AP BIO INSTA-REVIEW

TOPIC 8.2

Energy Flow Through Ecosystems

ENE-1.M.1

Organisms use energy to maintain organization, grow, and reproduce–

a. Organisms use different strategies to regulate body temperature and metabolism.

i. Endotherms use thermal energy generated by metabolism to maintain homeostatic body temperatures.

ii. Ectotherms lack efficient internal mechanisms for maintaining body temperature, though they may regulate their temperature behaviorally by moving into the sun or shade or by aggregating with other individuals.

b. Different organisms use various reproductive strategies in response to energy availability.

AP BIO INSTA-REVIEW

TOPIC 8.2

Energy Flow Through Ecosystems

ENE-1.M.1

Organisms use energy to maintain organization, grow, and reproduce–

c. There is a relationship between metabolic rate per unit body mass and the size of multicellular organisms–generally, the smaller the organism, the higher the metabolic rate.

d. A net gain in energy results in energy storage or the growth of an organism.

e. A net loss of energy results in loss of mass and, ultimately, the death of an organism.

AP BIO INSTA-REVIEW

TOPIC 8.2

Energy Flow Through Ecosystems

ENE-1.N.1

Changes in energy availability can result in changes in population size.

ENE.1.N.2

Changes in energy availability can result in disruptions to an ecosystem–

a. A change in energy resources such as sunlight can affect the number and size of the trophic levels.

b. A change in the producer level can affect the number and size of other trophic levels.

AP BIO INSTA-REVIEW

TOPIC 8.2

Energy Flow Through Ecosystems

ENE-1.0.1

Autotrophs capture energy from physical or chemical sources in the environment–

a. Photosynthetic organisms capture energy present in sunlight.

b. Chemosynthetic organisms capture energy from small inorganic molecules present in their environment, and this process can occur in the absence of oxygen.

ENE-1.0.2

Heterotrophs capture energy present in carbon compounds produced by other organisms.

a. Heterotrophs may metabolize carbohydrates, lipids, and proteins as sources of energy by hydrolysis.

AP BIO INSTA-REVIEW

TOPIC 8.2

Warm-blooded organisms are actually...

A. Ectotherms

B. Endotherms

AP BIO INSTA-REVIEW

TOPIC 8.2

Warm-blooded organisms are actually...

B. Endotherms

Endotherms are organisms that regulate their own body temperature through metabolism. These organisms are called "warm-blooded" in elementary and middle school classes. Biologists call these organisms "regulators".

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do endotherms get their body heat from?

A. Cellular Respiration

B. Environment

C. Photosynthesis

D. Thermophiles

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do endotherms get their body heat from?

A. Cellular Respiration

The process of cellular respiration is an exergonic reaction (releases energy). This process is inefficient so the extra energy that is not used to synthesize ATP is released as heat energy.

AP BIO INSTA-REVIEW

TOPIC 8.2

"Cold-Blooded" organisms have cold-blood...

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 8.2

"Cold-Blooded" organisms have cold-blood...

B. False

This is a misconception that you learned in elementary school. "Cold-blooded organisms" do not have cold-blood. The term "cold-blooded" refers to that the organisms use their environment to control their body temperatures. Biologists call them "conformers".

AP BIO INSTA-REVIEW

TOPIC 8.2

"Cold-Blooded" organisms are...

A. Ectotherms

B. Endotherms

AP BIO INSTA-REVIEW

TOPIC 8.2

"Cold-Blooded" organisms are...

A. Ectotherms

Ectotherms are organisms that absorb their heat energy from their environment. These are "conformers" and will use their environment to regulate their internal temperature.

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do ectotherms get their body heat from?

A. Cellular Respiration

B. Environment

C. Photosynthesis

D. Thermophiles

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do ectotherms get their body heat from?

B. Environment

Ectotherms are "cold-blooded organisms" that regulate their internal body temperature using their environment. Example: crocodile – when they are cold, they bask in the sun or when they are warm, they go take a dip in the water

AP BIO INSTA-REVIEW

TOPIC

8.2

Assuming the same size of organisms, at cooler temperatures, who would have a higher O_2 consumption?

A. Ectotherms

B. Endotherms

AP BIO INSTA-REVIEW

TOPIC 8.2

Assuming the same size of organisms, at cooler temperatures, who would have a higher O_2 consumption?

B. Endotherms

Endotherms regulate their body temperature using metabolism while ectotherms regulate their body temperature using their environments. Due to this, the endotherm would require a higher concentration of oxygen as oxygen is the final electron acceptor. The endotherm must undergo more cellular respiration to generate the heat to warm the organim,

AP BIO INSTA-REVIEW

TOPIC

8.2

How does a litter size change based on energy availability?

AP BIO INSTA-REVIEW

TOPIC 8.2

How does a litter size change based on energy availability?

If there is less energy available, the litter size will be smaller. The organisms will have less offspring due to the low energy available for reproduction and growth.

AP BIO INSTA-REVIEW

TOPIC

8.2

The smaller the organism, the ____ the metabolic rate.

A. Higher

B. Lower

AP BIO INSTA-REVIEW

TOPIC 8.2

The smaller the organism, the ____ the metabolic rate.

A. Higher

The smaller the organism, the higher the surface area to volume ratio. This leads to a higher metabolic rate in the organism.

AP BIO INSTA-REVIEW

TOPIC 8.2

Why is metabolic rate per unit body mass higher in smaller animals?

AP BIO INSTA-REVIEW

TOPIC 8.2

Why is metabolic rate per unit body mass higher in smaller animals?

However, BMR is higher per unit of body mass in small animals compared to larger ones. This is because the higher metabolic rate of small animals needs a greater delivery of oxygen to tissues around the body.

Also, the smaller animals have a greater surface area to volume ratio, so more heat is lost.

AP BIO INSTA-REVIEW

TOPIC
8.2

Net gain of energy by organism causes...

A. Decay & Energy Storage

B. Gain of Mass & Death

C. Growth & Energy Storage

D. Loss of Mass & Death

AP BIO INSTA-REVIEW

TOPIC 8.2

Net gain of energy by organism causes...

C. Growth & Energy Storage

Gain of energy refers to an endergonic process. Growth of an organism is an endergonic process. Energy storage is an endergonic process.

AP BIO INSTA-REVIEW

TOPIC

8.2

Net loss of energy results in...

A. Decay & Energy Storage

B. Gain of Mass & Death

C. Growth & Energy Storage

D. Loss of Mass & Death

AP BIO INSTA-REVIEW

TOPIC 8.2

Net loss of energy results in...

D. Loss of Mass & Death

Loss of energy refers to an exergonic process. Losing mass refers to an exergonic process. If you lose too much energy, the organism is unable to complete simple tasks which can result in death.

AP BIO INSTA-REVIEW

TOPIC 8.2

What property of water allows for cooling from sweat?

A. Adhesion

B. Cohesion

C. High Heat of vaporization

D. Less dense as solid

AP BIO INSTA-REVIEW

TOPIC 8.2

What property of water allows for cooling from sweat?

C. High Heat of vaporization

High heat of vaporization refers to that water requires a large amount of heat energy to vaporize liquid water to gaseous water vapor.

AP BIO INSTA-REVIEW

TOPIC

8.2

What is this called when this "heat of vaporization" is used?

AP BIO INSTA-REVIEW

TOPIC 8.2

What is this called when this "heat of vaporization" is used?

Evaporative cooling

AP BIO INSTA-REVIEW

TOPIC 8.2

Goosebumps are a vestigial structure to keep warm.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 8.2

Goosebumps are a vestigial structure to keep warm.

A. True

Vestigial structures are homologous structures from a common ancestor with no apparent function.

AP BIO INSTA-REVIEW

TOPIC

8.2

Describe how countercurrent exchange keeps core warm.

AP BIO INSTA-REVIEW

TOPIC 8.2

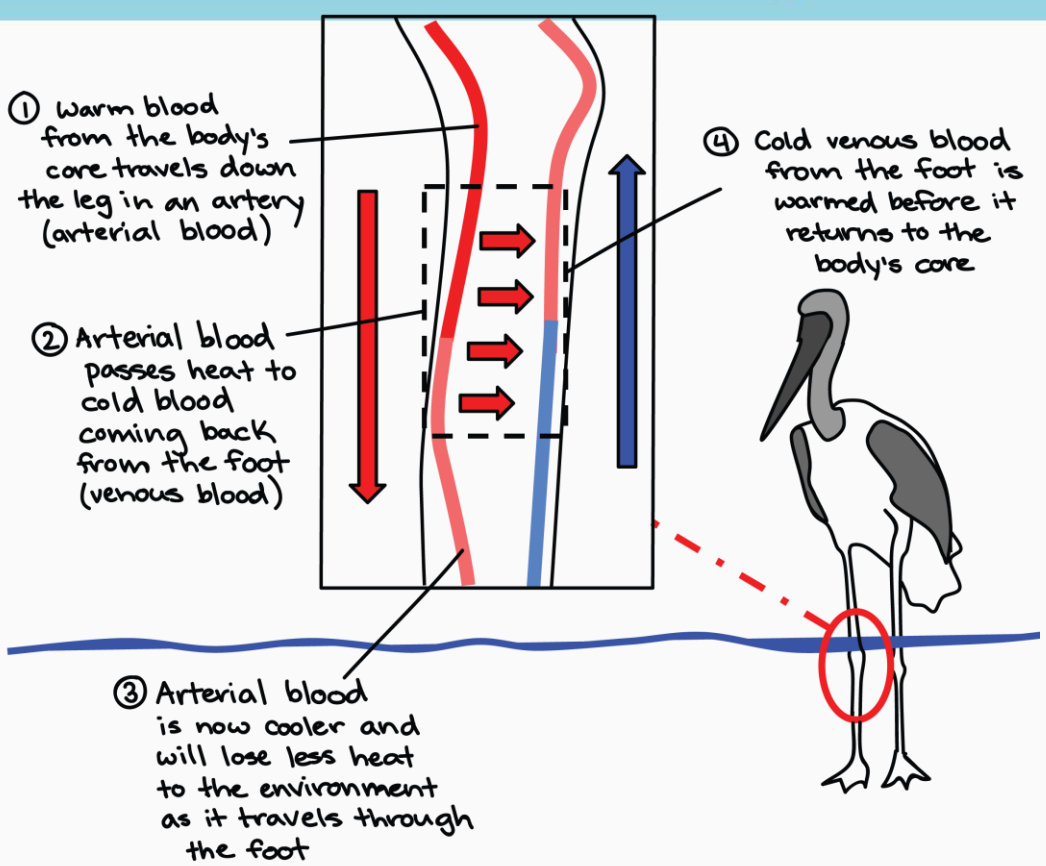
Describe how countercurrent exchange keeps core warm.

Countercurrent exchange involves the fluid moving in the opposite direction exchanging something. This something in this case is heat. The blood leaving the core is warm and that warmth is transferred to the blood re-entering the core.

AP BIO INSTA-REVIEW

TOPIC 8.2

Describe how countercurrent exchange keeps core warm.



So the blood coming back into the core is warmed by the blood leaving the core. This reduced energy lost to the environment and maintains the body temperature of the organism.

AP BIO INSTA-REVIEW

TOPIC 8.2

A reduction in ___ would cause a decrease in entire chain.

A. Decomposer

B. Primary Consumer

C. Primary Producer

D. Sunlight

AP BIO INSTA-REVIEW

TOPIC 8.2

A reduction in ___ would cause a decrease in entire chain.

C. Primary Producer

The primary producer is the food source for the entire food chain. If there is a decrease in the primary producer, there is less available food for the primary consumers. If there is a decrease in the primary consumers, then there is less available food for secondary consumers.

AP BIO INSTA-REVIEW

TOPIC
8.2

When you control producer level, what type of model does this describe?

A. Bottom-Up Model

B. Top-Down Model

AP BIO INSTA-REVIEW

TOPIC 8.2

When you control producer level, what type of model does this describe?

A. Bottom-Up Model

Using the word to assist your thinking...

BOTTOM-UP model refers to starting at the BOTTOM and moving up to the TOP. In a food chain, the producer is at the BOTTOM of the chain.

AP BIO INSTA-REVIEW

TOPIC 8.2

What are all secondary consumers?

A. Carnivores

B. Decomposer

C. Herbivore

D. Producer

AP BIO INSTA-REVIEW

TOPIC 8.2

What are all secondary consumers?

A. Carnivores

A secondary consumer consumes the primary consumer which consumes the primary producer.

The primary producer is an autotroph and relies on the sun.
The secondary producer is a heterotroph and consumers the primary producer which is another organism making the secondary consumer a carnivore.

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do photosynthetic organisms get most of their energy?

A. Inorganic molecules

B. Moonlight

C. Organic molecules

D. Sunlight

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do photosynthetic organisms get most of their energy?

D. Sunlight

Energy cannot be created or destroyed. The PHOTOsynthetic organisms require LIGHT. This light is used to provide the solar energy for photosynthesis. The LIGHT must come from SUNLIGHT.

AP BIO INSTA-REVIEW

TOPIC
8.2

Where do chemosynthetic organisms get most of their energy?

A. Inorganic molecules
B. Moonlight
C. Organic molecules
D. Sunlight

AP BIO INSTA-REVIEW

TOPIC 8.2

Where do chemosynthetic organisms get most of their energy?

A. Inorganic molecules

Energy cannot be created or destroyed. The CHEMOsynthetic organisms require CHEMICALS. This chemical is used to provide the chemical energy for chemosynthesis. These organisms use inorganic molecules to synthesize organic molecules.

AP BIO INSTA-REVIEW

TOPIC 8.2

What can heterotrophs not metabolize for energy?

A. Carbohydrates

B. Lipids

C. Nucleic Acids

D. Proteins

AP BIO INSTA-REVIEW

TOPIC 8.2

What can heterotrophs not metabolize for energy?

C. Nucleic Acids

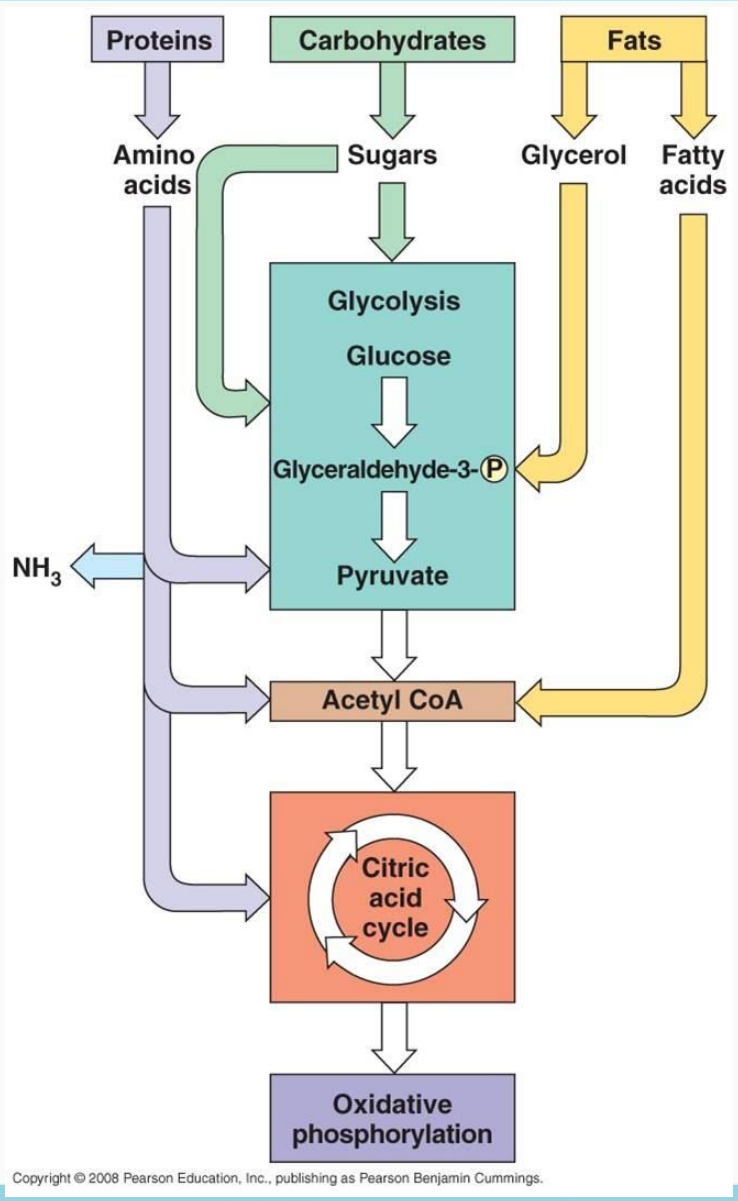
Three of the four macromolecules can be used for energy. Carbohydrates (sugars) enter glycolysis. Proteins (amino acids) enter at the end of glycolysis or the beginning of Krebs cycle. Fats (glycerol) enter in the middle of glycolysis and (fatty acids) enter into the Krebs cycle. There is no mention of nucleic acids because they are NOT used for energy.

AP BIO INSTA-REVIEW

TOPIC 8.2

What can heterotrophs not metabolize for energy?

C. Nucleic Acids

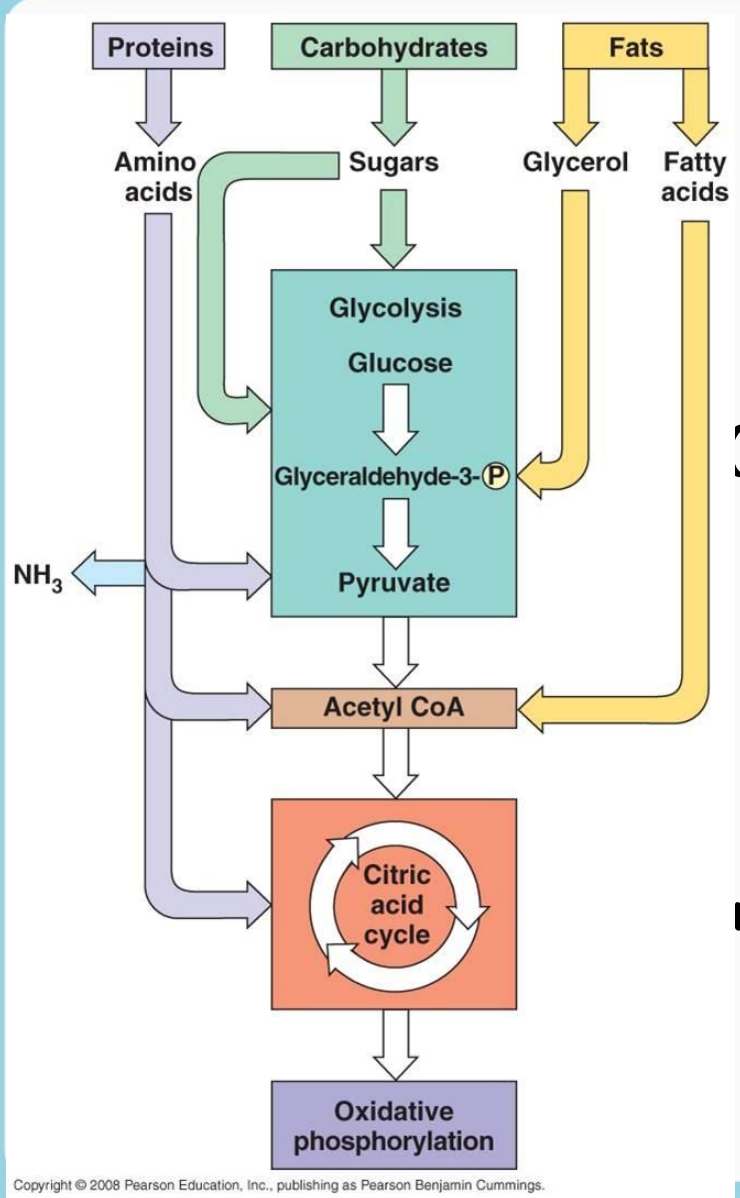


AP BIO INSTA-REVIEW

TOPIC 8.2

What can heterotrophs not metabolize for energy?

C. Nucleic Acids



Three of the four macromolecules can be used for energy. Carbohydrates (sugars) enter glycolysis. Proteins (amino acids) enter at the end of glycolysis or the beginning of Krebs cycle. Fats (glycerol) enter in the middle of glycolysis and (fatty acids) enter into the Krebs cycle. There is no mention of nucleic acids because they are NOT used for energy.

AP BIO INSTA-REVIEW

TOPIC 8.2

Which stores the most energy per molecule?

A. Carbohydrates

B. Lipids

C. Nucleic Acids

D. Proteins

AP BIO INSTA-REVIEW

TOPIC 8.2

Which stores the most energy per molecule?

B. Lipids

Fat has the highest energy potential given that it provides 9 calories per gram. Protein and carbohydrates provide 4 calories per gram each. Carbohydrates are the easiest for the body to break down though.

AP BIO INSTA-REVIEW

TOPIC
8.2

Fun Fact: Where do lipids enter cellular respiration pathway?

A. Glycolysis
B. Krebs Cycle
C. Electron Transport
D. Chemiosmosis

AP BIO INSTA-REVIEW

TOPIC 8.2

Fun Fact: Where do lipids enter cellular respiration pathway?

B. Krebs Cycle

Fatty acids are oxidized through fatty acid or β-oxidation into two-carbon acetyl CoA molecules, which can then enter the Krebs cycle to generate ATP.

AP BIO INSTA-REVIEW

TOPIC
8.2

What is an endotherm?

A. Organism generates heat by metabolism

B. Organism generates heat by basking in sun

C. Organism that releases heat

D. Organism that absorbs heat

AP BIO INSTA-REVIEW

TOPIC 8.2

What is an endotherm?

A. Organism generates heat by metabolism

Endotherms are "warm-blooded organisms" that are able to regulate their own body temperature using metabolism.

AP BIO INSTA-REVIEW

TOPIC
8.2

What is an ectotherm?

A. Organism that generates heat by performing metabolism
B. Organism that uses external sources of heat
C. Organism that releases heat to warm the organism
D. Organism that absorbs heat to cool the organism

AP BIO INSTA-REVIEW

TOPIC 8.2

What is an ectotherm?

B. Organism that uses external sources of heat

Ectotherms are "cold-blooded organisms" that use their external environment to regulate their internal temperature. When they are cold, they will lay out ("bask") in the sun.

AP BIO INSTA-REVIEW

TOPIC 8.2

Which organism requires more food at the same temperature?

A. Ectotherm

B. Endotherm

AP BIO INSTA-REVIEW

TOPIC 8.2

Which organism requires more food at the same temperature?

B. Endotherm

Since endotherms are generating their own heat through cellular respiration, an endotherm requires more food to provide the fuel to cellular respiration. Have you ever noticed that snakes only eat once a week?

AP BIO INSTA-REVIEW

TOPIC 8.2

Which organism consumes more oxygen at cooler temperatures?

A. Ectotherm

B. Endotherm

AP BIO INSTA-REVIEW

TOPIC 8.2

Which organism consumes more oxygen at cooler temperatures?

B. Endotherm

Since endotherms are generating their own heat through cellular respiration, an endotherm requires more oxygen as the final electron acceptor in cellular respiration. Have you ever noticed that fish move their operculum slower in the cold water? These ectotherms have a decrease in cellular respiration as it is colder.

AP BIO INSTA-REVIEW

TOPIC 8.2

Why would an endotherm have a higher oxygen consumption at low temperatures?

AP BIO INSTA-REVIEW

TOPIC 8.2

Why would an endotherm have a higher oxygen consumption at low temperatures?

Endotherms regulation their body temperature through metabolism (aka cellular respiration). As the temperature decreases, the organism needs to generate heat to maintain body temperature. More metabolism means, more oxygen consumption because oxygen is the final electron acceptor.

AP BIO INSTA-REVIEW

TOPIC
8.2

How does metabolic rate compare to size of organism?

A. Smaller the organism, the higher the metabolic rate

B. Larger the organism, the higher the metabolic rate

AP BIO INSTA-REVIEW

TOPIC 8.2

How does metabolic rate compare to size of organism?

A. Smaller the organism, the higher the metabolic rate

It's all about that surface area. The smaller the organism, the larger the surface area. This leads to heat loss which results in an additional amount of oxygen required for cellular respiration to maintain body temperatures.

AP BIO INSTA-REVIEW

TOPIC 8.2

If a secondary consumer population decreases, what would happen to the producers?

A. Decrease

B. Increase

C. Stay the Same

AP BIO INSTA-REVIEW

TOPIC 8.2

If a secondary consumer population decreases, what would happen to the producers?

A. Decrease

The secondary consumer will consume the primary consumer. A decrease in the secondary consumer results in an increase in the primary consumer. If there is an increase in the primary consumer, there will be more primary producer consumed leading to a DECREASE.

AP BIO INSTA-REVIEW

TOPIC 8.2

What is an autotroph?

A. Produces its own food stored in organic compounds

B. Produces its own energy from metabolic reactions

C. Produces its own ATP from feeding on lower trophics levels

D. Produces its own light energy from chemical reactions

AP BIO INSTA-REVIEW

TOPIC 8.2

What is an autotroph?

A. Produces its own food stored in organic compounds

Autotrophs will use solar energy or energy from inorganic molecules to synthesize organic compounds to store the energy. Then, they will break down those organic compounds for cellular energy through cellular respiration.

AP BIO INSTA-REVIEW

TOPIC
8.2

How does chemoautotroph differ from photoautotroph?

A. Chemoautotroph makes food from sunlight

B. Photoautotroph makes the food from sunlight (solar energy)

C. Chemoautotroph makes the food with decomposing detritus

D. Photoautotroph makes the food from decomposing detritus

AP BIO INSTA-REVIEW

TOPIC 8.2

How does chemoautotroph differ from photoautotroph?

B. Photoautotroph makes the food from sunlight (solar energy)

The "photo" in photoautotroph means light. The photoautotrophs are using solar energy to synthesize organic compounds. Chemoautotrophs will use inorganic molecules as their energy source.

AP BIO INSTA-REVIEW

TOPIC 8.2

Oxygen is required by the photosynthesis process

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 8.2

Oxygen is required by the photosynthesis process

B. False

Oxygen is a PRODUCT of photosynthesis. During the light reactions in photosystem II, the water molecule undergoes photolysis which splits the water molecule releasing the electrons, protons, and oxygen.

AP BIO INSTA-REVIEW

TOPIC

8.2

Plants require oxygen.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 8.2

Plants require oxygen.

A. True

Plants have a mitochondria and undergo cellular respiration. The oxygen is the final electron acceptor in cellular respiration.

AP BIO INSTA-REVIEW

TOPIC 8.2

Plants have a mitochondria.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 8.2

Plants have a mitochondria.

A. True

Plants have both a mitochondria (for cellular respiration) and a chloroplast (for photosynthesis). Recall, all eukaryotes have a mitochondria based on endosymbiotic theory that the chemosynthetic prokaryote was engulfed prior to the photosynthetic prokaryote.

AP BIO INSTA-REVIEW

TOPIC 8.2

Mrs. Jones, why do plants have a mitochondria and require oxygen if they are autotrophs?

Mitochondria is believed to be a chemosynthetic prokaryote which was engulfed, so all eukaryotes have a mitochondria.

The ATP synthesized in the process is used in the process. They do not make ATP for cellular activities during photosynthesis. They make carbohydrates which are broken down by mitochondria (hence the higher oxygen consumption)

AP BIO INSTA-REVIEW

TOPIC
8.2

What is a heterotroph?

A. Organism that must consume organic molecules for light.

B. Organism that breaks down organic molecules for energy.

AP BIO INSTA-REVIEW

TOPIC 8.2

What is a heterotroph?

B. Organism that breaks down organic molecules for energy.

Heterotroph must consume an autotroph for cellular energy. These organism break down the organic molecules synthesized by autotrophs (or organic molecules synthesized from consuming autotrophs)

AP BIO INSTA-REVIEW

TOPIC
8.2

Which macromolecule is not broken down for energy?

A. Carbohydrates

B. Lipids

C. Nucleic Acids

D. Proteins

AP BIO INSTA-REVIEW

TOPIC 8.2

Which macromolecule is not broken down for energy?

C. Nucleic Acids

Three of the macromolecules are used for energy except nucleic acids. The carbohydrates are used in glycolysis, the proteins are used at the end of glycolysis and during Krebs cycle, and fats are used in glycolysis (glycerol) and Krebs cycle (fatty acids)