PRIMARY SCIENCE

TOPICAL REVISION

THE HUMAN BODY

SUMMARIZED SCIENCE REVISION NOTES
THE HUMAN BODY

TEETH
There are four types of teeth:

a) Incisors
b) Canines
c) Premolars
d) Molars

INCISORS
• Found in the front
• They are chisel-like.
• Eight in number i.e. four in the upper jaw and four in the lower jaw.
• Have one root
• Used for biting and cutting

CANINES
• They are sharp and pointed
• Four in number i.e. two in the lower jaw and two in the upper jaw
• Have one root
• Used for tearing and gripping

PREMOLARS
• They are broad with ridges on top
- Eight in number i.e. four in the upper jaw and four in the lower jaw
- Used for crushing and chewing food
- Have two roots

**MOLARS**

- Broad with ridges on top
- Twelve in number i.e. six in the upper jaw and six in the lower jaw
- Have three roots
- Used for grinding food

**SHEDDING OF TEETH**

- Shedding is the falling of teeth when they become loose.
- At the age of six months, teeth start to appear- Incisors first, followed by canines, premolars and lastly molars.
- By two years, a child has twenty teeth (deciduous/milk teeth)
- The first set of teeth to grow are called milk teeth/temporary teeth/deciduous teeth.
- Milk teeth are usually 20 in total comprising of incisors, canines and premolars.
- By the age of 6 years, milk teeth start shedding (falling out)

**N.B. Molars are not part of the deciduous teeth.**

- When milk teeth shed, the permanent set of teeth grows.
- An adult has 32 permanent teeth.
- The last four molars to grow are called wisdom teeth.
• When permanent teeth come out, they are replaced with artificial teeth also called false teeth or dentures.

**BREATHING SYSTEM**

• Breathing is the process of taking air in and out of our bodies.
• Breathing in is called inhalation while breathing out is called exhalation.
• We breathe in (inhale) oxygen
• We breathe out (exhale) carbon dioxide
• Oxygen is used to break down food through a process called respiration to release energy needed by the body.
• Carbon dioxide is a waste gas that is harmful.

**PARTS OF THE BREATHING SYSTEM**

a) Nose  
b) Trachea (windpipe)  
c) Bronchus  
d) Bronchioles  
e) Air sacs/Alveoli  
f) Diaphragm  
g) Lungs

**MAIN PARTS FUNCTIONS**
1. Nose
   - Consists of two nostrils
   - Inside the nose there are tiny hairs and mucus that clean the air.
   - The tiny hairs and mucus:
     a) trap dust and germs
     b) moisten the air
     c) warm the air

     - Air from the atmosphere enters the lungs through the nose.

   *N.B.*  *Air breathed through the mouth is cold, dry and dusty with germs. Hence, it is NOT advisable to breathe through the mouth.*

2. Trachea
   - Also called windpipe.
   - Always kept open by hard c-shaped rings known as *cartilage*.
   - Has tiny hairs and mucus that trap dust and germs.
3. Bronchus

- Each bronchus divides into many tubes called bronchioles.
- Bronchioles divide into many tiny tubes called air sacs.
- There are millions of air sacs in the lungs.
- Another name for air sacs is alveoli.
- Exchange of gases takes place in the air sacs i.e. oxygen gets into the blood and carbon dioxide is passed out of the blood then breathed out.
- Air sacs have blood capillaries that help in the exchange of gases.

![Diagram of respiratory system]

**LUNGS**

There are two lungs – left and right.

Inside the lungs, there is a bronchus, bronchioles and air sacs.

**Diaphragm** – sheet of muscle that separates the chest and the abdomen.

**Ribs** – form the chest cavity that protects the lungs.

**Breathing in (inhalation)**

- Oxygen gets into the lungs – 21%.
- Lungs expand – get inflated.
- Ribs move upwards and outwards. Hence, the volume of the chest cavity increases.
- Diaphragm moves downwards i.e. flattens.

**Breathing out (exhalation)**

- Lungs contract i.e. deflate.
- Ribs move inwards and downwards.
- Diaphragm moves upwards – Dome shape.
- Chest volume decreases.
- Carbon dioxide is forced out – (4%).
Model of the breathing system

Represents
1. Balloons – Lungs
2. Drinking straw – Trachea
3. Rubber sheet – Diaphragm
4. Bottle – Chest cavity
THE DIGESTIVE SYSTEM

DIGESTION:-

- It is the process of breaking down food into small particles that can be absorbed into the bloodstream.
- Digestion starts in the mouth and ends in the small intestine.
- Digestion of food takes place in the alimentary canal / gut.
- The gut is a long tube that runs from the mouth to the anus.

PARTS OF THE DIGESTIVE SYSTEM

N.B. The liver, gall bladder and pancreas are NOT parts of the alimentary canal but they help in the digestion of food.

MOUTH

- It is where digestion starts.
- Starch is the food that is digested in the mouth.
- Saliva is the first digestive juice produced in the mouth.
• Saliva produced by salivary glands digests starch.
• Teeth break down food into small pieces by chewing.
• Tongue rolls down food into small round balls called boluses and pushes them to the back of the mouth for swallowing.
• Saliva makes food moist, slippery and easy to swallow.

OESOPHAGUS

• Also called gullet or food pipe.
• Connects the mouth and the stomach.
• Food moves in a wave-like manner down to the stomach.
• The movement of the food from the mouth to the stomach is called peristalsis.

STOMACH

• Food stays in the stomach for 3 – 4 hours.
• Rhythmic movements of stomach walls mix food with digestive juices to form chime.
• Proteins are digested in the stomach.
• Two digestive juices produced in the stomach are:
  a) Gastric juice – To digest proteins
  b) Hydrochloric acid – To kill germs

Absorption of glucose, alcohol, drugs and medicines begins in the stomach.

Duodenum

• Upper part of the small intestine
• Fats and oils are digested
• Pancreatic juice, insulin and bile juice are found in the duodenum

Liver – Produces bile juice that is stored in the gall bladder.

Pancreas – Produces pancreatic juice and insulin.

Insulin controls the amount of sugar in the body.

Small intestine

• Also called ileum
• Walls of the small intestine produce the last digestive juice called intestinal juice.
• Intestinal juice completes digestion
• Absorption of digested food takes place in the small intestine with the help of finger-like projections called villi.

**DIAGRAM OF VILLI**

*Adaptation of ileum to absorb a lot of food*

• Very long about 7m
• Heavily coiled to slow down the movement of food

**Large intestine**

Water and mineral salts are absorbed in the large intestine also known as the colon

**Appendix**

This stores impurities in the food e.g. stones, soil, metals, plastics, etc

**Rectum**

This stores the undigested solid waste in form of faeces before being released outside the body through the anus.

*N.B. Egestion is the process of removing the solid waste outside the body.*
THE HUMAN REPRODUCTIVE SYSTEM

FEMALE REPRODUCTIVE SYSTEM

PARTS

Vagina or Birth canal
Uterus / womb
Cervix
Ovary
Oviduct or the fallopian tube

DIAGRAM OF THE FEMALE REPRODUCTIVE SYSTEM
FUNCTIONS OF THE PARTS

**Ovary**
There are two ovaries in the body.
Ovaries release eggs (ova) after every 28 days.
They alternate in releasing eggs.
Ovaries also produce hormones.
Ova is the female sex cell.

**Uterus/womb**
It is where a fertilized egg develops into a baby.
The fertilized egg is called a zygote.
The zygote develops into an embryo, then foetus, finally into a baby.

**Vagina/Birth canal**
It’s the tube through which the baby passes during birth.
Male sex cells (sperms) are deposited here during sexual intercourse.

**Cervix**
Made up of muscles that open the uterus.
Relaxes during birth to allow the baby to be born.

**Oviduct /fallopian tube**
Allows the egg to move from the ovary to the uterus.
Fertilization of the ova by the sperm takes place in the oviduct.

MALE REPRODUCTIVE SYSTEM

**PARTS**
Testis
Sperm duct / Vas deferens
Glands
Urethra
Penis
Scrotum
Epididymis

*DIAGRAM TO SHOW PARTS OF THE MALE REPRODUCTIVE SYSTEM*

**Functions:**

**Testes**
- Produce sperms
  Sperms are male reproductive sex cells

**Sperm duct/Vas deferens**
It's a tube that allows sperms to pass from the testes to the urethra

**Glands**
- Produce fluids in which sperms swim through.
  The mixture of the fluids and sperms is called semen.

**Urethra**
- The tube that allows/carries urine and sperms out of the body.
  It opens to the outside of the body.

**Penis**
- This deposits sperms into the vagina during sexual intercourse.

**Scrotum**
- Encloses the testes.
  Protects the testes.

**Epididymis**
- Stores sperms.
ADOLESCENCE

- Adolescence is the stage between childhood and adulthood.
- The initial stages of adolescence is known as puberty.
- It occurs between 10 and 13 years in girls and between 12 and 15 in boys.
- Girls and boys undergo many changes during adolescence, both physical & emotional
- A boy/girl undergoing these changes is called an adolescent.
- Physical changes – visible
- Emotional changes – feelings

**Physical changes**

<table>
<thead>
<tr>
<th>In girls</th>
<th>In boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in weight and height</td>
<td>Increase in weight and height</td>
</tr>
<tr>
<td>Hips broaden</td>
<td>Shoulders and chest broaden</td>
</tr>
<tr>
<td>Hair grows under the armpits and on the pubic area</td>
<td>Beards grow. Hair also grows on the chest, cheeks and pubic area and under the armpits.</td>
</tr>
<tr>
<td>The menstrual flow begins</td>
<td>Start experiencing wet dreams</td>
</tr>
<tr>
<td>Pimples on the face</td>
<td>Pimples on the face</td>
</tr>
<tr>
<td>Breasts enlarge</td>
<td>Voice deepens and Adam’s apple enlarges</td>
</tr>
<tr>
<td>Reproductive organs enlarge</td>
<td>Reproductive organs enlarge</td>
</tr>
<tr>
<td>Release of ova once the ovaries mature</td>
<td>Release of sperms since the testes mature</td>
</tr>
<tr>
<td>Face of most of the girls become smooth/much more hair grows on the head and appears more silky and shiny</td>
<td></td>
</tr>
</tbody>
</table>

**EMOTIONAL CHANGES IN BOTH GIRLS AND BOYS**

**Moods:** Hormones lead to mood changes that an adolescent cannot explain.
This might bring misunderstanding between the adolescent and other
people. They become unreasonably aggressive, angry, easily disappointed etc.

**Shyness**: Girls feel shy about their enlarging breasts or pimples on the face.

Boys are shy about their cracking voice.

**Embarrassment**: Girls are embarrassed about their menstrual flow. Boys about their wet dreams

**Unhappy**: Boys and girls feel unhappy with the size and shape of their bodies.

**Worry**: Both tend to worry about their appearance, especially when pimples develop on the face, a condition known as Acne.

Girls who start their menstrual flow late or have small breasts tend to worry about themselves. They may feel abnormal.

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**REPRODUCTION IN HUMAN BEINGS**

Reproduction takes place when an adult male and female come together and have sexual intercourse.

**Ovulation**

In females, the ovaries produce ova alternately. An ovum is produced after every 28 days during ovulation. The ovum moves towards the uterus through the fallopian tube (oviduct).

**Fertilization**

During sexual intercourse (coitus), sperms are introduced in the vagina by the male penis. They swim up the uterus using their tails. Many sperms surround the ovum but only one unites with the ovum. The union of the sperm and ovum is referred to as fertilization. The woman becomes pregnant and this is called conception. The fertilized ovum is called a zygote.

**The Male**

He produces reproductive (sex) cells called sperms.

Sperm production starts during adolescence at the age of 13 to 15 although puberty starts much earlier at 10 or 11 years.
Testes produce sperms and store them in the epididymis.

**Structure of the sperm**
The sperm has three main parts

i) The head

ii) Nucleus

iii) The tail

*An illustration of the sperm*

![Sperm illustration](image)

**Functions of the parts of the sperm**

i) The head – Has chemicals that enables the sperm to penetrate the ovum

ii) The nucleus – Fuses with the nucleus in the ovum during fertilisation to form the zygote.

iii) The tail – Propels the sperm and makes it move forward.

**Discharge of semen**
Semen is discharged from the male’s body through

i) Sexual intercourse – also called copulation

ii) Wet dreams – This is the discharge of sperms during sleep.

**The Female**
She produces reproductive (sex) cells called ova (singular – ovum)
Puberty in girls starts much earlier than in boys. It begins between the ages of 9 and 12 but greater changes occur at between the ages of 11 and 14.

The ovary is the main reproductive organ.

**THE OVUM**

- It is the female reproductive cell.
- It has two main parts
  1. The yolk
  2. The nucleus

**Functions of the parts of an ovum**

<table>
<thead>
<tr>
<th>Part</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yolk</td>
<td>Provides nourishment</td>
</tr>
<tr>
<td>Nucleus</td>
<td>It fuses with the nuclei in the male gametes to form a zygote during fertilization.</td>
</tr>
</tbody>
</table>

**Egg production and ovulation**

- Ovulation is the release of a mature egg by the ovary.
- Ovulation occurs after every 28 days (4 weeks).
- Ovaries alternate during ovulation.
- Each ovary takes 56 days to ovulate.
- Ovulation is controlled by chemicals in the body called hormones.
After ovulation, the egg takes about 3-6 days as it moves down the fallopian tube.

An ovum has a lifespan of about 2 days (48 hours).

Fertilization
- It is fusion of the male and female gametes to form a zygote.
  - Fertilisation occurs in the upper part of the fallopian tube.
  - During copulation, the penis deposits sperms in the upper part of the vagina.
  - Their tails propel the sperm to the fallopian tube.

FOETAL DEVELOPMENT
1. Zygote: Once an ovum is fertilized, it divides repeatedly as it passes through the oviduct to the uterus. At this stage, it is called a zygote.
2. Embryo: When the zygote reaches the uterus, it attaches itself on the walls of the uterus using finger-like structures.
   The process of attachment is called implantation. At this stage, it is known as an embryo.
3. Foetus: After about six months of growth, the embryo develops features such as limbs, ears and nose. It continues to develop and becomes a baby.

Summary of developmental stages and processes
Zygote → embryo → foetus → baby
Thickening of uterine wall → ovulation → fertilisation wall → implantation

**PLACENTA**

This is the disc-shaped organ that joins the embryo and uterus. It has many blood capillaries but there is no direct blood flow between the mother and the foetus.

**Functions of the placenta**

1. Exchange of oxygen and carbon dioxide.
2. Facilitates transfer of food nutrients
3. Facilitates transfer of waste products.

**UMBILICAL CORD**
This is the tube that connects the embryo to the placenta. It has an artery and a vein.
The artery carries food nutrients and oxygen to the foetus.
The vein passes out waste products and carbon dioxide.

*Illustration on how to cut the umbilical cord*

![Illustration of umbilical cord cutting]

**AMNIOTIC FLUID**

This is the fluid that surrounds a foetus. It is enclosed in a bag called Amnion or Amniotic bag/sac.

**Functions of the Amniotic Fluid**

1. It acts as a shock absorber.
2. It prevents the foetus from drying up and reduces friction during movement.
3. It protects the foetus from physical injury.

**SIGNS OF PREGNANCY**

1. Menstruation stops.
2. Breasts become large, tender and very sensitive.
3. Morning sickness may occur. A woman feels nausea and vomits in the morning.
4. At a later stage, the abdomen enlarges.
5. Movements of the foetus can be felt after 4 to 5 months.

PROCESS OF GIVING BIRTH

1. The gestation period is the period between conception and birth.
2. In human beings it is about 40 weeks (9 months)

The process of birth

1. Labour pains begin. They are brought about by contractions of the muscles of the uterus.
2. The amnion bursts, releasing amniotic fluid that lubricates the birth canal.
3. The cervix widens and opens.
4. The baby is pushed out through the vagina, head first.
5. The umbilical cord is tied twice and cut.
6. The placenta detaches itself from the uterine wall and comes out as the afterbirth.

N.B.

1. **Stump:** Part of the umbilical cord that is tied and cut, then falls after some time.
2. **Navel:** Part of the umbilical cord that remains and heals up.
3. **Afterbirth:** The remaining part of the umbilical cord and placenta that are expelled.

THE CIRCULATORY SYSTEM

The flow of blood from the heart to the body organs and back to the heart is called blood circulation.

MAIN PARTS OF THE CIRCULATORY SYSTEM

1. The heart – It is the muscular organ that pumps blood to all parts of the body.
2. Blood – It is the fluid that helps in the transportation of a substance in the body.
3. Blood vessels are tubes through which blood circulates or flows through the body.

**BLOOD COMPONENTS AND THEIR FUNCTIONS**

The four main components of blood are:

a) Plasma  

b) Red blood cells  

c) White blood cells  

d) Platelets

**Plasma**

It is the liquid part that forms the main part of the blood.

It contains dissolved substances e.g. digested food, salts, amino acids and glucose.

**Functions**

Transportation of:

a) Digested food from the ileum to all parts of the body.  
b) Oxygen from the lungs to all body tissues.  
c) Carbon dioxide from body cells to the lungs to be expelled.  
d) Waste products to the organs of excretion.  
e) Heat from the liver to all parts of the body.  
f) Hormones from the glands to where they are needed.  
g) Other blood components e.g. white blood cells, red blood cells and platelets to where they are needed

**Red blood cells**

- They are many in number.  
- Contain haemoglobin (Red colouring matter).  
- Biconcave in shape.  
- Have nucleus which disappears on maturity.  
- Produced in red bone marrow  
- Destroyed (broken) in the liver/spleen.
- Red blood cells carry oxygen from the lungs to the body tissues.
- Oxygen combines with haemoglobin to form oxyhaemoglobin – oxygenated blood, which is bright red in colour (dark red)

c) White blood cells

- Larger than red blood cells
- Few in number compared to red blood cells i.e. ratio of white to red blood cells is 1:600
- Have no definite shape
- Have a nucleus at the centre
- Produced in the yellow bone marrow and the lymph glands

N.B. White blood cells fight and kill germs by engulfing them.

d) Platelets

Help the blood to clot when injured.

Types of blood vessels and their functions

These are:-

a) Arteries

b) Veins

c) Capillaries

ARTERIES

- The main artery is the aorta.
- Arteries carry blood away from the heart to other parts of the body.
- All arteries carry oxygenated blood except the pulmonary artery
- Have thick walls
- Have a narrow lumen (space)
- Have no valves since the blood flows under high pressure.
- Located deep in the body.
- Blood comes out in spurts when cut, due to high pressure of the flow of blood.
- Blood flows in waves felt as a pulse.
- Pulse rate is the number of waves felt per minute.

**Diagram of an artery**

![Diagram of an artery]

**VEINS**

- The main vein is the vena cava.
- Veins have thin walls with a wider lumen (space)
- Blood flows at a low pressure, hence veins have valves to prevent the back-flow of blood.
- Carry blood from other parts of the body to the heart.
- Carry deoxygenated blood except the pulmonary vein.
- Located close to the surface of the body.
- Have no pulse.
- Blood flows steadily when cut.

**Diagram of a vein**

![Diagram of a vein]
Capillaries

- Smallest blood vessels
- Main function is to reunite veins and arteries
- Have thin single cell walls
- Have no valves
- No pressure at all in the flow of blood.
- Excretory substances and digested food diffuse in them.

Diagram of capillary

THE HEART

Structure and functions of the heart

- The heart is made up of four chambers.
- Two chambers on the upper side called auricles – left and right auricles.
- Two chambers on the lower side called ventricles – right and left ventricles.

- All the chambers are sub-divided by valves that prevent the back-flow of blood.
- Ventricles are more muscular (have thicker) walls because they pump blood a longer distance.
- The wall of the left ventricle is thicker than the wall of the right ventricle because it pumps blood to all the body organs under high pressure.

**Circulation of blood**
- The vena cava brings deoxygenated blood from all body parts to the right auricle then the right ventricle.
- Right ventricle pumps blood to the lungs through the pulmonary artery.
- Oxygenated blood from the lungs enters the left auricle through the pulmonary vein then into the left ventricle.
- The thicker left ventricle pumps blood through the aorta to all body parts.

Other simplified presentations of the heart.
THE EXCRETORY SYSTEM

**Excretion** is the removal of waste products from the body of a living thing. Main excretory organs and their products:

<table>
<thead>
<tr>
<th>Organ</th>
<th>Waste product produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>Sweat (excess water and excess salts), lactic acid</td>
</tr>
<tr>
<td>Lungs</td>
<td>Carbon dioxide and water (vapour form)</td>
</tr>
<tr>
<td>Kidneys</td>
<td>Urine (Excess water, salts and urea), uric acid</td>
</tr>
</tbody>
</table>

**THE SKIN**

1. It is the largest organ in the body.
2. The skin has two main layers i.e. epidermis (outer layer) and the dermis (inner layer).
3. The dermis contains the sweat glands, blood capillaries, oil glands, sweat ducts and a fatty layer.
4. The skin excretes sweat which contains excess water and salts.

**DIAGRAM OF SKIN**

![Diagram of Skin](image-url)
Importance of sweating
- It gets rid of excess water, excess salts and lactic acid.
- It cools down the body.

THE LUNGS
1. We breathe in air through the nose where it is cleaned, moistened and warmed.
2. The main waste product excreted by the lungs is carbon dioxide. It also excretes water in form of water vapour.

DIAGRAM OF THE LUNGS

N.B. The main waste is carbon dioxide.

THE KIDNEYS
1. A normal person has two kidneys which are bean-shaped and red brown in colour.
2. The left kidney is located slightly lower than the right one.
3. The kidneys have two blood vessels. The renal vein and the renal artery.
4. The renal vein brings blood to the kidney. The blood is filtered and the waste products (urea, excess water and salts) are removed and taken to the bladder.
5. The renal artery carries the clean blood away from the kidney.
6. The urine is taken to the bladder through the ureter for storage.
7. From the bladder, the urine is taken out of the body through the urethra.

N.B. In males the urethra is both an excretory and reproductive organ but in females, it is only an excretory organ.

The waste from the kidney is called urine.
A human being can survive on one kidney.

**Signs of ill health using urine**

i) Blood in urine
ii) Pain during urinating
iii) Urine leakage
iv) Burning sensation and pain during urinating

N.B. Passing out large volumes of urine is not a health problem.