundwater comes to the surface are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. What happens to an **aquifer** when the recharge rate of the ground water from infiltration is lower than the usage rate (uptake from wells)?
3. What are two common threats to **groundwater**?
4. What are two common threats to **surface water**?

Atmosphere

Fill in the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| Atmospheric Layer | Sublayers? (list them) | Altitude | Temperature Change |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Which layer of the atmosphere is **weather** found in?
2. How does air pressure and temperature change as you increase altitude in the troposphere?
3. Rank these gases in order from highest to lowest concentration in the Earth’s atmosphere: Carbon dioxide, Water vapor, oxygen, nitrogen.
4. What layer of the atmosphere is the ozone layer in?
5. What is the importance of the ozone layer in terms of climate and organisms in the troposphere?
6. What is responsible for making the current hole in the ozone layer?
7. What is the difference between **conduction** and **convection**?
8. What is humidity?
9. What is the relationship between temperature and maximum saturation?
10. Define relative humidity and dew point.
    1. Relative humidity:
    2. Dew point:
11. Describe **cumulonimbus, stratus, and cirrus clouds**. What do they look like and what is the associated weather?
12. Describe the process of cloud formation by **orographic** **lifting**. Draw a picture showing the **windward** and **leeward** sides of a mountain range and the **rain shadow**.
13. Where on Earth are atmospheric low pressures found? Why?
14. Draw the wind patterns for a low pressure system and high pressure system in the Northern Hemisphere. Label the pressures and show wind direction and rotation.
15. Air masses move from areas of \_\_\_\_\_\_\_\_\_\_ pressure to areas of \_\_\_\_\_\_\_\_\_\_ pressure.
16. Warm air \_\_\_\_\_\_\_\_\_\_\_ while cool air \_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to differences in density.

88. What is the boundary between two air masses called?

Fill in the following table about air masses.

|  |  |  |  |
| --- | --- | --- | --- |
| Air Mass Name | Symbol | Source Region | Characteristics |
| Maritime Tropical |  |  |  |
| Continental Tropical |  |  |  |
| Maritime Polar |  |  |  |
| Continental Polar |  |  |  |

Fill in the following table about fronts.

|  |  |  |
| --- | --- | --- |
| Front Type | Symbol on a Weather Map | Associated Weather |
| Cold Front |  |  |
| Warm Front |  |  |
| Stationary Front |  |  |
| Occluded Front |  |  |

Explain how each of the following factors would affect the temperature of an area:

|  |  |
| --- | --- |
| Factor | Effect on Temperature |
| Albedo |  |
| Altitude |  |
| Proximity to a large body of water |  |
| Insolation |  |
| Vegetation |  |
| Latitude |  |

Use the following word bank to complete the paragraph below:

**Water vapor, Dew point, Temperature, Convection, Fahrenheit, Evaporation, Latent, Heat, Condensation, Coalesce**

Heat and temperature are not the same. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a measure of how rapidly or slowly molecules move. In contrast, \_\_\_\_\_\_\_\_\_\_\_ is the transfer of energy that takes place because of the temperature differences. The most commonly used temperature scale in the United States is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The atmosphere’s temperature plays a role in the formation of rain. The first step in cloud formation is when liquid water on the Earth’s surface goes through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and turns into a gas. In the atmosphere, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transforms from a gas back into liquid cloud droplets through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This process releases \_\_\_\_\_\_\_\_\_\_\_\_ heat. Those cloud droplets \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together and eventually form droplets big enough to fall as precipitation. The heat released goes on to fuel more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells. Air must be saturated for condensation to occur. Saturation is the point at which the air holds as much water as it possibly can. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the temperature to which air must be cooled to reach saturation. Until this temperature is reached, condensation cannot occur and rain will not fall.

Climate

89. What is the difference between weather and climate?

90. What are the major climate zones in the Koppen Climate Classification System? Describe each one in terms of temperature and precipitation.

91. What kinds of factors determine the climate of an area? (list at least 3)

92. Explain the greenhouse effect using a diagram, complete sentences, or both.

93. List 5 common greenhouse gases.

94. Which two greenhouse gases are the most common in the atmosphere?

95. What historical event occurred in the 1850’s that began to increase the global levels of carbon dioxide?

97. What happens to the oceans when carbon dioxide levels increase?

98. Describe the process of coral bleaching.

99. Define thermal expansion.

100. Describe at least one example of how global climate change is affecting ecosystems and biodiversity.

101. Explain the process of ocean acidification. How does it affect marine wildlife? How is it connected to global climate change?

Biosphere

Match the following terms with the correct statement. Each statement may be used only once.

i. \_\_\_\_\_ Heterotroph

1. The degree of variation in life.
2. Depicts feeding connections in an ecological community.
3. Study of organisms and their environment.
4. Species that has a disproportionately large effect on its environment.
5. The position an organisms occupies in the food chain.
6. Organisms that cannot make their own food.
7. Any factor that restricts distribution of organisms regardless of population size.
8. Organisms that can make their own food.
9. An organism that hunts.
10. Organisms that eat only meat.
11. Organisms that break down dead material.
12. Any factor that restricts distribution of organisms based on the size of the population.
13. Organisms that eat plants and animals.
14. Organism that is hunted.
15. An organism that eats only plants.

ii. \_\_\_\_\_ Biodiversity

iii. \_\_\_\_\_ Ecology

iv. \_\_\_\_\_ Prey

v. \_\_\_\_\_ Carnivore

vi. \_\_\_\_\_ Autotroph

vii.\_\_\_\_\_ Trophic Level

viii.\_\_\_\_\_Food Web

ix. \_\_\_\_\_ Herbivore

x. \_\_\_\_\_ Keystone Species

xi. \_\_\_\_\_ Decomposer

xii.\_\_\_\_\_ Omnivore

xiii.\_\_\_\_\_ Predator

xiv.\_\_\_\_\_ Density-Dependent Factor

xv. \_\_\_\_\_ Density-Independent Factor

Caterpillar Bird

Grass Mouse Snake Owl

Grasshopper Frog

Use the diagram above to answer questions 102-106

102. What is the producer in the food web above? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

103. Energy flows from the caterpillar to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

104. The primary consumers are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

105. The frog is considered a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ consumer, while the owl is considered a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ consumer.

106. As matter and energy moves from the grass to the owl, the amount of available energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

107. How much energy is lost from one trophic level to the next?

In the space to the left, write the word or phrase that includes the rest.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 108. Trophic level, food web, food chain

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 109. Ecosystem, habitat, biome, population

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 110. Organism, population, community

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 111. Omnivores, consumers, carnivores, herbivores

For questions 112-115, label the statement as describing **Exponential Growth** or **Logistic Growth** or Both.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 112. This type of growth tends to level off upon reaching carrying capacity

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 113. This type of growth has a period of steady growth

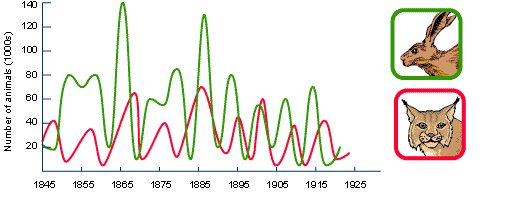
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 114. This type of growth is more realistic and true

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 115. This type of growth currently describes the human population

Plants Mosquito larvae Dragonfly larvae

Turtles Beetles Fish Pelicans

116. If all of the mosquito larvae are removed from the food web above, which populations will decrease?



The image above is of a predator-prey graph. The upper line represents a population of arctic hare and the lower line represents the population of Canadian lynx.

117. What factor seems to be controlling the hare population?

Match each biome with the correct description using the word bank below.

**A. Desert B. Temperate forest C. Rainforest D. Grasslands E. Tundra F. Chaparral G. Alpine H. Taiga**

118. \_\_\_\_\_ Largest biome in the world. Dominated by coniferous forest such as spruce and fir.

119. \_\_\_\_\_ Treeless biome that lies between 55o and 70o N

120. \_\_\_\_\_ Hot, dry and in coastal regions. Dominated by shrubs and small trees.

121. \_\_\_\_\_ Cold and windy. Animals adapt with larger lungs and extra hemoglobin to cope with less oxygen.

122. \_\_\_\_\_ Experience all four seasons and have trees that lose their leaves each fall.

123. \_\_\_\_\_ Few trees due to reduced rainfall and natural wildfire cycles. Usually found in the middle of continents.

124. \_\_\_\_\_ Cover less than 6% of the Earth’s surface but contain more than 50% of the diversity.

125. \_\_\_\_\_ Generally lie between 23.5o N and 23.5o S of the equator. Dominated by plants and animals that have adaptations to avoid desiccation.

126. List 5 reasons the human population has changed so drastically in modern times.

127. List 5 concerns you have about the uncontrolled growth of the human population.