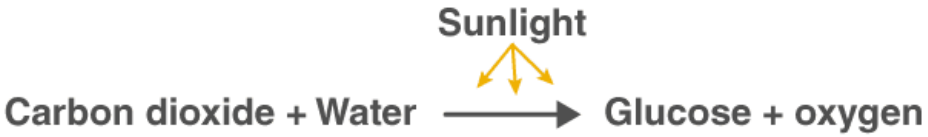
Name_____ **Study Guide**
Date_____ Grade 7

Please do not only study from the study guide, use your books and worksheet as well.

Topic 1 **Cells**

Lessons 5 Photosynthesis

Photosynthesis is a process by which autotrophs convert light energy into chemical energy, which is later used to fuel cellular activities. The chemical energy is stored in the form of sugars, which are created from water and carbon dioxide.



Where Does This Process Occur?

Chloroplasts are the sites of photosynthesis in plants and blue-green algae. All green parts of a plant These cell organelles are present only in plant cells.

Factors Affecting Photosynthesis

- Light Intensity:
- The concentration of CO2
- Water
- Pollution

Photosynthesis Equation

Photosynthesis reaction involves two reactants, carbon dioxide and water. These two reactants yield two products, oxygen and glucose. Hence, the photosynthesis reaction is considered to be an endothermic reaction. Following is the photosynthesis formula:

$$ATP + 6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

Steps of Photosynthesis

1. Chlorophyll absorbs the light **energy** from the sun to split **water** molecules into hydrogen and oxygen.
2. The hydrogen from water molecules and **carbon dioxide** absorbed from the air are used in the production of glucose. Furthermore, **oxygen** goes out into the atmosphere through the leaves as a waste product.
3. **Glucose** is a source of food for plants that provide energy for growth and development, while the rest is stored in the roots, leaves and fruits, for their later use.

Lesson 6 Cellular Respiration

Respiration is the process of gaseous exchange in an organism.

Respiration at a **cellular** level, however, refers to the burning of food to obtain energy.

The release of energy during cellular respiration

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

Stages of Cellular Respiration

1. In the cytoplasm, glucose is broken down into smaller molecules, releasing a small amount of energy.
2. In the mitochondria, the smaller molecules react producing carbon dioxide, water and large amounts of energy.

Role of Mitochondria

The mitochondria, known as the powerhouse of the cell, creates large amounts of energy in the cell. The folds in the organelle create more surface area which allows more chemical reactions to take place which produces more energy. **If the cell needs more energy, it will create more mitochondria.**

Fermentation

Fermentation is the process in which energy is released without the use of oxygen.

Alcoholic fermentation Takes place in live yeast cells. This produces alcohol, carbon dioxide, and a small amount of energy. Bakers often use the products of fermentation (Think of the little holes you see in bread)

Lactic Acid Fermentation In this, starch or sugar is converted into lactic acid by yeast strains and bacteria. During exercise, energy expenditure is faster than the oxygen supplied to the muscle cells. This results in the formation of lactic acid and painful muscles.

Topic 2 **Body Systems**

Lesson 1 Body Organization

Organization of the Body

- The body is organized into systems that require control and work together

  → The digestive and circulatory systems work together to help the cells in the body get the energy they need to function

  → The nervous, skeletal and muscular system work together to move your body

- Each system is made up of smaller parts, with the smallest being the cells that form the basic units of every living thing

- You need each of your systems so that you can survive and grow

Levels of Organization

- Levels of organization in the human body: cells-tissues-organs-organ systems
- All tissues are made up of cells
- Organs are made of different kinds of tissues
- Organ systems are made from organs that work together to perform bodily functions

Cells and Tissues

- **Tissue:** similar cells that are grouped together and perform the same function

  → Muscle tissue: contracts or shortens to make parts of your body move

  → Nerve tissue: carries electrical signals from the brain all over the body and back

  → Connective tissue: such as bone and fat, provides support for the body and attaches all of its parts together

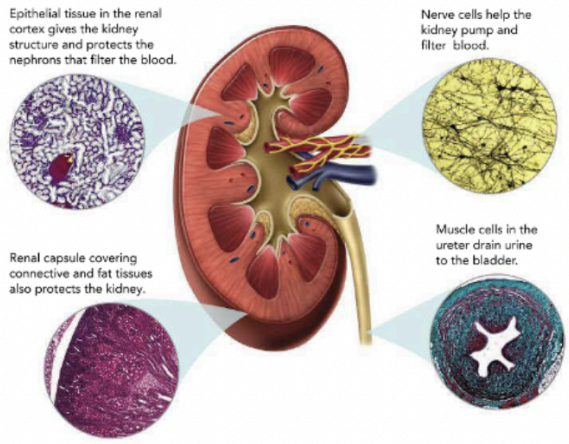
- Skin, the largest organ in the human body

  → Epithelial tissue: protects your insides from damage. Covers the inner and outer surfaces of the body

Organs and Systems

- **Organ:** a body structure composed of different kinds of tissues that work together

  → Kidneys, heart, brain and skin



- Each organ has a specific function in the body because its structure is more complex than that of a tissue

  → Example: Kidneys remove waste from blood and urine. Each kidney contains muscle, connective and epithelial tissues. Nervous tissue connects to the kidney and helps to control its function

- **Organ system:** a group of organs that work together, performing major functions

  → Kidneys are part of the excretory system, which also includes the skin, lungs and liver

Human Organ Systems

- Eleven major organ systems that keep the human body running smoothly

Control Systems

- To function properly, each part of the body must be able to communicate with other parts of the body
- The body communicates using the nervous system

  → Made up of the brain, spinal cord and nerves

  → **Function:** sends information through nerve cells to control your actions

- Many functions are controlled through the endocrine system

  → A collection of glands that produces important chemicals

  → **Function:** affects energy levels, body temperature, digestion and moods

Structural Systems

- Three organ systems work to shape, move and protect the body
- **<u>The skeletal system</u>**

  → Made up of bones and connective tissues

  → **Function:** support body, protect organs, make blood cells and store minerals

  → Connective tissues cushion the bones and attach bones to muscles

- **<u>The muscular system</u>**

  → Made up of 650 muscles I need Mr. Cris

  → **Function:** controls movement, helps you stand up straight, allows you to breathe and keeps blood and food moving through the body

- **<u>The integumentary system</u>**

  → Made up of skin, hair and nails

  → **Function:** protects body from outside damage

  → Example: oil and sweat glands under skin help keep skin waterproof and temperature comfortable

- The skin is attached to muscles, which are anchored to bones by connective tissue → together they provide shape and allow the body to move

Oxygen and Transport Systems

- **<u>The respiratory system</u>**

  → **Function:** brings in oxygen and moves out carbon dioxide by way of the lungs

  → As you breathe in fresh air, oxygen diffuses into the red blood cells. When you breathe out, carbon dioxide diffuses back into the air

- **The circulatory system**

  → Made up of the heart, blood and blood vessels

  → **Functions:** carries oxygen-rich blood to all parts of the body. Transports nutrients, wastes and disease-fighting cells all over the body through the bloodstream

  → Heart pumps blood through blood vessels → blood cells pass oxygen to your cells and pick up carbon dioxide → veins then bring blood back to heart and lungs

Food and Waste Processing Systems

- **The digestive system**

  → **Function:** to break down food so nutrients can be released and used to make energy

  → The esophagus squeezes the food down into the stomach, where the food is crushed and broken down by acids → food travels into the intestines, where useful substances pass through the intestinal walls into the blood → liver and pancreas produce substances that help to break down food → some parts of food cannot be digested, those parts pass out of your body as waste

- **The excretory system**

➢ **Function:** gets rid of waste products and toxic substances in your body

➢ Kidneys produce urine, sweat glands in skin make sweat, lungs release wastes from the body into the air and the liver breaks down toxic chemicals into substances that the kidneys can pull out of the blood

- ***Defense System***

The immune system

→ Made up of lymph nodes, lymph vessels and white blood cells

→ Function: fights infections

→ Lymph nodes and lymph vessels trap bacteria and viruses

→ Swollen glands are lymph nodes that have grown larger to fight off an infection

→ White blood cells produced inside your bones attack and destroy bacteria and other causes of disease

- **Reproductive System**

→ **Function:** producing sperm and eggs and (in females) for nurturing the fetus until birth

→ Male reproductive organs: testes and penis

→ Female reproductive organs: ovaries, uterus and vagina

Lesson 2 Systems Interacting

Transporting Materials

- All cells need oxygen and nutrients, and they need to get rid of carbon dioxide and other wastes
- Blood vessels from the circulatory system carry nutrients to and waste from the cells in the body

  → **Capillary:** a tiny blood vessel where substances are exchanged between the blood and the body cells
- Blood picks up oxygen from the lungs and food molecules from the intestines and delivers them to needy cells → at the same time, blood collects carbon dioxide and
- waste from the cells → carbon dioxide is returned to the lungs to be released into the air → waste products are filtered from the blood by the kidneys in the excretory system and passed out of the body in urine

Stimulus and Response

- Eyes, ears, skin, nose and taste buds all send information about the environment to the nervous system

  → **Stimulus:** any change or signal in the environment that can make an organism react in some way

  → **Response:** an action or change in behavior that occurs as a result of a stimulus

- Example: muscular and skeletal systems help you reach for food and the digestive system releases saliva before the food reaches the mouth

Hormonal Control

- The endocrine system uses chemical signals instead of nerves to control body functions
- **Glands:** organs that produce and release chemicals either through tiny tubes called ducts or directly into the bloodstream

  → Example: when something startles you, your adrenal glands send signals that prepare you to fight or run away → heart pumps faster, lungs let in more air → ability to feel pain decreases → pupils of eyes get larger and allow in more light → you're ready for action

Hormone: chemical produced by an endocrine gland

→ Hormones are carried through the body by the circulatory system

→ They affect many body processes

→ One hormone interacts with the excretory system and the circulatory system to control the amount of water in the bloodstream

→ Another hormone interacts with the digestive system and the circulatory system to control the amount of sugar in the bloodstream

→ Hormones also affect the reproductive systems of both males and females

Homeostasis

- The body's temperature must stay stable and remain close to 37℃
- Each organism requires specific conditions to function
- **Homeostasis:** the condition in which an organism's internal environment is kept stable in spite of changes in the outside environment

Regulating Temperature

- When body temperature starts to fall too low, the nervous system sends out signals to other systems to take action to warm the body up

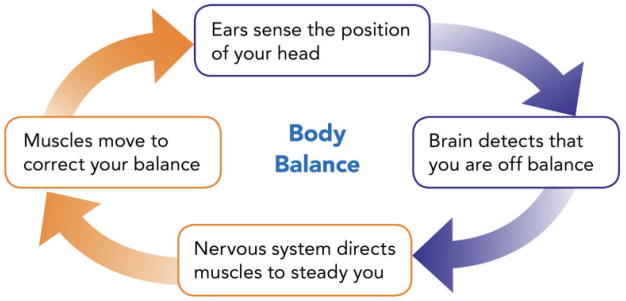
  → The skin, part of the integumentary system, develops goosebumps

  → The muscles cause the body to shiver. The body tends to move large muscles to generate heat

- All these actions help to raise the body temperature back to normal

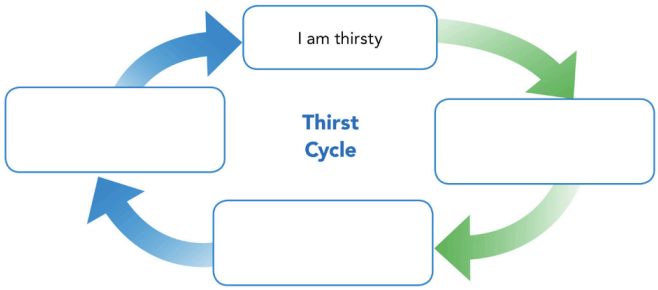
Keeping Balance

- Structures in the inner ear sense the position of the head → send information to the brain, which interprets the signals → if the brain senses a loss of balance, it sends messages to the muscles to move in ways that help the body stay steady



Meeting Energy Needs

- When the cells in the body need more energy, hormones from the endocrine system signal the nervous system to make the body feel hungry → After you eat, other hormones signal the brain to make you feel full



Maintaining Water Balance

- All the chemical reactions that keep you alive take place within the watery environment of the cells
- If the body needs more water, the nervous system causes you to feel thirsty → your senses, muscles and skeleton take you to a source of water → after the body has had enough water, the nervous system causes the thirst to end
- After that, the water passes through the digestive system to the circulatory system and from there into the cells → water balance is restored
- The immune system includes specialized cells that attack and destroy.