

Symbiotic relationships

Listed below are three different symbiotic relationships found in a typical Iowa ecosystem. Identify each as an example of mutualism, parasitism or commensalism.

WORD BANK:



M = Mutualism

P = Parasitism

C = Commensalism

Cowbird/other birds**P**

Cowbirds lay their eggs in other birds nests. The hatched cowbird chicks push the host eggs and chicks out, and eat all the food the host parents bring. The host bird species numbers are lowered.

**Cowbird/Bison**

Insects are stirred up by the bison walking through the grass, which makes them easier for the cowbirds to find and eat. The bison are neither harmed nor benefited.

C

**Monarch Butterfly/Milkweed**

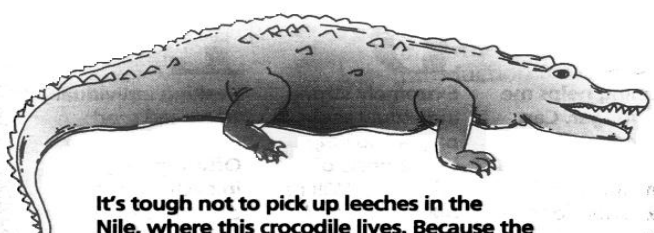
The monarchs drink nectar from and lay their eggs on the milkweed. The hatched larvae eat the milkweed leaves, and acquire their poisonous chemicals. Predators are less likely to eat monarch larvae and adults. Milkweed gets pollinated by the adult monarch.

M**Skunk/Opossum/Woodchuck**

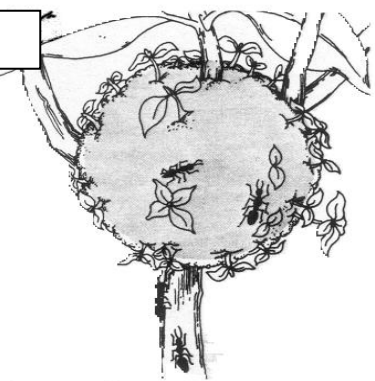
Skunks and Opossum sometimes live in burrows dug by Woodchucks. They gain a home, the Woodchucks aren't helped or harmed.

C

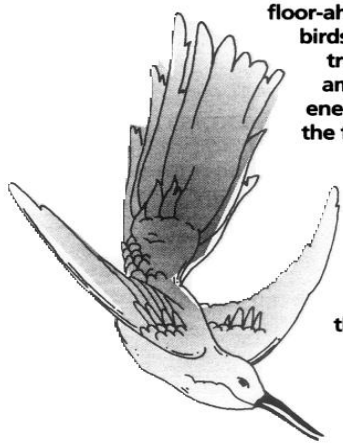
- Directions - 1) Read each paragraph below. Each paragraph describes one OR MORE relationships.
- 2) Next to each, write the name of the organisms, and the type of relationship they have. Be sure to identify EVERY relationship.



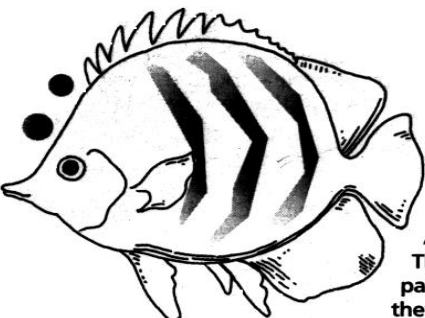
It's tough not to pick up leeches in the Nile, where this crocodile lives. Because the crocodile's skin is so tough, leeches usually attach themselves to the soft areas in the reptile's mouth. Birds called Egyptian plovers (PLUHV-uhrs) hop in and out of the crocodiles' mouths, making meals of the leeches and any food that's stuck between the crocodile's teeth.



These ants live in the hollow root balls of certain plants called epiphytes (EP-uh-fights). The hollow balls provide a protected nest for the ants. And the material that the ants carry into their nests creates a great nutrient-rich compost for the epiphytes.



Only a sword-billed hummingbird can drink the nectar of the Passiflora (PASS-ee-floor-ah) orchid. The birds need tremendous amounts of energy, which the flower provides. In the process of getting a meal, the birds pollinate the flowers.



Some rain forest trees rely on very unlikely animals to disperse their seeds: fish! During certain times of the year, the Amazon River floods. Then fish swim into parts of the forest that they can reach only during flood season. As fruit falls from the trees into the water, the fish eat it. Later, they excrete the seeds in another area.



By trapping insects, plants like this bucket orchid get pollinated. Perfume lures bees to the flowers. When the bees crawl inside the flowers, they fall into a pool of liquid. By crawling out a special "side door," the bees save themselves from drowning. In this process, they become coated with pollen, which they carry to the next orchid they visit.

BIOTIC RELATIONSHIPS IN THE ENVIRONMENT

- ♦ **Symbiosis** - a relationship in which two organisms of different species 'live together' for a period of time
- ♦ **Parasitism** - a form of symbiosis in which one organism derives nutrients from the second organism which suffers some harm but is usually not killed (e.g. A tick is the parasite that feeds off a dog which is the host.)
- ♦ **Mutualism** - a form of symbiosis in which both organisms benefit each other (e.g. bee and flower)
- ♦ **Commensalism** - a form of symbiosis in which one organism helps the other organism, but there is no help nor harm done in return (e.g. A clown fish lives inside a sea anemone and is protected by it. The sea anemone derives no benefit nor harm from the relationship.)
- ♦ **Predator / Prey Relationships** – the relationship in which one organism (predator) hunts and eats another (prey) (e.g. owl and mouse, shark and fish)
- ♦ **Competition** – a relationship where two types of organisms compete for the same resource such as food, habitat, mates (e.g. sheep and kangaroos compete for grass) There are two types of competition-interspecies and intraspecies.

Homework: Biological Molecules Which Provide Energy

Use the following choices to answer the questions which follow.

- a. lipids (fats and oils)
- b. simple sugars such as glucose
- c. complex carbohydrates such as starch and glycogen
- d. ATP
- e. proteins

___**D**___ 1. The most directly usable form of energy in a cell. Used to power cellular processes.

___**E**___ 2. The cell's *last* preferred choice of molecules to be used for energy.

___**B**___ 3. Molecule which is directly used in cellular respiration.

___**D**___ 4. Molecule which is produced by the energy released through cellular respiration.

___**A**___ 5. Long-term energy storage molecules which a cell will use for energy after immediately available and stored carbohydrates are used up first.

___**C**___ 6. Short term energy storage polysaccharides in animals and plants.

7. Fill in the chart below with the missing blanks to show the general order of preference for energy molecules utilized in a cell.

___**ATP**___ → __Glucose_ → ___**Glycogen**___ → __Lipids__ → **Proteins**___

Ecological Pyramids

Introduction: An ecological pyramid is a model that shows the total **biomass** and **energy** that is transferred from one trophic level to the next.

Biomass is the dry weight of a group of organisms. Biomass in an ecological pyramid can be thought of as the mass of organisms (minus water) that is consumed by the next trophic level.

Ecological pyramids can also show the amount of **energy** that is transferred from one trophic level to the next. Energy can be defined using different terms including **calories**, **food energy**, and **chemical energy**. Each level in a pyramid is called an **energy or trophic level** and is numbered from bottom to top. For example, the uppermost level in the pyramid below is the 4th trophic level or the 4th energy level.

Questions:

- 1) Fill in the pyramid below using the following food chain: **grass**→ **mice**→ **snake**→ **hawk**. Indicate which feeding strategy each organism uses (**producer**, **primary consumer**, **secondary consumer** or **tertiary consumer**)

Organism:

Feeding Strategy:

____ **tertiary consumer** ____ Trophic level 4

____ **hawk** ____

____ **secondary consumer** ____ Trophic level 3

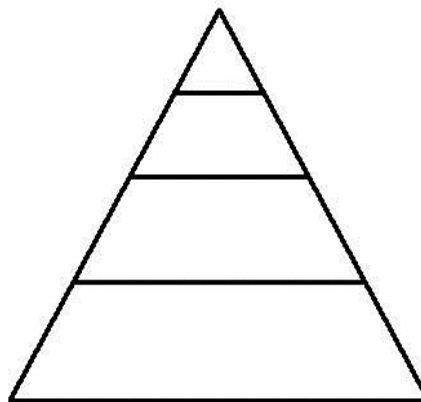
____ **snake** ____

____ **primary consumer** ____ Trophic level 2

____ **mice** ____

____ **producer** ____ Trophic level 1

____ **grass** ____



- 2) What important group of organisms is not represented in the energy pyramid? ____ **decomposer** ____

- 3) Circle the words or statements below which could be used to describe the energy that is transferred from one trophic level to the next.

a) heat energy c) light energy e) food energy g) chemical energy
b) numbers of organisms d) calorie f) electricity

- 4) Could the boxes *in this* ecological pyramid represent the *number* of organisms at each energy level?

yes _____

- 5) Give an example of an ecological pyramid in which the numbers of organisms *does not* decrease as you go up the pyramid. (Hint: Think of a symbiotic relationship in which consumers are smaller than their host.) Inverted pyramid (one large tree that supports many insects)

- 6) On which level of the pyramid does the most energy, biomass and numbers of organisms occur?

1st trophic level _____

- 7) On which level is the least amount of energy, biomass and numbers of organisms?

4th trophic level _____

- 8) How are the three pyramids related to one another? Numbers, energy and biomass.

Numbers, energy, and biomass pyramids usually show more producers than consumers at each level with one exception: the pyramid of numbers can be inverted.

- 9) What percent of energy is lost from one feeding level to the next? How much is carried to the next level?

Ninety percent of energy is lost from one feeding level to the next. Ten percent is carried to the next level.

- 10) The diagram below represents an energy pyramid constructed from data collected from an aquatic ecosystem. Which statement best describes this ecosystem?



A. The ecosystem is most likely unstable.

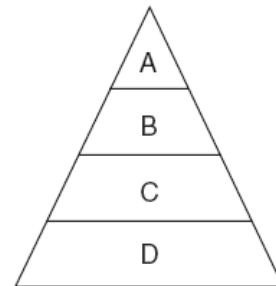
B. Long-term stability of this ecosystem will continue.

C. The herbivore populations will continue to increase in size for many years.

D. The producer organisms outnumber the consumer organisms.

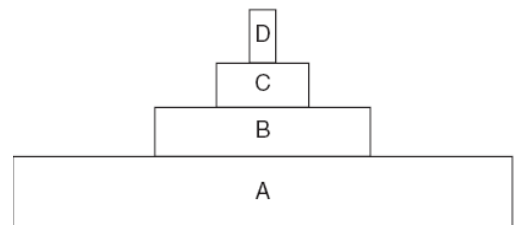
11) Which level of the energy pyramid to the right would contain a species of bird that eats seeds of a plant found in the salt marsh?

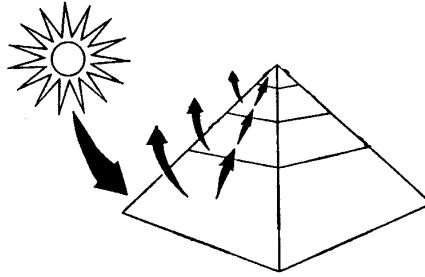
- A. A B. B C. C D. D



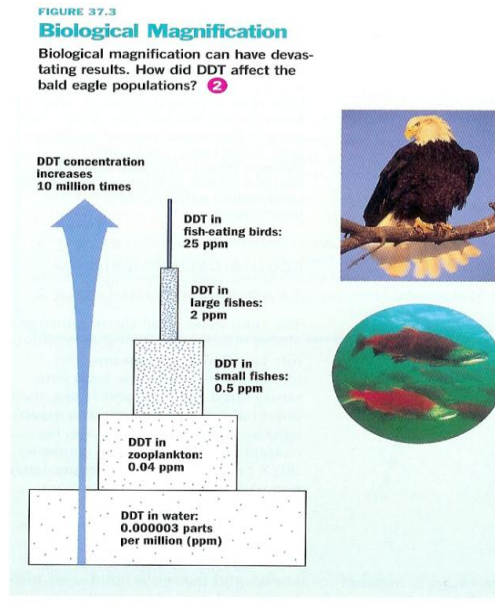
12. How much energy would be available to the organisms in level D in the energy pyramid below?

- (a) all of the energy in level C, plus the energy in level B
- (b) all of the energy in level C, minus the energy in level B
- (c) a percentage of the energy contained in level C
- (d) a percentage of the energy manufactured in levels C and level B



**Answer the following questions:**

13. What unit of measurement do we use to define energy? calories
14. At which trophic level is the most energy located? 1st trophic level
15. At which trophic level is the least energy located? 4th trophic level
16. On the average, how much energy is carried from one trophic level to the next? 10%
17. How much energy is lost at each trophic level? 90%
18. What happens to the lost energy?
- a) Goes to the decomposers in the form of waste/dead matter
- b) lost to atmosphere as HEAT
19. What is the eventual fate of all energy entering the biosphere? converted to heat
20. Why do the layers within an energy pyramid get smaller with increasing trophic levels?
- decreasing amounts of energy means that fewer organisms can be supported at higher levels
- _____
- _____



The picture on the right uses the layer-cake model to describe the movement of the pesticide DDT through the environment. DDT was a pesticide used to kill insect populations in agricultural areas and to control mosquito populations. In the 1950's, it was determined that residues of DDT were showing up in predatory birds like the bald eagle. These residues made the eggshells of the birds so fragile that they were easily broken. This reduced the number of predatory birds in the next generation. As you would expect, this upset the balance of the food chains as feeding on prey animals decreased.

15) Notice that the residues are in unusual units, "ppm." Look up and define ppm. Is it used to measure high concentrations or low concentrations of substances?

_____ ppm=parts per million. Ppm is used to measure
low concentrations of substances. _____

Biology 08

Name _____

Date _____ Period _____

Indicate the letter that **best shows the relationship** between the item in Column A and the item directly across from it in Column B.

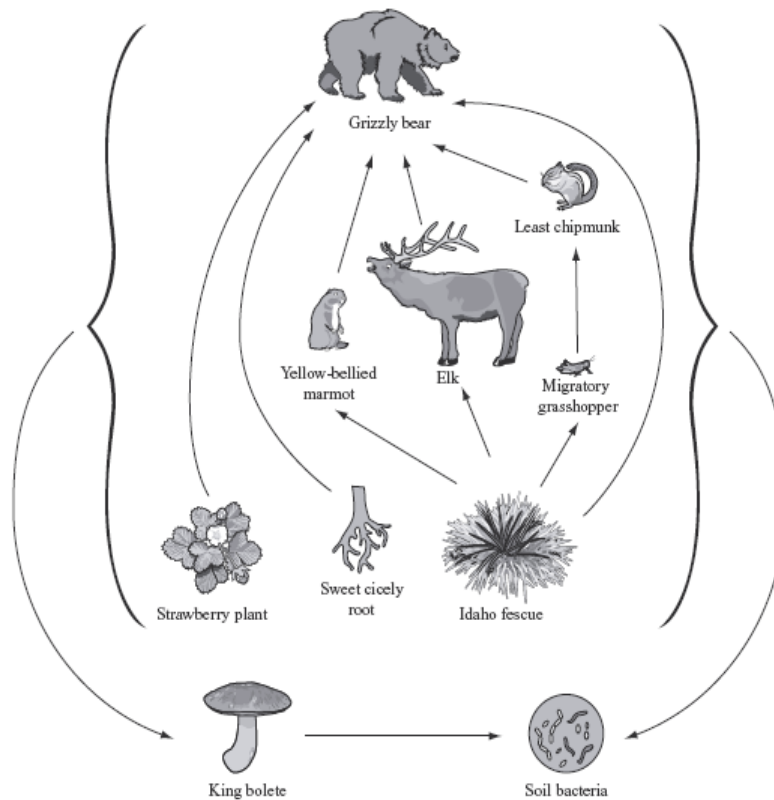
Answer **A** if the item in Column A is greater than the item in Column B.

Answer **B** if the item in Column B is greater than the item in Column A.

Answer **C** if the items in both columns are the same or about the same.

Answer	#	Column A	Column B
	1.	The amount of energy available to second order consumers.	The amount of energy available to first order consumers
	2.	The amount of energy entering an ecosystem from the sun	The amount of energy captured by photosynthesis in the same ecosystem
	3.	The number of producers in an ecosystem	The number of autotrophs in the same ecosystem.
	4.	The biomass of second order carnivores	The biomass of first-order carnivores.

ANSWERS: 1. B 2. A 3. C 4. B



Use the diagram shown at right to answer the questions which follow it (#1-10). Base your answers **ONLY** on the feeding relationships shown in this particular diagram.

MATCHING. Some answers will be used more than once.

- | | |
|---|-----------------------------|
| ___ C 1. marmot, elk, grasshopper | |
| ___ B 2. mushroom (king bolete) and soil bacteria | a. predators (2° consumers) |
| ___ B 3. Recycle nutrients into the system by feeding upon waste matter and dead organisms | b. decomposers |
| ___ A 4. grizzly bear and chipmunk | c. herbivores |
| ___ E 5. strawberry plant, sweet cicely root, Idaho fescue | d. omnivore |
| ___ F 6. Chipmunk | e. producers |
| ___ E 7. Perform photosynthesis | f. carnivore |
| ___ D 8. Grizzly bear | |

Multiple choice. Choose the best answer.

___ **C** ___ 9. What type of energy is passed from one organism to the next?
a. light energy b. heat energy c. chemical (food) energy

___ **A** ___ 10. What is the correct name for this diagram?
a. food web b. food chain c. nitrogen cycle d. population

Food Web for Coastal Salt Marsh Ecosystem

DIRECTIONS: Use the Food Web from the saltmarsh ecosystem to answer the questions on this page.

Identify the Autotrophs in the Food Web (there are 3):

a. Algae (phytoplankton) b. Marsh Grass c. Microbes

Find two omnivores in the food web.

a. Marsh wren

b. small invertebrates

Draw a food chain in which the turtle is a secondary consumer.

sheepshead minnow → blue crab → turtle → gull

Draw a food chain in which the turtle is a tertiary consumer.

small invertebrates, shrimp → sheepshead minnow → blue crab → turtle

Use the food web to figure out what organisms would fit for letters A-D. Give an example for each from the food web.

A Gull

B Blue crab

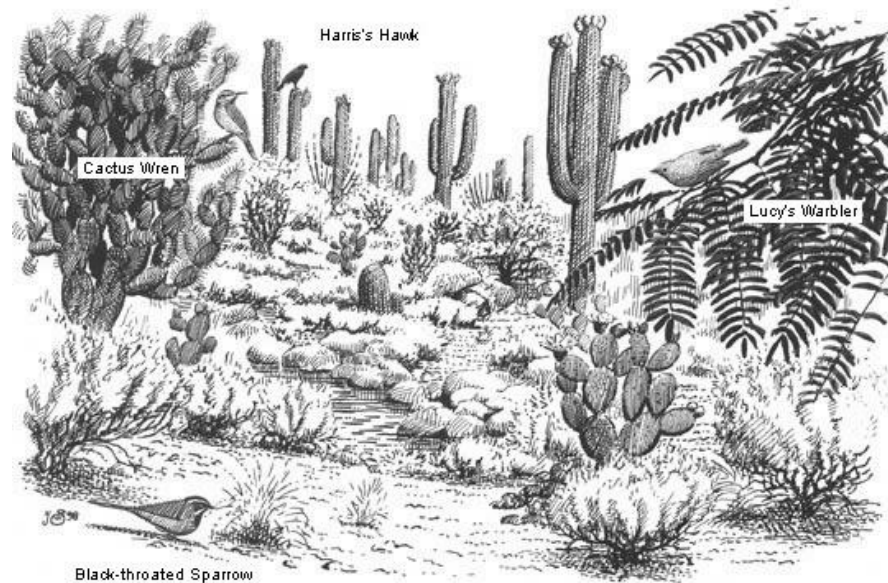
C Snails

D Marsh grass

Which organism would you expect to have more energy: the marsh wren or the blue crab? Marsh wren

Why? The marsh wren is a primary consumer, while the blue crab is a secondary consumer.

Below is a diagram of a desert ecosystem. There are a bunch of factors in this picture - Your **JOB#1** is to group them into biotic and abiotic by placing either an "A" for abiotic or a "B" for biotic next to the word on the checklist. Some of these things are visible in the picture, and some are not.



A = Abiotic

B = Biotic

<u> B </u> beetle	<u> B </u> fire ant	<u> A </u> sand	<u> B </u> coyote	<u> B </u> mule deer
<u> B </u> Harris hawk	<u> B </u> bacteria	<u> B </u> prickly pear	<u> B </u> flower	<u> B </u> saguaro cactus
<u> B </u> gila monster	<u> A </u> oxygen gas	<u> A </u> water vapor	<u> A </u> sunlight	<u> A </u> rocks

JOB #2

Place the letter of each term below within the circles.

The term that includes all of the others should be in the outermost circle. Place the others in order until the smallest group is in the center circle.

- Population - third circle from outside
- Ecosystem = outermost circle
- Community - second circle from outside
- Organism - innermost circle

JOB #3

What is the difference between a species and a population - give an example that illustrates this difference. A population is all the members of the same species in a specific geographic area. Members of the species may live in a different geographic area and be members of a different population.

Read each statement. If the statement is true, write T in the space provided. If the statement is false, write F in the space provided.

- ____ 1. All of the energy available to organisms at each level of the food chain is stored.
- ____ 2. Numbers pyramids often reveal that organisms at the bases of the pyramids are the most numerous.
- ____ 3. A food chain is the specific sequence in which organisms obtain energy in an ecosystem.
- ____ 4. In an ecosystem, stored energy is generally transferred from one trophic level to the trophic level directly below it.
- ____ 5. Food chains usually consist of eight or nine levels.

Choose the one best response. Write the letter of that choice in the space provided.

- ____ 6. A food chain generally begins with:
 - a. an autotroph
 - b. an omnivore
 - c. a decomposer
 - d. a heterotroph
- ____ 7. Biomass pyramids are used to represent:
 - a. numbers of producers in an ecosystem
 - b. energy transfers among organisms in an ecosystem
 - c. the total dry weight of organisms in an ecosystem
 - d. numbers of autotrophs in an ecosystem
- ____ 8. Interrelated food chains are called a:
 - a. food niche
 - b. food web
 - c. habitat
 - d. biogeochemical cycle



- ____ 9. In the ecological pyramid shown, the least amount of energy is contained in the trophic level labeled:
 - a. 1
 - b. 2
 - c. 3
 - d. 4
- ____ 10. Which group of organisms is responsible for releasing nutrients back into the ecosystem so that the nutrients may be recycled by producers?
 - a. insects
 - b. bacteria
 - c. mammals
 - d. phytoplankton

ANSWERS: 1. F 2. T 3. T 4. F 5. F 6. A 7. C 8. B 9. D 10. B

Read each statement. If the statement is true, write T in the space provided. If the statement is false, write F in the space provided.

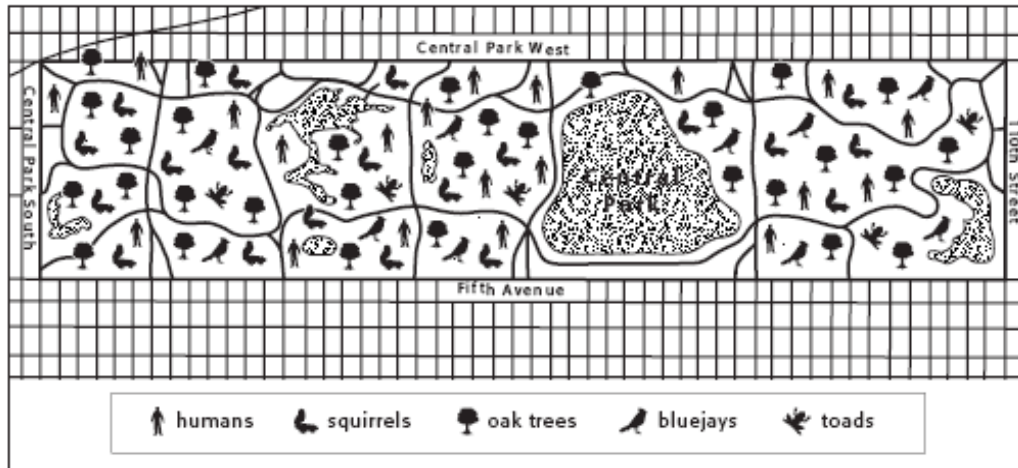
- _____ 1. The biosphere includes outer space.
 - _____ 2. A population includes all the communities in a given area.
 - _____ 3. The creation of a new island by volcanic action is an example of an abiotic event.
 - _____ 4. Plants replenish oxygen in the atmosphere.
 - _____ 5. An ecosystem consists of biotic and abiotic factors.
 - _____ 6. An ecosystem includes only a portion of the interacting parts of an environment in an area.
-

Choose the one best response. Write the letter of that choice in the space provided.

- _____ 7. Which term best describes the interaction of two insect species that eat the same plant?
 - a. competition
 - b. symbiosis
 - c. predation
 - d. adaptation
- _____ 8. Which of the following is the smallest ecological unit?
 - a. a community
 - b. a biome
 - c. a population
 - d. an ecosystem
- _____ 9. Which of the following is considered a biotic factor?
 - a. flooding
 - b. sunlight
 - c. wildlife
 - d. temperature
- _____ 10. In general, ecologists learn about the biosphere by studying:
 - a. interactions among island populations in a controlled setting
 - b. relatively small and simple ecological units
 - c. interactions between the earth's atmosphere and its oceans
 - d. large, complex biomes

Answers: 1. F 2. F 3. T 4. T 5. T 6. F 7. A
8. C 9. C 10. B

Ecosystem Structure and Habitats



A habitat does not have to be large in size. Small areas, such as your backyard, can be home to many communities of species. Every day in New York City's Central Park, hundreds of different species interact.

Use the map above to answer the questions below.

1. Identify one organism, one population, and one community.

organism: a squirrel in this ecosystem

population: all the squirrels in this ecosystem

community: all the humans, squirrels, oak trees, bluejays and toads in this ecosystem

2. Which organism has the largest population? Which organism has the smallest population?

largest - oak trees; smallest - toads (confirm by counting)

3. Do the items in the key represent biotic or abiotic factors?

Biotic factors

4. List specific characteristics of this park that make it a habitat.

it has resources for food, shelter, water, etc. and whatever other resources these organisms need for life

5. If the human population decreased, how do you think other populations would be affected?

The other populations would probably increase.

Use the diagram below to answer the next question.

Solar energy

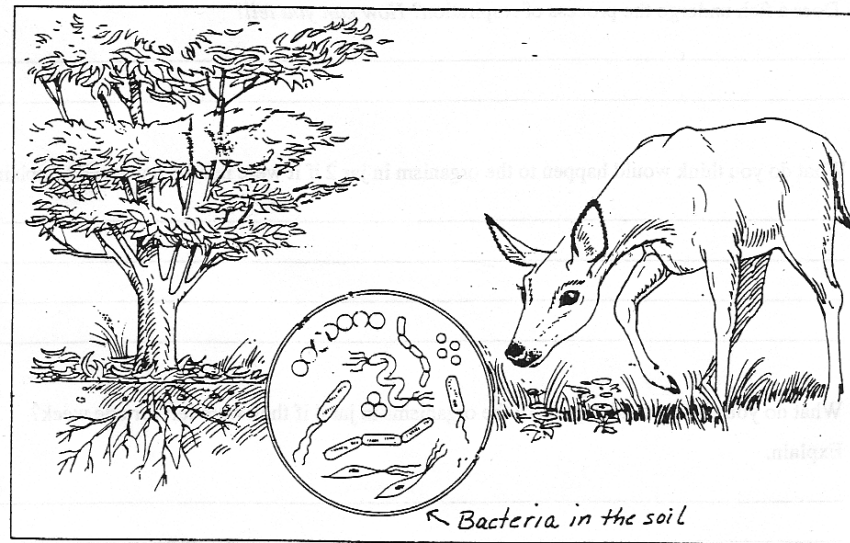
A

Chemical energy (food)

B

Chemical energy (to do cell activities)

1. The process indicated by the arrow labeled A is (circle one): **photosynthesis** /cellular respiration
2. The process indicated by the arrow labeled B is (circle one): **photosynthesis** /cellular respiration
3. Which process *photosynthesis or cellular respiration* USES CO_2 ? **Photosynthesis**
4. Which process *photosynthesis or cellular respiration* extracts the energy from food? **Cellular respiration**



5. Using TWO different colored pencils - indicate the movement of the gases CO_2 and O_2 . (Hint – bacteria in the soil get no sunlight and therefore are NOT producers.)

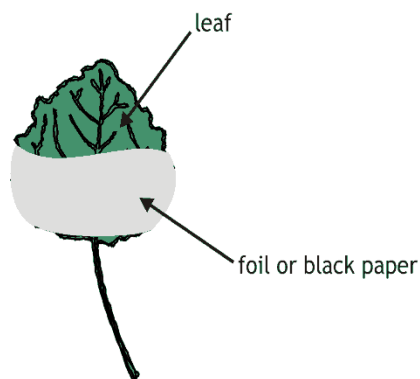
CO_2 moves into the trees/grasses only. CO_2 moves OUT of all organisms shown. O_2 moves INTO all organisms shown. O_2 moves out of trees/grasses only.

Review: Photosynthesis and Cellular Respiration

Use the information in your notes to fill in the following chart—some answers have been filled in for you:

	Photosynthesis	Cellular Respiration
What is the purpose of the reaction – to RELEASE or STORE energy?	STORE	RELEASE
Chemical Equation	$6\text{H}_2\text{O} + 6\text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 6\text{CO}_2$
Reactants	1) carbon dioxide 2) <u>H₂O</u>	1) oxygen gas 2) <u>glucose</u>
Products	1) glucose 2) <u>oxygen gas</u>	1) <u>carbon dioxide</u> 2) water
How is the first reactant obtained by the organism?	CO ₂ —Obtained from the air through the cell membrane or through openings in the leaf.	Glucose Plants: <u>produced by itself in photosynthesis</u> Animals: <u>then ingested by animals - passed up through food chains</u>
How is the second reactant obtained?	H ₂ O- <u>obtained from soil through roots</u>	O ₂ —Plants obtain it through the cell membrane or stoma. Animals breathe it in through lungs.
How is the first product used?	Glucose-as <u>energy source in cellular respiration, energy in bonds transferred to ATP</u>	H ₂ O--Used by plants as a reactant in photosynthesis—Used by animals in various reactions (such as hydrolysis, etc.) or eliminated as waste.
How is the second product used?	O ₂ - <u>used in cellular respiration to break bonds in glucose</u>	CO ₂ --Used by plants as a reactant in photosynthesis—Eliminated as waste by animals during the breathing process.
What molecule or energy source (sun) provides energy for the reactions?	<u>Sun</u>	<u>ATP is the molecule of usable energy produced when the bonds of glucose are broken during cellular respiration.</u>
What types of organisms conduct this process – consumers, producers, or both?)	<u>producers</u>	<u>Producers and consumers (BOTH)</u>

Photosynthesis Experiment Analysis



A healthy geranium plant is placed in a dark closet for several days in order to **stop** photosynthesis and force the leaves to use up any stored starch.

Several of the leaves were partially covered with foil or black paper. These were the experimental group. The rest of the leaves on the plant were left uncovered to serve as the control group.

The plant was then removed from the closet and placed under strong, bright sunlight for several days.

Today several leaves were plucked off the plant, from both the control and experimental groups. They then were softened in hot water and treated with alcohol to destroy any pigments in the leaf.

The leaves were then tested with iodine solution to see whether or not the leaves contained starch.

Data Table of Results:

Part of Leaf	Color After Testing with Iodine Solution	Conclusion
Covered	Yellowish	No starch present
Uncovered	Blackish	Starch present

- ___ **A** 1. Which of the following is most likely the question the scientist was trying to answer?
- _____ Do plants need sunlight to perform photosynthesis?
 - Do plants contain starch?
 - Do plants perform cellular respiration?
 - Do plants need carbon dioxide to survive?
- ___ **D** 2. What was the experimental variable in this experiment?
- the size of the leaf
 - the color of the leaf in iodine
 - heating the leaf in water
 - covering the leaf with foil or paper
- ___ **D** 3. If the data had shown that both the covered AND uncovered leaves turned black in the iodine test, the scientist would most likely (mistakenly) conclude:
- Plants do not need carbon dioxide to survive.
 - Plants do not perform cellular respiration.
 - Plants do not contain starch.
 - Plants do not need sunlight to perform photosynthesis.

- ___ **B** 4. If any of the leaves on the plant removed from the closet were immediately were treated with hot water, alcohol and iodine, what color would the leaves show?
- they would be black, indicating the presence of starch
 - they would be yellow, indicating a lack of starch
 - they would be green, indicating the presence of chlorophyll
 - they would be black, indicating the lack of starch

- ___ **B** 5. What is starch made of?
- DNA
 - glucose
 - protein
 - salt

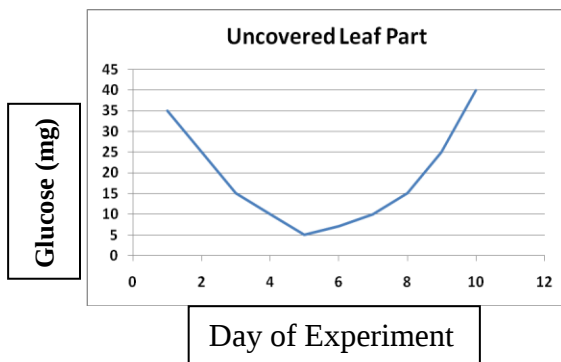
- ___ **B** 6. Which of the cells in the plant would be able to undergo the greatest amount of cellular respiration to make the most ATP over the 10-day period?
- The cells in the covered areas of the leaf.
 - The cells in the uncovered areas of the leaf.
 - There would not be a difference.

Interpret the graphs based on the following information:

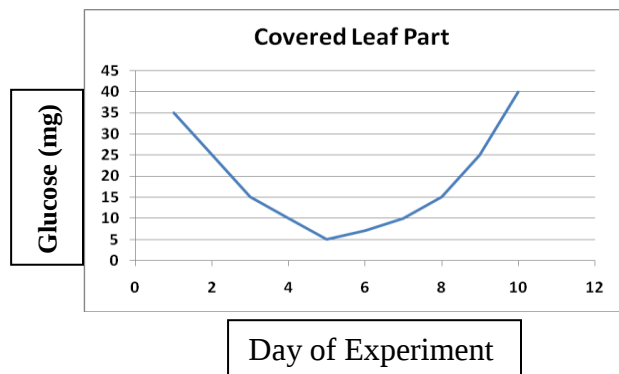
- The day that the plants were put in the closet was day one.
- The day they were removed from the closet and placed in direct sunlight was day 5.
- The day they were tested with iodine was day 10.

- ___ **A,D** 7. Identify which of the following graphs would represent an accurate prediction of the production of glucose (mg) over 10 days in the uncovered (A or C?) and covered (B or D?) leaves. (Choose two answers.)

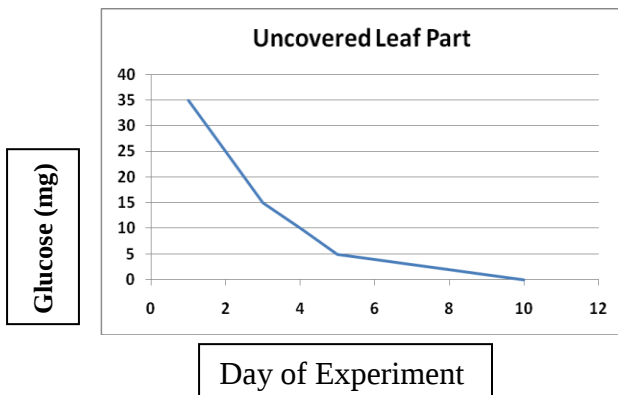
A.



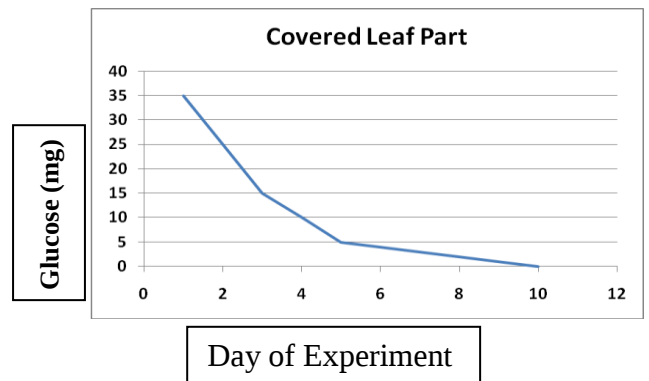
B.



C.



D.



8. List two variables that should have been held constant or controlled between the leaves in the control group and the leaves in the experimental group: _____
The amount of water in the soil, volume of the soil, composition of the soil._____

Carbon-Oxygen Cycles Homework

Carbon Cycle

Coal	Oil	Natural Gas	burning of fossil fuels	volcanoes
Photosynthesis	Respiration	ocean	sugar	Greenhouse
				decayed

1. Plants use CO₂ in the process of _____ to make _____ and oxygen.
2. Animals use oxygen in the process of _____ and make more CO₂.
3. The _____ is the main regulator of CO₂ in the atmosphere because CO₂ dissolves easily in it.
4. In the past, huge deposits of carbon were stored as dead plants and animals _____.
5. Today these deposits are burned as fossil fuels, which include _____, _____, and _____.
6. More CO₂ is released in the atmosphere today than in the past because of _____.
7. Another natural source for CO₂ is _____.
8. Too much CO₂ in the atmosphere may be responsible for the _____ effect.
9. Write the equation for **photosynthesis**.
10. Draw a **simple diagram** of the Carbon Cycle using the words in the text box above.

ANSWERS:

1. photosynthesis; glucose.

2. (cellular) respiration

3. ocean

4. decayed

5. coal, oil, natural gas

6. burning of fossil fuels

7. volcanoes

8. greenhouse

9.



sunlight

10. see notes for picture of carbon-oxygen cycle

Oxygen Cycle

Photosynthesis	Ozone	Waste	Crust	Oceans	Respiration
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1. Plants release 430-470 billion tons of oxygen during process of _____.
2. Atmospheric oxygen in the form of _____ provides protection from harmful ultraviolet rays.
3. Oxygen is found everywhere on Earth, from Earth's _____ (rocks) to the _____ where it is dissolved.
4. Oxygen is vital for _____ by animals, a process which produces CO₂ and water.
5. Oxygen is also necessary for the decomposition of _____ into other elements necessary for life.
6. Write the equation for **respiration**.
7. Draw a **diagram** of the Oxygen Cycle using the words in the text box.

ANSWERS:

1. photosynthesis

2. ozone

3. crust; ocean

4. (cellular) respiration

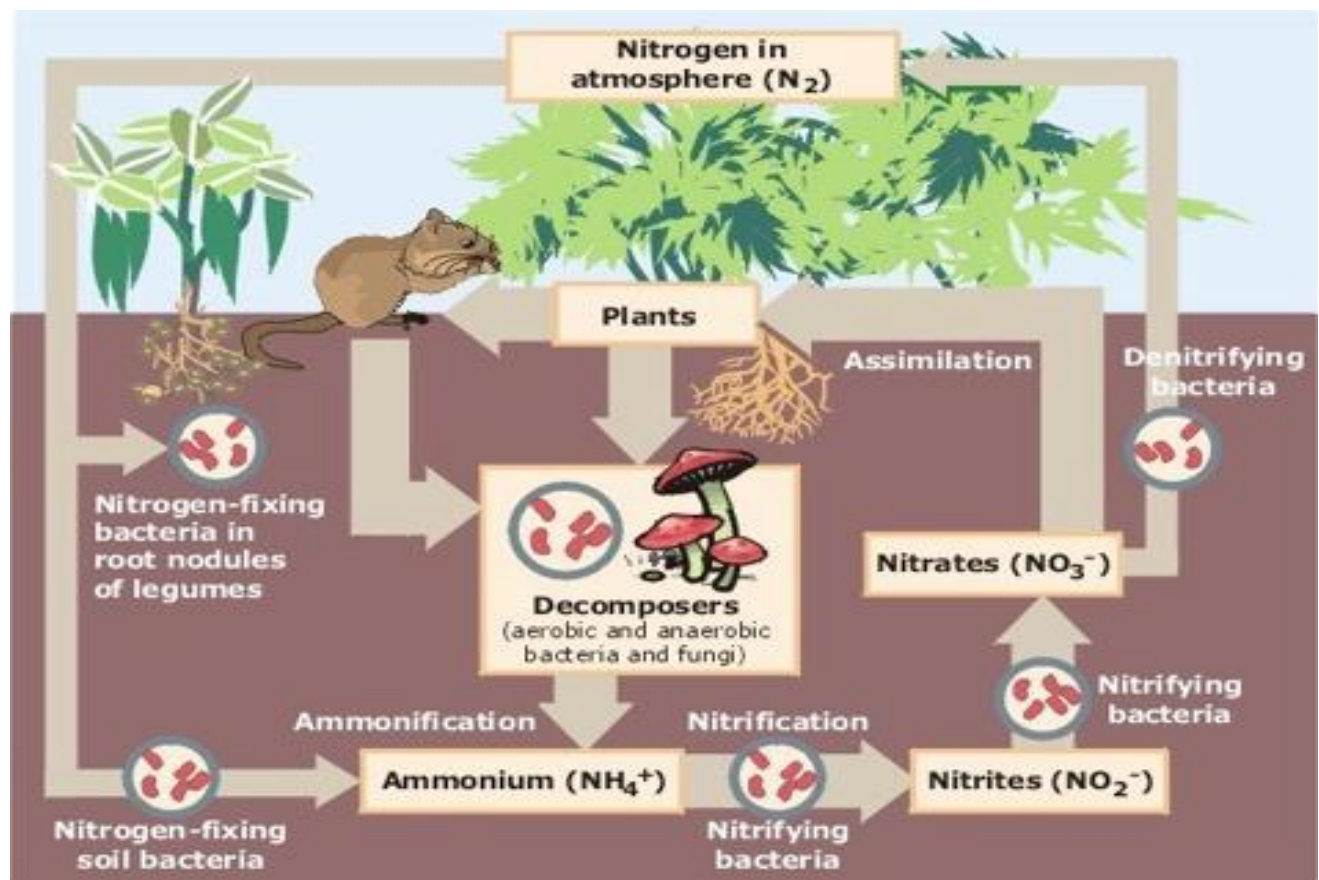
5. waste

6. $6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$

Note: **ATP** formed from energy released

7. see notes for picture of carbon-oxygen cycle

Nitrogen Cycle Homework



 A 1. Which statement about this cycle is true?

- a. All the nitrogen obtained by animals can be traced back to the eating of plants.
- b. Plants fix nitrates into atmospheric nitrogen gas.
- c. Nitrogen atoms are continually created and destroyed.

 A 2. Which statement about this cycle is FALSE?

- a. Plants but not animals are parts of the nitrogen cycle.
- b. The nitrogen cycle requires nitrogen-fixing bacteria.
- c. Bacteria convert nitrogen gas into a form in which it can be used as a plant nutrient.
- d. Bacteria and fungi break down dead plant and animal tissues into nitrates that plants can use.

___**B**___ 3. What is the name of the process that converts nitrogen gas into ammonia?

- a. Nitrification
- b. Nitrogen fixation
- c. Decay
- d. Denitrification

___**C**___ 4. Organic compounds in dead organic matter & wastes are converted into ammonia as a result of:

- a. Nitrogen fixation
- b. Denitrification
- c. Decomposition

___**B**___ 5. Bacteria responsible for nitrogen fixation are found in the roots of:

- a. all plants
- b. certain plants such as legumes
- c. evergreen trees

___**A**___ 6. Animals get their “organic nitrogen compounds” by:

- a. Feeding
- b. Breathing
- c. Performing photosynthesis

___**C**___ 7. Why do organisms need nitrogen?

- a. To make carbohydrates
- b. To make lipids
- c. To make proteins and nucleic acids

___**C**___ 8. What is the approximate % of nitrogen gas in our atmosphere?

- a. less than 1%
- b. 25-30%
- c. 75-80%
- d. over 95%

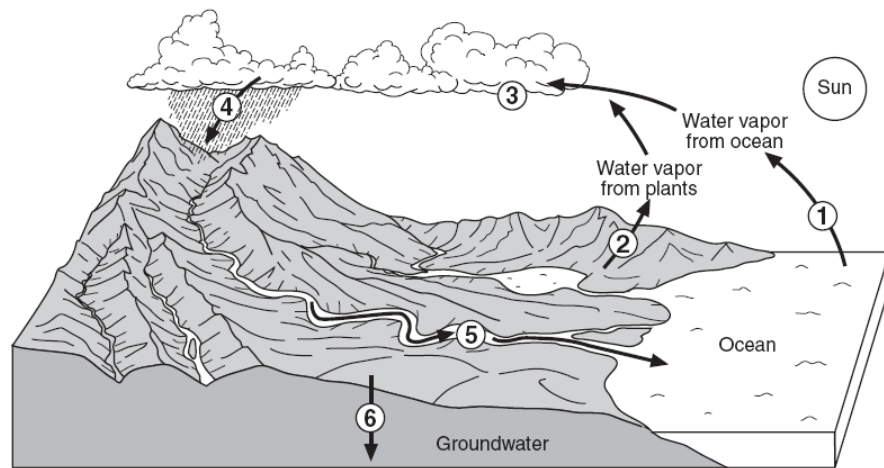
___**B**___ 9. Why is it so difficult for most organisms to use nitrogen gas from the atmosphere?

- a. Nitrogen is a non-reactive atom.
- b. A strong triple covalent bond holds the molecule together.
- c. Oceans quickly absorb nitrogen gas, so not much is available in the air.

___**A**___ 10. ___?___ are the primary organisms which drive the nitrogen cycle.

- a. bacteria
- b. animals
- c. plants

Water Cycle Homework



Directions: Below is a diagram of the water cycle. Use your prior knowledge to answer the following questions.

First read each statement and fill in the blanks with words from the “Word Bank of Processes”. Next, place the following statements in the correct order of the water cycle. Start at number one in the above diagram.

3 The warm, moist air meets cooler air causing the water vapor to condense onto dust particles in the air forming clouds. This process is called condensation.

1 The sun warms the surface of the water and liquid water turns into water vapor through a process called evaporation.

4 Water filters down through the soil into the zone of saturation. This is called groundwater.

2 Plants lose water vapor from their leaves called transpiration.

3 As the clouds get so heavy, water begins to fall as rain, snow, hail, or sleet which are all called forms of precipitation.

5 The term, runoff, describes water that does not soak into the soil, but travels over the surface of the earth into ponds, streams, rivers and other bodies of water.