

Introduction

Non-living factors in an ecosystem are termed _____ factors.
 The whole-earth ecosystem is named the _____.
 Energy _____ through ecosystems, while chemicals _____.
 Energy enters nearly all ecosystems in the form of _____.
 Autotrophs have the ability to transform sunlight into _____ energy.
 All ecosystem energy is ultimately dispersed in the form of _____.

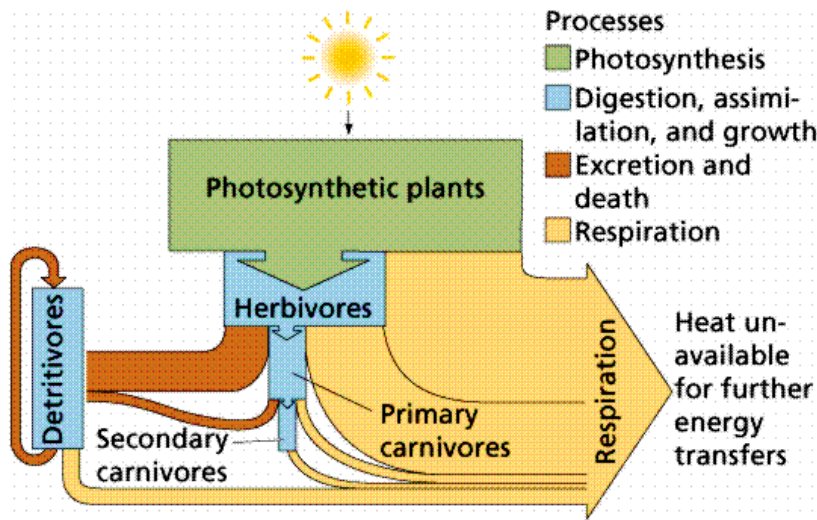
55.1 The Laws of Thermodynamics

The 1st Law of Thermodynamics is the Law of Conservation of Energy. Please recite this irrefutable law:

During all energy conversions in all ecosystems, the total amount of energy _____ (does / does not) change.

The 2nd Law of Thermodynamics is the Law of Entropy and states that:

All of the energy in all ecosystems is ultimately converted to _____.



What process is utilized by the producers to convert radiant energy to chemical energy?

In this diagram, 1st level consumers are called _____.

Which is greater, the biomass of primary carnivores or the biomass of secondary carnivores? _____

What process produces by-product heat as a result of energy transfer?

The biosphere's main autotrophs are: (1) _____ (2) _____ (3) _____
 In ecosystems isolated from the sun, the autotrophs are c_____ p_____
 Decomposers are sometimes called _____ because they decompose detritus.

Decomposition

The 2nd most important role performed by decomposers in an ecosystem is to serve as a vital link between the p_____ and c_____ in an ecosystem.

The MOST important role performed by decomposers is to make nutrients available to _____.

How can it be argued that all organisms are decomposers?

In most ecosystems, the main decomposers are either _____ or _____.

How do fungi "feed"?



55.2 Primary Production In Ecosystems (Primary Productivity)

Primary Productivity = the amount of _____ energy converted to _____ energy by an ecosystem's autotrophs in a given time period.

Producers use _____ energy to synthesize energy-rich organic molecules, which can subsequently be broken down to generate ____.

The Global Energy Budget

Of all the radiant energy that strikes photosynthetic autotrophs, how much is converted to chemical energy? _____%

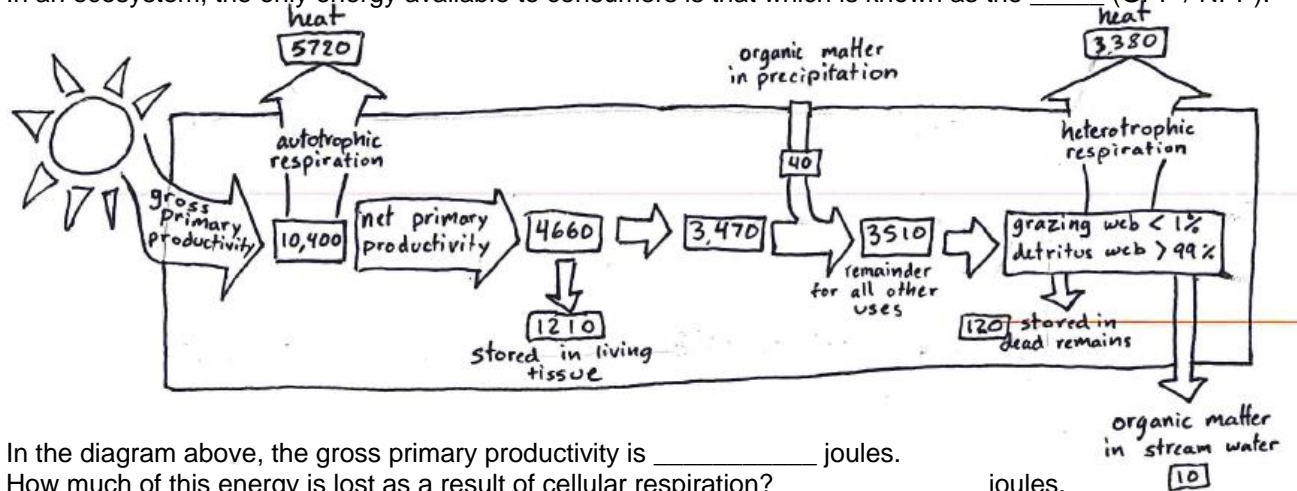
How much organic matter is produced by Earth's photosynthesizers per year? _____

Gross and Net Primary Production

GPP is the total amount of organic matter synthesized by autotrophs per unit time.

If the amount of organic matter that is respired by plants is subtracted from the GPP, the remainder is abbreviated ____.

In an ecosystem, the only energy available to consumers is that which is known as the _____ (GPP / NPP).

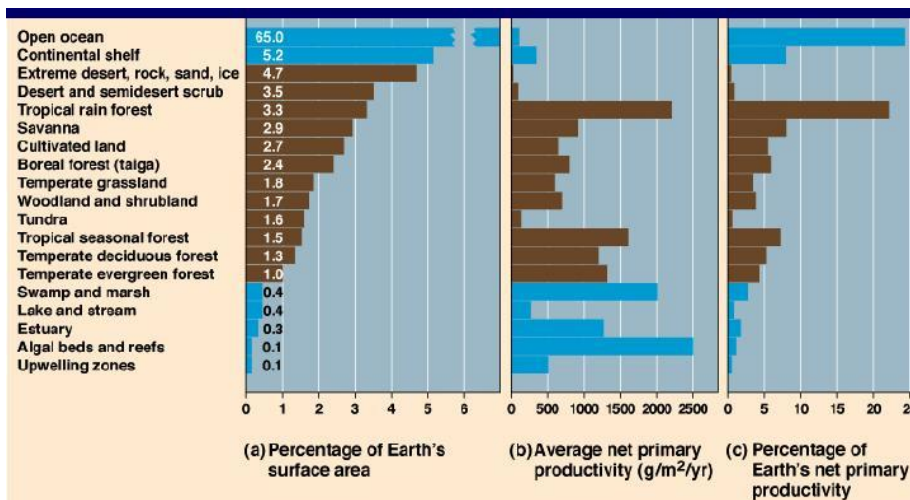


In the diagram above, the gross primary productivity is _____ joules.

How much of this energy is lost as a result of cellular respiration? _____ joules.

What is the value of NPP? _____ joules

The only way to ADD to the value of NPP is _____.



What ecosystem has the highest GPP?

What ecosystem has the highest NPP?

What do all brown ecosystems have in common?

What do all blue ecosystems have in common?

Productivity In Aquatic Ecosystems

The more solar radiation, the _____ (more / less) primary production.

The introduction of nutrients from fertilizers and animal wastes tends to increase populations of _____ in fresh water bodies.

Under more natural conditions, fresh water bodies are dominated by the microorganisms _____ and _____.

What nutrient is most often responsible for pond or lake eutrophication? _____

Productivity In Terrestrial Ecosystems

What are the two principle factors contributing to levels of productivity in terrestrial ecosystems?

- 1.
- 2.

The most productive terrestrial ecosystem is the _____.

The soil nutrients that most commonly cap terrestrial primary production are _____ and _____.

55.3 10% Energy Transfer?

Secondary Production In Ecosystems

Secondary Production is the amount of an animal's food that is converted to its _____.

The efficiency of energy transfer between trophic levels is usually less than ____%.

Do animals *respire* or *assimilate* the greater quantity of the food they eat (Thought Question!) _____

Production Efficiency

If a caterpillar consumes 200 joules of energy in its food and 33 joules are used for growth, how much energy

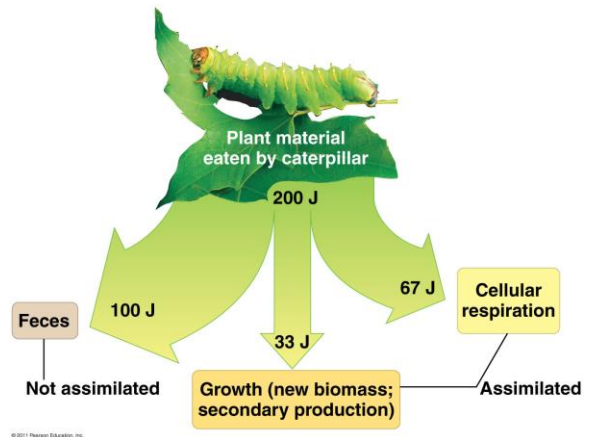
Is respired away? _____ joules

How much ends up as unuseable matter in its feces?

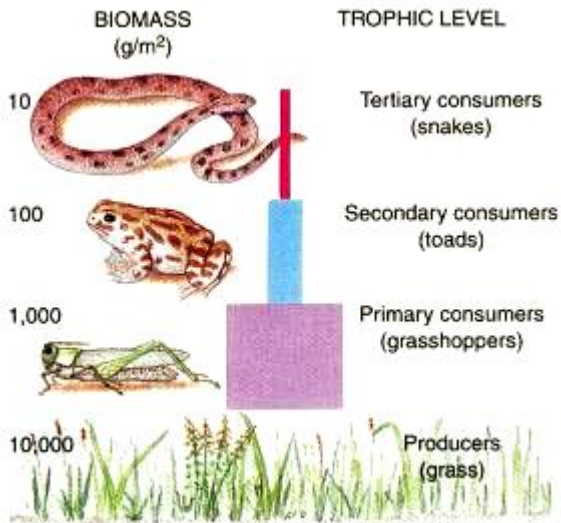
_____ joules

Is the energy lost to respiration recoverable? _____ (Yes / No)

Is the energy lost in feces recoverable? _____ (Yes / No)



Trophic Efficiency and Ecological Pyramids



What percentage of the energy stored in grass is transferred to the snake? _____%

Trophic efficiency (here shown as 10%) is usually less than production efficiency (see the caterpillar example above) because it takes into account the organisms at each energy level that are NOT _____!

In the English Channel, the biomass of grazers (zooplankton) is 5X greater than the population of producers (phytoplankton). In other words, the ecological pyramid is upside down! How can you account for this odd occurrence?

55.4 BIOGEOCHEMICAL CYCLES – Redraw the 4 major biogeochemical cycles with key terms

55.5 Restoration Ecology

What is the goal of a restoration ecologist? Provide an example

Bioremediation -