Unit 6L.5 Organs and Systems

- Major human systems; function of human organs.
- Internal and external fertilisation.
- Puberty and reproductive organs.
- Organs of plants; structure of a flower.

By the end of this unit you should:

- Know the names of the main organs of vertebrates that are responsible for circulation, food processing, gas exchange, locomotion, reproduction, sensitivity and waste removal.
- Locate, identify and compare size of the major internal organs of humans.
- Differentiate between internal and external fertilisation.
- Understand that during puberty the body changes to enable reproduction.
- Know the different parts of flowering plants and the job of each part.
Major human systems:

- Respiratory and circulatory system
- Excretory and digestive system
- Skeletal and muscle system
- Nervous system
- Reproductive system

**Organ system:** different organs all working together.
1a. Circulatory System:

Can you imagine a messenger making trillions of stops in less than a minute? This is what blood does in your body. In approximately thirty seconds, your blood moves (circulates) through your entire body. It reaches out to every one of your trillions of cells.

Circulation is the movement of the blood around the body

Organs responsible for circulation:
The heart is the most important organ in your body. It is mainly made of muscles and is divided into four chambers.

The other two parts of the circulation system are blood and blood vessels.

- Blood moves through the blood vessels called veins, capillaries and arteries.
**Artery**

Large arteries have more elastic tissue and less smooth muscle. The elasticity allows them to stretch, filling with blood each time the heart pumps. They then return to their original shape ready for the next pump. They also help to push the rapid flow of blood when the ventricles are relaxed and the heart is refilling.

**Arteries:** carry blood away from the heart, rich in oxygen

**Veins**

The walls of the veins are thinner than the arteries, and have less muscle and elastic tissue than the arteries. Some veins have valves in them to ensure the flow of blood travels in one direction to the heart, and not backwards.

**Veins:** return the blood back to the heart, rich in carbon dioxide
Capillary

Capillaries are the smallest blood vessels in the body. Water and other small-molecule substances can pass through the capillary wall. They act as a link between arteries and veins.

The Human Double Circulation:

1. Blood flows to the lungs carrying de-oxygenated (carbon dioxide rich) blood. It passes the lungs and collects oxygen to take back to the heart.
2. The main artery of the body, the aorta, pumps the oxygenated blood to all the organs and tissues in the body. The main vein of the body returns deoxygenated blood from organs and tissues to the heart.
1b. Respiratory System:

How long can you hold your breath for? After approx one minute it becomes difficult and you have to breathe in more air. All the cells in our body need oxygen to stay alive.

Respiration is when we breathe in air to get oxygen. Then we breathe air out to get rid of carbon dioxide.

The organs responsible for respiration:

1. In humans:
   The organ responsible for respiration in humans is the lung. The lungs are like two large sponge bags that fill your chest. The job of the lungs is to take oxygen from the air and give it to the blood and at the same time remove carbon dioxide from the blood.
2. In fish and amphibians:

Fish and young amphibians take in the oxygen dissolved in water. **Gills** are the organs responsible for the respiration or **gas exchange** process for animals that live in water.
Activity 1: Testing for CO$_2$

Do we actually breathe out carbon dioxide?

You will need: a glass, balloon, lime water, straw and safety glasses.

Steps:
1. Put on the safety glasses
2. Pour some lime water into a glass
3. Inflate the balloon then carefully insert the straw into the balloon opening.
   Hold it tight so no air escapes!
4. Place the other end of the straw into the lime water.
5. Slowly release the air from the balloon into the lime water.

Observe (O):
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Explain (E):
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2a. Excretory System:

Chemical reactions in our body’s cells produce waste. This waste includes harmful chemicals and even carbon dioxide. These chemical wastes have to be removed or they will make our body ill, or poison us.

Removing waste made in our cells is called excretion.

Our body removes waste in many stages; First the blood collects waste from the cells. The waste is then transported to the kidneys for processing. The kidneys filter the waste from the blood and pass it out of the body through liquid waste called urine.

The kidneys are part of the body’s excretory system.
**Activity 2:**

Use your fists, like the picture below to locate your kidneys.

![Image of a person using hands to locate kidneys]

**Activity 3:**

**Steps:** Design an 'A-Z Alpha Ladder' for parts of the body and its main function. Continue on until you have a body part for each letter of the alphabet.

**ALPHA LADDER**

<table>
<thead>
<tr>
<th>BODY PART</th>
<th>FUNCTION</th>
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<tr>
<td>A</td>
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<td>B</td>
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<td>C</td>
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2b. Digestive System:

Humans like all other living things need food to survive. Food provides our bodies with the nutrients and energy to be happy and healthy.

Before our body can utilise the food, it has to be broken down into very small pieces called molecules. The first stage of breaking down the food is in our mouths when we chew the food. Salivary glands produce saliva to help soften the food to make it easier to digest. The food is assisted to the stomach by the oesophagus. In the stomach acids help to break the food into smaller particles. These particles then travel through the large and small intestine where bile stored in the gall bladder, from the liver and enzymes from the pancreas help to break down the particles further.
The main organs responsible for food processing are shown in the picture to the right:

**Activity 4:**

**Steps:** Use the Decision Making Matrix to compare key features of major organs in the body. Brainstorm a list of main organs in the body. Choose 5 organs to research.

<table>
<thead>
<tr>
<th>ORGAN</th>
<th>SIZE (approx)</th>
<th>WEIGHT (g)</th>
<th>LOCATION</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ie. heart</td>
<td>A clenched fist</td>
<td>300</td>
<td>chest</td>
<td>circulatory</td>
</tr>
</tbody>
</table>


3. Skeletal and Muscular System:

When our body is awake it is constantly moving; walking, talking, writing, chewing even blinking. Bones and muscles work together to produce movement or locomotion.

The bones of our skeleton protect our organs but they also provide a strong framework so it can move, this is called the skeletal system. Muscles and tendons attached to the bones can stretch and shorten to move the bones, this is called the muscular system.

Locomotion is moving from one place to another.

Muscles and tendons stretch and shorten to move the bones.
Movement in Birds:

In order to *move* from one place to another, birds usually *fly*. The body parts responsible for *locomotion* in birds are the *wings*. The wings have very light hollow bones to help them fly.

Movement in Fish:

Fish live in water. In order to *move* from one place to another they need to *swim*. The body parts responsible for *locomotion* in fish are the *fins* and *tail*.
4. Nervous System:

The nervous system includes the brain, the spinal cord and nerves. Messages are sent from the brain along the spinal cord to the nerve cells in the body. Your nervous system controls your body’s actions; walking, talking, smiling, thinking.

What other every day actions depend on the nervous system?

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The brain controls all our actions and thoughts. It collects information from the surrounding environment to send messages to our body on how to respond and act.

The following picture shows the body parts responsible for receiving information from the environment to send to the brain. Label what sense each body part is responsible for.
5. Reproductive System:

All living organisms reproduce so that the species continue to exist. Some organisms reproduce outside the body this is called external fertilisation. Humans reproduce inside the body this is known as internal fertilisation.

Reproduction involves the sperm from an adult male and the egg from an adult female.

Sperms and eggs are specialised cells responsible for reproduction.

In humans the egg and sperm meet each other inside the mother’s body.

Where do we find eggs and sperms?

Eggs are part of the female reproductive system, and are located in the ovaries. Sperms are part of the male reproductive system and are located in the testicles.
Female reproductive system:
Females have 2 ovaries; they are responsible for storing the eggs and releasing them once every month. They also have a uterus, an organ which the babies grow inside.

Male reproductive system:
Sperms are made in the testes. They are then transported through the penis. Sperms are specialised cells responsible for fertilisation. The tail helps them swim to meet the egg.
Key Ideas:
- Organs belong to an organ system and have a specific function.
- The main organ systems in vertebrates: respiratory and circulatory system, excretory and digestive system, skeletal and muscle system, nervous system and the reproductive system.

Key Words:
circulation, heart, blood vessels, artery, vein, capillary, respiration, gas exchange, gills, food processing, stomach, liver, pancreas, small and large intestine, kidneys, waste removal, movement, legs, wings, fins, reproduction, ovaries, testes, brain, nerves.
Look at the pictures below to answer question 1:

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<td>6</td>
<td>7</td>
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<td>10</td>
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Q1- Write the name of each organ?

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Q2- Reorder the organs from the smallest to largest:

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Q3 - Complete the following table

<table>
<thead>
<tr>
<th>Body Part</th>
<th>Sense</th>
<th>Sensitive to:</th>
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<tbody>
<tr>
<td>Sight</td>
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<tr>
<td>Smell</td>
<td></td>
<td>Chemicals in the air (smells)</td>
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<tr>
<td>Tongue</td>
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<td></td>
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<tr>
<td>Hearing</td>
<td></td>
<td></td>
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<tr>
<td>Skin</td>
<td></td>
<td>Temperature and pressure</td>
</tr>
</tbody>
</table>
Internal and external fertilisation
Every day millions of living things die. Organisms do not live forever so how is there still life on Earth?
Many organisms before they die reproduce new organisms like themselves.

Reproduction is producing young so that species continue to exist.

In many animals a new life begins when the nucleus of a sperm, a specialised cell from the father, combines with the nucleus of an egg, a specialized cell from the mother. This is called fertilisation.

Fertilisation is the fusion of an egg with a sperm to form a zygote.
Different animals fertilise their eggs in different ways;

**Fertilisation in Vertebrates**

- **External fertilisation**
  - Fish and Amphibians
  - Young develop in water

- **Internal fertilisation**
  - Birds and Reptiles
  - Young develop on land

- **Mammals**
  - Young develop inside uterus

Fish and female frogs lay thousands of eggs in water. Males will wait for the females to lay the eggs then they will release the sperm into the water. Fertilisation happens when a sperm and an egg meet by chance. This is called external fertilisation. The mothers do not take care of their young as they grow.
Mammals, reptiles and birds have a different, more efficient form of reproduction. The sperm and egg meet and fuse, or combine, inside the mother’s body. Birds and reptiles lay their eggs on land. The eggs are covered by hard shells, and contain lots of stored food to provide young with enough nutrients to last until they are ready to hatch.
The mothers take care of their young until they can live on their own. Most **mammals** are different as their young grow inside a special organ inside the mother’s body called a **uterus**. The mother takes care of the young, feeds them milk after they are born.

**Key words:**
Reproduction, zygote, sperm, egg, uterus, external and internal fertilisation

**Key ideas:**
- All living things reproduce
- Fertilisation is the fusion, joining of the sperm and egg to form a zygote.
- There are two types of fertilisation; outside the mother’s body is called external fertilisation and internal fertilisation happens inside the mother’s body.
- The mammals have a special organ called the uterus to keep the young inside the mother’s body.
Key Questions:
Q1- Answer the following questions:
1- Define reproduction:

2- Label the diagram of
The fertilisation process:

3- What is the function of the uterus in a mother's body?

Q2- Read each sentence below carefully. Mark whether the statement is describing (I)nternal or (E)xternal fertilisation.

A. This happens for most animals that live on land..................
B. This happens for most animals that live in water..................
C. The egg and sperm come together inside the female.......... 
D. The egg and sperm come together outside the female....... 
E. Sperm swim through water to reach the eggs..................
F. Many eggs are produced and many do not survive............... 
G. A few eggs are produced and more survive....................
Puberty

The development from infants, to adults takes many years. It involves physical, mental and emotional changes.

The development from child to adult is called **puberty**.

**Puberty** is when the body develops and changes. It can happen anywhere between ages 9 to 18. Each person is unique, which means that your body will go through puberty according to its own time table. Girls usually develop earlier than boys. Some changes can be embarrassing and some changes are quite obvious.
What are some of these changes?

Girls:
- Hair starts to grow on the body
- Two sexual characteristics;
- Breasts develop
- Ovaries start to release egg cells once a month. When the egg is not fertilised, the body gets rid of the egg and the lining of the uterus. This is called menstruation.
- Muslim girls cannot pray when they are menstruating.
- After the period has finished they will take a full body bath before praying again.

Boys:
- Hair starts to grow on the face and body
- The voice changes and deepens.
- Sexual characteristic;
- Testes start producing sperms

Why do these changes happen in our bodies?
During adolescence, the body is undergoing sexual maturation. These changes will result in the body being able to reproduce.
Key words:
Puberty
Ovaries
Egg
Menstruation
Period
Testes
Sperm

Key ideas:
- The development from child to adult is called puberty.
- Puberty is the process of sexual maturation so the body is able to reproduce.

Key questions:

Answer the following questions:

1- Define puberty.
...........................................................................................................................................................................

2- List two sexual characteristics that develop in girls during puberty:
   1- .................................................................................................................................
   2- .................................................................................................................................

3- List one characteristic that changes both in boys and in girls?
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