CORNERSTONE JUNIOR SCHOOL - MUKONO
P.O. Box 704 Mukono. Tel: 0772485711/0786809463,
Email: cornerstonejuniorschool@gmail.com

PRIMARY SEVEN SCIENCE SELF STUDY NOTES - SET THREE

By the end of this topic, a child should be able to:

- Define excretion and explain why it is important
- Name the main parts of the different excretory organs and describe the role played by each parts
- Describe how different excretory organs are related to other body systems
- Identify products excreted by different organs of the excretory system and the main by-products (substances) each contains
- Identify diseases and disorders that affect different excretory organs and how to ensure health of excretory organs

INTRODUCTION

Different processes in that take place in living organisms lead to release of end-products (wastes). If these wastes are poisonous/toxic if they are left to accumulate.

Definition of excretion: Excretion is the removal of wastes (by-products) from the body.

Importance of excretion: It removes waste materials from body fluids before they become harmful. Waste materials become toxic/harmful when they accumulate or last long in the body. So, they need to be removed from the body before they become toxic.

EXCRETORY SYSTEM

The excretory system is a group of organs that remove waste materials from the body.

Organs of the excretory system

These are organs that remove waste materials from the body before they become toxic/poisonous.

These include:

1. The skin
2. The kidney
3. The lungs
4. The liver.

Excretory Products from the body

These are the substances removed from the body as waste materials.

Different waste materials are removed from the body by different organs.

Examples of waste materials and organs that remove them from the body

Excretory organ	**Excretory products**
Lungs	Carbon dioxide, water vapour
Kidneys	Urine
Skin	Sweat
Liver	Bile pigments

Components of urine

Urine contains the following substances:

1. Urea
2. Uric acid
3. Excess water
4. Excess mineral salts

Components of sweat

Sweat contains the following substances:

1. Urea
2. Lactic acid
3. Excess water
4. Excess mineral salts**.**

LESSON TWO

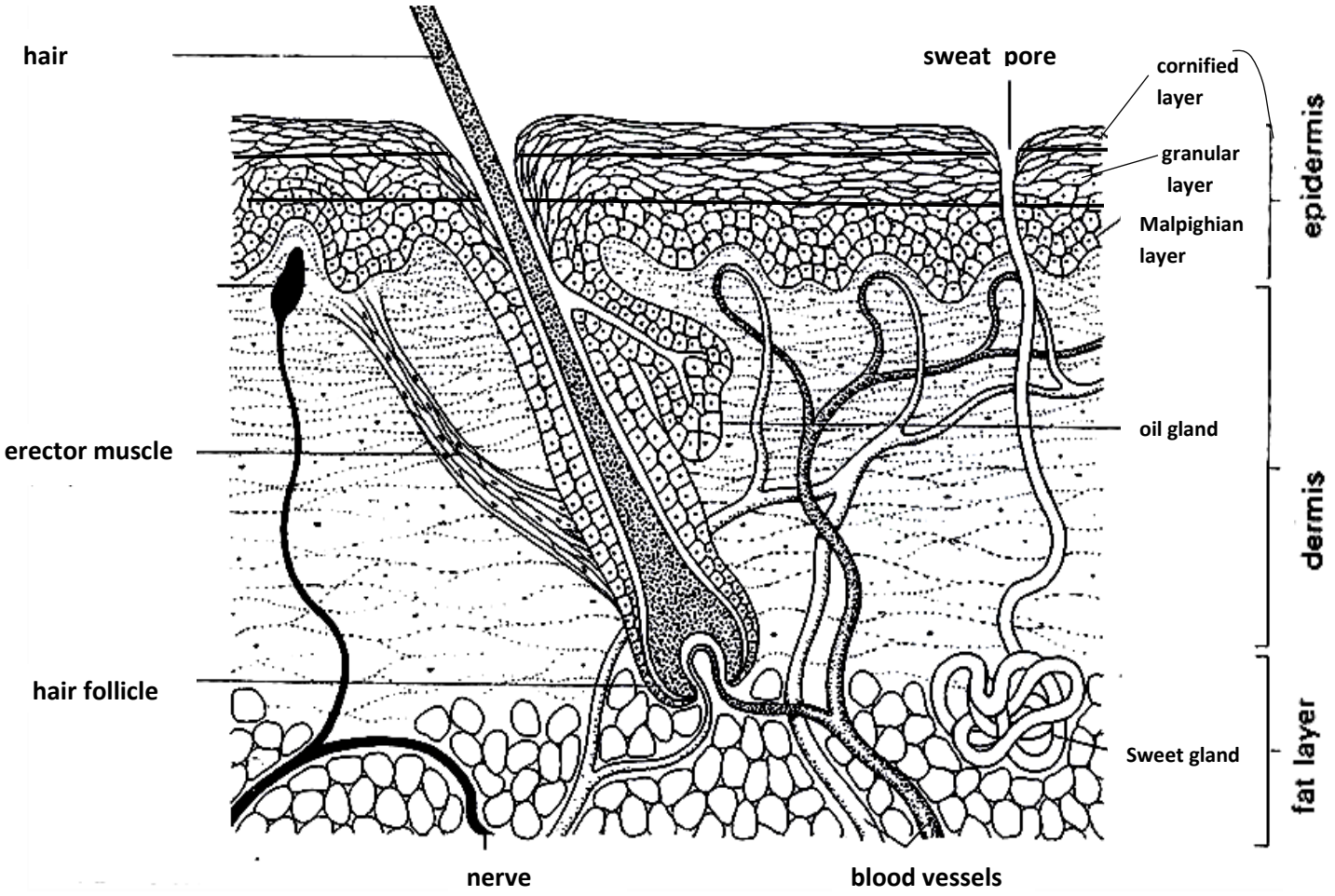
THE HUMAN SKIN

The human skin is the largest organ of the body. It is one of the major excretory organs in human beings.

The skin covers the most part of the body.

It is also a sense organ for feeling.

STRUCTURE OF THE SKIN



The skin consists of two main layers

These are:

- Epidermis
- Dermis

Epidermis
- This is the outer layer of the skin

The outer layer (epidermis) of the skin is made up of three layers and these are:
a) Cornified layer
b) Granular layer
c) Malpighian layer

The cornified layer
This is the tough outermost layer of the skin. It is made up of dead cells.

The dead cells in this layer offer resistance to damage and bacterial invasion.

The cornified layer has the following functions:

- ❖ It prevents bacteria/germ invasion to the skin
- ❖ It provides resistance to damage
- ❖ It reduces excessive loss of water by evaporation

The granular layer
- ❖ The granular layer contains living cells that gradually give way to form the cornified layer
- ❖ It increases resistance to damage and germ invasion

The malpighian layer
This layer contains cells which divide actively to produce the epidermis
It contains a pigment called **melanin** which determines the skin colour. It gives the skin a dark colour.
Melanin also protects the skin against strong rays of the sun.
Albinos lack melanin and show high sensitivity to light

Exercise
1. Which skin layer contains dead cells?
2. In which way is lack of melanin a disadvantage?
3. Which 2 layers of the epidermis are most involved in protection the body from damage and invasion by bacteria?
4. Why is the skin considered a sense organ?

LESSON THREE

Dermis

This is the inner layer of the skin and it stores fats under it.

The dermis consists of the following parts-

i.	Capillaries	v.	Sweat duct
ii.	Sweat glands	vi.	Erector muscle
iii.	Hair follicle	vii.	Nerves
iv.	Sebaceous glands	**viii.**	Subcutaneous fat

Uses of some parts of the skin

- **Hair**:

For keeping the body warm: The hair keeps the body warm by trapping air around the skin which acts as an insulator to heat loss.

- **Sweat glands**:

They produce and store sweat

- **Pore**:

It lets out sweat from the body.

- **Capillaries**:

Capillaries transport food and oxygen to all parts of the skin.

- **Sebaceous glands**:

- Produce an oily substance called sebum which lubricates the skin
- Sebum also keeps the skin waterproof.

- **Erector muscle**:

It keeps the hair standing.

- **Nerves:**

They enable the skin to feel.

- **Subcutaneous fat:**

It contains fat cells which insulates our bodies.

Importance of fats in the body

- Fats produce energy in the body.
- Fats provide insulation to the body, i.e. it helps the body to keep warm.

Functions of human skin

The skin has different functions and these are:

- It removes sweat from the body
- It protects inner parts of the body
- It regulates body temperature
- It is a sense organ, used for feeling
- It manufactures vitamin D.

How the skin regulates body temperature

When it is hot, the skin regulates the body temperature through:

a) **Sweating**
Through sweating, heat is lost from the body by the process of evaporation. This leaves the body cool.

b) Vasodilation
Vasodilation is the widening of blood vessels allowing the blood flow nearer to the surface of the skin. As a result, more heat is lost from the body to the air by convection and radiation, leaving the body cool.

When it is too cold, it regulates the temperature by:

a) Producing goose pimples to prevent heat loss from the skin. When the skin produces goose pimples, hairs erect, reducing heat loss.

b) Shivering
Through shivering, heat is produced by the contracting muscles. This keeps the body warm.

c) Vasoconstriction
Vasoconstriction is the narrowing of blood vessels reducing blood flow to the skin surface.
Vasoconstriction reduces heat loss from the body.

Exercise

1. Explain why a P.7 girl sweats a lot when playing netball.
2. State three uses of the skin to people
3. In what way is shivering helpful when it is cold?

4. Name 2 substances, apart from water, which are eliminated from the body through sweating
5. Of what use is sebum in the human skin
6. In which layer of the skin is melanin found?
7. Differentiate between vasodilation and vasoconstriction

LESSON FOUR

Diseases of the human skin

Below are some of the diseases that affect the human skin and their causes:

Disease	Cause	Description
Ringworm	Fungi	Skin infection that shows as bumps or patches. Commonly found on scalp but may be on any other part of the skin. It is transmitted from one affected person to another by sharing clothes, combs or by contact.
Athletes foot	Fungi	Fungal infection, usually between toes. Causes itching, bad smell and pain. Can be contracted by walking barefooted or by coming in contact with item such as towels, nail cutter or socks used by person infected with the fungus that causes athletes foot. Wearing dump (not properly dried) socks increases danger of contracting athletes foot.
Dhobi itch	Fungi	Fungal infection, mainly affecting upper inner parts of the thigh area. It causes itching and in some cases inflammation (redness). Wearing dump (not properly dried) underwear increases danger of contracting Dhobi itch.
Scabies	Itch mite	The mites burrow and lay eggs inside the skin, causing itching and a rash
Leprosy	Bacteria	The disease leads to severe skin sores and nerve damage in the arms, legs, and skin areas around the body
Impetigo	Bacteria	Highly contagious skin infection that mainly affects infants and children. Usually appears as sores on the face, especially around a child's nose and mouth, and on hands and feet.
Measles	Virus	Measles can be controlled by giving children measles vaccine at 9 months. Measles symptoms include fever (high temperature, which may be > 40 °C), cough, runny nose, and inflamed eyes.
Chickenpox	Virus	Chickenpox causes an itchy rash with small, fluid-filled blisters (swellings). Chickenpox is highly contagious.

Disorders of the human skin

Skin disorders are conditions that hinder the proper functioning of the skin. These include the following:

Disorder	Description
Albinism	Condition where one lacks the skin pigment **melanin**
Burns	Burns are damages to body tissue caused by heat, too much sun, chemicals or electricity
Scalds	Injury caused by hot liquid or steam
Cuts	Injury which causes an opening to the skin
Corns	Hard, thickened areas of skin, mostly occurring on the feet
Herpes zoster	Painful skin rash. Caused by infection by virus.
Pimples	Swellings on the skin, mainly in the face. They happen when the sebaceous glands or oil glands, become clogged and infected, leading to swellings filled with pus
Bruises	A bruise is a skin injury that results in a discoloration (change of appearance) of the skin

Care of the human skin

There are different ways we can care fore our skin. To care for your skin, do the following:

- Bath regularly with clean water and soap
- Smear the body with Vaseline to moisten the skin
- Avoid sharing clothes, bath towels, basins and sponges
- Wash and iron clothes before wearing them
- Eat a balanced diet
- Avoid playing with sharp cutting materials
- Do regular physical exercises

Exercise

1. Why are we encouraged to bathe regularly with soap?
2. Give any one danger of sharing clothes and bathing sponges.
3. How does eating a balanced diet keep our skin healthy?
4. Why do we smear our skin with Vaseline after bathing?
5. State the use of a towel when promoting personal hygiene.
6. How can you protect your skin from skin diseases?

LESSON FIVE

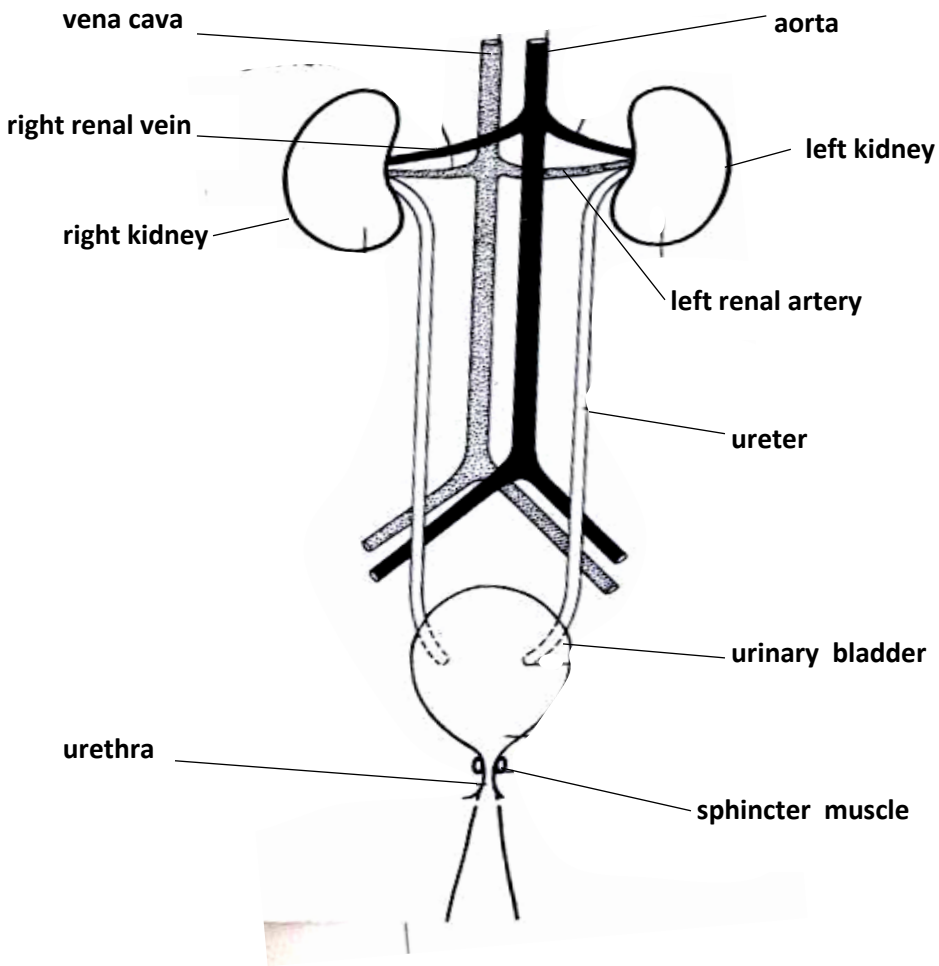
THE KIDNEYS

The kidney just like the human skin is a major organ that supports the excretion.

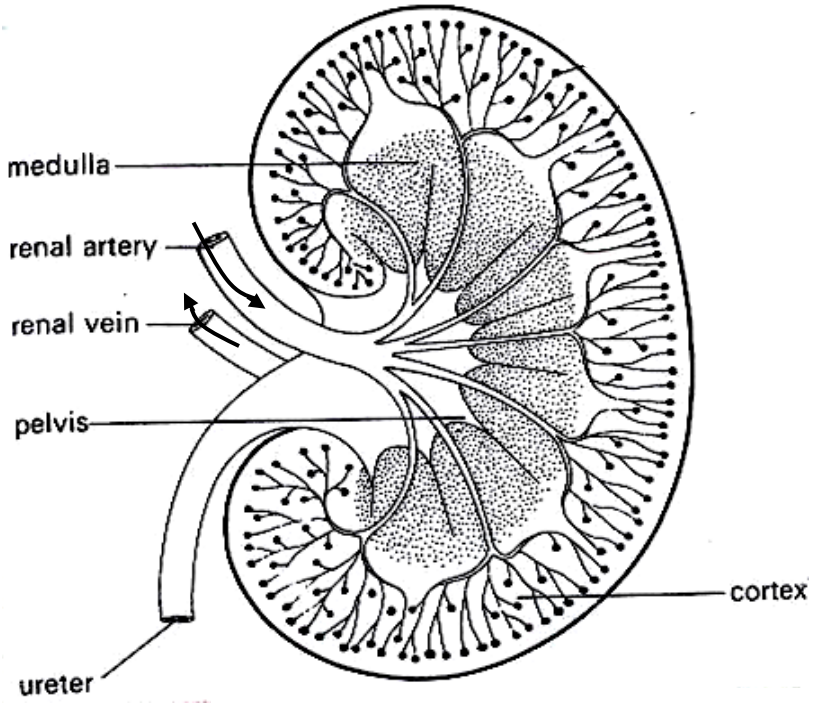
In humans, kidneys are in form of two brownish bean shaped organs at the back of the abdominal cavity.

Kidneys belong to both excretory and urinary systems.

THE KIDNEYS IN THE URINARY SYSTEM



STRUCTURE OF THE KIDNEY



LESSON SIX

FUNCTION OF THE KIDNEYS

- They filter blood

  During filtration of blood, urine components are removed from blood by the glomeruli. The glomeruli are found in the cortex.

- The kidneys remove nitrogenous compounds from blood

- They regulate the amount of water and mineral salts in blood.

Examples of nitrogenous compounds in blood

- Urea
- Uric acid.

FUNCTIONS OF THE DIFFERENT PARTS OF THE KIDNEY

Different parts of the kidneys perform different functions as shown below:

- **Cortex**
  It is where filtration of blood takes place.
- **Medulla**
  It is where re-absorption of water, salt and other substances takes place**.**
  The process of re-absorption of water from urine is known as **osmoregulation.**
- **Pyramid**
  It is a hole through which urine from the cortex pours into pelvis.
- **Pelvis**
  It receives urine from the cortex before it goes down to the urinary bladder.
- **Ureter**
  It is a passage of urine from pelvis to the urinary bladder.
- **Renal artery**
  It carries oxygenated blood from the aorta to the kidney.
- **Renal Vein**
  It carries deoxygenated blood from the kidney to the vena cava.
- **Urethra**
  It is a tube through which urine is passed out of the body.
- **Sphincter muscle**
  They control the flow of urine out of the urinary bladder.
- **Urinary bladder**
  It stores urine before it is passed out of the body.

Ways of keeping the kidney in a good working condition

Our kidneys can be kept healthy and in good condition through the following ways:

- Doing regular physical exercises
- Avoid holding back urine for a long time
- Drinking enough boiled water
- Consuming a balanced diet
- Avoiding excessive consumption of alcohol
- Avoiding excessive salt consumption.

Why people urinate more frequently on cold days than a hot days

During cold days, the skin reduces the rate of removing excess water and mineral salts from the body leaving it to kidneys do more of this.

Note:

1. Kidneys keep a constant amount of water in the body. This is why we urinate more regularly when we drink a lot of fluids.
2. The left kidney is located slightly higher than the right kidney because the right kidney is found under the liver which is the largest internal organ unlike the left kidney which is under the spleen.
3. We urinate more frequently on cold days because the skin does not remove much of the excess water, requiring the kidneys to do more.

DISEASES OF THE KIDNEY AND THE URINARY SYSTEM

Disease	Description
Kidney failure	When the kidney's stop performing their functions as required
Bilharziasis	Due to parasitic worms (schistosomes) spread by snails
Nephritis	Infection of the kidneys which can lead to kidney failure
Cancer of the kidney	Uncontrolled multiplication (growth) of kidney cells

Kidney stones

- This is a disorder of the kidney
- Kidney stones are hard deposits of minerals and acid salts that stick together in concentrated urine, causing pain during passing of urine

LESSON SEVEN

THE LUNGS AS EXCRETORY ORGANS

The lungs are both excretory and respiratory organs.

They are called respiratory organs because they allow oxygen into the body used for respiration.

They are regarded as excretory organs because they remove carbon dioxide and water vapour from the body.

In the lungs is where gaseous exchange takes place (specifically in the air sacs).

REVISE YOUR P6 NOTES ON LUNGS AS RESPIRATORY ORGANS

Diseases of the Lungs

i. Diphtheria
ii. Lung cancer
iii. Asthma
iv. Pneumonia
v. Bronchitis
vi. Emphysema
vii. Pleurisy
viii. Tuberculosis
ix. Whooping cough
x. Haemophilus
xi. Influenza
xii. Laryngitis

Use the internet to search for the descriptions of each of these diseases

Disorders of the Lungs

- Choking
- Hiccups
- Yawning

THE LIVER

The liver is a large reddish-brown organ found below the diaphragm. It is the largest internal body organ.

The liver is supplied with oxygenated blood by the hepatic artery. It receives blood rich in digested food from the ileum by the hepatic portal vein.

Functions of the liver

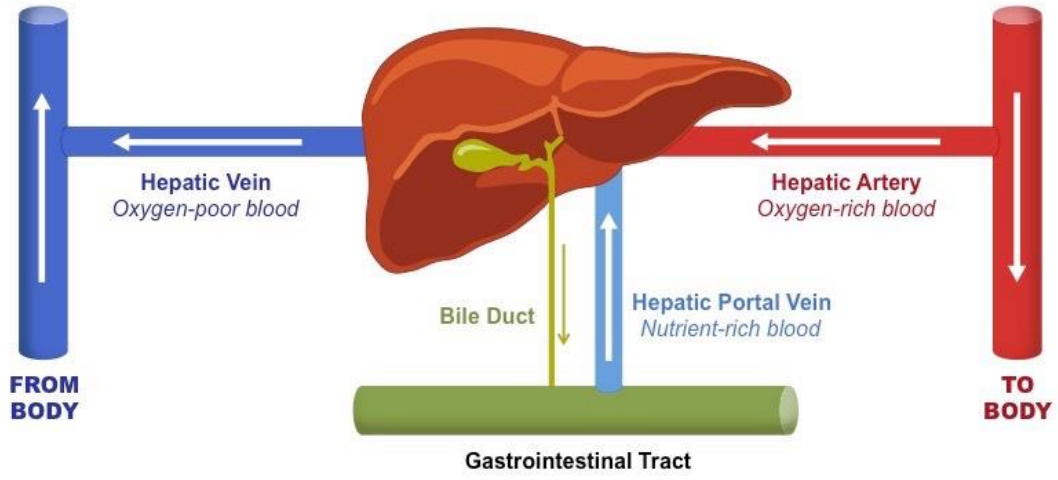
- It regulates blood sugars
- It produces bile. Bile is useful in emulsification and absorption of fats
- Stores iron
- It reduces on excess amino acids in the body
- It converts poisonous compounds into harmless substances
- It stores vitamin A, D and B_{12}
- It produces heat.

How the liver regulates blood sugars.

- The liver controls sugar levels by the help of insulin.
- Insulin is produced by the pancreas. It stimulates the liver to remove excess glucose from blood, which is converted into glycogen for storage.

Circulation to and from the liver

a) **Hepatic artery**: It supplies oxygenated blood to the liver.
b) **Hepatic portal vein**: It supplies blood with nutrients obtained from digestion of food from the stomach and intestines to the liver.
c) **Hepatic vein**: Carries deoxygenated blood from the liver to the vena cava.



Diseases of the liver

Disease	Description
Hepatitis	Injury liver commonly arising from virus infection, toxins, drugs or alcohol abuse
Cirrhosis	Changes in live appearance and function commonly due to hepatitis or alcohol abuse
Abscesses	Development of swellings filled with pus
Liver cancer	Abnormal multiplication (growth) of liver cells

Care for the liver

1. Avoid taking too much alcohol
2. Eat a balanced diet
3. Perform regular physical exercises

Exercise

1. How are the following important in our bodies?
    a) Kidneys c) Liver
    b) Lungs
2. Apart from the excretory system, state one other system each of the following organs belong to.

i) The skin ii) The liver iii) The lungs iv) The kidneys

3. Complete the table below

Excreted substance	Material excreted	Excreting organ
Carbon dioxide		
	Urine	
		Skin
	Sweat	

4. Why should we avoid sharing of clothes?
5. State any one disease for each of the organs below that may result from excessive consumption of alcohol:
    a) Liver b) Kidneys
6. State any two ways of keeping the following in good working conditions
    a) Skin b) Lungs c) Liver
7. Why is the skin referred to as an excretory organ?
8. Write down any two diseases of the following:
    a) Skin b) Lungs

9. How is the urinary bladder different from gall bladder?
10. Give one adaption of the cortex to its function
11. State one difference between the air we breathe in and the air we breathe out.

TOPICAL TEST: <u>EXCRETORY SYSTEM</u>

1. Name the excretory organ that removes lactic acid from the body
2. State one way of caring for the liver.
3. Give any one function of the skin
4. Why are the lungs grouped under excretory system?
5. Name any one disease that affects the kidney.
6. Give the difference between a burn and a scald.
7. How is melanin useful in the body?
8. How is the gall bladder different from the urinary bladder?
9. Name the outermost later of the skin.

<u>SECTION B</u>

10. a) State two functions of the liver in the body.
    b) Name two diseases that attack the liver
11. Fill in the table below correctly

Disease	**Cause**	**Organ**
Tuberculosis	----------	Lungs
----------	Itch mite	Skin
Bilharziasis	----------	Kidney
Lung cancer	**Smoking**	----------

12. a) What happens to the following when we breathe in;
    i) Diaphragm
    ii) Lungs
    b) How is cilia useful in the nose?
    c) Name one disorder of the respiratory system.