Session 10

All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

Plants acquire their material for growth chiefly from air and water.

Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.

Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.

The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.

The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.

As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.

As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.

energy that is stored up. Examples: parked car,boulder at the top of a mountain, or any object that is not moving.

Convection

Kinetic energy

Potential energy

Radiation

Energy that is in motion. Examples:fingers while you type, car driving, and fire burning.

Kinetic energy

Radiation

Potential energy

Convection

1 True/False Question

Convection → Heat transferred through a gas or liquid. Example: Heat vents on floor ....heat rises to air conditioner on ceiling and falls to the ground because it was cooled.

True False

F

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Regenerate TestPrint this Test

Question Types

Written

Matching

Multiple Choice

True/False

Start With

Term

Definition

Both

Question Limit

of 5 available terms

Reconfigure

2 Written Questions

Heat energy that transfers through waves. Examples: microwaves or sun.

INCORRECT: You gave no answer

ANSWER: Radiation

When heat is transferred by direct contact. Examples: pot on stove, metal spoon in pot of water, or a land line phone.

INCORRECT: You gave no answer

ANSWER: Conduction

2 Multiple Choice Questions

energy that is stored up. Examples: parked car,boulder at the top of a mountain, or any object that is not moving.

Convection

Kinetic energy

CORRECT: Potential energy

Radiation

Energy that is in motion. Examples:fingers while you type, car driving, and fire burning.

CORRECT: Kinetic energy

Radiation

INCORRECT: Potential energy

Convection

1 True/False Question

Convection → Heat transferred through a gas or liquid. Example: Heat vents on floor ....heat rises to air conditioner on ceiling and falls to the ground because it was cooled.

CORRECT: This is true.

Charles Brightbill was one of the first scholars to acknowledge the importance of what he variously called "education for leisure" and "leisure education." He wrote that "when we speak . . . of education for leisure, we have in mind the process of helping all persons develop appreciations, interests, skills, and opportunities that will enable them to use their leisure in personally rewarding ways" (italics in original, C. Brightbill. [1961]. Man and leisure: A philosophy of recreation. Englewood Cliffs, NJ: Prentice-Hall, p. 188). Since the general public tends to view leisure largely through the lens of its casual form, the first goal of educators for leisure -- conceived of broadly as lifestyle counsellors, volunteers, and classroom instructors -- is to inform their clients or students about the nature and value of serious, project-based, and casual leisure, including their interrelationship.

Leisure education has a special place in the field of leisure studies: it lies between the theoretic/conceptual pole and related research in this field and the applied pole and research conducted there. This website, largely concerned as it is with the theoretic/conceptual pole, needs no further explanation on this page. At the applied pole we find the provision and use of leisure services, where people avail themselves of the sites, equipment, services, and the like they need to engage in their leisure activities. Parks, recreation centers, vendors and repairers of equipment, concert halls, cinemas, and libraries, number among the many leisure services. They also offer, occasionally, specialized leisure education, complicating somewhat the three-part scheme just presented.

Nevertheless, many a leisure educator works in the middle part, informing students or clients about leisure and helping them get involved in those activities the latter have learned are likely to be rewarding and for which they will likely need some kind of leisure service provision. For visitors to this website who are not, or have not been, students in a leisure education course or who have not sought the services of a lifestyle counsellor, the following sources, which are compatible with the serious leisure perspective (and they are but a sample), can help them bridge the two poles.

Natural resources are useful raw materials that we get from the Earth. They occur naturally, which means that humans cannot make natural resources. Instead, we use and modify natural resources in ways that are beneficial to us. (The materials used in human-made objects are natural resources.) Some examples of natural resources and the ways we can use them are listed in the table below.

Natural Resource	**Products or Services**
Air	Wind energy, tires
Animals	Foods (milk, cheese, steak, bacon) and clothing (wool sweater, silk shirt, leather belt)
Coal	Electricity
Minerals	Coins, wire, steel, aluminum cans, jewelry
Natural Gas	Electricity, heating
Oil	Electricity, fuel for cars and airplanes, plastic
Plants	Wood, paper, cotton clothing, fruits, vegetables
Sunlight	Solar power, photosynthesis
Water	Hydroelectric energy, drinking, cleaning

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Modern biology is based on several unifying themes, such as the cell theory, genetics and inheritance, Francis Crick's central dogma of information flow, and Darwin and Wallace's theory of evolution by natural selection. In this first unit we will examine these themes and the nature of science.

The Ancient Greek philosopher Anaxiamander (611-547 B.C.) and the Roman philosopher Lucretius (99-55 B.C.) coined the concept that all living things were related and that they had changed over time. The classical science of their time was observational rather than experimental. Another ancient Greek philosopher, Aristotle developed his Scala Naturae, or Ladder of Life, to explain his concept of the advancement of living things from inanimate matter to plants, then animals and finally man. This concept of man as the "crown of creation" still plagues modern evolutionary biologists (See Gould, 1989, for a more detailed discussion).

Post-Aristotlean "scientists" were constrained by the prevailing thought patterns of the Middle Ages -- the inerrancy of the biblical book of Genesis and the special creation of the world in a literal six days of the 24-hour variety. Archbishop James Ussher of Ireland, in the late 1600's calculated the age of the earth based on the geneologies from Adam and Eve listed in the biblical book of Genesis. According to Ussher's calculations, the earth was formed on October 22, 4004 B.C. These calculations were part of Ussher's book, History of the World. The chronology he developed was taken as factual, and was even printed in the front pages of bibles. Ussher's ideas were readily accepted, in part because they posed no threat to the social order of the times; comfortable ideas that would not upset the linked applecarts of church and state.

Figure 2. Archbishop James Ussher. Image from the Internet.

Often new ideas must "come out of left field", appearing as wild notions, but in many cases prompting investigation which may later reveal the "truth". Ussher's ideas were comfortable, the Bible was viewed as correct, therefore the earth must be only 5000 years old.

Geologists had for some time doubted the "truth" of a 5,000 year old earth. Leonardo da Vinci (painter of the Last Supper, and the Mona Lisa, architect and engineer) calculated the sedimentation rates in the Po River of Italy. Da Vinci concluded it took 200,000 years to form some nearby rock deposits. Galileo, convicted heretic for his contention that the Earth was not the center of the Universe, studied fossils(evidence of past life) and concluded that they were real and not inanimate artifacts. James

Hutton, regarded as the Father of modern geology, developed the Theory of Uniformitarianism, the basis of modern geology and paleontology. According to Hutton's work, certain geological processes operated in the past in much the same fashion as they do today, with minor exceptions of rates, etc. Thus many geological structures and processes cannot be explained if the earth was only a mere 5000 years old.