Grade 9 – Science
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Lesson 1 - Respiratory and Circulatory Systems Working with the other Organ Systems

The **respiratory system** that are in charge of supplying oxygen are the nose, nasal passageways, windpipe, lungs, and diaphragm. In the nose and nasal passages, the entering air is made warm, damp, and clean of unknown particles. Next, the air moves down through the trachea, bronchi, bronchioles, and alveoli.

Trachea is the empty tube that serves as passageway of air into the lungs.
Bronchi are the two branching tubes that connect the trachea to the lungs.
Bronchioles are the hairlike tubes that connect to the alveoli.
Alveoli are the air sacs that allow gas exchange in the

The **circulatory system** is the life support structure that nourishes your cells with food and oxygen. It also carries away the waste products. The circulatory system can be compared to a complex arrangement of highways, avenues and lanes connecting all the cells together into a neighborhood. Sequentially, the community of cells sustains the body to stay alive.

Three major parts of the circulatory system, with their roles:

1. **Heart** – pumps the blood throughout the body

2. **Blood vessel** – carries the blood throughout the body

    Arteries - carry oxygenated blood away from the heart to the cells, tissues, and organs of the body

    Veins – carry deoxygenated blood to the heart

    Capillaries - the smallest blood vessels in the body, connecting the smallest arteries to the smallest veins

    - the actual site where gases and nutrients are exchanged

3. **Blood** – carries the materials throughout the body

The **heart** has two pumps. Each pump has two chambers, the upper and lower chambers. The upper chamber is the atrium that receives blood coming in from the veins. The lower chamber is the ventricle that forces the blood out into the arteries.

Cigarette smoking harms nearly every organ in the body, causing many illnesses and affecting health in general. The negative effects of smoking on the circulatory system include increased heart rate and blood pressure, coronary heart disease, arteriosclerosis, and vascular diseases. The respiratory diseases caused by smoking are chronic bronchitis, emphysema, asthma, cough, colds, tuberculosis, lung cancer, and other respiratory infections.

The best way to prevent diseases in the respiratory and circulatory systems is to have a healthy lifestyle, which includes balanced diet, regular exercise, adequate rest, proper hygiene, and avoiding vices such as cigarette smoking and alcohol drinking.

Lesson 2 - Heredity: Inheritance and Variation

Genetic information is organized in genes on chromosomes

Traits of organisms are inherited through **different patterns**.

Sex limited traits are generally autosomal, which means that they are not found on the X or Y chromosomes. The genes for these traits behave exactly the same way that any autosomal gene behaves.

Sex-influenced traits are also autosomal. Again, what makes these traits unusual is the way they are expressed phenotypically. In this case, the difference is in the ways the two genders express the genes.

One classic example of a sex influenced trait is **pattern of baldness** in humans, though the condition is not restricted to males. This gene has two alleles, "bald" and "non-bald". The behaviors of the products of these genes are highly influenced by the hormones in the individual, particularly by the hormone testosterone.

Sex-limited traits are those that are expressed exclusively in one sex.

Sex-influenced traits are expressed in both sexes but more frequently in one than in the other sex.

DNA is composed of chains of nucleotides built on a sugar and phosphate backbone and wrapped around each other in the form of a double helix. The backbone supports four bases: guanine, cytosine, adenine, and thymine. **DNA** contains the information needed to form and control the physical make-up and chemical processes of an organism. **DNA** is a double-stranded helix made up of repeating units of nucleotides.

In humans, XX chromosomes determine femaleness and XY determine Maleness.

Lesson 3 - Biodiversity and Evolution

In any ecosystem, **organisms need a balanced environment**. A balanced ecosystem is one in which all living things are interacting successfully, in an environment where even non-living things are adequately present in order to sustain life. If any part of the ecosystem is disturbed, other parts will also be disturbed.

> **Population** pertains to the number of organisms of the same species living in a certain place.
> **Biodiversity** refers to the variety of life in an area.

Population sizes change when new members move into the ecosystem. They decrease when members move out of an ecosystem. The birthrate and death rates can also affect a population's size. Anything that limits the size of a population like certain environmental conditions are called **limiting factors. Limiting factors** keep a population from increasing in size and help balance an ecosystem. Examples of limiting factors are the availability of food, water, and living conditions.

Light, temperature and soil nutrients are also limiting factors because they help determine the types of organisms that can live in an ecosystem. The maximum population size an environment can support is called its **carrying capacity**. If the population size rises above the carrying capacity, organisms die because they cannot meet all their needs.

Extinction occurs when the last members of that species dies.

When the population of a species begins declining rapidly, the species is said to be a threatened species.

A species is in endangered when its population has become so low

Deforestation - One of the country's environmental problems is the rapid rate at which trees are cut down.
Wildlife Depletion - As human population gets bigger, huge space is needed for shelter, for growing crops and for industries.

Water Pollution - A major problem in lakes, rivers and ponds is eutrophication, one of the effects of water pollution.

Air Pollution - a great volume of cars travels each day, smog blankets the area, nitrogen oxides and hydrocarbons from car exhausts react with water vapor or dust particles and produce new irritating chemicals.

Destruction of Coastal Resources Coral reefs and coastal mangrove forests in the Philippines serve as breeding grounds and nurseries of marine fishes. But due to man's activities, coastal areas are getting destroyed through the years. Some of these activities include the following:

Deforestation, agricultural activities and mining activities

Dynamite fishing and muro-ami

Coastal areas conversion to beach resorts, residential areas

Overharvesting

Acid Precipitation - Acid precipitation is commonly known as acid rain. Rainwater is normally acidic, because carbon dioxide is normally present. Acid rain can be harmful to living things. It causes yellowing of leaves of trees and cause leaves to fall.

sustainable society should live under the carrying capacity of the environment. This means that the rate at which society uses renewable resources does not exceed the rate at which the resources are generated.

Lesson 4 - ECOSYSTEM: Life Energy

Plants have green pigments called **chlorophyll** stored in the chloroplast. This pigment aids in capturing light energy from the sun that enables plants to change it into chemical energy stored in the food. This process is called **photosynthesis.**

Photosynthesis is a process of food making done by plants and other autotrophic organisms. The presence of chlorophyll enables these organisms to make their own food. Autotrophic organisms require light energy, carbon dioxide (CO_2) and water (H_2O) to make food (sugar).

Two stages of photosynthesis

light dependent action happens in the presence of light. It occurs in the thylakoid membrane and converts light energy to chemical energy. Water one of the raw materials of photosynthesis is utilized during this stage and facilitates the formation of free electrons and oxygen.

Calvin cycle (dark reaction) is a light-independent phase that takes place in the stroma and converts carbon dioxide (CO_2) into sugar. This stage does not directly need light but needs the products of the light reaction, thus it occurs immediately after the light-dependent phase.

Stomata are mostly found on the lower surface of the leaf of land plants. They consist of two specialized cells, called guard cells. Their main function is to allow gases such as carbon dioxide, water vapor, and oxygen to move rapidly into and out of the leaf.

Cellular Respiration - Food is considered as the major source of energy for all organisms.

Glycolysis - the 6-carbon sugar, glucose, is broken down into two molecules of a 3- carbon molecule called pyruvate. This change is accompanied by a net gain of 2 ATP molecules and 2 NADH molecules.

Krebs Cycle - occurs in the mitochondrial matrix and generates a pool of chemical energy (ATP,NADH, and FADH2) from the oxidation of pyruvate, the end product of glycolysis.

The electron transport - chain allows the release of the large amount of chemical energy stored in reduced NAD+ (NADH) and reduced FAD (FADH2). The energy released is captured in the form of ATP (3 ATP per NADH and 2 ATP per FADH2).