Biome Cards (pp. 1 of 7)

Cut out each biome card and divide each card into three sections. Place all sections in a plastic storage bag. Have one bag for every two students.

Column 1 – biome name
Column 2 – biome description
Column 3 – examples of plant adaptations

TUNDRA	• Ground is permanently frozen (permafrost) below surface, even during summer • Alternating thawing and freezing of soil crushes plant roots, roots cannot penetrate deeply • Growing season is very short, in summer the ground becomes soggy and wet due to ice under soil surface not allowing water to penetrate • Characterized by very cold winters • Precipitation in the form of rain is not common (less than 25cm) • Temperatures range between -40°C to 10°C • Windy • Short periods of winter sunlight • Nutrient-poor soil since the process of decay is slow	• Very short plants with shallow roots, absence of large trees, due to roots not being able to penetrate deeply • Mosses and lichens most common (nonvascular), can grow in cold temperatures • Plants grow, flower and reproduce extremely quickly, then become dormant during the winter • Reproduce by seed that is dispersed by wind or through standing water, then seeds stay dormant through winter until next growing season • Nonvascular and some very small vascular plants are successful, plants cannot grow very large

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TAIGA	• Temperatures range between -30°C to 20°C • Soil is not permanently frozen, water is found both on soil surface in streams, as well as, deep underground • Fairly short growing season, summers are cool, winters are bitterly cold • Rainfall averages between 50– 125cm • High humidity, except in winter when the air is fairly dry, since precipitation is in the form of snow, not rain • Topsoil develops slowly from decaying coniferous needles	• Plants have very developed vascular tissue, and can grow quite large, some into very large trees that can withstand cold temperatures • Despite plant size, roots do not penetrate deeply and reach abundant surface water • Many trees have narrow, waxy leaves allowing them to keep their leaves through cold winter • Reproduction of plant occurs in a fairly short time span, seeds, found in cones, last a long time, until the next growing season

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GRASSLAND	• Fertile soil, water is generally found just below soil surface • Periodic fires destroy and prevent large vegetation • Warm to hot summers, cold winters • Moderate, seasonal precipitation, between 10 and 20 inches per year • Much of the precipitation falls as snow, serving as a reservoir for the beginning of the growing season • Growing season is dependent upon the amount of precipitation, occasional drought with little rainfall • Very windy	• Flowers are above the leaves at the top of short plant stems and pollinated by wind • Plant has a deep base (low centered) with branching surface roots which form sod • Some plants have toxic components to prevent grazing by large animals • Dominant plants have thin leaf blades that can be dormant in the winter and during dry spells in the summer • Seeds are narrow with sharp pointed edges that stick to large grazing animals • Plants are small and can grow over open land quickly during the summer rainy season

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TEMPERATE FOREST	• In the fall, the decrease in hours of sunlight hinders photosynthesis and most plants become dormant. • Cold winters halt plant growth for several months • Soil is rich in humus, a material formed from decaying leaves and other organic material that makes soil fertile • Temperature ranges between 0°C to 25°C • Precipitation ranges between 75-250 cm and occurs all year long; rivers and streams are common	• Roots are expansive, deep and long. Fertile soil supports large plants and trees with woody stems • Plants either have broad leaves that are shed in the fall after changing color and reappear in the spring or have narrow, waxy, needle shaped leaves • Nonvascular plants rely on flowing water for reproduction, vascular plants rely on wind, water and animals attracted by small fruit for pollination and seed dispersal. Small plants usually flower in the spring

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AQUATIC FRESHWATER		
	• Consists of freshwater lakes and ponds • Limited species diversity due to isolation from each other • Have several zones dependent on water depth and light penetration • Temperature varies seasonally from 4°C near the bottom to 22°C; in the winter, temperature can vary from 4°C near the bottom to 0°C (ice) on the top. In-between the two layers is an area of drastic temperature change • During spring and fall seasons there is a mixing of top and bottom layers due to winds, resulting in a uniform temperature throughout • Mixing also circulates oxygen throughout, which supports free-floating organisms	• Roots can be free-floating unattached, floating attached, submerged or emergent (stick up into the air) • Leaves have stomata (breathing holes) on the top surface, instead of the bottom, which is common to most plants • Leaves have waxy coating with special air sacs to keep oxygen gas in the leaf • Stems are flexible to adjust to currents • Reproduction of plants is either asexual (stems break off and grow elsewhere) or sexual, using either insects, wind, or water (floating seeds) for pollination and seed dispersal • Plants may be vascular or nonvascular, the vascular tissue is for transporting oxygen, not water

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DESERT	• Less than 25 cm of rain per year, area is dry most of the time • Soils are rich in minerals, but poor in organic material • Less than 10-20% humidity • Extreme temperature changes during the course of the day, but generally very hot in summer and mild in winter • Water is generally found only near surface after a rain, or is in aquifers quite deep underground	• Stems are waxy, photosynthetic stems, some are pleated in order to store water • Roots are either extremely deep or very shallow • Leaves are modified (thorny) or plant has no leaves to reduce water loss through transpiration • Reproduction – pollination and seed dispersal is generally by animals or by wind. Animals are often attracted by fleshy, water-storing fruit • Plants generally have a vertical, upright stance in order to reduce exposure to direct sunlight • Plants are dormant during periods of very hot dry summers and germinate only when sufficient moisture guarantees a chance for survival

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TROPICAL RAINFOREST

- The earth's most densely populated biome and is home to more species than all the other biomes combined.
- Normally found within 10 degrees of the equator
- Sunlight is the major limiting factor. On the forest floor the light is dim and measurements have shown only 1% of the light that reaches the top of the forest makes it to ground level
- The temperature varies from 21°C to 34°C in the highest canopy layer. Daytime temperatures at ground level normally range between 21 to 26°C. Excellent growing conditions all year long
- The amount of rainfall is usually over 300 cm a year with two seasons: semi-wet and very wet. When it is not raining humidity ranges from 75 to 88%
- The thin soil is nutrient-depleted and when organic matter (trees and leaves, etc.) fall to the forest floor they are quickly decomposed and the nutrients recycled
- There is a very distinct vertical layering of plants in the rain forest. There are three distinct canopy layers from 30 to 80 meters high, and a layer of plants living in the dim area nearest to ground level

- Some plants are root parasites of woody vines called lianas (because the soil is so poor, they get their nutrition from another plant); these plants produce the world's largest flowers which are over three feet in diameter and produce an odor similar to rotting flesh, which attracts pollinating insects
- Plants are fast growing woody vines that grow rapidly up tree trunks when the sunlight reaches the plant through a break in the canopy
- Some plants have aerial roots and live their entire life high up in tree tops, never touching the soil. They obtain their water from moisture in the air
- Plants generally have extremely large leaves to catch as much sunlight as possible, since light is a limiting factor. Plants do not lose their leaves at a specific time, but instead replace them throughout the year
- Both vascular and nonvascular plants are present. Nonvascular plants obtain their moisture from the extremely humid air or numerous streams and waterfalls