ES Test #4 (Climate and Biomes) Study Guide Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Climate**

1. What is climate?

The average weather in an area over a long period of time, whereas weather is a day to day explanation.

2. What factors affect climate?

Temperature and Precipitation

Other factors that affect an area’s climate include its location relative to the ocean or mountain ranges.

3. What determines the moisture level of a biome?

Precipitation and Evaporation

4. What are the different air masses of the United States?

Continental = dry, inland Maritime = wet, coastal

Polar = cold Arctic = very cold Tropical = warm

Continental arctic: inland, dry and very cold air

Continental polar: inland, dry and cold air

Continental tropical: inland, dry and warm air

Maritime polar: coastal, moist and cold air

Maritime tropical: coastal, moist and warm air

5. Describe what occurs during a warm front.

a warm air mass stretches over a cold air mass, stratus clouds form, and steady rain/snow falls

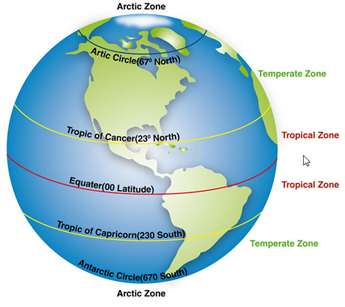
6. Describe what occurs during a cold front.

a cold air mass pushes the warm air mass up, cumulus clouds form, and heavy rain/snow storms occur

7. How does climate determine the type of biome?

Climate determines which type of producers can grow, which in turn determines the other organisms

8. What are the different climate zones of the world?



9. What factors affect temperature?

Temperature on Earth’s surface falls from the equator to the poles. Based on temperature, climates can be classified as tropical, temperate, or arctic. Temperature also falls from lower to higher altitudes, for example, from the base of a mountain to its peak. This explains why the tops of high mountains in tropical climates may be snow-capped year-round.

10. Describe the terms used to describe a climate and the amount of water available to plants.

Based on the amount of water available to plants, climates can be classified as arid (dry), semi-arid, semi-humid, or humid (wet).

11. How does climate affect plants?

Climate is the major factor affecting the number and diversity of plants (and therefore animals) that can grow/live in a terrestrial biome. Climate determines the average temperature and precipitation, the length of the growing season, and the quality of the soil, including levels of soil nutrients

**Biomes**

1. What is an adaptation?

Certain traits can make organisms more suited for the challenges of their environments.

2. What are the different plant adaptations?

1. Stressful condition: Dry habitats such as desert, tundra, taiga

• Adaptation: small, needle leaves with waxy cuticle

2. Stressful condition – moist, highly populated environment such as the tropical rainforest

• Adaptation: Large, tall plants with high leaf surface area to maximize photosynthesis

3. Stressful condition – poor soil nutrients

• Adaptation: Thigmotropism - the ability of a plant to move in response to touch.

• Adaptation: Pitcher plants and Venus fly traps have digestive enzymes to breakdown small insects for nutrients (NOT ENERGY)

4. Stressful condition – competition for space/light

• Adaptation: Phototropism - the movement/growth of a plant toward light

3. What is thigmotropism?

the ability of a plant to move in response to touch.

4. What is phototropism?

the movement/growth of a plant toward light

5. What are the 3 different types of animal adaptations?

Structural - fins on a fish (Physical)

Physiological - production of sweat to cool the body (From within the body)

Behavioral - hibernation during seasons when food is scarce

6. What are the adaptations for dry, hot areas? Cold areas?

Dry, hot conditions

• Adaptation: Many animals are nocturnal, where they stay inactive during the heat of the day and become active at night when it’s cooler to reduce water loss.

• Adaptation: Reptiles have scaly skin which prevents excessive water loss

• Adaptation: Large mammals must migrate to find water sources in the savanna

Cold winters

• Adaptation: Many organisms migrate south during the cold winter season and return for the warm summer season

• Adaptation: Mammals have heavy fur coats and a thick layer of fat for insulation from the cold

7. What are the different freshwater biomes?

Ponds, lakes, rivers, streams, wetlands

8. Describe the different zones of a lake.

- Littoral Zone – regions occupied by floating and rooted plants; shallow water close to shoreline

-Plants have roots in the soil and insects, snails, frogs, and salamanders make this their home

- Limnetic zone – open waters away from shore; occupied by phytoplankton, zooplankton, fish, etc.

-Algae are the main producers (because they don’t need roots in soil) and sunfish feed on algae and insects while catfish scavenge their meals

-Profundal zone (aphotic zone) – where detritus accumulates

9. What are adaptations for organisms in rivers and streams?

Streamlined bodies, hooks, suckers

10. Describe wetlands.

-Includes marshes, bogs, swamps, seasonal ponds

-Among richest biomes with respect to biodiversity and productivity. Favors growth of water plants and also rich in invertebrates and birds.

-Very few now exist as they are often thought of as wastelands

11. What is a marine biome?

All oceans and made of saltwater

12. What is a photic zone? Aphotic zone?

-Photic zone- penetrated by sunlight

-Aphotic zone- no sunlight

13. What are the different ocean zones?

o Intertidal zone- alternates between being submerged and exposed to sun/air in the photic zone

• Sudden changes in temperature and pounding of waves

• Home to sand stars, clams, crabs, and barnacles

o Neritic Zone- A region of shallow water below the low-tide line in the photic zone

• Home to large schools of fish such as sardines and anchovies

• In tropical waters, coral reefs live in this zone

o Pelagic zone- open blue water constantly mixed by wind-driven oceanic currents; has photic and aphotic regions

• Covers 70% of Earth’s surface

• High oxygen levels

• B/c of thermal stratification, some tropical areas have lower nutrient levels than temperate areas

• Home to algae, phytoplankton, photosynthetic bacteria, zooplankton, shrimp-like krill, jellies, fishes, large squids, sea turtles, sharks, marine mammals, etc.

o Benthic zone- seafloor below the surface waters of the neritic (coastal) zone, and the offshore pelagic zone. Except for shallow areas, this zone receives no sunlight.

• Sufficient oxygen concentrations

• Shallow benthic areas (photic) have seaweeds and algae to support invertebrates and fishes

• Deep benthic areas (aphotic) aka deep sea vents, have chemoautotrophic prokaryotes that support tube worms, arthropods, echinoderms, etc.

14. What is an estuary?

o Where the fresh water of a river meets the salt water of the ocean; optimal breeding grounds

o Shallow, sunlit waters, rich in nutrients

o Home for marsh grasses, algae, crabs, worms, clams, oysters, and fish

15. What are the different terrestrial biomes?

Tropical Rainforest, Temperate Rainforest, Desert, Grassland, Coniferous Forest (Taiga), Deciduous Forest, Tundra

16. For each biome, list the following: climate (temperature and precipitation), geographical location, plants and animals, and any unique features.

**Tropical Rain Forest**

 Warm regions close to the equator

 Lots of rainfall and constant sunlight all year

 Rain forests receive at least 200 cm of rain annually; some rain forests receive 600 cm.

 Vertical layering allows for the large # of niches:

 Canopy: The leafy roof made by the trees; 25-45 meters high. Tree tops are exposed to rain, sunlight and strong winds. Home to monkeys, birds, lizards and insects.

 Understory (sub-canopy): 2nd layer of shorter trees under the canopy which grow well in the shade. The air is still, humid, and dark. Vines grow from the soil to the canopy. Home to ferns, shrubs, insects, frogs, birds, lizards, snakes, etc.

 Ground layer: moist forest floor covered in leaves, roots, plants and dirt. Home to insects, worms, bacteria, fungi, and mammals such as rodents and cats.

**Temperate Rain Forest**

 Moderate temperatures and lots of rainfall

 200-350 cm of precipitation (rain or snow) annually

 Huge diversity of life:

 Big coniferous trees dominate this area like spruces, firs, and cedars. Deciduous trees like maples are also found in warmer regions. Mosses and lichens are common and widespread.

 Consumers include bacteria, fungi, coyotes, bears, deer, birds, reptiles, insects, etc.

 Has vertical stratification like the tropical rain forest

 Northwestern coast of USA and in other places throughout the world, such as South America, New Zealand, and Australia.

**Desert**

 Receives less than 25 centimeters of rain per year

 With rainfall as the major limiting factor, vegetation in deserts varies greatly. The driest deserts are sand dunes.

 Scorching days and cold nights

 Plants and animals living in deserts have adaptations to help them survive these harsh conditions

 The spines on a cactus prevents organisms from stealing its water reserves

 The leaves of some desert plants curl up, or even drop off altogether, thus reducing water loss during extremely dry spells.

 Many desert mammals are small herbivores that remain under cover during the heat of the day, emerging at night to forage on plants.

 Home to coyotes, hawks, owls, roadrunners, snakes, lizards, insects, etc.

**Grasslands**

• Grasslands are large communities covered with rich soil, grasses, and similar plants.

• A.K.A. Prairie

• Middle latitudes

• 25-75 cm rain each year (enough for grasses but not for many trees)

• Home of large grazing herbivores that maintain the grasses; bison, zebras, giraffes, rhinoceros, deer, elk

• Also home to prairie dogs, big cats, birds, reptiles, insects, etc.

Savanna: Grasslands closer to the equator; receive up to 120 cm of rain each year

**Deciduous Forest**

 Precipitation ranges from about 70 to 150 cm annually

 Cool mornings, warm days

 Deciduous trees: broad-leaved hardwood trees that lose their foliage annually. Ex. Oak, maple, elm, aspen, etc.

 Vertical stratification: canopy of tall trees, understory of shorter trees, and mosses and ferns on the forest floor

 Animals include: many bird species live here during the warmer months while some species like the blue jay live here all year long. Also squirrels, rabbits, mice, deer, bears, etc.

**Coniferous Forest**

 Also called the boreal forest or taiga

 Lies just south of the tundra

o Because of their latitude, taiga communities usually are somewhat warmer and wetter than the tundra.

 Long, severe winters and short, mild summers

 Coniferous trees (cone-bearing; also called conifers): Ex. Spruces, hemlocks, pines, firs, etc.

 Precipitation varies from about 20 cm – 200 cm annually

 Animals include: insects, birds, squirrels, rodents, elk, moose, bears, wolves, cats, etc.

**Tundra**

 Precipitation (rain and snow) is 15 – 25 cm annually

 Treeless plains

 Long summer days and short daylight in winter

 Permafrost: frozen sub-layer of soil

 Producers: grasses, shrubs and small plants

 Animals: rabbits, foxes, birds, weasels; Summer brings mosquitos, insects, oxen, caribou, and reindeer