

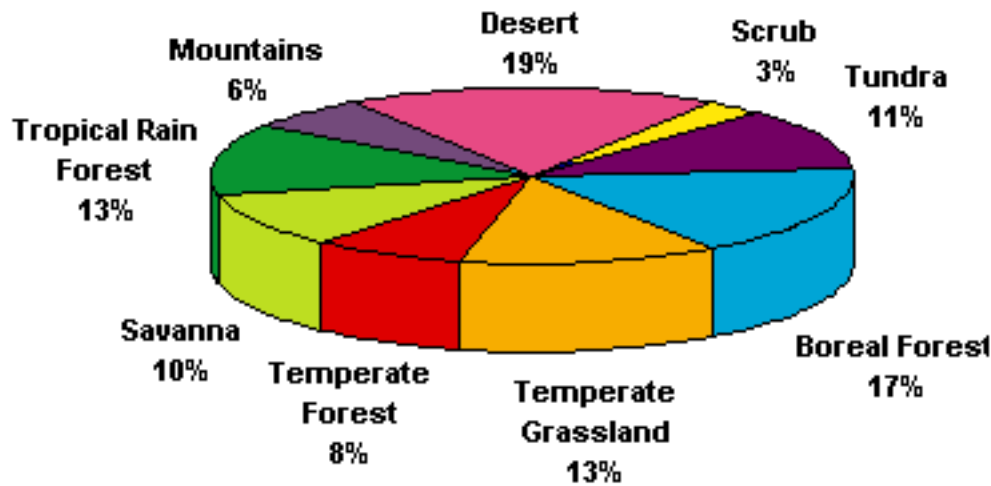
Section Title: Ecology-the ecosystem level

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Opening Activity:

Review of Old Information: mbgnet.net

New Information: Ecology Notes-the ecosystem level.



- a. \_\_\_\_\_ – a large terrestrial ecosystem that contains a number of smaller ecosystem
  - i. Specific organisms are characteristic of each biome
- b. The Seven Major Biomes
  - i. \_\_\_\_\_
    - 1. Cold and largely treeless
    - 2. Largest and northernmost biome
    - 3. Permafrost layer in soil that is low in nutrients
    - 4. Long and bitterly cold winters
  - ii. \_\_\_\_\_
    - 1. Forested; dominated by evergreens
    - 2. Long winters, short summers, nutrient-poor soils
  - iii. \_\_\_\_\_
    - 1. Trees lose all leaves in fall
    - 2. Have pronounced seasons, MORE precipitation than taiga
  - iv. \_\_\_\_\_
    - 1. Dominated by grasses; rich fertile soil
    - 2. Much has been transformed into farmlands
  - v. \_\_\_\_\_
    - 1. LITTLE precipitation
    - 2. Vegetation SPARSE; organisms adapted to conserving water
  - vi. \_\_\_\_\_
    - 1. Tropical or subtropical grasslands
    - 2. MORE rainfall than deserts; LESS than tropical forests
  - vii. \_\_\_\_\_
    - 1. Characterized by tall trees

2. NEAR equator
  3. Stable, year-round growing season
  4. HIGHEST species richness of all biomes
- viii. Aquatic Ecosystems
1. \_\_\_\_\_: area near the shoreline affected by the tides
  2. \_\_\_\_\_: area of ocean over the continental shelf
  3. Ocean
    - a. Oceanic Zone: deep water of the open sea
    - b. \_\_\_\_\_ Zone: open ocean
    - c. \_\_\_\_\_ Zone: ocean bottom
    - d. \_\_\_\_\_ Zone: part of the ocean that receives sunlight
    - e. \_\_\_\_\_ Zone: cold and dark part of the ocean
    - f. \_\_\_\_\_: area where freshwater flows into the sea
    - g. Lakes, Rivers and Streams

**Activity:**

**Biome Classification On-line lab.** Your objective is to gain a better understanding of the plants, animals, climate, and location of each biome listed in the table.

Site: <http://mbget.mobot.org/index.html>

Biome	Types of Plants	Location	Types of Animals	Details & Climate (weather)
Rainforest				
Tundra				

Taiga				
Desert				
Temperate (deciduous forest)				
Grasslands				
Temperate oceans				

**Activity:**

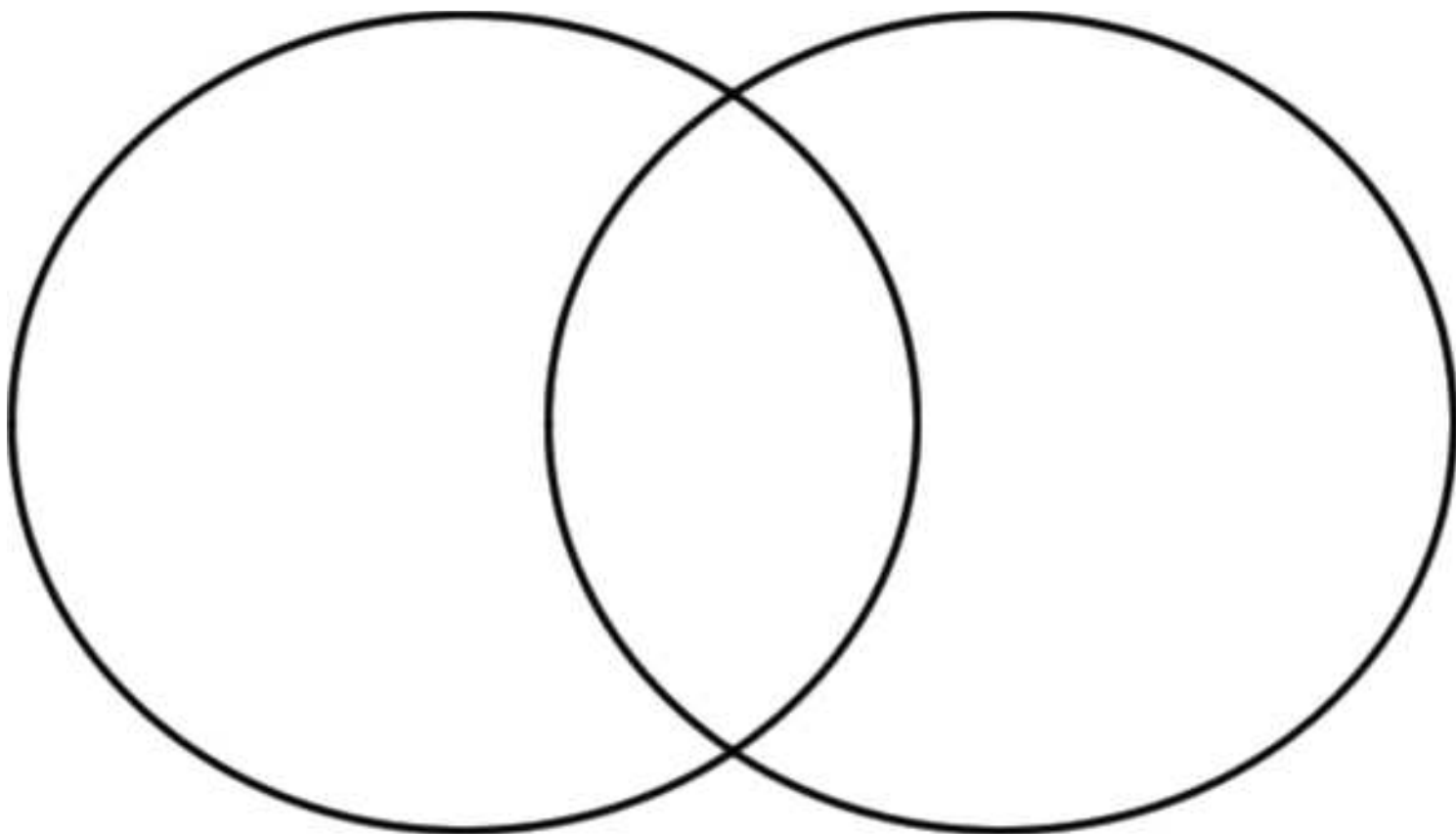
1. Describe the leaves of trees that live in the taiga.



species. For instance, deer can be found in grasslands and in temperate forests. In this activity, you will work together to create a VENN diagram to compare two ecosystems, illustrate what features are distinct to each and what they have in common. Each group will have a pair of ecosystems to investigate.

<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Tropical Rain Forest Temperate Forest	Tundra Taiga	Desert Grasslands

Instructions: As a group, brainstorm a list of animals and plants you can find in each ecosystem. Find any animals or plants that you would probably find in both areas. The venn diagram can also include other features of the ecosystem, such as average temperature, physical features, geography.



**Section Title: Ecology-The biosphere level.**

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**Opening Activity:****Review of Old Information:** N/A**New Information:****Biome WebQuest – Major Land Biomes****Data Collection and Analysis**

**Biomes** are regions of the earth that have similar environmental conditions and as a result, similar types of living organisms. **Environmental conditions** (abiotic factors) include temperature, rainfall, soil conditions, sunlight, and seasonal changes. **Living organisms** (biotic factors) must have strategies for survival in their environment, and through the course of evolution have developed **adaptations** that maximize their ability to survive.

**Activity:**

For each of the major terrestrial (land) biomes listed below, make a chart of **3** abiotic **environmental conditions** that **act as limiting factors in** the biome. These are abiotic factors that are found at a high or low level that make survival difficult for organisms without adaptations. **3 evolutionary adaptations** that organisms (plants and animals) in the biome possess to help them survive. As well, indicate **3 countries where the biome is located**.

In Review: Environmental conditions that act as limiting factors for population growth in the biome, evolutionary adaptations of organisms to survive, 3 countries that are located within the biome. WRITE YOUR POINTS OF INFORMATION IN BULLETED FORM INTO THE CHART.

**Land Biomes**

Tundra

Taiga

Temperate Deciduous Forest

Grassland

Desert

Tropical Rainforest

**Chart is attached to the back of the notes packet.**

## Section Title: Ecology-The biosphere level.

Opening Activity Day 1:

Opening Activity Day 2:

Review of Old Information: N/A

New Information: Nutrient Cycling:

### The Water Cycle

1. Water cycles between the oceans, atmosphere and land. All living organisms require water.
  - A. Water enters the atmosphere as **water vapor**, a gas, when water evaporates from the ocean or other bodies of water.

**Evaporation**—the process by which water changes from a **liquid** to a **gas**.
  - B. Water can also enter the atmosphere by evaporating from the leaves of plants—**Transpiration**.
  - C. Precipitation--**rain**, **snow**, **sleet**, or **hail**
    - a. The sun heats the **atmosphere**.
    - b. Warm, moist air rises and cools.
    - c. Eventually, the water vapor condenses into tiny droplets that form **clouds**.
    - d. When the droplets become large enough, the water return to Earth's surface.

### The Nitrogen Cycle

1. All organisms require nitrogen to make **amino acids**, which in turn are used to build **proteins**.
  - A. Nitrogen gas makes up 78% of Earth's **atmosphere**.
  - B. Nitrogen containing substances such as **ammonia** ( $\text{NH}_3$ ), **nitrites** ( $\text{NO}_2^-$ ), and **nitrates** ( $\text{NO}_3^-$ ) are found in the wastes produced by many organisms and in dead and **decaying** organic matter.
  - C. Nitrate is major component of plant **fertilizers**.
2. Nitrogen gas is the most abundant form but only certain **bacteria** can use this form.
  - A. Such bacteria live in the **soil** and on the **roots** of plants.
  - B. These bacteria convert nitrogen gas into ammonium--**nitrogen fixation**.
  - C. Other bacteria in the soil convert ammonia into **nitrites** and **nitrates**.

## The Carbon Cycle

1. Every **organic** molecule contains the element **carbon**.
  - A. Carbon and oxygen form **carbon dioxide** gas ( $\text{CO}_2$ ), an important component of the **atmosphere**.
  - B. Carbon dioxide is taken in by plants during **photosynthesis** and is given off by plants and animals during **cellular respiration**.
2. Four main types of processes move carbon through its cycle:
  - A. Biological processes, such as **photosynthesis**, **cellular respiration**, and **decomposition**, take up and release carbon and oxygen.
  - B. Geochemical processes, such as **erosion** and volcanic activity, release carbon dioxide into the atmosphere and oceans.
  - C. Mixed biogeochemical processes, such as the burial and decomposition of **dead organisms** and their conversion under pressure into **coal** and **petroleum** (fossil fuels), store carbon underground.
  - D. Human activities, such as **mining**, cutting and **burning** forests, and burning **fossil fuels**, release carbon dioxide into the atmosphere.

### I. The Biosphere Level

#### a. Humans affecting the Biosphere

##### i. Human Population Growth

1. Requires more energy, food, space, and disposal of waste (affects the environment)

##### ii. \_\_\_\_\_

1. Currently, species are disappearing faster than any time since the last mass of extinction because of the increase of the human population

##### iii. \_\_\_\_\_

1. The ozone layer – protects earth's living organisms by absorbing UV ray's that would overheat the earth.
2. \_\_\_\_\_ (CFC's) that are produced by humans are currently destroying the ozone layer.
  - a. Aerosol sprays, plastics

##### iv. \_\_\_\_\_

1. \_\_\_\_\_ - Carbon Dioxide and Water Vapor help keep the earth warm by not allowing heat to escape after is trapped in the atmosphere
2. By burning fossil fuels, humans produce more carbon dioxide which traps more heat than normal – this is what causes global warming

## Video Worksheet: "Global Warming: The Signs and The Science"

1. Over the past 100 years how much has the average global temperature risen?
2. Over the past 50 years how much has the average temperature risen in the Artic and Alaska?
3. Plants use sunlight to stimulate the process of...



4. Ancient sunlight comes in the form of...
5. Concentrations of CO<sub>2</sub> remain in the atmosphere for how long?
6. What country is the biggest greenhouse gas emitter in the world today?
7. What are the worlds largest polluters?
8. The spikes in temperature in big cities have threatened human health. How many degree warmer are urban areas than their surroundings?
9. Add in global warming and unhealthy air days in urban cities could increase by...
10. In the summer of 2003 a human health disaster developed in Colorado where the moisture and increased temperatures allowed mosquitoes to carry what disease?
11. How do warming sea temperatures affect our weather/climate?
12. What drives the process of rising sea levels?
13. Rising sea levels could impact what offshore energy deliverer?

14. What is being affected by droughts in Colorado?
15. What food crop would be greatly affected by a 1 degree warming?
16. An increased amount of nitrogen in the soil causes microbes to feed and release a greater amount of carbon dioxide out of the soil. Where does the increase amount of nitrogen come from?
17. How do melting glaciers affect the density of cooler water, causing climate change?
18. The Kyoto agreement attempted to decrease a countries release of...
19. How is China trying to enforce lower carbon emissions into the atmosphere?
20. How are cars changing to become more energy efficient?
21. In New Hampshire, what is used to power the recycle plant?
22. What alternative energy source is found in California, the Dakotas, Kansas, and Texas?
23. What is the largest source of alternative energy?
24. How do plants help reduce the amount of carbon in the atmosphere?

**Activity:**

1. \_\_\_\_The combustion of fossil fuels has increased atmospheric levels of
  - a. Ammonia
  - b. Nitrogen
  - c. CFC's
  - d. Carbon dioxide
  
2. \_\_\_\_The thinning of the ozone is caused by
  - a. CFC's
  - b. Carbon dioxide
  - c. Oxygen gas
  - d. Carbon monoxide
  
3. \_\_\_\_Many scientists think that humans have caused an increase in the size of the ozone hole by
  - a. Burning large quantities of fossil fuels
  - b. Generating a lot of carbon dioxide that has resulted in an increase in the atmospheric carbon dioxide level
  - c. Releasing large quantities of chlorofluorocarbons into the atmosphere
  - d. All of the above
  
4. \_\_\_\_The small percentage of ultraviolet radiation that strikes the earth from the sun is the cause of
  - a. Climate changes
  - b. Global warming
  - c. Sunburns and skin cancer
  - d. The greenhouse effect
  
5. \_\_\_\_The greenhouse effect is
  - a. Energy and materials needed by a species
  - b. Decreased average global temperatures due to trapped excess greenhouse gases
  - c. Phenomenon that insulates earth from the freezing temperatures of space

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**Unit 2.9**

**Name:**

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**Section Title: Unit 2 Ecology Review**

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**Opening Activity:**

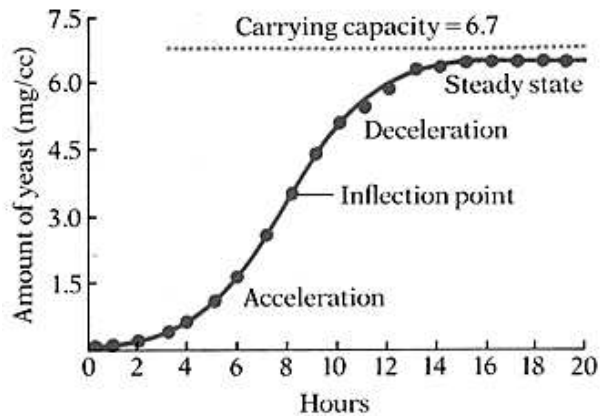
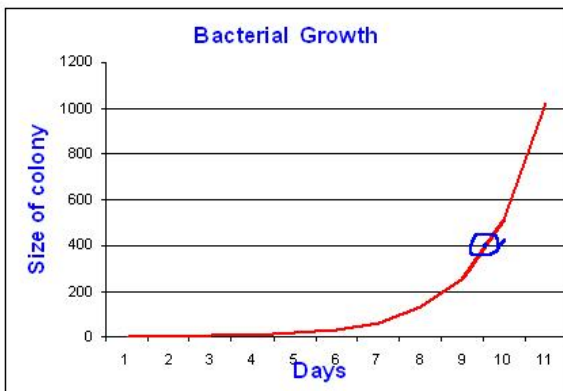
**Review of Old Information:**

1. \_\_\_\_\_The broadest most inclusive level of organization in ecology is
  - a. An ecosystem
  - b. A community
  - c. a population
  - d. the biosphere

2. \_\_\_\_\_When organisms affect and are affected by other organisms in their surroundings and with the nonliving parts of their environment, it is called
  - a. Ecology
  - b. Disturbances of the ecosystem
  - c. interdependence
  - d. modeling
3. \_\_\_\_\_An example of an abiotic factor is
  - a. a tree
  - b. bird
  - c. sunlight
  - d. grass
4. \_\_\_\_\_Conformers are organisms that
  - a. use energy to control their internal conditions
  - b. do not regulate internal conditions
  - c. change over many generations
  - d. none of the above
5. \_\_\_\_\_A long term strategy to avoid unfavorable conditions by moving to another, more favorable habitat is called
  - a. dormancy
  - b. hibernation
  - c. migration
  - d. all of the above
6. \_\_\_\_\_A species fundamental niche is
  - a. the range of resources it can potentially use
  - b. the range of conditions it can potentially tolerate
  - c. where it probably competes for resources
  - d. all of the above
7. \_\_\_\_\_the range of resources a species actually uses is called
  - a. an abiotic factor
  - b. resource tolerance
  - c. a realized niche
  - d. a regulator
8. \_\_\_\_\_A pond is an example of
  - a. a population
  - b. a community
  - c. a biosphere
  - d. an ecosystem
9. \_\_\_\_\_Once biotic factor that could influence a plant might be
  - a. the amount of sunlight
  - b. soil pH
  - c. carbon dioxide concentration
  - d. a pollinating insect
10. \_\_\_\_\_People who spend time at high elevations develop more red blood cells, which helps them obtain oxygen from the “thin air”. This phenomenon is an example of
  - a. acclimation
  - b. migration
  - c. adaptation
  - d. dormancy
11. \_\_\_\_\_An animal that maintains its body temperature within a narrow range even when the environmental temperature varies is an example of a
  - a. specialist
  - b. conformer
  - c. generalist
  - d. regulator
12. \_\_\_\_\_The role a species play in its environment is called the species
  - a. habitat
  - b. resources
  - c. niche
  - d. tolerance curve
13. \_\_\_\_\_ A forest is an example of
  - a. A population
  - b. A community
  - c. A biosphere
  - d. An ecosystem
14. \_\_\_\_\_ A group of Japanese beetles is an example of
  - a. A population
  - b. A community
  - c. A biosphere
  - d. A ecosystem

15. \_\_\_\_\_ All the living and nonliving things in a given area is known as
- A community
  - An ecosystem
16. \_\_\_\_\_ The earth and it's atmosphere fall into which ecological category?
- A population
  - A community
  - A biosphere
  - An ecosystem
17. \_\_\_\_\_ Temperature and precipitation would be an example of
- Biotic factors
  - Abiotic factors
  - Habitat
  - Climate factors
18. \_\_\_\_\_ Organism adjusting their tolerance to an abiotic factor is known as
- Conformation
  - Regulation
  - Dormancy
  - Acclimation
- 19) Which of the following types of dispersion patterns would a flock of snow geese display?
- clumped
  - even
  - random
  - logical
- 20) The measure of how crowded a population is referred to as
- size.
  - density
  - dispersion.
  - growth rate.

For numbers 4-7, use the diagrams below.



- 21) The diagram on the left occurs only under ideal conditions and in the absence of limiting factors. This type of growth model is called
- exponential
  - logistic
- 22) The diagram on the right involves carrying capacity, and is therefore which growth model?
- exponential
  - logistic
  - Malthusian
  - irruptive

- 23) Human population growth is most reflective of which growth model?  
 a. exponential                      b. logistic                      c. Malthusian                      d. irruptive

**Match the following terms with their corresponding environmental factors.**

24) \_\_\_\_\_Disease                      a. density-dependent factor

25) \_\_\_\_\_Weather                      b. density-independent factor

26) \_\_\_\_\_Fire

27) \_\_\_\_\_Food Shortage

- 1) The measure of how crowded a population is, or the number of individuals per unit area, is called  
 a) population size.      b) population density. c) dispersion.      d) population dynamics.

- 2) Ecologists use survivorship curves in order to illustrate the death rates of different populations. An example of an organism with a Type III survivorship curve, where MOST organisms die relatively “early” in their life, is a  
 a) human.                      b) bird.                      c) salmon.                      d) elephant.

- 3) When the birth rate and death rate of a population are equal,  
 a) the population is growing in size.  
 b) the population is remaining constant in size.  
 c) the population is decreasing in size.  
 d) the life expectancy of individuals in the population is increasing.

- 4) The type of dispersion where individuals are clustered together is called \_\_\_\_\_. One example of organisms with this type of dispersion are \_\_\_\_\_.  
 a) even; birds.      b) clumped; fish.      c) random; trees.                      d) random; fish.

**Match the type of growth rate with their characteristics in Questions 15-17. Answers will be used more than once.**

5) \_\_\_\_\_Follows J-shaped curve.                      a) Exponential Model

6) \_\_\_\_\_Follows S-shaped curve.                      b) Logistic Model

7) \_\_\_\_\_Birth rates decline and death rates increase as a population grows until the growth rate is zero.

- 8) Which of the pairs of parasites listed below are endoparasites?  
 a) tapeworms and leeches                      c) leeches and fleas  
 b) tapeworms and bacteria                      d) ticks and mosquitoes

- 9) Pioneer Species  
 a) are usually small.                      c) predominate early in succession.  
 b) reproduce fast.                      d) ALL of the above.

- 10) Species Richness is HIGHEST in areas  
 a) close to the equator.                      c) far from the equator.  
 b) with small islands.                      d) with low community stability.

**Match the types of species reactions with their characteristics in Numbers 21-25.**

- 11) \_\_\_\_\_ Similar to predation, but does not result in immediate death of host. a) Predation
- 12) \_\_\_\_\_ Relationship where one species benefits and the other is NOT affected. b) Parasitism
- 13) \_\_\_\_\_ Cooperative relationship in which two Species derive some benefit. c) Competition
- 14) \_\_\_\_\_ Determines relationships in the food web. d) mutualism
- 15) \_\_\_\_\_ Caused by two or more species using the same limited resource. e) commensalism
- 16) What percent of the total energy consumed in one trophic level is incorporated into the next level?  
a) 10%      b) 25%      c) 50%      d) 75%
- 17) Organisms that are autotrophic and use photosynthesis to obtain energy are called  
a) carnivores.      b) producers.      c) herbivores.      d) decomposers.
- 18) Omnivores eat  
a) only producers.      c) producers and consumers.  
b) only consumers.      d) only other omnivores.
- 19) Organisms that feed on the “garbage” of an ecosystem are called  
a) carnivores.      b) producers.      c) herbivores.      d) decomposers.
- 20) The 1<sup>st</sup> trophic level of an ecosystem typically contains  
a) carnivores.      b) producers.      c) herbivores.      d) decomposers.
- 21) Which of the following methods do wild organisms use to decrease their competition with other species for limited resources?  
a. character displacement      b. resources partitioning      c. dormancy      d. both a. & b.
- 22) The richness and stability of a community are relatively \_\_\_\_\_ if the area is large and near the equator.  
a. low      b. high      c. unstable      d. oscillating
- 23) Jordan and Taylor did not listen to Smokey’s advice and accidentally started a wildfire. The regrowth of that forest following the fire is an example of  
a. primary succession      b. secondary succession      c. climax community
- 24) Which organism is the best example of a pioneer species?  
a. grizzly bear      b. bald eagle      c. white-tailed deer      d. field mouse
- 25) A “random” distribution of individuals in a population would be most likely to result from  
a. clumped food resources.      c. herding behavior by individuals in the population.  
b. territorial behavior by the population.      d. the dispersal of seeds by the wind.
- 26) The stable end point of succession is called the  
a. staged community.      c. climatic change.  
b. climax community.      d. community development.
- 27) Compared to the lowest trophic level, the highest trophic level contains  
a. more individuals.      b. less energy.      c. more producers.      d. fewer carnivores.
- 28) All producer organisms are  
a. autotrophs.      b. heterotrophs.      c. detriivores.      d. omnivores
- 29) A population of cheetahs has a birth rate of 2.5 and a death rate of 1.5. What is the growth rate of this population?  
a. 4.0      b. 1.53      c. 0.6      d. 1.0
57. \_\_\_\_\_ A large terrestrial ecosystem that contains a number of smaller ecosystems is known as a  
a. Trophic level  
b. Food chain  
c. Biome

d. Intertidal zone

58. \_\_\_\_\_The biome that is dominated by grasses and has rich fertile soil is a
- Tundra
  - Taiga
  - Grassland
  - Tropical rainforest
59. \_\_\_\_\_Tropical to subtropical grasslands are known as
- Tundra
  - Savannah
  - Temperate deciduous forest
  - Taiga
60. \_\_\_\_\_The biome that has the highest species richness and is near the equator is known as
- Tundra
  - Temperate deciduous
  - Tropical rainforest
  - Savannah
61. \_\_\_\_\_The biome that has very little precipitation and organisms that are adapted to conserving water
- Tundra
  - Tropical rainforest
  - Desert
  - Savannah
62. \_\_\_\_\_The biome that is dominated by evergreens (coniferous forests) are known as
- Tundra
  - Taiga
  - Desert
  - Savannah
63. \_\_\_\_\_The largest and northern most biome is known as the
- Savannah
  - Tropical rainforest
  - Tundra
  - Taiga
64. \_\_\_\_\_The cold and dark part of the ocean that receives no light is known as the
- Neritic zone
  - Aphotic zone
  - Photic zone
  - Benthic zone
65. \_\_\_\_\_The area where fresh water runs into the sea
- The oceanic zone
  - The pelagic zone
  - Estuaries
  - The aphotic zone
66. \_\_\_\_\_What protects earth's living organisms by absorbing UV ray's that would overheat the earth?
- Greenhouse gases
  - Global warming
  - The ozone layer
  - Biomes
67. \_\_\_\_\_What is a main contributor to the release of greenhouse gases into the atmosphere?
- Photosynthesis
  - Burning of fossil fuels
  - Thinning of the ozone layer
  - CFC's



68. \_\_\_\_\_The process in which carbon dioxide and water vapor help keep the earth warm by not allowing heat to escape after it is trapped in the atmosphere is known as
- Thinning of the ozone layer
  - Photosynthesis
  - The greenhouse effect
  - Global warming
69. \_\_\_\_\_The thinning of the ozone layer is caused by
- CFC's
  - Carbon dioxide
  - Oxygen gas
  - Carbon monoxide
70. \_\_\_\_\_ The biosphere includes
- All the members of one species
  - All the living and non-living factors in an environment
  - All parts of Earth where life exists
  - All members of one species in the same area
71. \_\_\_\_\_The combustion of fossil fuels has increased atmospheric levels of
- Ammonia
  - Nitrogen
  - CFC's
  - Carbon dioxide
72. \_\_\_\_\_Which of the following is not true of tropical rainforests?
- They are found near the equator
  - They have the highest species richness of any biome
  - They show wide seasonal changes in temperature
  - They are rapidly disappearing
73. \_\_\_\_\_Which of the following best characterizes the difference between the tundra and taiga biomes?
- Tundra biomes are located at lower latitudes than taiga biomes
  - Tundra biomes are warmer and have lower average annual precipitation than taiga biomes
  - Tundra has small, slow growing plants with root systems limited by a layer of permafrost, while the taiga has trees adapted to cold temperatures
  - Tundra has extremely long and cold winters, and taiga has short and warm winters.
74. \_\_\_\_\_Temperate deciduous forests are characterized by
- Pronounced seasons with high average annual precipitation
  - The presence of trees that lose their leaves during the winter
  - Mild winters, moderate average annual precipitation, and broad leaves
  - Pronounced seasons, broad-leaved trees, and grasses being the dominant plants.
75. \_\_\_\_\_One reason trees are unusual in the tundra is that
- Large herbivores eat them
  - There is not enough rainfall to support them
  - Permafrost prevents root growth
  - Grass and shrubs crowd them out
76. \_\_\_\_\_The small percentage of ultraviolet radiation that strikes the earth from the sun is the cause of
- Climate changes
  - Global warming
  - Sunburns and skin cancer
77. \_\_\_\_\_The greenhouse effect is
- Energy and materials needed by a species
  - Decreased average global temperatures due to trapped excess greenhouse gases
  - Phenomenon that insulates earth from the freezing temperatures of space
  - Organisms interacting in a specific area
78. \_\_\_\_\_The photic zone of the oceans differ from the aphotic zones in that
- There are living things in the photic zones but no living things in the aphotic zones
  - The photic zones receive sunlight, while the aphotic zones do not
  - The photic zones are less warm than the aphotic zones

d. The photic zones are found near the tropics, while the aphotic zones are found far from the tropics

79. \_\_\_\_\_Plants living in the taiga are adapted for

- a. Long, cold winters
- b. Long summers
- c. Nutrient rich soil
- d. Very small amounts of precipitation

80. \_\_\_\_\_Which of the following is not an adaptation that limits water loss in plants

- a. Protective spines
- b. A waxy coating
- c. Broad, thin leaves
- d. Opening of the stomata only at night

81. \_\_\_\_\_The amount of light that reaches the floor of a tropical rainforest is limited by the

- a. Short growing season in the tropics
- b. Forest canopy
- c. Dense growth of short vegetation that covers most of the floor
- d. Dense fog that exists within the forest